

**IDENTIFYING ORGANISATIONAL AND BEHAVIOURAL FACTORS
THAT INFLUENCE KNOWLEDGE RETENTION**

by

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DECLARATION

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I hereby declare that “**Identifying organisational and behavioural factors that influence knowledge retention**” is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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DATE

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ABSTRACT

The wave of knowledge loss that organisations are facing on account of layoffs, retirements, staff turnover and mergers gave rise to this research. The main research aim was to identify the organisational and behavioural factors that could enhance or impede tacit knowledge retention. A multidisciplinary approach focusing on knowledge management, organisational behaviour and organisational development was followed.

The nature of knowledge in organisations was explored by following a contextualised theory-building process, focusing on epistemology, and the appearance and application of knowledge. Knowledge in the context of this research is the knowledge and experience that reside in the minds of people. It is not easily documented, and is referred to as tacit knowing.

A theoretical model was developed that revealed the factors that could influence tacit knowledge retention. The model focused on human input factors taking into account knowledge loss risks, strategic risks and behavioural threats that could cause knowledge loss.

The main purpose of the empirical research was to operationalise the theoretically derived knowledge retention constructs, determine statistically the enhancing and impeding factors that influence knowledge retention and develop a structural equation model to verify the theoretical model. A quantitative empirical research paradigm using the survey method was followed. A questionnaire was compiled, and a survey conducted in the water supply industry. The principal component factor analysis postulated nine factors. A composite factor, knowledge retention, as the dependent variable was compiled. The questionnaire was found to be reliable, with a Cronbach alpha coefficient of .975.

A structural equation model development strategy produced a new best-fitting knowledge retention model based on the new constructs postulated in the factor analysis. The model indicated that there is a direct causal relationship between strategy implementation and knowledge retention and between knowledge behaviours and knowledge retention. The regression analysis showed that most of the intercorrelations are significant, thus confirming the theory.

The research contributed towards a comprehensive understanding of the factors that influence tacit knowledge retention. The questionnaire and the new knowledge retention model could assist organisations in determining the extent to which knowledge is retained and where to focus in developing and implementing a knowledge retention strategy. The study encourages practitioners to take cognisance of the fact that organisations are different and that the enhancing and impeding factors of knowledge retention are to be considered.

KEY TERMS

Knowledge loss; knowledge retention; knowledge attrition; strategic knowledge loss risks; knowledge behaviours; tacit knowledge; knowledge epistemology; knowledge construction processes; cognitive knowledge processes; principal component factor analysis; structural equation modelling; organisational behaviour; knowledge management; organisational development

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CHAPTER 1

OVERVIEW OF THE RESEARCH

1.1 INTRODUCTION

Knowledge loss has become a critical factor that could make organisations vulnerable in difficult economic times as well as during thriving economic growth periods when competition is rife. All organisations face the risk of losing knowledge, which could affect their sustained competitive advantage. In this context it is necessary to understand the factors that gave rise to this research, the consequences of losing knowledge and the significance of retaining knowledge in organisations.

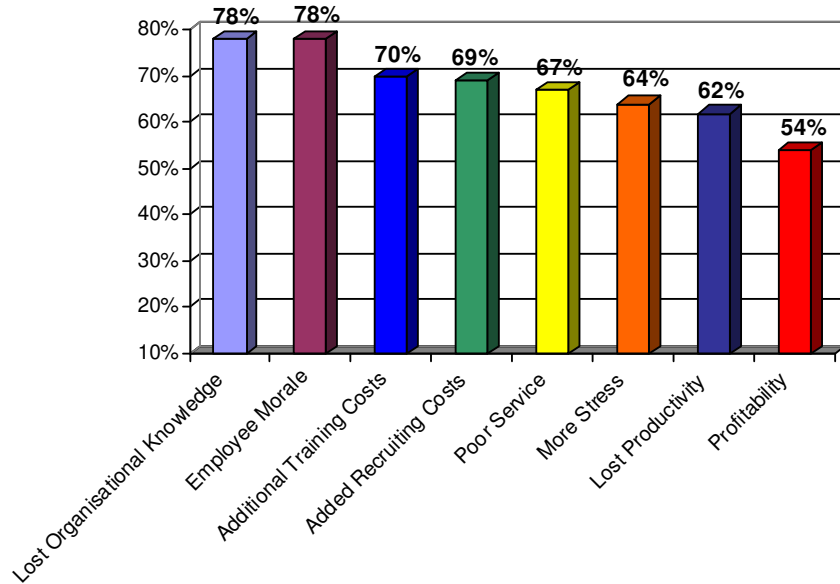
1.2 BACKGROUND TO AND RATIONALE FOR THE STUDY

There has been growing concern in the business and organisational sector that organisational knowledge can be lost through the exit of employees. According to DeLong and Davenport (2003:51), unprecedented knowledge retention problems are created in many industries through **changing workforce demographics** such as an aging workforce, more competitive recruiting and faster turnover in younger people. They refer to the problem as “operational and institutional amnesia imperil”. The most significant business and societal trend for the next decades is considered by many to be the rapidly aging workforce (Foster 2005:28; Nicholson 2008:14). According to Juliano (2004:82), in the next five to ten years, the utility industry will face its most severe workforce problem since World War II, namely a massive loss of job-specific and plant knowledge through the retirement of a large portion of the current utility workforce. Brown and Galli-Debicella (2009:11) contend that fewer young workers are entering the skilled trades, and many companies only realise the importance of tacit knowledge in their employees after they have left the company.

In a study conducted in the USA by TalentKeepers at 240 organisations, it was found that 78% reported that the main impact of turnover is lost knowledge and lower employee morale (fig 1.1) (Frank, Finnegan & Taylor 2004:18).

FIGURE 1.1

ORGANISATIONAL FACTORS MOST IMPACTED BY TURNOVER



Source: Frank et al (2004:18)

Ntuli (2007:1) reported that job-hopping in South Africa is also exerting pressure on organisations' pay budgets. According to Martin Westcott, managing director of P-E Corporate Services (in Ntuli 2007:1), the cost of replacing employees could amount to between 35 and 40% of the annual remuneration package. Overall, job-hopping could cost South Africa more than R25 billion per annum, based on figures from the SA Reserve Bank, which showed that employee compensation costs companies more than R600 billion a year in total. The costs of replacing employees refer to separation or severance pay, recruiting replacements, developing their skills and experience and factoring in a loss of productivity during that period (Ntuli 2007:1). These costs do not even take into consideration the indirect costs of lost knowledge such as recreating knowledge for new projects. DeLong (2004:11), Doyle (2004:45) and Salopek (2005:23) refer to the startling fact that most of the knowledge and experience of landing astronauts on the moon was lost in the 1990s on account of factors such as retirements, cost cutting and downsizing. NASA has had other priorities over the past 30 years, but when government officials refer to returning to the moon, the \$50 billion plus price tag placed on returning to the moon, "ignores the fact that NASA has forgotten how they did it in the first

place". This means that NASA will be starting from scratch at an exorbitant cost, having lost the "capacity to replicate one of the greatest achievements in the history of mankind". Also, having lost supporting knowledge and technologies, should NASA engineers, say, be able to build and launch a Saturn 5 rocket, they have lost the knowledge of how to fly it (DeLong 2004:12). This example explains the hidden costs of lost knowledge that organisations do not always recognise.

Additional factors that could cause knowledge loss (as well as knowledge attrition and knowledge gaps) are rapid growth, mergers and acquisitions, internal redeployment (American Productivity and Quality Centre 2002:6), downsizing and retrenchments (Pickett 2004:248).

Examples of the loss of knowledge and its impact have been pointed out by authors such as Carlisle (2002:133), who mentioned that during the 1980s many organisations invested heavily in information technology (IT) and IT training. In the face of intensification of competition, some of them later downsized in their organisations only to subsequently find that important knowledge had been lost.

The amount and type of knowledge generated in organisations, combined with the reality of demographic trends such as Baby Boomer (born between 1946 and 1964) retirement from the workforce and many mid-career transitions from Generation X (born between 1965 and 1977), could result in "massive quantities of invaluable, irreplaceable, specialised knowledge being lost by organisations every day" (DeLong cited in Salopek 2005:23; DeLong cited in Doyle 2004:45; Garlick & Langley 2007:1; Juliano 2004:83). Kransdorff (2003:42) reports that the consequence of employee turnover that has the most expensive price tag is the dispersal of an organisation's expensively acquired knowledge and experience. A result of this knowledge loss is that organisations are plagued with an inability to learn from past experiences which tends to lead to reinvented wheels, unlearnt lessons and a pattern of repeated mistakes. He points out that "institutional 'forgetting' or 'corporate amnesia' contributes massively to productivity shortfalls". No organisation can afford the luxury of rediscovering its own prior knowledge (Kransdorff 2003:43).

Another concern is that critical knowledge lost through job-hopping, may find its way into the hands of competitors, which could affect an organisation's competitive advantage. A lack of investment in knowledge retention means that some knowledge may have to be

recreated for each new project, thus limiting project effectiveness (Davis-Blake & Hui 2003:196).

Since organisations cannot afford to lose expert knowledge, they need to develop ways of keeping the knowledge safely inside the organisation. It is thus imperative to ensure that knowledge is retained in the organisation (Bender & Fish 2000:127). In 2009, Gotthart and Haghi (2009:305) pointed out that the need for knowledge retention is becoming increasingly apparent because many industries have to face the challenges of an aging workforce nearing retirement. To this may be added the current world recession, leading to downsizing in many companies and thus knowledge loss.

According to Bender and Fish (2000:125) and Wong and Radcliffe (2000:493), the knowledge and expertise of an organisation's employees need to be seen as a critical strategic resource and a valuable asset in maintaining its competitive advantage. Stewart (cited in Quintas 2002:1) contends that "knowledge has become the most important factor in economic life. It is the chief ingredient of what we buy and sell, the raw material with which we work. Intellectual capital – not natural resources, machinery, or even financial capital – has become the one indispensable asset of corporations." The importance of knowledge is emphasised by a European survey of 100 European business leaders where 89% considered "knowledge to be the key business power" (Murray & Myers cited in Quintas 2002:2).

Du Plessis (2003:94) maintains that knowledge is of utmost importance in organisations and must be timely, correct, dispersed to the correct people in organisations, and above all, retained in organisations. Such knowledge retention will allow organisations to reap the benefits of past experience because knowledge is readily available and can be used over and over again. The author argues that this is especially true of South African organisations where an alarming number of highly knowledgeable employees resign, are retrenched or emigrate, with the result that this collective knowledge is lost for ever.

According to Mac and Sockel (cited in Acton & Golden 2003:137), "retention of employees and retention of valued skills are important for continuous business achievement". Successfully retaining employees as a solution to the issue of lost knowledge may lead to knowledge retention in the organisation. However, employee turnover may lead to loss of knowledge and consequently affect competitive advantage (Capelli in Acton & Golden 2003:137). Staff retention as such may not be an easy

solution to knowledge retention in organisations because people still leave the organisation and their expertise goes with them.

The above discussion focused on the organisational factors that cause knowledge loss, the risks of losing knowledge and the possibility of retaining employees as a solution. However, since people leave the organisation for different reasons, one may well ask how organisations can retain knowledge in the minds of people before they leave the organisation. Pollard (2005:4–5) suggests that knowledge management leaders need to understand and accommodate front-line knowledge behaviour instead of trying to change it and find new solutions to improving knowledge worker effectiveness. This suggestion could be applied to understanding knowledge behaviour and enhancing or impeding behavioural factors that could have an impact on knowledge retention. Focusing on behaviour that could enhance knowledge retention might help organisations to find solutions to retain knowledge before it actually leaves the organisation. It would therefore appear that addressing the organisational risks of losing knowledge and behavioural factors that influence knowledge retention could help organisations to retain critical, valuable knowledge before it leaves the organisation. According to Juliano (2004:82), it appears that organisations may need to focus on developing a formal retention strategy to retain critical and highly specialised knowledge.

A preliminary literature review was conducted to determine what research has been conducted in the field of knowledge retention to resolve the issue of knowledge loss and to determine the focus and scope of this research. The literature review on research studies conducted in South Africa and registered on the NEXUS database revealed that only one partially related study had been conducted in South Africa, namely an MBA dissertation completed in 2002 on the retention factors affecting knowledge workers in the financial services sector. The focus of the study, according to the title, could have been employee retention as such and not knowledge retention. Some literature was found on the retention of individual knowledge from a teaching and educational perspective, which falls outside the field of study in this research proposal.

The preliminary literature review revealed that little research has been conducted in the area of organisational knowledge retention. This is supported by DeLong and Davenport (2003:51) who state that the “challenges of knowledge retention are so new that a rigorous comparison [of practices to retain knowledge] cannot be established” in their research.

In 2002, the American Productivity and Quality Centre conducted a study among 33 companies in the USA, consisting of 24 sponsors and nine best practice partner organisations. The focus of their research was to determine which knowledge retention approaches were the most effective and most frequently used. Guidance was also provided on how to successfully retain valuable knowledge. This is a valuable article in this research. However, the article (report) does not focus on the factors that influence knowledge retention, or the type of knowledge that should be retained, but does provide some general tenets of knowledge management initiatives.

Several authors, Cross and Baird (2000), DeLong and Davenport (2003) and Mason (2004) have proposed a few general approaches that organisations could use to retain knowledge. DeLong (in Salopek 2005:23) proposed a comprehensive solution that involves multiple steps, such as the following:

- determining what knowledge is most at risk
- building organisational support for knowledge retention
- deciding which initiatives to pursue

According to Cross and Baird (2000:77), organisations should do more to accrue and store knowledge in order to improve their profitability, by providing structured learning processes and ensuring that valuable experiential learning informs collective processes that will continue to change as operations evolve according to market demands. Mason (2004:47) claims that successful knowledge management is ultimately a balanced blend of technology, training, people and processes.

The only researcher who has focused on the issue of lost knowledge extensively, is DeLong (2004). He proposes that effective knowledge retention efforts require a holistic approach that integrates elements of HR infrastructure and culture, the most appropriate transfer practices depending on the types of knowledge involved, and supporting IT applications (DeLong 2004:6). His research would appear to prove extremely useful in this research.

The approaches in a number of other articles that were found in the preliminary literature review have a more specific focus on the following:

- retention of tacit knowledge in small manufacturing enterprises (SMEs) (Wong & Radcliffe 2000)
- the effect that loss of knowledge through retirement has on the utility workforce and the differences in the ways the older and younger generation learn as a factor that influences knowledge retention (Juliano 2004)
- the loss of IT people in the Irish software industry and the impact of training on employee retention (Acton & Golden 2003)
- the use of the internal audit department as opposed to external auditors in a process of due diligence (identifying and confirming or disconfirming the business reasons for the proposed capital transaction) in a merger and acquisition transaction in the USA (Burke 2000:38)
- retention of knowledge by running a business as a series of projects using the film industry as an example (Arthur & Defillippi 1998)
- the transfer of knowledge and expertise throughout organisations operating on a global scale and retaining knowledge through people transfer and training (Bender & Fish 2000)

The studies appear to have been narrowed down according to specific environments and specific groups of people in organisations. The studies focused mainly on the retention of knowledge and prevention of knowledge loss or knowledge attrition. All these studies might have some elements that could prove useful to this research in terms of factors that could influence knowledge retention and approaches that could be followed to retain knowledge in organisations.

One empirical longitudinal study conducted over a period of 21 years was found. This study investigated the relationship between the amount of human capital inflow into an organisation and two activities underlying an organisation's knowledge production, namely variation or change and knowledge retention (Madsen, Mosakowski & Zaheer 2002). The paper also described a model for intraorganisational knowledge production based on the classic evolutionary process of variation, selection and retention (VSR) (Madsen et al 2002:164).

In an article exploring the status of knowledge management in South African organisations, it was mentioned that considerable international research into knowledge management models and measures exists, with some progress being made towards deriving knowledge management standards. However, there has been minimal research in South Africa in this regard (Tobin & Volavsek 2006:96). Botha and Fouché (in Tobin & Volavsek 2006:114) and Botha (in Tobin & Volavsek 2006:114) found that in 53 South African organisations, only 18% of these actually have some knowledge management metrics, and of these, only 10% align knowledge management initiatives with their vision, objectives and strategy. Tobin and Volavsek (2006:115) researched the knowledge management models and metrics use in South African organisations, focusing on work by the British Standard Institute (BSI). They found “at least exploratory evidence that the standard metrics suggested by them [BSI] have found some favour with South African organisations” (Tobin & Volavsek 2006:115). The authors concluded that none of the many models in the literature adequately accommodates all aspects of knowledge management measurement, and they suggested that a more holistic knowledge management and intellectual capital measurement model should be developed (Tobin & Volavsek 2006:115). The focus of this study was purely on the status of knowledge management in South African organisations and not on knowledge retention as such.

Various approaches towards knowledge retention were suggested by different authors. The only studies that give perspectives of different approaches were those conducted by the American Productivity and Quality Centre in 2002 and David DeLong in 2004, which were mentioned earlier. No indication could be found in the preliminary literature review of the type of knowledge retention strategies and the extent to which knowledge retention approaches have been implemented in South African organisations. Not a single study was found that focused specifically on the factors that impact on knowledge retention, from both a knowledge management and organisational behavioural perspective, which indicated that it is an area for possible research.

1.3 PROBLEM STATEMENT

It would seem that organisations will be facing a wave of knowledge loss and attrition in the next ten to 15 years that will affect their business in many ways, especially their economic growth. Many organisations seem to be in denial about knowledge loss and the leaders in these organisations do not acknowledge the threat and impact of lost

knowledge (DeLong in Salopek 2005:23; Foster 2005:28). Many management teams find that attracting, developing and retaining a knowledgeable work force is a major issue, but many are unaware of the scope of the problem or potential solutions, such as retaining knowledge through knowledge management solutions (American Productivity and Quality Centre 2002:6).

If knowledge is not retained, organisations will not be able to learn from past experiences and will have to continually reinvent the wheel, unless appropriate knowledge resides within the organisation and is easily accessible to the right people to enable them to do their jobs (Du Plessis 2003:94). Some forward-thinking companies which are already experiencing skills shortages and knowledge loss are changing by approaching the issue from an HR perspective focusing on testing new and creative recruitment, retention, workforce career planning and retirement solutions to ensure that the talent and knowledge needed to continue productivity are in place (Foster 2005:28). From research conducted by Foster (2005:28, 30) for the Conference Board, it would appear that none of the 25 companies interviewed or data from 17 major North American and European working group members had any indication of a systematic programme being in place. Instead, they seem to focus on ad hoc fixes to what they perceive as an impending brain drain.

In South Africa, the problem of knowledge retention appears to be affected by factors such as retirement, turnover (resignations), retrenchment, emigration, employment equity, mergers, acquisitions and globalisation. If organisations do not seriously address the issue of knowledge loss and attrition by implementing a knowledge retention strategy, this could have detrimental effects on their business success and survival.

In order to determine the focus of a knowledge retention strategy, it is necessary to understand the organisational factors that would enhance or impede knowledge retention. Knowledge is gained by different manifestations of behaviour such as learning, sharing and transferring the acquired knowledge to human beings. Certain enhancing or impeding organisational and behavioural conditions that prevail in organisations may cause this knowledge to either be lost or retained.

The problem investigated in the current research can be formulated as follows:

What behavioural and organisational factors could an organisation consider to combat the increasing knowledge loss and attrition that is affecting organisations?

In terms of the **literature study**, the problem can be addressed by answering the following specific questions:

- (1) What is understood by the concept of knowledge in organisations in terms of the type of knowledge that should be retained?
- (2) What is understood by the concepts of knowledge loss and knowledge retention and the impact of knowledge loss on the organisation?
- (3) What are the organisational factors that could impede or enhance (influence) knowledge retention?
- (4) What are the behavioural factors in organisations that could impede or enhance (influence) knowledge retention?
- (5) How can the behavioural and organisational factors be integrated to develop a knowledge retention model?

In terms of the **empirical study**, the following specific research questions can be addressed:

- (1) How can the integrated theoretical model be operationalised to determine the factors that enhance or impede knowledge retention in an organisation?
- (2) To what extent is knowledge retention influenced by certain behavioural and organisational factors in a South African organisation?
- (3) What empirically derived factors have an impact on knowledge retention?
- (4) How does the empirically derived model compare with the theoretically derived model?

- (5) What recommendations can be made for future research for the organisation to retain knowledge and for practitioners in the field of study?

In the light of the above problem areas, the aim of the study is described below.

1.4 PURPOSE OF THE RESEARCH STUDY

The purpose of the current research study is to determine in detail what is understood by the concept of knowledge in organisations, what knowledge is at risk in organisations that should be retained and whose knowledge should be retained. Furthermore, the purpose is to identify the organisational factors that might influence knowledge retention such as the workforce, culture of the organisation, training, change, strategic directions, management and leadership, mergers and acquisitions, technology, and so forth. The enhancing or impeding behavioural factors that could determine whether knowledge in the minds of people is retained in the organisation will be explored. Based on the findings, a knowledge retention model will be developed that organisations could use to determine the extent to which they are managing to retain knowledge. Approaches that could be followed to successfully retain tacit knowledge in the organisation that participated in the empirical study will be identified from the literature as part of the recommendations for the organisation towards developing a knowledge retention strategy.

The **general purpose** of the study is to develop a knowledge retention model and test it empirically for future application in practice in order to retain knowledge in organisations.

More specific aims of the literature and empirical studies are discussed in the section below.

1.4.1 Aims of the literature review

The specific aims of the literature review are to

- (1) conceptualise the nature of knowledge in terms of how it is to be understood in organisations relating to the type of knowledge that could be lost and should be retained

- (2) define the concepts of “knowledge loss” and “knowledge retention” in organisations in terms of the risks and challenges involved
- (3) identify the organisational factors that could impede or enhance knowledge retention
- (4) identify the different knowledge behaviours in organisations and the effects of enhancing or impeding behaviour on knowledge retention
- (5) integrate the factors into a knowledge retention model by conceptualising the dimensions and their constructs

1.4.2 Aims of the empirical study

The specific aims of the empirical study are to

- (1) operationalise the theoretically derived knowledge retention constructs (identification of critical knowledge in the organisation, behavioural clusters and influencing factors) by developing a questionnaire to diagnose the degree to which knowledge retention is maintained in an organisation
- (2) investigate the extent to which knowledge retention is influenced by organisational and behavioural factors in identified South African organisations
- (3) determine statistically the enhancing or impeding organisational factors that influence knowledge retention
- (4) develop a structural equation model to verify the theoretical model and determine whether any new constructs have emerged
- (5) formulate recommendations on the basis of the findings of this research for further research, for the organisation to retain knowledge and for practitioners in the field

1.5 THEORETICAL PERSPECTIVE

The research problem to be investigated and the theoretical and empirical aims to be achieved, as described in section 1.4 above, seem to relate to different fields of study – hence the need to clarify the disciplinary scope of the research in the discussion below.

The concepts of knowledge loss and knowledge retention fit into the discipline of knowledge management. Although there has been immense and increasing interest in **knowledge management**, the field is still complex and there does not seem to be any consensus on further development. Many different approaches exist as well as various subdomains dealing with one set of issues while ignoring others (Despres & Chauvel in Scholl & Heisig 2003:180). Scholl and Heisig (2003:180) conducted a First Global Delphi Study to assess the art of knowledge from a theoretical and practical point of view and to study the future of knowledge management. Their findings on the most important recent theoretical and practical advances in knowledge management are depicted in figure 1.2.

FIGURE 1.2
MOST IMPORTANT THEORETICAL AND PRACTICAL ADVANCEMENTS
IN KNOWLEDGE MANAGEMENT

Most important theoretical advancement	Priority on human factors : shift from IT perspective to a behavioural science perspective
Most important practical advancement	Priority on human factors such as the nontechnological reflection of knowledge management, emphasising social factors

Source: Adapted from Scholl & Heisig (2003:184, 187)

The emphasis appears to be on the human factor, which seems to be a shift from an IT perspective to a **behavioural science** perspective. Pickett (2004:247) confirms this in the following statement: “we need to move from the technology and information revolutions to the people’s revolution”. Furthermore, according to Scholl and Heisig (2003:188–189), research on knowledge management should be both interdisciplinary and multidisciplinary. Empirical research designs should focus on action research, survey studies, case studies, statistical studies and qualitative studies. According to Research Councils UK (<http://www.rcuk.ac.uk> 2010) multidisciplinary research can be defined as

research that “takes place at the edges of traditional disciplines and across traditional subject boundaries”.

By the year 2008, there seemed to be more clarity on the diversity of perceptions and disagreement over certain schools, stages or generations of knowledge management. Earl (in Martin 2008:386) identifies three broad schools of knowledge management approaches, namely technocratic (representing information systems), economic (representing commercial approaches) and behavioural (broadly representing behavioural approaches). Koenig (in Martin 2008:386) mentions three ages in the development of knowledge management. The first age focused on the application of technology to knowledge sharing and coordination in organisations, the second on the human and cultural factors in knowledge management and the third on content management (Koenig in Martin 2008:386). These approaches have been criticised for ignoring the large body of knowledge management activity.

Efforts to clarify the **paradigmatic status** of knowledge management have identified several different, and in some instances, conflicting paradigms (Lam 2000; Swanne & Scarborough in Martin 2008:385). A deeper focus on **ontological** and **epistemological** fundamentals with an **interdisciplinary** and **organisational** approach was thought to provide clarity on knowledge management (Despres & Chavel; Brusoni et al; Day; Lam; Lanzara & Patriotta; McInerney & Day; Moffett, McAdam & Parkinson in Martin 2008:386).

Considering the context of the problem investigated in this research, namely the organisational and behavioural factors that could influence knowledge retention, the theoretical scope of this research could be broadened to a multidisciplinary approach relating to the disciplines of knowledge management, organisational behaviour and organisational development. These disciplines and the way in which they relate to this research are discussed below.

1.5.1 Knowledge management

Knowledge management may be an excellent platform to start off by addressing the issue of knowledge retention in organisations. Knowledge management is regarded as a multidisciplinary approach to achieving organisational objectives by making the best use of knowledge (Standards Australia International in Pickett 2004:248).

The discipline of knowledge management is approximately 15 years old. The increasing importance of knowledge in the global economy has led to knowledge management gaining worldwide attention (Bender & Fish 2000:128). Defining knowledge management is a daunting task and needs to be researched to find a suitable definition for the current research. According to Bender and Fish (2000:129), defining knowledge management entails describing what it is all about and what it means to a specific organisation, since each organisation has a different approach to its knowledge management practices (Greengard in Bender & Fish 2000:129).

For the purpose of this research, the following definition may shed some light on the attempt to use knowledge management as a starting point to address the issue of retaining knowledge in organisations: Knowledge management is "... the strategy and process to enable the creation and flow of relevant knowledge throughout the business and to create organisational, customer and consumer value" (Smith from Unilever cited in Bender & Fish 2000:129). Robbins (2005:312) defines the concept as a process of organising and distributing an organisation's collective wisdom so that the right information reaches the right people at the right time. This improves performance because it makes employees smarter.

According to Pollard (2005:1), knowledge management, after being part of critical strategic assets in the 1990s, has not demonstrated any competitive advantage to the organisations that have invested in it. The expectations were that knowledge management would be able to improve

- growth and innovation in organisations
- employee learning, satisfaction and retention
- productivity and efficiency (reflected in cost savings)
- customer relationships
- management decision making

Pollard (2005:2) believes that "it arguably failed on all accounts". This is because of the unrealistic expectation that organisational behaviour could be changed in positive ways by persuading people to capture, share and archive knowledge. However, people only change their behaviour if there is no alternative, or when "there is an overwhelmingly

compelling argument to do so (not the “leap of faith” on which Knowledge Management was predicated)”.

There is evidence of the failure of knowledge management in the following (Pollard 2005:3):

- Budgets for knowledge management have been slashed.
- Knowledge management is no longer regarded as a core competency and many companies are outsourcing their knowledge management.
- Fortune 500 companies have fewer chief knowledge officers than five years ago.
- Very few knowledge management titles now crack the top ten Books for Business best-sellers, while at one time, six of these were about knowledge management.

The focus on persuading people to capture, share and archive knowledge does not seem to have produced any evidence of success. Broadening the perspective by focusing on understanding and accommodating front-line knowledge behaviours instead of trying to persuade people to change (Pollard 2005:4) could prove to be effective in retaining knowledge. The discipline of knowledge management provides insight into conceptualising the nature of knowledge in organisations. The issue of knowledge retention in organisations will be approached from an organisational behaviour perspective and, within this framework, determine what knowledge and knowledge behaviour mean in organisations and how the principles, tools and practices thereof can be applied to retain valuable knowledge in an organisation before it leaves the organisation in the minds of people.

This idea is supported by DeLong and Davenport (2003:62) who point out that “effecting long-term knowledge retention in a serious way will require a much more holistic approach”, than implementing technology applications or attacking knowledge retention with solutions that are too narrow.

1.5.2 Organisational behaviour

According to Robbins (2005:9), organisational behaviour “is a field of study that investigates the impact that individuals, groups, and structure have on behaviour within the organization for the purpose of applying such knowledge toward improving an organization’s effectiveness”. In other words, it is concerned with what people do and how their behaviour affects the organisation (eg employment turnover, productivity, human performance, work and management). It also has to do with the inner drive to perform in context. Organisational behaviour as an applied behavioural science builds on a number of behavioural disciplines such as psychology, sociology and anthropology (Robbins 2005:12).

Knowledge management occurs at individual, group and organisational level in organisations and involves certain manifestations of knowledge behaviour such as knowledge sharing and transferring. Certain organisational factors will have an impact on these manifestations of behaviour and specifically on the retention of knowledge in organisations.

1.5.3 Organisational development

A field of study that will be involved in the current research is organisational development. The purpose of involving this applied discipline is the assumption that knowledge retention needs to be managed as an organisational improvement strategy. Organisational development is not easy to define as a single concept. French and Bell (1999:1) refer to the concept as an organisational improvement strategy. The term “encompasses a collection of planned change interventions built on humanistic democratic values that seek to improve organisational effectiveness” (Van Daalen & Odendaal 2003:412-413). French and Bell (1999:xiii) describe organisational development as the applied behaviour science discipline dedicated to improving organisations and the people in them by making use of the theory and practice of planned change. Many of the definitions found in the literature emphasise the same aspects of the concept.

All authors agree that organisational development (OD) applies behavioural science to achieve planned change, the target of the change is the total organisation and the goals are increased organisational effectiveness and individual development (French & Bell

1999:25). Human and organisational growth, participative and collaborative processes and a spirit of enquiry are valued in the OD paradigm (Van Daalen & Odendaal 2003:413). To these aspects one may add characteristics such as OD being a long-term effort, led and supported by top management, to improve an organisation's visioning, problem-solving processes and learning processes through an ongoing, collaborative management of organisation culture, using the consultant-facilitator role and the theory and technology of applied behavioural science (such as action research) (French & Bell 1999:25-26). Action research is a data-based problem-solving method that replicates the steps involved in the scientific method of inquiry. This approach involves three processes, namely data collection, feedback of the data to the organisation members and action planning based on the data (French & Bell 1999:100).

The results of the empirical study of this research could ensure the implementation of an OD process through which knowledge retention is diagnosed, feedback is given and recommendations in terms of solutions are made to the participating organisation.

Based on the above discussion, the current research is conducted from a knowledge management, organisational behaviour and organisational development perspective in order to find answers to the problem statement.

1.6 SCOPE OF THE RESEARCH

From a theoretical perspective, the scope of the current research is limited to what the term "knowledge" means, focusing specifically on the knowledge in the minds of individuals and what it means in organisations. The focus is neither on explicit knowledge that can be easily documented nor on an information technology perspective, but on a humanistic, behavioural and socialistic view of tacit knowledge.

Individuals operate at individual, group and organisational level in organisations, which implies that the risks of losing knowledge in the minds of people would exist at all three levels. The focus is on a study of knowledge retention and not staff retention, since people leave the organisations at some point in time.

From an empirical perspective, the scope of this research is on determining the extent to which an organisation retains knowledge and which organisational and behavioural factors they need to focus on in order to improve knowledge retention.

1.7 VALUE OF THE STUDY

The value of this research in general is that it could contribute to a multidisciplinary view of knowledge retention focusing on knowledge, behaviour and improvement of knowledge retention. The value of this research from a theoretical perspective is that it will provide a clear understanding of what knowledge at cognitive level means, how it manifests in the behaviour of people and in organisations and what knowledge retention is. The study should provide clarity on enhancing or impeding organisational and behavioural factors that could influence knowledge retention and could be considered to improve knowledge retention.

The value of the empirical study lies in the development of a questionnaire that could be used in organisations to determine the extent to which organisational and behavioural factors exist in their organisations, which could enhance or impede knowledge retention. The empirical model that will be developed could provide clarity on the dimensions that explain knowledge retention.

Organisations differ from one another in terms of strategic focuses, how pressing the nature of the knowledge retention problem is and the fact that there clearly is no "one-size-fits-all" solution when it comes to knowledge retention (DeLong & Davenport 2003:62). According to DeLong and Davenport (2003:51) no one is ready to claim he or she knows what the "best practices" are when confronting the threat of losing knowledge that is critical to organisational performance. The current research could shed light on the different approaches that could be followed to retain knowledge, based on knowledge retention behaviour and the organisational factors that have a role to play in knowledge retention. At a practical level, the empirical model to be developed in this research could be used as an indicator of the factors that impact on knowledge retention, the progress being made in terms of knowledge retention in an organisation and where to focus their knowledge retention strategy.

1.8 TERMINOLOGY

The term "knowledge" in the current research refers to the expert knowledge embodied by people working in an organisation that enables them to do their jobs effectively and

efficiently. This would encompass operational and organisational knowledge owned by the individual (DeLong & Davenport 2003:51).

Terms such as organisational knowledge, personal knowledge, operational knowledge, tacit and explicit knowledge need to be explored in the literature study to determine the nature of knowledge in organisations and specifically what type of knowledge should be retained in organisations.

Madsen et al (2002:165), define the term “retention” as follows: “the preservation and refinement of changes or variations in the behaviour adopted by a firm and the subsequent dispersion of these changes across the firm’s subunits. Through dispersion, a firm leverages its new and past knowledge across space and time”. According to Walsh and Ungson (in Madsen et al 2002:165), the content that is retained by an organisation represents knowledge about its past and existing behaviour and is stored in different retention bins that form the organisation’s memory.

The term “knowledge retention” in this research proposal refers to retaining the expert and critical knowledge in people’s minds, that might be lost to the organisation should these people leave the organisation for some reason.

Authors in the organisational behaviour field, such as Hellriegel, Slocum and Woodman (2001), Robbins (2005) and Dick and Ellis (2006), and in the knowledge management field, such as Davenport and Prusak (1998), DeLong (2004) and Nonaka and Takeuchi (1995), use the term “behaviours” to describe different ways of behaviour or behavioural actions. Davenport and Prusak (1998:xiii) link knowledge and behaviour by using the term “knowledge behaviours”. They state the following: “Our first step should be to observe key knowledge workers in different business environments to learn more about their knowledge behaviours.” In the current research the terms “behaviours” and “knowledge behaviours” are used where applicable, based on the finding that these terms seem to be accepted in the disciplines relating to the current research.

1.9 RESEARCH DESIGN

A research design involves the planning and structuring of the way in which the research will be conducted in terms of data collection and analysis in a way that is relevant to the purpose of the research (Sellitz et al in Mouton & Marais 1990:34). The research design

should be planned in such a way that it ensures the validity of the research findings. This involves a series of rational decisions to eliminate disturbing factors that could undermine the validity of the research (Mouton & Marais 1990:35).

The approach in the current study is **quantitative research study using the survey method**. A quantitative approach to studying knowledge retention emphasises its quantifiable nature and is concerned with identifying its predictive power (Brewerton & Millward 2001:12) (ie identifying knowledge to be retained, knowledge retention behaviour and factors that influence knowledge retention).

Three dimensions need to be considered in designing the research investigation, namely the use that will be made of the research, the purpose of the research and the time in which the data will be collected (Neuman 2000:22). The use of this research will be to contribute to **basic** theoretical knowledge (Neuman 2000:25) and **apply** and tailor the knowledge obtained to address a specific practical issue (Neuman 2000:23), namely combating the loss of critical knowledge in organisations. The design of this research is a combination of **descriptive and exploratory** research. The purpose of the study is to explore the factors that could enhance or impede knowledge retention in organisations (in other words "what"?) (Neuman 2000:21–22). In more detail, the purpose is to conduct a descriptive literature study to describe the phenomena (knowledge, tacit knowledge, knowledge behaviour, enhancing and impeding behavioural and organisational factors that would affect knowledge retention) and model building as a theoretical foundation combined with an empirical study in order to validate the model (Mouton 2001:179, 176, 152). Bak (2004:25) endorses the combination of a literature study and empirical work, and this method would appear to be a suitable way of finding answers to the questions in the problem statement. The survey method is used in the current research because it will enable the researcher to collect data on opinions, attitudes and behaviour (Booyesen 2003:127). Cross-sectional research will be conducted collecting the data at one point in time to take a **snapshot** of the conditions prevailing at that particular time in the organisation (Neuman 2000:30). The data will enable the researcher to conduct statistical analyses to test and validate the theoretical model that will be developed to provide insight into the factors that influence knowledge retention in organisations.

These dimensions (use of the research, purpose and the data to be collected) have an impact on the research methodology, which is discussed below.

1.10 RESEARCH METHODOLOGY

The research methodology explains how the research will be conducted (Mouton 2001:49). The approaches adopted in the literature and empirical studies to describe the phenomena and collect, analyse and interpret the data, are discussed below.

1.10.1 Literature study

The intention is to accurately describe the phenomena through the literature study. The constructs "knowledge" and "knowledge retention" will be described from a knowledge management perspective and an organisational behaviour perspective drawing from literature in these two study fields. The factors that influence knowledge retention (by either promoting or inhibiting knowledge retention) will be derived from the literature study.

Although certain approaches that could be followed to retain knowledge will form part of the discussion, the focus is not on these approaches and strategies since there is not a "one-size-fits-all" solution for knowledge retention. This implies that specific solutions would differ from one organisation to the next, depending on where they need to focus to retain knowledge.

A theoretical model based on the literature study will be developed which will then be tested in the empirical study by means of structural equation modelling (SEM).

1.10.2 Empirical study

Following the literature study, the next phase of the research is the empirical study. The empirical research design entails the planning and structuring of circumstances for conceptualising and operationalising of the concepts, collection and analysis of data in a way that would be relevant to the nature of the research (Mouton & Marais 1990:34, 60). It involves the choice of cases, data sources and variables (Kervin 1992:85).

In this research, the purpose of the empirical research is to test and validate the model developed in the literature study and develop a new model on the basis of the findings of the empirical study.

The methodology describes the process to be followed to conduct the empirical research. Two factors, namely validity and reliability, are important in this context. Validity describes the measure that accurately reflects the concepts that are intended to be measured. Validity can be obtained on the basis of face, content and construct validity (Babbie 1998:G7). Reliability refers to the quality of the measurement method which suggests consistency of the measure of variables each time the measurement is repeated (Babbie 1998:G6; Neuman 2000:518). In chapter 4, the way in which validity and reliability were obtained, will be described in detail.

A series of rational decisions are normally made during the methodology phase in an effort to eliminate factors that could affect the validity of the research findings (Mouton & Marais 1990:35, Sekaran 1992:92). Some of these factors are briefly referred to in this section, but will be discussed in detail in the empirical section of this research. The process is described below.

1.10.2.1 Questionnaire design

A measuring instrument will be designed in the form of a questionnaire based on the model developed in the literature study. In other words, a quantitative approach will be adopted by first conceptualising concepts to convey their meaning in this research and then operationalising the concepts by developing operational definitions (Babbie 1998:120, G5).

Several factors such as the length of the questionnaire, wording (eg double-barrelled or leading questions, questions with hidden assumptions, sensitive questions and negatively phrased questions) and layout features will be taken into consideration to ensure comprehensibility of the questionnaire as suggested in the literature (Brewerton & Millward 2001:104–105; Mouton 2001:103–104).

1.10.2.2 Obtaining buy-in from participating organisations

Three South African organisations will be invited to participate in the survey to determine the extent to which the organisational and behavioural factors are enabling them to retain knowledge. The next step will be to obtain access to the organisations, securing “buy-in” from those to be involved in the research project and managing the organisations and their contacts as the project progresses. The researcher will prepare a covering letter and

organisational research proposal outlining the project process, value to the organisation and the cost to the organisation (ie the amount of time – 15 to 20 minutes – that the survey would take to complete) which was presented to the organisations that were approached (Brewerton & Millward 2001:44–46).

The unit of analysis (people invited to participate in the survey) will be the supervisory, middle and senior managers and specialists in each of the participating organisations because it was felt that they would have a reasonable understanding of the knowledge retention behaviour, influencing factors and approaches that their organisations follow to retain knowledge.

The following factors need to be considered at the stage of conducting the survey and managing the survey process:

- creating an imperative among the middle and senior management group to participate (eg a covering letter from the CEO in each company)
- ensuring confidentiality
- ensuring that invited participants are aware of the project's aims, what is needed from them and what they will receive in return, time scales and the method and process to be used to complete the questionnaire
- meeting and talking regularly to the companies' representatives to maintain commitment and interest (Brewerton & Millward 2001: 47–48)

Feedback to the participating organisations is a vital part of the research process and the researcher has a responsibility to give some form of feedback to these organisations (Brewerton & Millward 2001:177). This feedback will be approached from an organisational development perspective, diagnosing the individual organisations, interpreting their results and making recommendations on the basis of the knowledge retention model developed in the research. Each organisation will receive a report and a presentation of the results including recommendations.

These factors will be addressed in detail in the research design in chapter 4.

1.10.2.3 *Pilot study*

Once commitment has been obtained from the participating organisations, the next step will be to conduct a pilot or pretest to determine the comprehensibility of the instrument and to ensure face validity. Methods of pretesting and the ideal sample size need to be considered before conducting the pilot or pretest (Converse & Presser in Mouton 2001:103).

1.10.2.4 *Target population and sampling*

The main criteria of sample selection are to ensure that the sample is representative of the total population from which it is selected and “knowing as precisely as possible the probability that a sample is reliable in this way” (Brewerton & Millward 2001:114). The population is organisations with the target population being supervisory, middle and senior management as mentioned in section 1.10.2.2. It will be proposed in this research methodology that the entire supervisory, middle and senior management levels in each organisation are invited to participate in the survey because of the possibility that everyone might not take the time to complete the survey. Selecting a sample in each organisation will complicate matters and might also not produce a sufficient number of respondents to enable the researcher to draw valid conclusions in the interpretation of the results.

1.10.2.5 *Data collection*

The survey will be conducted electronically on the researcher’s internet website, which means that participants must be able to access the internet. This is a low-cost, user-friendly method that requires minimal resources and has the potential of large sample-capturing abilities (Brewerton & Millward 2001:99). Participants who do not have access to the internet will complete a paper format of the questionnaire in group sessions facilitated by the HR consultants in the organisations. Confidentiality will be ensured by the participants placing their completed questionnaires in a sealed envelope to be placed in a container for collection by the researcher.

Data that will be obtained via the questionnaire are demographical/biographical data such as race, gender, years of service and job level. This information could be used to compare the results of different groups, but does not form part of the research aims of

this study. Furthermore, data will be collected on the extent to which organisational and behavioural factors (aspects) regarding knowledge retention take place in the organisations.

1.10.2.6 Data analysis

The levels of reliability and validity of the measuring instrument need to be determined. Reliability, in this context, “refers to the internal and temporal consistency of an instrument, that is, the degree of data consistency across a defined or undefined dimension” (Suen cited in Brewerton & Millward 2001:89), whereas validity may be defined as “the degree to which an instrument actually represents what it *purports to represent*” (Brewerton & Millward 2001: 88).

A survey software package, “SurveyTracker” will be used to analyse the data in means, frequencies and percentage response distribution based on the Likert-type scale. A research report will be compiled to present to the organisation participating in the survey. The results will be interpreted, conclusions drawn and recommendations made to retain knowledge in the organisation.

1.10.2.7 Statistical analysis

An exploratory **factor analysis** (principal components) will be conducted to determine the construct validity of the instrument – in other words, the degree to which the instrument items actually represent what they purport to represent (Mouton & Marais 1990:70). Patterns in the data set will be explored by examining the correlations between variables and describing these patterns of the newly developed instrument (Brewerton & Millward 2001:149).

To determine the reliability (internal consistency) of the newly discovered factors of the instrument, a **Cronbach alpha** will be used. The purpose is to determine the degree of accuracy of the items in measuring the factors. The Cronbach alpha is a reliability coefficient that reflects how well the items in a factor correlate with one another (Sekaran 1992:284).

Structural equation modelling (SEM) will be used to validate the model. Brewerton and Millward (2001:165–166) describe it as follows: “At its heart, SEM is based on a

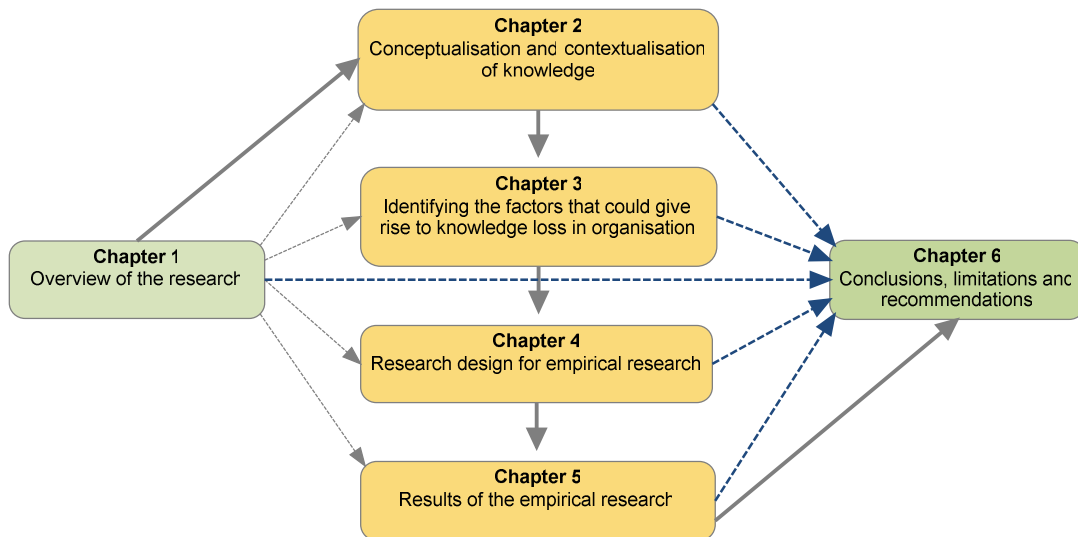
comparison of covariance structures between a previously constructed theoretical model and an empirically derived data-based model. If the two models ... are consistent with one another, the originally conceived structural model may be considered to be a plausible explanation for observed relationships between measured and latent variables.” SEM is a linear cross-sectional statistical modelling technique, which includes confirmatory factor analysis, path analysis and regression analysis (Botha in Martins 2002:760). It is mostly used to determine whether a certain model is valid as opposed to “finding” a suitable model (Martins 2002:760).

Statistics that could be applied to determine significant differences between groups of demographical/biographical data collected in the survey are the Anova test, which is used to examine variable differences between more than two groups, say, different job levels and different race groups, and the *t*-test which examines differences between two groups, say, gender.

1.11 CHAPTER LAYOUT

Based on the aims of the research, the layout of the chapters is indicated in figure 1.3.

FIGURE 1.3
CHAPTER LAYOUT



The dark grey arrow lines in figure 1.3 indicate the flow from one chapter to the next. The light grey dotted lines broadly represent the research questions specified in chapter 1 that will be addressed in chapters 2 to 5. The blue dotted lines indicate the connection of all chapters to chapter 6.

Chapter 2 conceptualises and contextualises the concept "knowledge" by exploring the nature of knowledge from a disciplinary, modular, epistemological, appearance and application point of view.

Chapter 3 identifies the factors that could give rise to knowledge loss in organisations by conceptualising knowledge loss and knowledge retention, identifying the organisational and behavioural factors that could influence knowledge retention and compiling a theoretical model that explains the factors.

Chapter 4 explains the research design and method, which is quantitative study. The questionnaire design, sample, data collection, data analysis and statistical analysis of the empirical research are explained.

Chapter 5 provides the results of the empirical study explaining the descriptive statistics, exploratory factor analysis, reliability analysis, structural equation modelling, multiple regression analysis and the empirically designed knowledge retention model compared to the theoretically designed model.

Chapter 6 draws together the results from previous chapters, indicated by the blue dotted lines in figure 1.3. The conclusions and recommendations are discussed. The answer to the research question, the limitations of the research, opportunities for further research and recommendations for the organisation and practitioners are discussed.

1.12 SUMMARY AND CONCLUSIONS

The purpose of this chapter was to provide an overview of the research. Factors that gave rise to exploring the issue of knowledge loss in organisations were discussed. An overview was provided of the research that has been conducted in the area of knowledge retention. Not one study was found that investigated the behavioural and organisational factors that would impact on knowledge retention. The research problem was formulated as determining the organisational and behavioural factors that an organisation could

consider to combat knowledge loss. Theoretical and empirical aims to address the issue were formulated. The theoretical perspective was described as a focus on human factors emphasising behavioural and social factors. The issue of knowledge retention is approached from an interdisciplinary perspective drawing from the fields of knowledge management, organisational behaviour and organisational development. These three disciplines were discussed in relation to the problem being addressed in this research. The research design is a quantitative study using the survey method to collect the data. The methodology was discussed explaining the theoretical study, questionnaire design, data collection and statistical analysis phases of the empirical research process to be followed. Finally, the layout of the chapters to follow was described.

Chapter 2 deals with the conceptualisation and contextualisation of knowledge.

CHAPTER 2

CONCEPTUALISATION AND CONTEXTUALISATION OF KNOWLEDGE

2.1 INTRODUCTION

The purpose of this chapter is to conceptualise knowledge in order to gain a better understanding of what it means in organisations regarding the type of knowledge that could be lost and should be retained. The complex nature of the concept of knowledge requires an in-depth review of the literature to foster a meaningful investigation of knowledge retention in organisations, with a strong focus on knowledge management, but also from an organisational behaviour and organisational development perspective. The contextualised theory-building process that focuses on the epistemology, appearance and application of knowledge (Venzin, Von Krogh & Roos 1998:28-29) is used in this chapter as a framework to explore the nature of knowledge in organisations.

The blocks shaded in grey are used where applicable to reflect the researcher's own interpretations of the literature and to explain how it applies to the current research.

The study of knowledge, specifically human knowledge, has been a central subject matter of philosophy and epistemology since the Greek period (Kakabadse, Kakabadse & Kouzmin 2003:75; Nonaka & Takeuchi 1995:viii). According to Shera (in McInerney 2002:1015), the study of knowledge is the study of psychological, social, biological and physical phenomena. The study of knowledge retention should begin with a study of the concept of knowledge itself (McInerney 2002:1009). Prominent authors in the field of knowledge (Drucker et al in Nonaka & Takeuchi 1995:6-7) agree that the future belongs to people endowed with knowledge.

The significance of knowledge for the competitiveness of organisations is widely accepted nowadays (Mertins, Heisig & Vorbeck 2003:1). According to Von Krogh, Ichijo and Nonaka (2000:13), organisations should spend time figuring out what knowledge means in their organisations and how the concept should be applied in practice because knowledge can mean different things to different people. A central challenge to managers is an understanding of the nature of knowledge, and "in particular understanding the tacit

dimension". This is knowledge that resides in the minds of employees and has not been codified or made explicit (Quintas 2002:10). Although competitors are able to copy organisational systems and processes, it is extremely difficult to copy the knowledge in staff members' minds and this is what gives organisations competitive advantage (Kermally 2002:46). Understanding the nature of knowledge in organisations also involves the process of knowing and the processes of knowledge creation, sharing, transformation and application (Quintas 2002:10).

2.2 DEFINITIONS OF KNOWLEDGE

Knowledge as a key concept can be explained by analysing different definitions in the literature. The literature contains many definitions, but according to Sveiby (cited in Bender & Fish 2000:126), none of these definitions "seem universally appropriate, as the definitions depend on the context in which they are used". Augier and Vendelo (cited in Carlson 2005:3) see knowledge as "a magical term with multiple connotations and interpretations", which supports Sveiby's statement above. Venzin et al (1998:49) also confirm this when stating that it is difficult to formulate a definition of knowledge that is uniformly accepted in the management domain.

Different definitions and descriptions are summarised in table 2.1.

TABLE 2.1
DEFINITIONS OF KNOWLEDGE

AUTHORS	ESSENCE OF DEFINITION / DESCRIPTION
Arce & Long (cited in Venzin et al 1998:35-36)	"Knowledge is constituted by ways in which people categorize, code, process and impute meaning to their experiences ... Knowledge emerges out of a complex process involving social, situational, cultural and institutional factors. The process takes place on the basis of existing conceptual frameworks and procedures and is affected by various social contingencies, such as skills, orientations, experiences, interests, resources and patterns of social interaction characteristic of the particular group or interacting set of individuals, as well as those of the wider audience."
Bender & Fish (2000:126)	"Knowledge originates in the mind of an individual and builds on information that is transformed and enriched by personal experience, beliefs and values with decision and action-relevant meaning. It is information interpreted by the individual and applied to the purpose for which it is needed. The knowledge formed by an individual will differ from another person receiving the same information. Knowledge is the

	mental state of ideas, facts, concepts, data and techniques, recorded in an individual's memory."
Bennet & Bennet (2004:5)	"In brief, knowledge is the human capacity to take effective action in varied and uncertain situations. By capacity we mean both potential and actual ability."
Chakravarthy, Mc Evily, Doz & Rau (2003:307)	"We define knowledge as beliefs that guide organizational action; it is causal understanding that may or may not fully reflect the realities of the environments a firm faces."
Chou & Tsai (2004:206)	"More specifically, the definitions of knowledge range from 'complex, accumulated expertise that resides in individuals and is partly or largely inexpressible' to 'much more structured and explicit content'."
Davenport & Prusak (cited in Choo 2003:209; Danskin, Englis, Solomon, Godsmith & Dave 2005:92; McInerney 2002:1010)	... "a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms."
Den Hertog & Huizenga (cited in Uit Beijerse 1999:99)	"a collection of information and rules with which a certain function can be fulfilled".
Ivancevich, Konopaske & Matteson (2005:393)	"Knowledge is defined as a conclusion or analysis derived from data and information. Data are facts, statistics, specifics. Information is the context in which data is placed."
Kermally (2002:47)	"Knowledge is the use of information. If you can get your staff to use information (including their training and experience), you have created knowledge. If this knowledge is codified or captured, you have created an appreciating, intangible asset for your organization that, when used, will enhance your business performance."
Leonard & Sensiper (cited in Noe, Colquitt, Simmering & Alvarez 2003:209)	"Knowledge may be defined as information that is relevant, actionable, and at least partially based on experience."
McInerney (2002:1012-1013)	Paraphrase: Knowledge cannot be defined as an intellectual dimension only. Essential aspects of human nature such as intuition, emotion and experience cannot be ignored and therefore mind, body and spirit cannot be separated.
Merriam Webster's collegiate dictionary (McInerney 2002:1009)	Knowledge is the awareness of what one knows through study, reasoning, experience or association, or through various other types of learning. It is "acquaintance with or understanding of science, art, or technique".
Murray (in Uit Beijerse 1999:99)	"Knowledge is information transformed into capabilities for effective action. In effect, knowledge is action."
Nonaka & Takeuchi (1995:21); Kakabadse et al 2003:76)	... "justified true belief" according to Western philosophers. Nonaka and Takeuchi feel that this definition is not perfect in terms of logic. "According to this definition, our belief in the truth of something does not constitute our true knowledge of it, so long as there is a chance, however slight, that our belief is mistaken. Therefore, the pursuit of knowledge in Western philosophy is heavily laden with scepticism, which has induced numerous philosophers to search for the method to help them establish the ultimate truth of knowledge beyond all doubt. They have aimed to discover 'fundamental knowledge without proof or evidence', on which all other knowledge could be grounded."

Nonaka, Toyama & Konno (2002:42)	Traditional definition of knowledge 'as justified true belief'. Their focus is on the 'justified' rather than the 'true' aspect of belief. "In traditional Western epistemology (the theory of knowledge), 'truthfulness' is the essential attribute of knowledge. It is the absolute, static and non-human view of knowledge. This view, however, fails to address the relative, dynamic and humanistic dimensions of knowledge." "Knowledge is dynamic since it is created in social interactions among individuals and organizations."
Oxford English dictionary (cited in McNerney 2002:1009)	Verb forms of knowledge, such as "acknowledging ... recognizing ... inquiring ... being aware ... understanding ... cognisance ... intelligence ... information acquired through study, and learning" show how knowledge is a result of a varied set of processes. These processes also describe the active nature of knowledge.
Taylor (cited in Ponelis & Fairer-Wessels, 1998:2)	... "knowledge is formulated in the minds of individuals through experience. Knowledge is shared between groups and communities through shared experience and through the transfer of knowledge, both tacitly and explicitly. Thus the individual and community (and organization as a specific form of community) has a pool of knowledge. Every task or skill has specific knowledge associated with it."
Turban & Frenzel (cited in Ponelis & Fairer-Wessels, 1998:2)	"Knowledge has several definitions: understanding, a clear and certain perception of something, learning, all that can be perceived or grasped by the mind, practical experience or skill, cognisance, recognition, organized information applicable to problem-solving."
Van der Spek & Spijkervet (cited in Carlson, 2005:19)	"The whole set of insights, experiences, and procedures that are considered correct and true and that therefore guide the thoughts, communications and behaviors of people"
Von Krogh et al (2000:6)	"Knowledge is justified true belief." "An individual justifies the truthfulness of his or her beliefs based on observations of the world; these observations, in turn, depend on a unique viewpoint, personal sensibility, and individual experience. Therefore, when somebody creates knowledge, he or she makes sense out of a new situation by holding justified beliefs and committing to them. Under this definition, knowledge is a construction of reality rather than something that is true in any abstract or universal way. The creating of knowledge is not simply a compilation of facts but a uniquely human process that cannot be reduced or easily replicated. It can involve feelings and belief systems of which one may not even be conscious ..."
Webster's new world dictionary (cited in Carlson 2005:19)	Organized information applicable to problem solving.
Weggeman (cited in Uit Beijerse 1999:99)	"Knowledge is a personal capacity that should be seen as the product of the information, the experience, the skills and the attitude which someone has at a certain point in time."
Wigg (cited in Carlson 2005:19)	"Consists of truths and beliefs, perspectives and concepts, judgements and expectations, methodologies and know-how."

To gain a better understanding of the concept of knowledge, an attempt is made to analyse the above definitions sourced in the literature by dividing the elements mentioned

in all the definitions into four definition categories and stating the number of times that certain elements were mentioned in brackets (tab 2.2).

TABLE 2.2

CATEGORIES OF KNOWLEDGE DEFINITIONS

ORIGINS OF KNOWLEDGE AT INDIVIDUAL, GROUP AND ORGANISATIONAL LEVEL	KNOWLEDGE IS DERIVED FROM INFORMATION	MENTAL STATE, INTELLECTUAL AND SOCIAL CONTINGENCIES (IN CREATING KNOWLEDGE?)	USE OF OR FUNCTIONS OF KNOWLEDGE
<p>Individual level:</p> <ul style="list-style-type: none"> - Originates in the mind of an individual - Originates and applies in the minds of knowers - Expertise that resides in individuals - Formulated in the minds of individuals <p>Group level:</p> <ul style="list-style-type: none"> - Shared between groups - Characteristic of particular groups or interacting set of individuals <p>Organisational level:</p> <ul style="list-style-type: none"> - becomes embedded in documents, repositories, organisational routines, processes, practices and norms - codified and captured, it creates an appreciative, intangible asset for organisations that will enhance business performance 	<p>Knowledge is</p> <ul style="list-style-type: none"> - information that is transformed (2) - information that is interpreted - information that is applied - organised information - contextual information - conclusion or analysis derived from data and information - collection of information and rules with which a certain function can be fulfilled - product of information - use of information - information that is relevant, actionable and at least partially based on experience 	<p>Procedures affected by social contingencies</p> <p>Emerges from complex processes involving social, situational, cultural and institutional factors</p> <p>Varied set of processes that describe the active nature of knowledge</p> <p>Human processes that cannot be reduced or easily replicated</p> <p>Contingencies</p> <ul style="list-style-type: none"> - experience (9) - beliefs (4) - insights/expert insights/complex accumulated expertise (3) - justified true belief (3) (nonhumanistic view – belief in truth does not constitute true knowledge of it) - skills (3) - values (2) - various types of learning (2) - concepts (2) - intuition, emotions and feelings (2) 	<ul style="list-style-type: none"> - Action-relevant meaning (transformed into capabilities for effective action, knowledge is action, human capacity to take effective action in varied and uncertain situations) (4) - Problem solving (2) - Applied to purpose for which it is needed - Guides thoughts, communications and behaviours of people - Decision meaning - Guides organisational action

ORIGINS OF KNOWLEDGE AT INDIVIDUAL, GROUP AND ORGANISATIONAL LEVEL	KNOWLEDGE IS DERIVED FROM INFORMATION	MENTAL STATE, INTELLECTUAL AND SOCIAL CONTINGENCIES (IN CREATING KNOWLEDGE?)	USE OF OR FUNCTIONS OF KNOWLEDGE
		<ul style="list-style-type: none"> - orientations - interests - resources - patterns of social interaction - study - reasoning - association - cognisance - recognition - attitude at a certain point in time - ideas - facts - data (mental state) - techniques recorded in individual's memory - perspectives - judgements - expectations - methodologies - know-how - awareness of what one knows 	

() The number of times an element occurs in the definitions described in table 2.1 is indicated in brackets.

Upon analysing the definitions, the four categories of definitions were developed on the basis of the different elements of these definitions. The definitions in table 2.1 appear to contain details that could be placed in one or more of the categories in table 2.2.

Based on the analysis in table 2.2, **knowledge** can be defined as follows:
Knowledge originates at individual, group and organisational levels. It is derived from information, interpreted and used by these three levels. It is created through different human processes involving social, situational, cultural and institutional factors. It makes use of intellectual and social contingencies, which guide the thoughts, communications and behaviours of people, and leads to definite actions.

2.3 CONTEXTUALISED THEORY BUILDING OF THE TERM "KNOWLEDGE"

It is clear from the above definitions of knowledge that it is difficult to conceptualise and contextualise the term. A generic tool for academic work that contextualises arguments, namely contextualised theory building, was found in the literature (Venzin et al. 1998:27) and deemed to be a useful tool to guide the discussion on the contextualisation of knowledge.

Contextualised theory building is a research methodology that focuses on the close link between the question of why the issue of knowledge is important, epistemological assumptions of knowledge, knowledge appearances and knowledge applications (Venzin et al 1998:26-27). The term "epistemology" refers to the investigation of fundamental assumptions of knowledge (Venzin et al 1998:28).

A research project cannot be placed entirely in one epistemology, which is why Venzin et al (1998:26) see the three epistemologies they discuss (cognitivist studies, connectionist studies and autopoietic epistemology – to be discussed in sec 2.4.2.3) as a continuum in which differences in epistemological assumptions influence the appearance and application of knowledge. While moving between these theory-building steps, new concepts have to be "consistent with the researcher's epistemology and legitimated by the research issue". Existing concepts have to be retrofitted by matching the epistemologies, appearance and application to one's own work (Venzin et al 1998:27).

The four-step theory-building process as applied to this current research can be summarised as follows (tab 2.3).

TABLE 2.3
CONTEXTUALISED THEORY-BUILDING PROCESS

STEPS	EXPLANATION OF STEPS AS APPLIED TO THIS RESEARCH
Step 1: Issue	<ol style="list-style-type: none"> 1. Explain why it has become increasingly important to conduct research on <i>knowledge</i> and <i>knowledge retention</i> in the fields of organisational behaviour, organisational development and knowledge management. 2. How would the organisation benefit from retaining knowledge?
Step 2: Epistemology	<ol style="list-style-type: none"> 1. Investigate fundamental assumptions. 2. Explore process of knowledge development by revealing its epistemological roots. 3. Knowledge concept assumes different forms depending on the epistemologies on which it is based.
Step 3: Appearance (manifestation)	<ol style="list-style-type: none"> 1. Explain the different forms that knowledge can assume, expressed by different adjectives of knowledge (eg tacit, explicit, embedded, encoded, knowing, ...). 2. How previous studies have conceived knowledge in the organisational behaviour, organisational development and knowledge management fields (in the context of this research – related concepts such as learning, information and intellectual capital).
Step 4: Application	<ol style="list-style-type: none"> 1. How the concepts of knowledge and knowledge retention are applied in the fields of organisational behaviour, organisational development and knowledge management in the context of this research.

Source: Adapted from Venzin et al (1998:28–29)

The issue (step 1) of knowledge and knowledge retention explaining why it is important to conduct research on knowledge and knowledge retention was discussed in chapter 1 (sec 1.2). This chapter the focus will be on the nature of knowledge based on the issues explaining the context of the research from a disciplinary perspective and determining the scope of the concept of knowledge in this research. Furthermore, epistemology (step 2) and the appearance (step 3) of knowledge and knowledge retention will be discussed. The application (step 4) of the construct "knowledge" will also be discussed.

2.4 THE NATURE OF KNOWLEDGE

The nature of knowledge can be explained by describing the different disciplines that have had an impact on knowledge management, different models of knowledge management and organisational behaviour from a knowledge perspective, the epistemologies (fundamental assumptions) of knowledge, the different approaches to gaining a better understanding of knowledge (ie object, process, location or levels), the different categories (taxonomies and typologies), knowledge-related concepts and types of knowledge that are important to the organisation.

2.4.1 Conceptualising and contextualising knowledge from a disciplinary and modular perspective

Knowledge and knowledge management are currently the focus of attention of both practitioners and academics and are being addressed in the academic and popular press (Kakabadse et al 2003:75). Many different approaches to conceptualising and contextualising knowledge are evident in the literature (Campos & Sánchez 2003; Carlson 2005; Cook & Brown 2002; Hall 2005; Huemer, Von Krogh & Roos, 1998; Lorenz 2001; Nonaka & Takeuchi 1995; Prahalad 2005; Uit Beijerse 1999; Venzin et al 1998; Von Krogh & Roos 1998), which makes it extremely difficult to conceptualise and contextualise the term “knowledge”.

Bart Nooteboom (Lorenz 2001:308) notes that without an underlying theory and cognition (for understanding processes of knowledge development and use in organisations [Lorenz 2001:307]), the relationship between the various concepts remains obscure and there is little room for scholars to build on one another’s results. Some scholars, inspired by practice, seem to rediscover the same ideas, give them new names and develop their own grounded theory. This makes replication and criticism of research difficult and researchers “will continue to proceed in a fragmented, haphazard, non-cumulated fashion” (Nooteboom cited in Lorenz, 2001:308). In the following section, an attempt is made to gain a better understanding of knowledge from a disciplinary perspective.

2.4.1.1 Disciplines that have impacted on knowledge and knowledge management

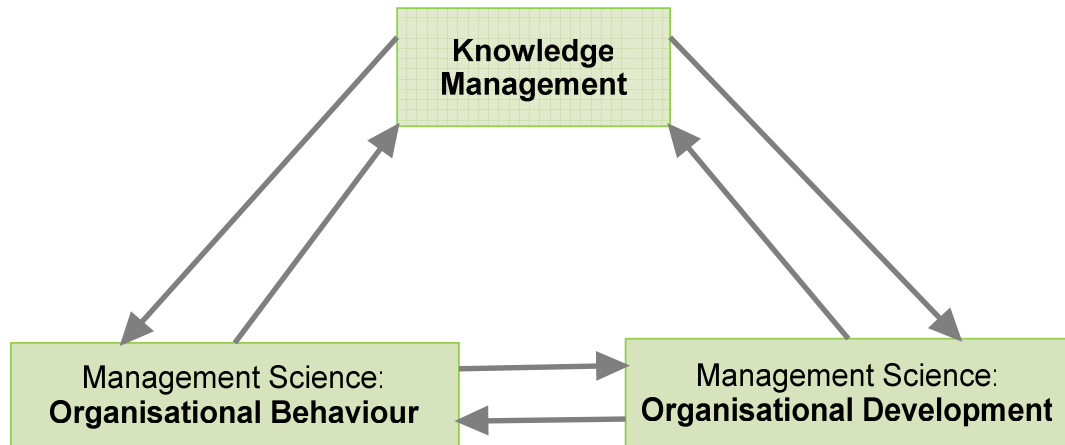
Many different fields have influenced the field of knowledge management thinking, namely (Kakabadse et al 2003:79):

- philosophy, in defining the concept of knowledge
- cognitive science, in understanding knowledge workers
- social science, in understanding people, interactions, motivation, culture, internal and external environment (also endorsed by Martin 2008:373)
- artificial intelligence, in automating routines and knowledge intensive work
- economics, in determining priorities (also endorsed by Martin 2008:373)
- information science, in building knowledge-related capabilities
- management science (also endorsed by Martin 2008:373) in optimising operations and integrating them with the organisation – subdisciplines include organisational behaviour and organisational development:
 - organisational behaviour in understanding and managing individual behaviour, group, social and organisational processes and problems (Willem, Vanderheyden & Cools 2006:28)
 - organisational development in using properly designed and managed knowledge management processes to develop and improve organisational effectiveness and competitiveness (Moerdyk & Van der Westhuizen 2003:182)

Based on the above description of the management sciences, the interdisciplinary approach of this research can be displayed as follows (fig 2.1).

FIGURE 2.1

INTERDISCIPLINARY APPROACH OF THIS RESEARCH



Organisational behaviour and organisational development have been described above. The disciplines that have had an impact on the field of knowledge management have resulted in the formulation of many different working definitions of knowledge and knowledge management (Kakabadse et al 2003:79).

The most popular business definition selected by 73% of 260 UK and European corporations is a “collection of processes that govern the creation, dissemination and utilization of knowledge to fulfil organisational objectives” (Murray & Myers cited in Kakabadse et al 2003:79). According to Eschenfelder, Heckman and Sawyer (in Kakabadse et al 2003:79), most working definitions of knowledge management contain some or all of the following four components:

- business processes
- information technologies
- knowledge repositories
- individual behaviours

These four components permit the organisation to acquire, store, access, maintain and reuse knowledge from different sources (Eschenfelder et al in Kakabadse, et al 2003:79).

The three disciplines that form the foundation of this research need to be further described by investigating appropriate models for each discipline.

2.4.1.2 Taxonomy of knowledge models to conceptualise knowledge in the knowledge management field

Kakabadse et al (2003:75) after examining and comparing different literature, concluded that although the literature reveals particular aspects of knowledge and knowledge management modes, a deeper understanding of knowledge complexities is required. They suggest that a multimodel and multidisciplinary approach should be followed. In their research they examined selected concepts and identified five dominant models (a taxonomy) in the **knowledge management** approach.

Their taxonomy provides a better understanding of the different approaches to knowledge management (Kakabadse et al 2003:76) and will help to clarify the approach adopted in this research. Each of the knowledge management models has a different approach and treats knowledge in its own particular way. These models are summarised in table 2.4 in order to depict the different perspectives.

**TABLE 2.4
KNOWLEDGE MANAGEMENT PERSPECTIVES**

	<i>Philosophy-based model</i>	<i>Cognitive model</i>	<i>Network model</i>	<i>Community of practice model</i>	<i>Quantum model</i>
Treatment of knowledge	Knowledge is "justified true belief"	Knowledge is objectively defined and codified as concepts and facts	Knowledge is external to the adopter in explicit and implicit forms	Knowledge is constructed socially and based on experience	System of possibilities
Dominant metaphor	Epistemology	Memory	Network	Community	Paradox
Focus	Ways of knowing	Knowledge capture and storage	Knowledge acquisition	Knowledge creation and application	Solving paradox and complex issues
Primary aim	Emancipation	To codify and capture explicit knowledge and information – knowledge exploitation	Competitive advantage	Promote knowledge sharing	Learning systems

	<i>Philosophy-based model</i>	<i>Cognitive model</i>	<i>Network model</i>	<i>Community of practice model</i>	<i>Quantum model</i>
Critical lever	Questioning, reflecting and debating	Technology	Boundary spanning	Commitment and trust	Technology
Primary outcomes	New knowledge	Standardization, routinization and recycling of knowledge	Awareness of external development	Application of new knowledge	Creation of multireality
Role of IT-based tools	Almost irrelevant	Critical integrative mechanism	Complementary interactive mechanism	Supporting integrative mechanism	Critical-Knowledge centric

Source: Kakabadse et al (2003:81)

A brief description of each model is given below in order to determine the focus of this research:

a Philosophy-based model of knowledge management

This model is concerned with the epistemology of knowledge or what constitutes knowledge. It focuses on “objectives (values, abstractions, minds), type (concepts, objects, prepositional) and the source of knowledge (perception, memory, reason)”. Its main concern is how humans gather information about social and organisational reality (Kakabadse et al 2003:80-81). It requires questioning and reflection from a practical perspective – in other words, it is concerned about ways of knowing. This model is practised by top teams in learning organisations and has particular relevance in strategic decision-making and visioning processes that impact on the longevity of organisations. The model also implies that knowledge management should not be technology driven (Kakabadse et al 2003: 81–82).

b Cognitive model of knowledge management

According to Swan and Newell (in Kakabadse et al 2003:82), the cognitive model of knowledge management is based on the following contributions:

- recognition of the economic value of knowledge by business and economic disciplines

- continuous effort to drive benefits from information via information management
- the use of information technology (IT)

From this platform organisational theorists have described the concept of knowledge as a valuable strategic asset by suggesting that an organisation should create, locate, capture and share knowledge and expertise in order to apply that knowledge in problem solving and exploiting opportunities. This will enable organisations to remain competitive (Drucker; Kougot & Zander; Winter in Kakabadse et al 2003:82).

Variations of the cognitive model are practised by most organisations that have embarked on a knowledge management drive by putting formal knowledge management processes in place. Some of these are the SECI model (socialisation, externalisation, combination, internationalisation) of Nonaka and Takeuchi (1995), the intellectual capital model of Van Buren (1999), the pillars and functions of the knowledge management model of intellectual capital of Edvinsson and Malone and Wigg (in Kakabadse et al 2003:82). (Some of these models are described in sec 2.4.2.3.)

c Network model of knowledge management

Network models try to develop network structures and ways to control flow of information. These models follow an integrative approach and have a strategic intention of tapping across levels in the organisation and the industry (Swan & Newell in Kakabadse et al 2003:83). This perspective of knowledge management is in line with the theories of network organisations and focus on acquisition, sharing and knowledge transfer. Network organisations are “characterized by horizontal patterns of exchange, interdependent flow of resources and reciprocal lines of communication” (Powell in Kakabadse et al 2003:83). According to Swan and Newell (in Kakabadse et al 2003:83), this perspective acknowledges that individuals have social and economic motives and their actions are motivated by networks of relationships. The focus is on how links between individuals and groups structure coalitions and cliques and facilitate sharing and transfer of knowledge. From the network perspective, the idea of knowledge acquisition and sharing contributes to organisational learning (Everett in Kakabadse et al 2003:83).

IT-based tools are used as facilitating tools for maintaining and building networks with a common function or interest (boundary spanning) in order to transfer shared knowledge (Hayes; Swan & Newell in Kakabadse et al 2003:83).

d Community of practice model of knowledge management

The community of practice model of knowledge management is one of the oldest models based on the sociological and historic perspective. It asserts that all knowledge is founded in the thinking that circulates in a community (Rorty; Barabas in Kakabadse et al 2003:83–84). According to Wenger, McDermott and Snyder (2002:4), communities of practice are groups of people who interact on an ongoing basis while sharing a concern, a set of problems or a passion about a topic in an effort to deepen their knowledge and expertise in this area. Members are informally bound by the values they find in learning together and engaging in informal discussion to help one another solve problems (Kakabadse et al 2003:84). The community of practice model builds on the concept of knowledge that one cannot separate knowledge from practice (Heron; Nonaka & Takeuchi in Kakabadse et al 2003:84).

There is no universal foundation for knowledge. Consensus and agreement in the community (Barabas in Kakabadse et al 2003:84) are the outcome and this often happens through story telling, conversation, coaching and apprenticeship (Kakabadse et al 2003:84; Wenger et al 2002:9). An important characteristic of the community of practice model of knowledge management is that it can retain knowledge in "living" ways instead of in the form of a database or manual. This requires that "explicit knowledge (codified knowledge) be re-interpreted, re-created and appropriated alongside locally situated, contextually specific, often tacit (existing in people's minds) knowledge about organisational practices and processes" (Wilson et al; Swan & Newell in Kakabadse et al 2003:84). People with the relevant tacit knowledge and expertise need to work together on these occasions. They need to recreate and apply the knowledge that was shared and transferred, in new and appropriate ways at local level (Kakabadse et al 2003:84).

From a community of practice perspective, tacit knowledge is described as consisting of "embodied expertise – a deep understanding of complex, interdependent systems that enables dynamic responses to context specific problems". This type of knowledge cannot easily be replicated by competitors (Wenger et al 2002:9).

Communities of practice generally exist informally in organisations and are self-sufficient but require resources such as time and environments that are conducive to learning. Knowledge management is based on interpersonal relations, respect and trust (Swan & Newell in Kakabadse et al 2003:84) and information technology plays a somewhat limited role, if any, in creating, sharing and implementing knowledge. The community of practice model of knowledge management is an interactive-based model found at various operational levels of the organisation (Kakabadse et al 2003:84).

e Quantum model of knowledge management

The quantum model of knowledge management is based on the work of quantum physics, emergent quantum technology and consequential economy. Quantum computing will be able to make rational assessment of complexity and will provide knowledge that makes sense to people. It assumes that current information and communication technology will change when built using quantum principles (Tissen, Andriessen & Depres in Kakabadse et al 2003:84).

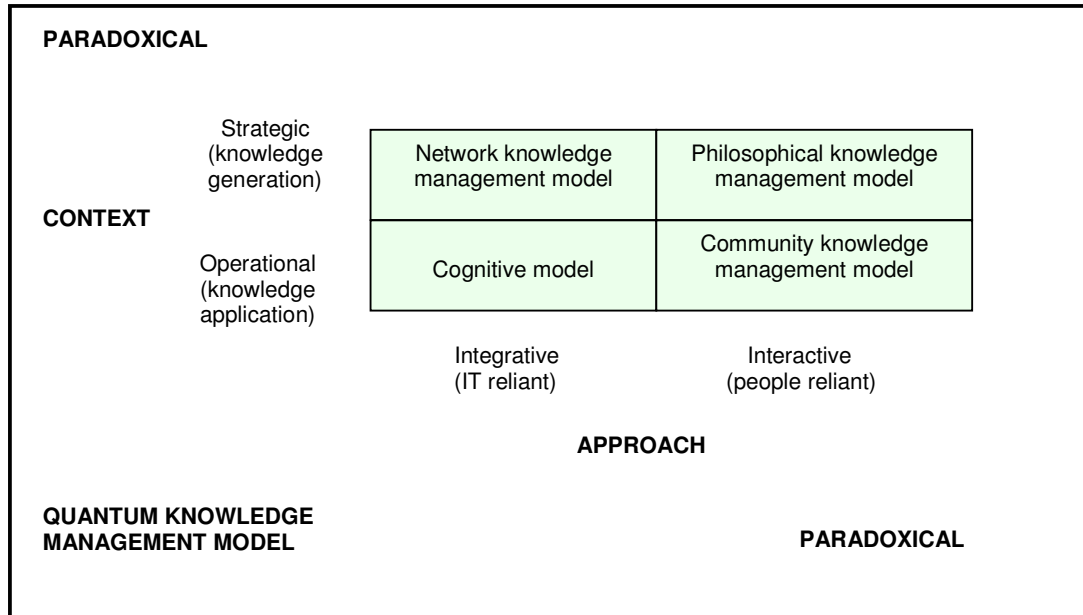
In order to make sense of paradoxes and complexities in decision making, wisdom is required. This type of knowledge is scenario driven, not fact driven, and is achieved through intuition, emotions and empathy. Quantum computing will provide this type of knowledge and wisdom. Quantum models of knowledge management are dependent on quantum computing. These models assume that IT-based tools will perform most intellectual work and provide simultaneous and virtual scenarios of decision outcomes. People will then prioritise value systems and select desired futures (Tissen et al in Kakabadse et al 2003:85).

These types of models are integrative and interactive of operations at all levels in organisations that promote the solving of complex, conflicting and paradoxical problems that are beneficial to all stakeholders (Kakabadse et al 2003:85).

This model does not have much relevance to this research, but as part of the taxonomy of knowledge management models, it is briefly described in order to complete the understanding of the taxonomy.

Kakabadse et al (2003:85) designed a figure that shows the position and approach of the different models (fig 2.2).

FIGURE 2.2
KNOWLEDGE MANAGEMENT MODELS



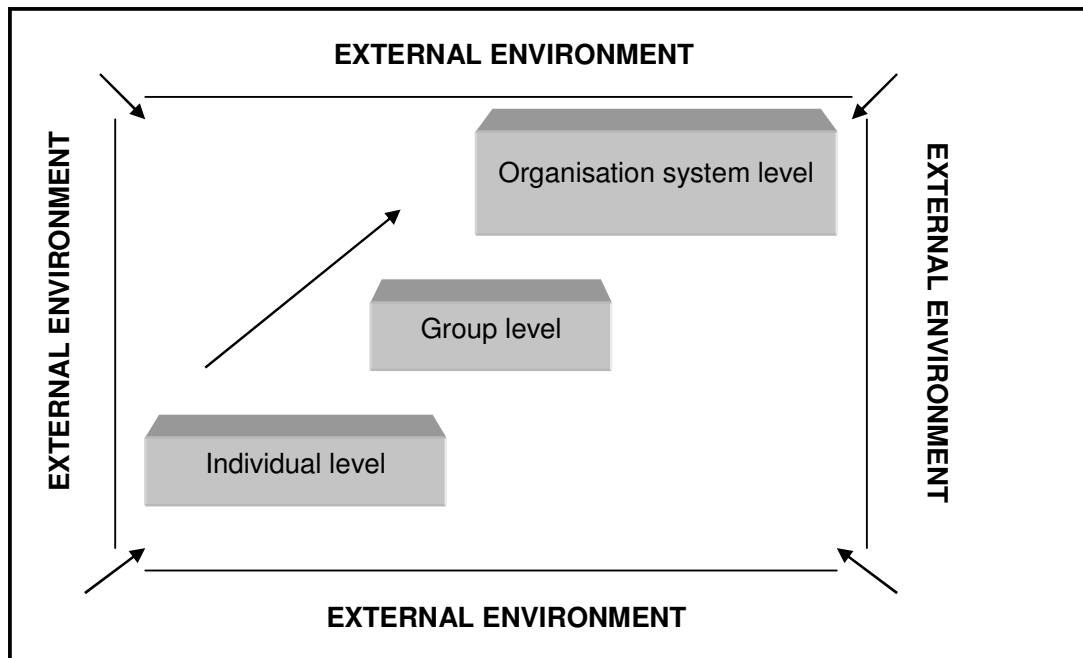
Source: Adapted from Kakabadse et al (2003:85)

According to the above figure, the **approach** adopted in **the current research** is from a people reliant (interactive) perspective. The **context** is at both the strategic and operational levels, which means that the philosophical and community of practice knowledge management models will set the tone for this research. To some extent the network model might also be relevant, specifically in terms of the human perspective of networks, but not the IT perspective. Of course, in a holistic approach, the IT perspective emphasised in the cognitive model and also forming part of the network model cannot be completely ignored, but IT will not be the primary focus of this research.

2.4.1.3 *Organisational behaviour model*

Robbins (2005:26) developed an appropriate model in the organisational behaviour discipline as one of the disciplinary fields that applies to the current research. He explains a basic, skeleton model of organisational behaviour (OB) (fig 2.3).

FIGURE 2.3
BASIC ORGANISATIONAL BEHAVIOUR MODEL



Source: Adapted from Robbins (2005:26); Odendaal & Roodt (2003:15)

The model proposes that there are three levels of analysis. One's understanding of behaviour in organisations is expanded as one moves up the levels. Each level is constructed on the previous levels, which thus act as increasingly complex building blocks. The individual level lays the foundation, which leads to the growth or development of group concepts and, ultimately, one arrives at organisational behaviour by the individual and group levels being overlaid by structural constraints (Robbins 2005:26; Odendaal & Roodt 2003:16). Environmental forces have an effect on the organisation (Odendaal & Roodt 2003:15), which in turn will impact on organisational behaviour.

Robbins (2005:26) and Odendaal and Roodt (2003:15) refer to **dependent variables** such as productivity, staff turnover resulting in loss, absenteeism and job satisfaction. They are the key factors that one would want to explain or predict and are affected by some other factors. The independent variables are the three levels of individual, group and organisation system, and the external environment (Robbins 2005:16-17). The question is: What are the major determinants of the dependent variables (such as staff turnover or knowledge loss)?

The different components of the model can be described as follows:

- At individual level, characteristics such as biographical differences, ability, values, attitudes and emotions, perceptions, learning, individual decision making and motivation are independent variables (Odendaal & Roodt 2003:17)
- At group level, the complexity is increased because of the acknowledgment that people's behaviour in groups is different from their behaviour when they are alone. Groups are more than the sum of their individual members. Factors that could influence group behaviour are effective work teams, communication patterns, leadership styles, power and politics, intergroup relations and levels of conflict (Odendaal & Roodt 2003:17).
- Organisations are more than the sum of their individual members and groups. The design of an organisation, jobs, work processes, HR policies and practices (such as recruitment, selection, training and performance evaluation) and the organisational culture all have an impact on the dependent variables [Robbins 2005:31; Odendaal & Roodt 2003:17]).
- The environmental challenges such as globalisation, innovation, ethics, workforce diversity, employment equity and people skills reflect the interplay between the external environment forces and the actions of managers and employees (Odendaal & Roodt 2003:17).

In the current research, knowledge loss can be regarded as the dependent variable. The determinants of knowledge loss and knowledge retention (ie the factors that would cause knowledge loss and those that would promote or inhibit knowledge retention) would be the independent variables. At this stage these factors are not known, but will be researched in the next chapter.

It is necessary to conceptualise and contextualise knowledge in the OB model in the sense that it explains why knowledge can be viewed at individual, group and organisational level when related to behaviour and to find answers to the research questions. The OB model is particularly significant from an organisational knowledge and organisational behaviour perspective and will be elaborated on in chapter 3. The determining factors (internal and external) and the three levels as building blocks might

form one of the components of the model that will be developed as a result of this research.

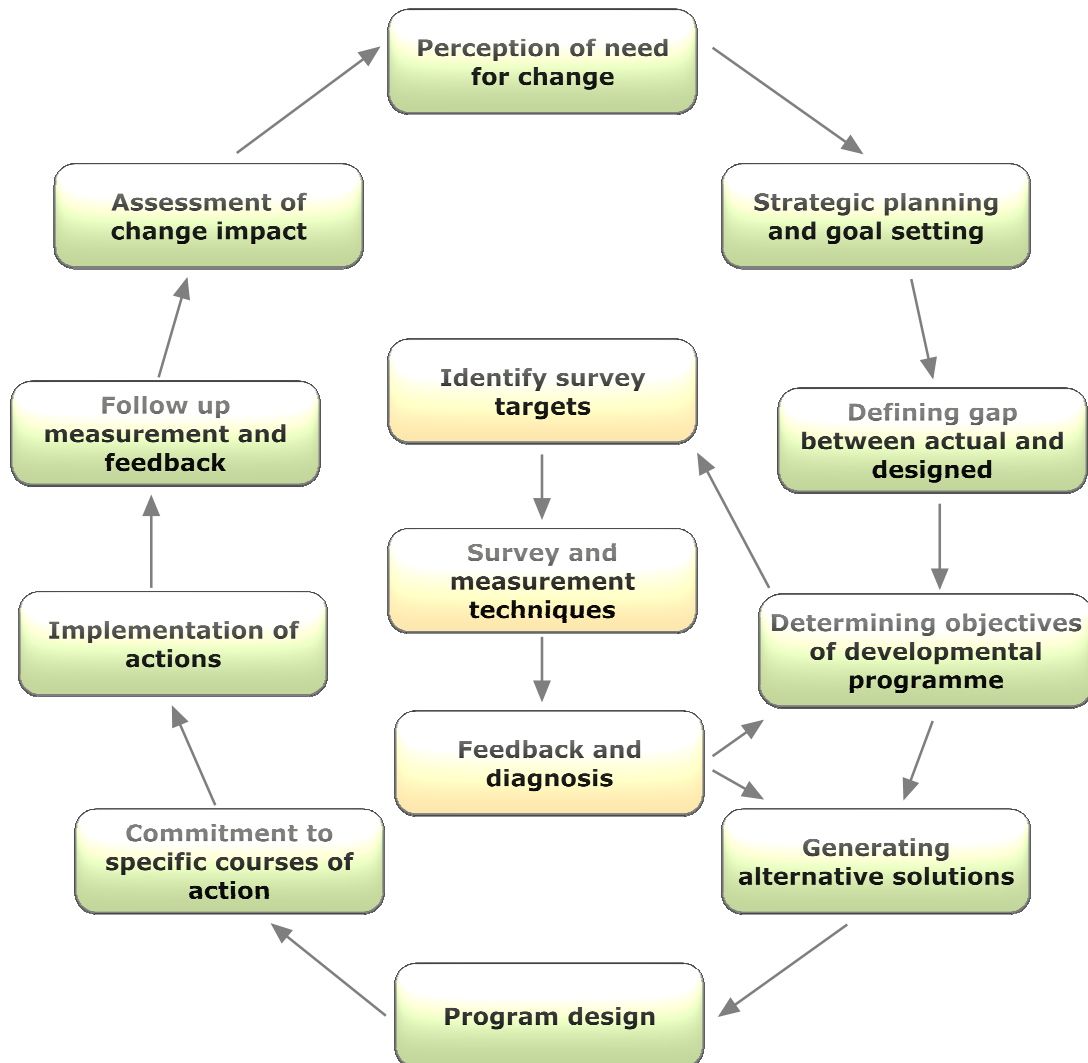
2.4.1.4 Organisational development model

Organisational development (OD) is the third disciplinary focus of the current research. Different traditional focuses and the more recent approaches in the field are discussed. Traditionally in the Western world, experts in the OD field focused on improving organisational functioning by improving organisational structures and processes including group functioning. Non-Western experts have concentrated on bringing the expression of creativity into organisations and accepting the view that humans are an organisation's most valuable asset, therefore focusing on humanised organisations by empowering people and caring for them (Van Aardt & Moerdyk 2003:16).

Another traditional focus of the OD process of improving organisations was to regard OD as a linear process turning an undesirable situation into a more desirable process. The OD process was thus regarded as having been completed once the desirable situation had been realised. However, it has recently been realised that the OD process is ongoing in the sense that OD occurs continuously as a basic philosophy or lifestyle, not only as a cure to organisational illness. A case in point would be the idea of the learning organisation that Senge (in Van Aardt & Moerdyk 2003:17) introduced. This approach is illustrated in the circular conception of the OD process model in figure 2.4.

FIGURE 2.4

A CIRCULAR CONCEPTION OF THE OD PROCESS



Source: Van Aardt & Moerdyk (2003:18)

The main features of the model are as follows: to identify the need for change; determine the gap between the desired and actual situation in the strategic framework; determine the objectives of the developmental programme; measure the current situation; diagnose and give feedback to management and employees; generate alternative solutions; design the most applicable interventions; obtain buy-in and commitment for implementation; implement interventions; do follow-up measurement; and assess the impact of the change. This process happens on a continuous basis.

In light of the discussion on **the nature of knowledge** above, the **focus of the current research** can be explained as follows:

- It is based on a **multidisciplinary** approach involving knowledge management, organisational behaviour and organisational development.
- The research is also conducted on the basis of a multimodel approach since it spans the philosophy-based model and the community of practice model (and to some extent the network model and cognitive model) in the knowledge management field.
- Another reason why the disciplines and taxonomy of knowledge management models were discussed here was to set the stage for the conceptualisation and contextualisation of the term “knowledge”, which is approached from an epistemological perspective.
- The organisational behaviour model explains the three levels at which knowledge may be conceptualised and contextualised. It also lays the foundation for the research to be conducted in chapter 3.
- The organisational development model is the practical implementation of a continuous process such as the implementation of a knowledge retention strategy as a consequence to the findings of the empirical research to be conducted.
- The outcome of this research should produce a new model with the specific intention of retaining knowledge in organisations that might be lost when employees leave the organisations.

2.4.2 Importance of the epistemological process

It is necessary to understand knowledge from an epistemological perspective because many of the models of knowledge developed by researchers stem from an epistemological background (as illustrated in sec 2.4.2.3).

Epistemology refers to the status and nature of knowledge – how we know the world (Dick & Ellis 2006:10). Nonaka and Takeuchi (1995:20) refer to epistemology as the philosophical enquiry of knowledge. Another description of epistemology is that it is the discipline that studies what the entire person knows, including thinking, feeling, communicating and acting (Shera in McInnery 2002:1015). This view of epistemology indicates that knowledge relies on both the mind and the body (McInnery 2002:1015).

Eastman and Bailey (1996:2) question whether epistemology really matters by asking the following questions: “What is the relationship, if any, between philosophical enquiry into the nature and conditions of knowledge and the particular kinds of knowledge that are actually created, disseminated, and acted on in academic disciplines and elsewhere?” and “Is there a point to writing about epistemology, or should concern for effective, just, or emancipatory action lead organisational scholars to extend Wittgenstein’s dictum and remain silent about that which we cannot speak fruitfully?”. Eastman and Bailey (1996:3) suggest that academics who wish to exert influence should change their way of expression by making it more action oriented and more connected to their audience’s interests.

In contrast to the above argument, Venzin et al (1998:28) point out that theory building requires careful investigation of fundamental assumptions by first exploring the process of knowledge development by revealing its epistemological roots and then exploring the concept of knowledge itself. They argue that concepts assume different forms, depending on the epistemology on which they are based, which emphasises the significance of epistemology for contextualised theory building. Additional reasons why Venzin et al (1998:36-37) feel that the study of epistemology is important, are the following more practice-oriented reasons:

- familiarity with the different possible epistemologies gives a larger knowledge management repertoire with a better understanding of the limitations of each approach – hence the understanding of epistemology assumptions should ensure effective knowledge management
- knowing more about existing epistemologies facilitates understanding of context since knowledge development is context dependent – individuals and organisations do not know in one single way and it is therefore necessary for

managers to understand and interpret changes in epistemology from an organisational perspective in order to decrease misunderstandings

- recognising different epistemologies which might make it possible to select and apply a distinct epistemology – according to Venzin et al (1998:37), “the conscious choice of an epistemological model is a critical success factor for research and management”

Based on the above reasons for fostering a better understanding of epistemology, the following section focuses on a brief layout of the historical development of Western epistemology, followed by the different philosophical challenges researchers were faced with in the 20th century, and then discussing the different epistemologies of knowledge found in the literature.

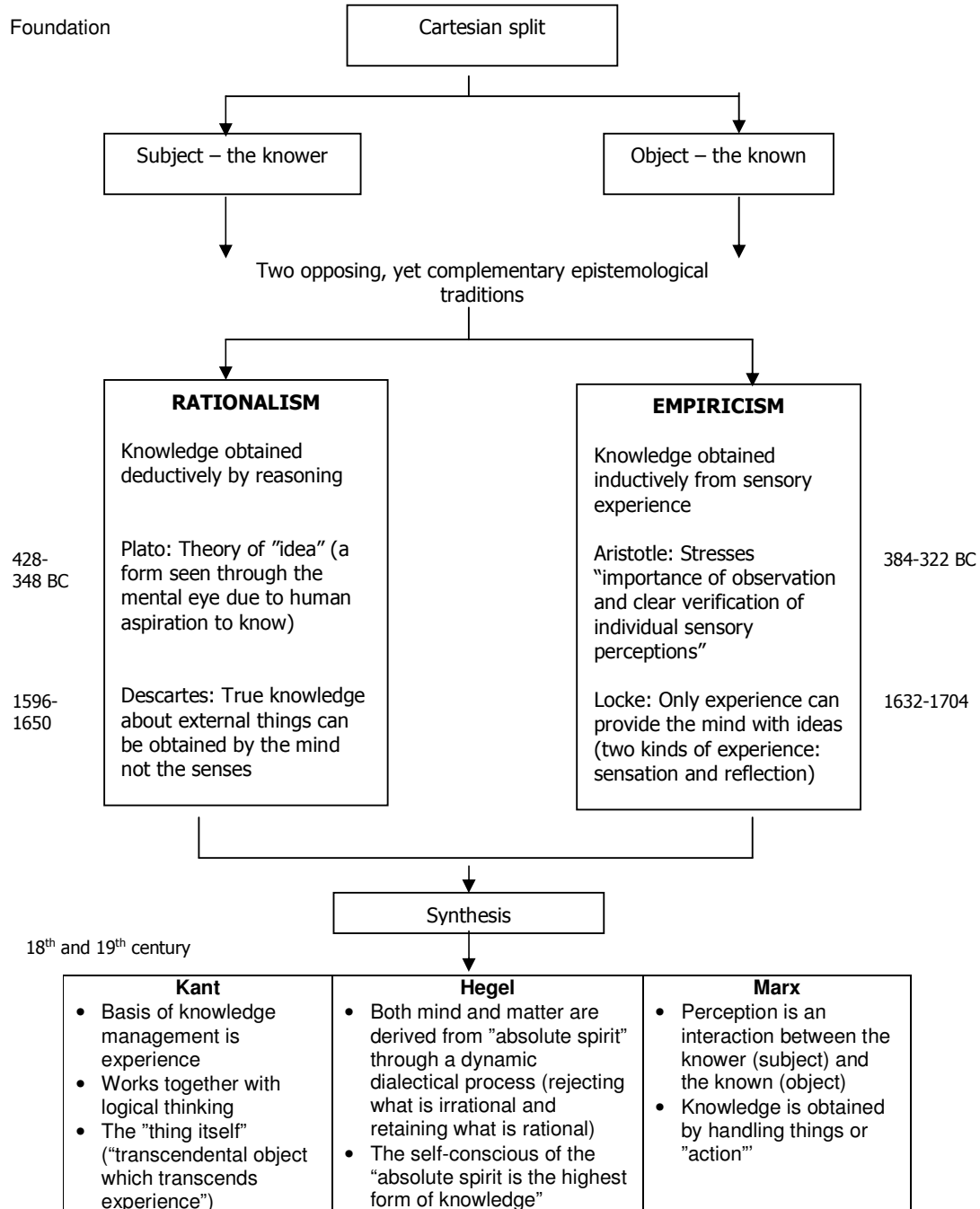
2.4.2.1 Historical development of Western epistemology

A description of the historical development of Western epistemology enables the researcher to examine the fundamental assumptions about what knowledge is and how it is generated.

Figure 2.5 is based on the work of Nonaka and Takeuchi (1995) in order to provide an overview of this historical development.

FIGURE 2.5

HISTORICAL DEVELOPMENT OF WESTERN EPISTEMOLOGY (PHILOSOPHICAL INQUIRY OF KNOWLEDGE)



Source: Adapted from Loslee (1980:5, 16, 70, 95); Nonaka & Takeuchi (1995:20–25)

The foundation of Western philosophy came about through a long tradition of separating the subject (the knower) from the object that is known. Descartes was the person who gave this tradition a solid methodological basis by postulating the so-called "Cartesian split" between subject (knower) and object (the known), mind and matter, or mind and body (Nonaka & Takeuchi, 1995:20). Cook and Brown (2002:72) also mention that the individual is regarded as primary.

The next two centuries were spent trying to overcome this Cartesian dualism (Nonaka & Takeuchi 1995:20). Two main streams of epistemological traditions developed from the above Western philosophical tradition, namely **rationalism** and **empiricism**, two opposing, yet complementary traditions (as depicted in fig 2.5). **Rationalism** refers to knowledge obtained deductively through reasoning about mental constructs such as concepts, laws and theories (Cook & Brown 2002:72; Nonaka & Takeuchi 1995:21–22). According to the rationalism tradition, "true knowledge is not a product of sensory experience but some ideal mental process" (Nonaka & Takeuchi 1995:21). Absolute truth is deduced from rational reasoning grounded in established or underlying accepted principles (Nonaka & Takeuchi 1995:21).

Empiricism refers to knowledge obtained inductively from sensory experience through, say, experimental science. According to this view, mere perception is significant, even when one has an illusory perception.

The two main differences between these two streams are as follows:

- what constitutes the actual source of knowledge
- the method whereby knowledge is obtained (ie deductively or inductively) (Nonaka & Takeuchi 1995:22)

These main differences can be noted to some extent by the contributions of Plato versus those of Aristotle and Descartes versus those of Locke, as briefly depicted in figure 2.5. Plato and Descartes's views of knowledge were based on obtaining knowledge through the mind, whereas Aristotle and Locke emphasised sensory experience.

The 18th and 19th century posed a synthesis between the two main streams of rationalism and empiricism. Some contributors such as Kant, Hegel and Marx tried to bring **mind and**

body together through their philosophical arguments – that is, mental reasoning and experience are deemed to constitute knowledge.

2.4.2.2 *Challenges to the Cartesian split during the 20th century*

The assumption that the essence of a human being lies in the rational thinking self, isolated from the rest of the world when seeking knowledge, formed the basis of the Cartesian dualism of mind and body or subject and object. During the 20th century, contemporary challenges to the Cartesian split emphasised the importance of some form of interaction between the self and the rest of the world when seeking knowledge (Nonaka & Takeuchi 1995:25).

Different contributors such as Husserl, Heidegger, Wittgenstein, James and Dewey approached this interaction between the self and the world from different philosophical perspectives, as outlined in table 2.5.

TABLE 2.5
20th-CENTURY CHALLENGES TO THE CARTESIAN SPLIT

<i>Philosophies</i>	<i>Contributors</i>	<i>Description</i>
Phenomenology (philosophical enquiry into human consciousness of self and objects outside self) (Nonaka & Takeuchi 1995:25-26)	Husserl, Edmund	<ul style="list-style-type: none"> • Focused on relationship between the thinking self and the world • Highlighted importance of conscious direct experience • Pure consciousness can be reached through "phenomenological reduction"
	Heidegger, Martin	<ul style="list-style-type: none"> • Analysed the "dasein" (mode of human being in world) • Practical behaviours such as producing something, having to do with something, making use of something must employ "theoretical cognition" • Being in the world is characterised by active relationships with other things in the world
Existentialism (philosophical inquiry into individual human existence and living experience – Russel in Nonaka & Takeuchi 1995:26)	Sartre, Jean Paul	<ul style="list-style-type: none"> • Focused on knowing the world through acting towards an end • The act must be defined by an intention • Intention is a choice of the end • It is intentional choice of the end, which reveals the world
Analytical philosophy (language with which phenomena are described) (Nonaka & Takeuchi 1995:27)	Wittgenstein, Ludwig	<ul style="list-style-type: none"> • Focused on the language with which phenomena are described • Viewed language as a "picture" of reality that corresponds to logic • Rejected metaphysics as "nonsensical" by saying: "What we cannot speak about we

Philosophies	Contributors	Description
		<p>must pass over in silence” (Ayer in Nonaka & Takeuchi 1995:27)</p> <ul style="list-style-type: none"> • Later in his life, linked the meaning of the word “knows” to “can”, “is able to”
Pragmatism (American philosophical tradition) (Nonaka & Takeuchi 1995:27)	James, William	<ul style="list-style-type: none"> • Argued that if an idea works (eg has cash value) it is true (meaningful)
	Dewey, John	<ul style="list-style-type: none"> • Ideas are worthless unless they pass into actions, which rearrange or reconstruct the world in which we live in some way
	Davenport, Thomas and Prusak, Lawrence	<ul style="list-style-type: none"> • Knowledge originates and is applied in the mind of knowers • Experience, values, contextual information and expert insights provide a framework for evaluating and incorporating new ideas • Sharing of knowledge between knowers is emphasised • Knowledge becomes embedded in documents, repositories, organisation processes, routines, practices and norms (Choo 2003:209)
Positivism (empiricism tradition) (Dick & Ellis 2006:10)		<ul style="list-style-type: none"> • Positivism is a paradigm in the hard sciences (eg chemistry and physics) and social sciences (eg organisational behaviour) • Knowledge about the world should be obtained through empirical methods (ie through actual experience of how the world behaves and then reporting on these experiences) • The world possesses objective characteristics that can be verified repeatedly in the correct conditions, which means that those characteristics are valid and reliable (Dick & Ellis 2006:11; Vera & Crossan 2003:125) • The truth of knowledge is understood as the extent to which representations correspond to the outside world (Nonaka, in Martin 2008:372)
Postmodernism (Kakabadse et al 2003:78)	Kuhn, [?]; Habermas, Jurgen; Lyotard, Jean Francis; and others cited in Kakabadse et al (2003:79)	<ul style="list-style-type: none"> • Search for universal truth and argue that “there is no universal foundation of knowledge, only agreement and consensus of the community” (Barabas in Kakabadse et al 2003:79) • History and culture are the context of all knowledge (Agger in Kakabadse et al 2003:79)

Source: Choo (2003:209); Dick & Ellis (2006:10–11); Kakabadese et al (2003:78–79); Nonaka & Takeuchi (1995:25–27); Martin (2008:372)

It is interesting to note that many of these contributions bring out the relationship between knowledge and action. This human action therefore refers to what is possessed in the individual's mind and to what is part of practice (Cook & Brown 2002:70). Another observation is that phenomenology tries to describe and analyse phenomena in terms of how they appear to our consciousness, whereas analytical philosophy uses language to describe phenomena (Nonaka & Takeuchi 1995:26). Pragmatism tries to develop an interactive relationship between the world and individuals by means of action, experience and experiment (Nonaka & Takeuchi 1995:27). Positivism emphasises empirical methods of obtaining knowledge through experience (Dick & Ellis 2006:10). The postmodernists criticise positivism which views scientific truth/knowledge as being merely the construction or reconstruction of language in a local context. They perceive knowledge to allow for continual change in reality and knowledge and that no single *a priori* thought system should govern belief or investigation (Kakabadse et al 2003:78–79). Furthermore, most of these philosophies about knowledge focus on the individual and not the group, and they do not distinguish between different kinds of knowledge (eg tacit or explicit) (in other words, knowledge is treated as one of a kind) (Cook & Brown 2002:69).

According to Cook and Brown (2002:72), Cartesian epistemology has made the development of an understanding of categories other than the individual, for example, difficult, and this epistemology needs to be broadened to describe other levels and types of knowledge as well. Looking at knowledge from an individual, group and organisational level is referred to as the **ontological** approach of knowledge (Campos & Sánchez 2003:7). Dick and Ellis (2006:10) refer to ontology as the study of the nature of the world. This reference to the three levels corresponds to the organisational behaviour model described in section 2.4.1.3.

Positivism continues to be the paradigm in the organisational behaviour field. The dominant ideas in organisational behaviour are that the world can be modelled and that events or behaviours can be predicted (Dick & Ellis 2006:11).

2.4.2.3 Different epistemological models and theories of knowledge found in the literature

Models and theories are closely intertwined, and the differences between them are mainly of degree. According to Mouton and Marais (1991:141), it is not always necessary to draw rigid distinctions between models and theories and this discussion will therefore not

make this clear distinction because the purpose here is to highlight the many different epistemological conceptualisations found in the literature. These different approaches are depicted in table 2.6.

**TABLE 2.6
COMPARISON OF EPISTEMOLOGICAL THEORIES AND MODELS OF KNOWLEDGE**

Year of reference or cited reference	Author and relevance to study	Discipline	Philosophical perspective or approach	Description of theories and models
[1958; 1966]	Polanyi (in Easterby-Smith & Lyles 2003:8; Hall 2005:171; Nonaka & Takeuchi 1995:59-60) <ul style="list-style-type: none"> Initial researcher who distinguishes between tacit and explicit knowledge 	Knowledge management	Philosophical analysis	Distinction between tacit and explicit knowledge ("we can know more than we can tell")
[1972; 1974a, b; 1982; 1994]	Popper (in Hall 2005:172) <ul style="list-style-type: none"> Appropriate to studies of organisational knowledge 	Knowledge management	Organisational knowledge theory	Three worlds and evolutionary epistemology: <ul style="list-style-type: none"> world 1 – existence/reality world 2 – organismic personal knowledge world 3 – objective knowledge
1988	Debons, Horne & Cronenweth (1988) <ul style="list-style-type: none"> Information science field 	Knowledge management (information science)	Hierarchical view also referred to as reductionist view by Styhre (2003:32)	Hierarchical view of knowledge: Data → information → knowledge → wisdom (expertise, capability)

Year of reference or cited reference	Author and relevance to study	Discipline	Philosophical perspective or approach	Description of theories and models
1995	Nonaka & Takeuchi <ul style="list-style-type: none"> Well known in knowledge management filed 	Knowledge management	<ul style="list-style-type: none"> Different to traditional Western epistemology Autopoietic (Venzin et al 1998:42) Cognitive [SECI model] (Edvinson & Malone; Wigg, in Kakabadse et al 2003:82) 	<p>Framework for knowledge creation. Two dimensions:</p> <ul style="list-style-type: none"> epistemology (tacit and explicit) ontology <p>Resulted in model of knowledge creation (SECI)</p>
1998	Venzin et al (1998:37–39) Simon (in Venzin et al 1998:38–39) <ul style="list-style-type: none"> Background to organisational context of this research 	Knowledge management	Cognitive science	<p>Cognitivist epistemology (representation):</p> <ul style="list-style-type: none"> Organisations are regarded as open systems that develop knowledge by formulating representations of their predefined world Data accumulation and dissemination are the major knowledge development activities Knowledge is developed by processing incoming data according to universal rules.
1998	Zander & Kogut (in Venzin et al 1998:40-41) <ul style="list-style-type: none"> Background to organisational context of this research 	Knowledge management	Connectionist	<p>Connectionistic epistemology (network):</p> <ul style="list-style-type: none"> Organisations are regarded as self-organised networks composed of relationships Representation of reality occurs through rules that vary locally The main method is to focus on relationships and not on the individual or the entire system
1998	Venzin et al (1998:41–44) <ul style="list-style-type: none"> Background to organisational context of this research 	Knowledge management	Autopoiesis – origin in field of neurobiology at a biochemical/cellular level using language. Name derived from Greek words: <i>auto</i> (self) and <i>poiesis/poein</i> (production)	<p>Autopoietic epistemology:</p> <ul style="list-style-type: none"> Autopoietic systems are simultaneously open to data and closed to information and knowledge The cycle of self-production of a cell as a living system characterises the theory of autopoiesis The world is not perceived as a fixed entity because it is not possible to represent reality
1998	Blackler, Crump & McDonald (1998:74–	Organisational behaviour	Process built on characteristics of "knowing"	<p>Knowing as a process</p> <p>Knowledge is analysed as follows:</p>

Year of reference or cited reference	Author and relevance to study	Discipline	Philosophical perspective or approach	Description of theories and models
	76) • Explains the concept "knowing"	Knowledge management	Constructivist perspective	<ul style="list-style-type: none"> • provisional and reflexive • mediated by linguistic and technical infrastructure • situated and pragmatic • contested and political • emotional and rational
1998	Davenport & Prusak (1998:chs 3, 4 & 5) • Well known in knowledge management field	Knowledge management	Pragmatism. Processes of knowledge management (operational view)	Describes three knowledge management processes: <ul style="list-style-type: none"> • generation of knowledge • codification of knowledge • transfer of knowledge
2001	Lorenz (2001) • Only model found in organisational behaviour field	Organisational behaviour	Cognitive	Describes three different cognitive theories of human cognition used to understand processes of knowledge use and development in organisations: <ul style="list-style-type: none"> • information-processing approach • situated learning (situated action and communities of practice approach) • cultural-historical approach
2002	Cook & Brown (2002) • Foundation of current research	Knowledge management	Combination between cognitivism and pragmatism as an explanation of epistemology	Epistemology of possession: <ul style="list-style-type: none"> • knowledge of individuals/groups • explicit/tacit knowledge Epistemology of practice: <ul style="list-style-type: none"> • knowing as action Bridging epistemologies as knowledge and knowing as action
2003	Styhre (2003) • Background to this	Knowledge management	Pragmatism Process-based view	Knowledge is fluid and moving, embedded in social relationships and emerges in the practices and use of concepts

Year of reference or cited reference	Author and relevance to study	Discipline	Philosophical perspective or approach	Description of theories and models
2003	Campos & Sánchez (2003) <ul style="list-style-type: none"> • Foundation of the current research 	Knowledge management	Constructionist perspective Cognitive Autopoietic Systemic (input-process-output)	Examines four conceptual dimensions of knowledge: <ul style="list-style-type: none"> • epistemological • ontological • systemic • strategic
2005	Carlson (2005) <ul style="list-style-type: none"> • New perspective on knowledge, but complex Links to behaviour 	Knowledge management	Pragmatism Functional view	Knowledge matrix <ul style="list-style-type: none"> • functional view of knowledge rather than descriptive • problem-centred conceptualisation of knowledge • effect of knowledge on outcomes happens through functions of the environment and individual behaviour
2005	Hall (2005) <ul style="list-style-type: none"> • Organisational development field 	Organisational development	Biological approach to the analysis of learning organisations Autopoesis	Based on complexity theory, autopoiesis and evolutionary epistemology <ul style="list-style-type: none"> • observing • orienting • deciding • acting
2005	Prahalad (2005) <ul style="list-style-type: none"> • Organisational development field 	Organisational development	Futuristic model based on organisational competencies	Model of an organisation's competence base: <ul style="list-style-type: none"> • people-embodied knowledge • capital-embodied knowledge

Note: Original dates referring to researcher of theory or model in square brackets [] in "year of reference or cited reference" column.
The bullet (•) in the "author and relevance to study column" describes the relevance of the theory or model to the current study.

Table 2.6 gives an overview of some of the contributions made in recent years to the epistemological investigation of knowledge. This overview is by no means complete. The relevance of each theory or model to the study is indicated in the author column. More detail of each contribution is outlined below. An effort is made to identify the disciplinary field(s) relating to these theories and models, the philosophical approach or perspective and a brief description of the theories and models.

a *Michael Polanyi (1958; 1966): distinction between tacit and explicit knowledge*

Polanyi is best known for his distinction between tacit and explicit knowledge. His ideas are based on philosophical analysis and not empirical evidence. Some would argue in support of this philosophical distinction saying that tacit knowledge is unconscious and thus cannot be examined empirically (Easterby-Smith & Lyles 2003:8).

According to Polanyi (in Nonaka & Takeuchi 1995:60), individuals acquire knowledge by creating and organising their own experiences (in other words, becoming involved with the object – Uit Beijerse 1999:100). Hall (2005:171) points out that Polanyi focused primarily on "personal" knowledge that was often tacit. Knowledge that can be expressed in words is merely the tip of the iceberg (Choo 2003:211; Nonaka & Takeuchi 1995:60; Uit Beijerse 1999:100) because most personal knowledge exists in people's minds. Tacit knowledge is not easily visible and expressible, hard to formalise and highly personal, making it difficult to express in words (Choo 2003:211). Explicit knowledge can be expressed in words and numbers, codified, easily communicated and shared in the form of, say, hard data, codified procedures and universal principles (Choo 2003:207). These two concepts are referred to throughout the remainder of the chapter (particularly in secs 2.4.3.5a and 2.4.3.6), which indicates their importance as types of knowledge.

b *Popper (1972; 1974; 1982; 1994): three worlds and evolutionary epistemology*

Karl Popper divided existence and products of cognition into three ontologically related domains that he referred to as "worlds". Hall (2005:172–173) adapted these three worlds, which can be described as follows:

(1) *World 1: existence/reality.* This represents the ultimate "truth" of knowledge of the world represented by dynamic physical reality controlled by the universal laws of physics, chemistry, biochemistry, thermodynamics and energy.

(2) *World 2: organismic/personal knowledge.* This world comprises of cognition and eventually consciousness of distinguishable entities formed in world 1. Language and writing enable humans to articulate their beliefs symbolically and share the resulting claims as the objective world 3 hypothesis-inferring aspects of world 1. These claims can be “scientifically criticised on the basis of logic and evidence external to the knowing individual” (Hall 2005: 172–173).

(3) *World 3: objective knowledge.* Knowledge in this world is produced or evaluated by world 2 processes. It is composed of the logical content produced by cognition (eg the logical content of computer memories encoded in bit patterns, contents of books, libraries, etc, encoded in language) (Hall 2005:173).

Popper distinguishes between two different senses of knowledge relating to these three worlds, namely:

- subjective knowledge (consists of a frame of mind or consciousness or a tendency to behave or react)
- objective knowledge (consists of problems, theories and arguments) – knowledge in this sense is without a knower or knowing subject (Hall 2005:173)

Popper contends that knowledge is a belief or theory about reality that can be acted on, particularly in a framework of problem solving (Hall 2005:174).

According to Hall (2005:172), Popper “extends the concepts of knowledge in ways that inform the development of organisational knowledge theory”. It seems to be more appropriate to the studies of organisational knowledge than the epistemology of Polanyi. However, explicit knowledge is the primary focus of Popper’s epistemology (Hall 2005:172–173).

c Debons et al (1988): hierarchical view of knowledge

Hierarchical views of knowledge representing levels of summarisation are common in the knowledge management literature (Alter; Beckman; Clark & Rollo; Davenport & Prusak; Tobin; Van der Spek & Spijkervet in Carlson 2005:3). Beckman (in Carlson 2005:3–4) for

example, distinguished between data, information, knowledge, expertise and capability. These distinctions are individual and context specific. What could be regarded as data by one person might be regarded as information or knowledge by another. In other words, these distinctions are often arbitrary and not necessarily properties of that which is to be "known". This makes the hierarchical distinction difficult to apply across individuals and contexts, which means that these distinctions are not useful in formal knowledge management systems (Lang in Carlson 2005:4).

d Nonaka and Takeuchi (1995): SECI model

Nonaka and Takeuchi (1995:56) developed their framework to describe innovation. They articulate that the Cartesian split between the knower and the known was sufficient to explain that organisations process information from the external environment in order to adapt to new circumstances (view of the organisation as a mechanism for "information processing"). Their perspective does not explain innovation (creation of new knowledge) because organisations do not simply process information when they innovate in order to solve existing problems and adapt to changes in the environment. The knowledge creation to address these issues happens from the inside out. It is new knowledge that is created in order to innovate and not merely the processing of information from the outside.

The cornerstone of Nonaka and Takeuchi's (1995) epistemology is their distinction between tacit and explicit knowledge. Furthermore, their focus is not on the individual but on the organisational level of knowledge creation, which is why their theory is built on its own "distinctive ontology" (addressing knowledge creation from individual, group, organisational and inter-organisation levels – the knowledge-creating entities) (Chou & Tsai 2004:205; Nonaka & Takeuchi 1995:56–57).

Nonaka and Takeuchi (1995:62) assumed that knowledge is created through the interaction between tacit and explicit knowledge, which led them to postulate four different modes of knowledge conversion. This postulation was eventually referred to as the SECI model of knowledge conversion. These modes of knowledge conversion are as follows:

(1) *Socialisation*. The process of converting new tacit knowledge into shared experiences (say, through informal social meetings, apprenticeship socialisation, on-the-job training, practising and training).

(2) *Externalisation*. The process of articulating tacit knowledge into explicit knowledge (eg during product development and quality control processes using years of experience to adapt and improve products, say, through the use of metaphors, analogies and models in language).

(3) *Combination*. The process of converting explicit knowledge into more systematic and complex sets of explicit knowledge (eg producing a financial report from information collected from several sources and then sharing it with others, knowledge combined through meetings, documents, telephonic conversations and exchange of information through computer networks).

(4) *Internalisation*. The process of embodying explicit knowledge into tacit knowledge. This is closely related to "learning by doing". This is where action and practice come into play. Internalisation of knowledge allows the knowledge to become part of the individual's tacit knowledge base in the form of shared technical know-how or mental models. According to Uit Beijerse (1999:100), internalisation is evident, say, when experienced managers give lectures or when new workers "relive" a project by studying the archives thereof. When this acquired tacit knowledge is shared with others, it sets off a new spiral of knowledge creation through socialisation (Nonaka et al 2002:44–45; Uit Beijerse 1999:100).

Li and Goa (2003:6) caution against the use of Nonaka's SECI model of knowledge creation when the model is extended for broader application. The SECI model appears to have emanated from certain Japanese manufacturing companies that use assembly lines – hence the need for caution when using the model in other applications.

Li and Goa (2003:6) also critically review the role of tacit knowledge in organisations, stating that the tacit dimension of knowledge in the context of Nonaka's model is different from that in Polanyi's original context. Li and Goa (2003:6) argue that Nonaka's tacit dimensions include implicitness, which is not clearly defined or taken into consideration in the SECI model. Implicitness, another form of expressing knowing, is knowledge that can be articulated, which individuals are unwilling to do because of specific reasons in specific circumstances (such as individual behaviour, cultural customs or organisational culture and style). The point Li and Goa (2003:13) are trying to make is that unawareness of the nuance between tacitness and implicitness of knowledge as well as the combination of

individual behaviour, organisational culture and cultural customs may misdirect strategy planning and resource allocation when managing knowledge in organisations.

They recommend that those wishing to explore and leverage tacit knowledge in their organisations need to

- identify knowledge hierarchies in their organisations
- examine the richness of tacit knowledge in specific contexts
- choose proper methodology (Li & Goa 2003:13)

e Venzin et al (1998): cognitivist epistemology

The cognitivist epistemology originated in the mid 1950s by researchers such as Herbert Simon, Noam Chomsky, Johan McCarthy, Marvin Minsky and others (Venzin et al 1998:37; Von Krogh et al 2000:27). However, it is listed under Venzin et al in table 2.6 because this source gives a clear description of the cognitivist epistemology (Venzin et al 1998:37).

Most cognitivist approaches regard knowledge as being equal to information and data. Information is gathered from the external environment, stored in the brain as facts, related to existing experiences and then created into pictures of the world. Knowledge consists of these representations and collections of abstract symbols that are stored in the mind (Lorenz 2001:309). The environment is pre-given, and what varies from one person to the next is the ability to present reality. The "truth" of knowledge is regarded as the degree to which inner representations correspond to the outside world. This "truth" will always be in a changing mode as new knowledge is added or learnt. The cognitivists view the brain as a "machine of logic and deduction" or a machine for information processing (Von Krogh & Roos in Venzin et al 1998:38; Von Krogh et al 2000:27), which means that they believe that knowledge is developed by processing data according to "universal" rules (Venzin et al 1998:38). This means that in an organisation top management, for instance, can reach consensus about policies and implant them firmly in all the employees' minds (Simon in Venzin et al 1998:39).

The cognitivist epistemology can be traced in studies of the organisation and management through ideas such as the mirroring (representation) of objective reality and

assumptions such as transparency of information, ability to process information, probability judgements and being logical (Von Krogh & Roos in Huemer et al 1998:131).

The cognitivist research tradition has contributed to the confusion between knowledge and information. Many knowledge management approaches have been regarded as simply information management. To the cognitivist, knowledge is explicit, can be encoded and stored and is easy to transmit to others (Von Krogh et al 2000:27).

f Venzin et al (1998): connectionist epistemology

In the connectionist epistemology, representation, as described in the cognitivist epistemology, is still prevalent, but the process of representing reality is different. Organisations appear to consist of individuals who operate in networks, composed of relationships and driven by communication (connected mostly through information technology) (Venzin et al 1998: 39–40).

Information processing is considered the basic activity in both the cognitivist and the connectionist epistemologies. In the connectionist epistemology, however, relationships and communication are the primary issues of cognition. Structures that store information and those that process information are embodied in the connections between the units (in other words, there is no distinction between storing and processing as in the cognitivist approach). These network units produce a different picture of the pre-given world that forms the basis for different adoptions in the different units. Knowledge resides in the connections of experts and is driven by problem solution. The way in which knowledge is accumulated is determined by local rules in a network, which allows self-organised groups to develop specific knowledge to represent their own environment. Different experts bargain and define the truth in an organisation (Venzin et al 1998: 40–41).

According to Zander and Kogut (cited in Venzin et al 1998:40–41), knowledge of an organisation is divided into information and know-how – information being knowledge which is “transmitted without loss of integrity once the syntactical rules required for deciphering it are known” and know-how describing how to do something. Knowledge is held by the individual, but also shared in groups. This process facilitates the transfer of knowledge in groups. Kogut and Zander (cited in Venzin et al 1998:41) suggest that “higher-order organising principles” should be developed for codifying technologies into a language that could be accessible to individuals outside the specific subunits.

According to Weick and Roberts (in Huemer et al 1998:133), the connectionist epistemology has many insights to follow, but has a limited impact on theory building.

g *Venzin et al (1998): autopoietic epistemology*

The concept of autopoiesis was developed by Varela, Maturana and Uribe (in Hall 2005:170; Maturana & Varela in Huemer et al 1998:136) to define the characteristics of life ("living systems") from a biochemical/cellular perspective in the field of neurobiology. "The cell is an autonomous entity where everything happens in reference to itself" (Varela, Thompson & Rosch cited in Venzin et al 1998:42).

The input coming from outside the system is regarded as data in the autopoietic epistemology and not information. Information is understood as data placed in a certain context, which is the first step in the process of acquiring knowledge. In an organisation that operates in an autonomous and observing fashion, the system is simultaneously open for data and closed for information. This means that knowledge cannot be conveyed directly to individuals, because data have to be interpreted. The system (organisation) has its self-defined rules according to which signals from the outside are allowed to stimulate processes within the system. These rules define the boundaries of the system (Venzin et al 1998:41–42).

According to the autopoietic epistemology, knowledge resides in the mind, the body and social systems. It is history- and observer-dependent, context specific and is not directly shared. Knowledge is shared indirectly through discussions, which are interpreted to create meaning based on previous observations and experiences. Truth is flexible in the sense that different standpoints are possible and reality is socially created (Venzin et al 1998:43). Based on the above discussion, Venzin et al (1998:42) view the contribution of Nonaka and Takeuchi's (1995) epistemological assumptions as being closer to the autopoietic epistemology. Nonaka and Takeuchi do not view the world as pre-given or a fixed and objective entity which therefore cannot represent reality. This means that each individual creates his or her own knowledge through experience, which is why knowledge is perceived as "justified true belief" (Nonaka & Takeuchi in Venzin et al 1998:42–43) with the emphasis on the "justified". This condition requires sources of evidence of truth. Knowledge requires that a statement must be true and that the individual must believe in its truth, which highlights the subjective character of knowledge (Venzin et al 1998:43).

Venzin et al (1998:43–44) concluded that knowledge needs to be validated, although absolute "truth" can never be attained. In the autopoietic theory, the world is not pre-given to be represented through knowledge, but knowledge is connected to observation and interpretation (Heumer et al 1998:137). The autopoietic approach to knowledge has been used in combination with other theories by some researchers, such as Nonaka and Takeuchi and Hall, as highlighted in the further discussions below.

h Blackler et al (1998): knowing as a process

Knowing as a process is a relatively new approach to the understanding of knowledge because of a shift in thinking about knowledge as a commodity that individuals and organisations have to acknowledge as something people do (Blackler et al 1998:74). The positivist view of "knowledge as true belief" has dominated Western culture, but it has been increasingly challenged by more constructivist perspectives "that argue that knowledge cannot be conceived independently of action" (Vera & Crossan 2003:125).

The key question, namely "how people do their knowing" brings out a link between knowing and social processes (in other words, who people do their knowing with) (Blackler et al 1998:74). It also brings out a behavioural element in terms of how people behave when they do their knowing. It can be described as "knowledge as action" (Vera & Crossan 2003:126)

Blackler et al (1998:74–75) do not describe the process of knowing, but have identified the following characteristics to describe knowledge in the knowing process:

(1) *Knowledge is provisional and reflexive.* This approach suggests "that there is no one true account of physical, social or psychological events ... Interest, plausibility and believability are as important as logicity, coherency and consistency" (Blackler et al 1998:75). This indicates that knowledge is reflexive and that truth is actively and creatively constructed (Blackler et al 1998:75).

(2) *Knowledge is mediated by linguistic and technological infrastructure.* The vocabulary that people have determines their understanding of objects and experiences and guides what they will accept as facts. Speech being a practical act of their understanding of, say, concepts such as knowledge sharing, enables people to

experiment with new metaphors in their talk as they grasp for new insights. In this sense it can be said that thought is mediated by language and discourse patterns (ie interviews, debating, discussions, etc) and actions are mediated by technologies and routines (Blackler et al 1998:75).

(3) *Knowledge is situated and pragmatic.* According to traditional approaches, expert knowledge leads to specialised skills that will be practised by professionals throughout their careers (Blackler et al 1998:75). Polkinghorne (in Blackler et al 1998:75) avers that the knowledge of experts is “a tentative, fragmented and essentially pragmatic social construction”. Scribner (in Blackler et al 1998:76) states that “practical thinking” such as problem-solving techniques depends on knowledge of a particular situation rather than abstract rules.

(4) *Knowledge is contested and political.* Patterns of discourse (interviews, discussions, etc) reflect and produce relations of power, as experts claim ownership of decontextualised knowledge (Foucault in Blackler et al 1998:76). This could result in “power play” (Lave in Blackler et al 1998:76).

(5) *Knowledge is emotional as well as rational.* Feelings associated with the acquisition of knowledge could be positive feelings such as mastery, but could also be associated with feelings of loss because well-known knowledge and practices need to be displaced. Similar processes operate at group and organisational level, for instance, when knowledge is transferred to newcomers in a hasty way without taking into consideration their learning needs, producing feelings of, say, frustration and inferiority (Blackler et al 1998:76).

According to Blackler et al (1998:76), it is not easy to find a way of representing the complexities of the above insights in a direct and straightforward way. However, these complexities may be found in the process of how people do their knowing and with whom they do their knowing. The concept “knowing” is further explored in section 2.4.3.2.

i Davenport and Prusak (1998): knowledge management processes

From a pragmatic perspective of knowledge, Davenport and Prusak (in Choo 2003:211) developed a more operational view of managing knowledge. They emphasise the sharing of knowledge and focus on how organisations can capture, codify and transfer

knowledge. Knowledge is viewed as being necessarily "explicit" (formal and systematic) (Choo 2003:211), whereas the creation, sharing and use of knowledge are mainly social activities embedded in a network of cultural norms and human relationships (Choo 2003:219). Groups and teams that share the same beliefs and have a common purpose create and utilise knowledge most effectively, which is why Davenport and Prusak also write about the importance of "communities of practice" (Choo 2003:219) and that managers should not underestimate the value of talk (Davenport & Prusak 1998:39).

The three processes of knowledge management can briefly be described as follows (according to authors referenced):

(1) *Knowledge generation.* Knowledge generation includes activities that build the stock of organisational knowledge. Knowledge is acquired through buying it (Davenport & Prusak 1998:53) by hiring individuals, acquisitions or mergers of organisations or contracting external people with knowledge. Resources might be **dedicated** functions such as research and development departments and corporate libraries that generate and provide new knowledge. When different groups of individuals work on a problem or project, the **fusion** of different specialisations and perspectives could lead to the generation of new knowledge. Individuals who acquire new knowledge and skills (through a willingness and ability to learn – Davenport & Prusak 1998:65) enable organisations to **adapt** to changes in the external environment such as competitiveness, technology and economic changes. Another way of generating new knowledge is through informal and self-organised **networks** of people in organisations who share common work interests and are motivated to share knowledge (Choo 2003:210).

(2) *Knowledge codification.* The codification of knowledge is streamlined by four principles proposed by Davenport and Prusak (1998:69):

- managers deciding what business goals will be served by the codified knowledge
- managers being able to identify knowledge existing in different forms that will enable the reaching of these goals
- knowledge managers evaluating knowledge for usefulness and appropriateness for codification

- codifiers identifying the appropriate medium for codification and transfer of knowledge to the appropriate users (Davenport & Prusak in Choo 2003:209–210; Davenport & Prusak 1998:69).

(3) *Knowledge transfer.* Knowledge transfer is the sharing process of knowledge in organisations and is the most difficult part of managing knowledge because it is affected by several impeding organisational culture factors such as the different cultures, frames of reference and vocabularies, lack of trust, lack of time and meeting places, refusal to share knowledge, lack of absorptive capacity of recipients and intolerance of mistakes or need for help (Choo 2003:210).

Organisations should create time and space (places such as watercooler talk rooms, knowledge fairs and open forums [Davenport & Prusak 1998:90, 93]) where trading and sharing of knowledge through formal and informal methods can take place, since organisations operate as knowledge markets (people seeking information to solve problems – buyers; people who are known for their expertise/substantiate knowledge – sellers; and people such as gatekeepers and librarians who act as connectors between people who need knowledge and those who have it – brokers [Choo 2003:209]).

It is clear from the above discussion that Davenport and Prusak’s approach is pragmatic, and from an organisational operational perspective, emphasises the sharing of both tacit and explicit knowledge.

j Lorenz (Edward) (2001): three different cognitive theories of human cognition

In an article on models of cognition and contextualisation of knowledge, Lorenz (2001:307) examines two cognitive theories which, according to him, had the most significant impact on the organisational behaviour literature, namely the information-processing approach originating from the work by Newell and Simon (in Lorenz 2001:307) and the situated learning approach based on the work of, for instance, Lave (1988) and Suchman (1987) (in Lorenz, 2001:307). Lorenz (2001:307) also explores the cultural-historical approach to cognition, although it has not had a significant impact on the organisational behaviour literature. This approach is associated with research conducted by the San Diego Laboratory of Comparative Human Cognition (LCHC) at the University of California, San Diego. The focus of Lorenz’s (2001) research is the implications of the three approaches to human cognition in terms of an understanding of organisational

routines and organisational problem solving. A brief description of each of the above theories, focusing on the epistemological background of knowledge, follows.

(1) *Information processing approach.* This approach focuses on an understanding of routines as symbolic expressions stored within the minds of the members of the organisation (Lorenz 2001:308). It stems from the cognitive epistemology (as described earlier) which holds that knowledge consists of representations or abstract symbols that are stored in the mind based on information gathered from the external environment. Human reasoning and problem-solving behaviours are the actions that are performed with these symbols and representations (Newell, Shaw & Simon in Lorenz, 2001:309). Hutchins (in Lorenz 2001:310) has observed that this view of stored representation has led to the conclusion that restricting cognitive analysis to the individual's mind isolates it from the external world consisting of social interactions and physical artefacts. The environment acts purely as a stimulus to trigger cognitive processes in the human mind, which means that routine behaviour is "governed by programmes or symbolic expressions stored in the mind" (Lorenz 2001:309). Lorenz (2001:308) concludes that in this approach, problem solving is understood independently of the social context in which an organisation operates.

(2) *Situated action and communities of practice approach (situated learning approach).* Lorenz (2001:308, 314) refers to this approach as the situated learning or situated action and community of practice approach, which refers to different elements of this approach, for instance, it involves action which is behaviour related. Routine behaviour emerges through the shared experiences of practices of a group (community of practice) in a local context (Lorenz 2001:324). Blumer (in Lorenz 2001:314) mentions that social interaction gives rise to the meanings attached to the behaviours.

In contrast to the cognitive approach, knowledge and learning develops in relation to an external context (Lorenz 2001:308), such as solving a problem in a specific context. According to Lorenz (2001), the knowledge remains tacit in nature and highly contextualised in the situated action approach, and he points out that this makes it difficult to apply this approach to the field of organisational behaviour. The communities of practice concept was developed in a partial effort to link organisational structure to organisational knowledge and problem solving. A community of practice consists of people who share a common practice and are bound together in informal relations (Lorenz 2001:316). Owing to the tacit nature of knowledge, storytelling and narration are

some of the tools used in problem solving in these communities of practice (Lorenz 2001:324) that lead to behaviour actions.

On the strength of the above discussion, it can be concluded that this approach limits the development of more formalised forms of knowledge and application across different local contexts.

(3) *Cultural-historical perspective.* The cultural-historical perspective is also based on the situated action approach which emphasises the importance of external context in understanding knowledge, but overcomes some of the limitations of the situated action approach and the information-processing approach. For instance, it relates “the coordinated behaviour of teams to operations on symbolic representations” and does not focus on individuals only as in the information processing approach. In comparison with the situated action approach, it provides a framework that spans time and space in a cultural and historical context in terms of the routine and problem-solving activities of employees in an organisation, whereas the situated action approach is limited to context, time and place (Lorenz 2001:308).

In the cultural-historical approach to distributed cognition, the emphasis is on the cultural and historical determinants of cognitive processes. This emphasis has led researchers from the Laboratory of Comparative Human Cognition (LCHC) to link local context with wider social and institutional settings in a way that is not possible with the sociological theories of the situated practice (Lorenz 2001:318).

The work of Edwin Hutchins (in Lorenz 2001:319) is the best example of the application of the cultural-historical approach to human cognition in the field of organisational behaviour. The core idea is that human cognitive processes are mediated by tools and artefacts, for example, language and external symbolic representations such as engineering, process books or the computer used to produce written text. These tools serve to connect individuals to knowledge held by other individuals in the wider world. This process of knowledge acquisition can be explained by the example of an apprentice obtaining knowledge from written procedures in a training session with more experienced people. With experience, the apprentice will memorise the written procedures and these will exist as explicit representations in his or her memory. With even more experience, this will become tacit or implicit knowledge embedded in the individual's sensorimotor system. During this learning process, various members of a team depend on one another

to complete a task or solve a problem in a work situation. This illustrates that social relationships/organisational relationships form part of the internal cognitive structure of the individual apprentice (Lorenz 2001:320).

In the cultural-historical approach to cognition, using the local environment to understand and interpret the words and actions of others can play a role in accounting for routinised behaviours.

Lorenz (2001:325) concludes that the use of tools (eg language and codified descriptions such as manuals), as explained above, can promote the emergence of shared knowledge and behaviours that span particular contexts. These tools are vital mediating devices in the transmission of organisational knowledge and the production of routines and behaviours.

It is clear from the above description of the cultural-historical approach that not only are epistemological aspects of acquiring knowledge addressed, but they are also linked to organisational behaviour (at a practical level, ie the individual-team-organisational relationships).

k *Cook and Brown (2002): epistemology of possession and epistemology of practice*

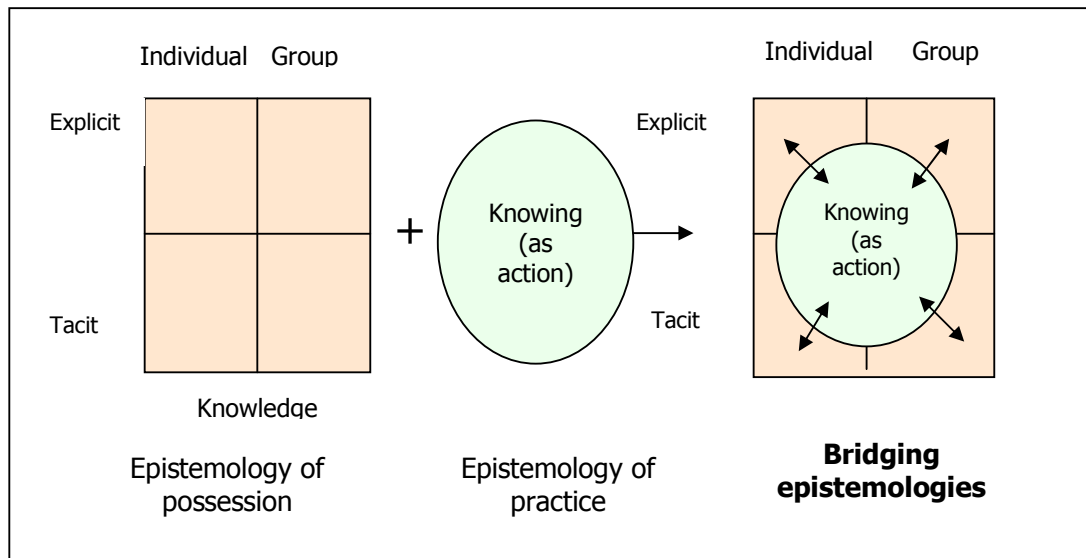
Cook and Brown (2002:69) agree that in the literature that explores epistemology of knowledge, there seems to be an implied tendency to treat knowledge as being essentially one of a kind. The literature tends to boost the individual over the group and the explicit over the tacit as though explicit and tacit were two variations of one kind of knowledge and not two separate distinct forms of knowledge.

These authors regard the four categories of knowledge, namely explicit/implicit and individual/group, as distinct forms of knowledge on equal footing to each other. One is not made up from another. Furthermore, each of these forms of knowledge does work that the others cannot. They refer to these four categories of knowledge as the *epistemology of possession*, since these forms of "what is known" are treated as something that people possess.

Cook and Brown (2002:70) continue their argument by saying that not everything that is known is captured by this understanding of knowledge. The knowledge we possess

cannot account for what we know how to do. "How to do" implies human action, and Cook and Brown (2002:70) believe that it is possible to talk "about what is *part of practice* as well as what is *possessed in the head*". They refer to what is possessed as "knowledge" (ie knowledge used in action) and to what is part of action as "knowing" (ie knowing as part of action). In addition to the epistemology of possession, Cook and Brown (2002:70) feel that there needs to be a parallel *epistemology of practice* that focuses on ways of knowing. This does not mean that knowing and practice fall under the same umbrella of traditional epistemology, but that there needs to be a radical expansion of what is considered epistemology, by including knowledge and knowing. Knowledge and knowing are regarded as complementary and mutually enabling, as indicated in figure 2.6.

FIGURE 2.6
KNOWLEDGE AND KNOWING



Source: Adapted from Cook & Brown (2002:71)

The two epistemologies of possession and practice are indicated in figure 2.6. The epistemologies are bridged in the block on the right and the arrows indicate the active use of knowledge in the interaction of people with the social and physical world. According to Cook and Brown (2002:87), knowing does not sit statically on top of knowledge. Knowing's relationship with knowledge is dynamic since knowing is an aspect of the interaction of people with the world. Each of the forms of knowledge (individual, group, explicit and tacit) is brought into play by knowing when knowledge is used as a tool in people's interactions with the world. Knowledge gives shape and order to knowing. This

interplay between knowing and knowledge is referred to as "bridging epistemologies" (Cook & Brown 2002:87).

The model described above indicates what and how people know as individuals and as groups. In other words, the focus is on knowledge, knowing and the actions that follow during interaction with the world.

I Styhre (2003): knowledge as fluid, emergent and moving, embedded in social relationships and produced in practice using concepts

According to Styhre (2003:32), the reductionist view of knowledge being an extension of data and information, dominates the field of theorising about knowledge in the knowledge management discipline. He maintains that the reductionist view of knowledge is logocentric deducing knowledge into its molecular forms of data and information (Styhre 2003:30). He suggests that a less logocentric view is required because knowledge is not simply located in particular domains and controlled by individuals, but is a "social accomplishment" (Orlikowski cited in Styhre 2003:38).

Styhre (2003:32) suggests that "knowledge is what is inherent in practices and concepts employed and invented to denote such practices". According to this approach, knowledge is always indeterminate and fluid because it is inherent in a great variety of undertakings and changing language games (Styhre 2003:32). Knowledge exists throughout the organisation, but many theorists choose to regard knowledge as something that is clearly bounded and manageable as a resource. This logocentric view of knowledge goes back to Plato, this way of thinking assuming that knowledge can be reduced to the level of pure presence. However, Styhre (2003:34) regards knowledge as fluid and emergent, not fixed and stable. Knowledge is continually being turned into something new. Because it is fluid and moving, it needs to be fixed in a signifying system or captured by concepts that can be used to denote objects of knowledge (Styhre 2003:35). Knowledge is produced in practice and in activities such as translation and inscription (terms used by Latour, in Styhre, 2003:35) into documents, models and concepts. Styhre writes (2003:35): "what is known must always be given a stable name: a concept, a model, a symbol. Such a concept or name serves to capture what is fluid and moving". Furthermore, he (2003:36) mentions that knowledge is embedded in social relationships and emerges in the practices and use of concepts. Knowledge being embedded in social relationships corresponds to Cook and Brown's (2002) thinking in their bridging epistemologies theory.

In conclusion, Styhre (2003:38) suggests that knowledge management theory should “enact more fluid and process-orientated images of knowledge that both recognise knowledge as being inextricably entangled with practise and at the same time being denoted by conceptual frameworks”.

m Campos and Sánchez (2003): four conceptual dimensions of knowledge

Campos and Sánchez (2003:6–8) have developed a descriptive proposal that examines four different conceptual dimensions of knowledge in the context of the organisation as a knowledge-based system. This perspective is viewed from a strategic point of view within the paradigm of the so-called “new economy” (Kelly cited in Campos & Sánchez 2003:6). They divided the dimensions into categories or classes of knowledge (based on the work of Bueno and Salmador 2000), as represented in figure 2.7.

FIGURE 2.7
CONCEPTUAL DIMENSIONS AND CATEGORIES OF KNOWLEDGE

CONCEPTUAL DIMENSIONS	CATEGORIES OR CLASSES OF KNOWLEDGE			
EPISTEMOLOGICAL	• Explicit: Objective and formulated			
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">• Tacit:</td> <td>• Cognitive: subjective</td> </tr> <tr> <td></td> <td>• Technical-expert: experimental</td> </tr> </table>	• Tacit:	• Cognitive: subjective	
• Tacit:	• Cognitive: subjective			
	• Technical-expert: experimental			
ONTOLOGICAL	<ul style="list-style-type: none"> • Individual: possessed by the person • Social: possessed by groups and the organisation 			
SYSTEMIC	<ul style="list-style-type: none"> • External: information and technical • Internal: created and cognitive 			
STRATEGIC	<ul style="list-style-type: none"> • Resource: basically explicit • Capacity: basically tacit technical • Vision: basically tacit cognitive 			

Source: Bueno & Salmander (cited in Campos & Sánchez 2003:6)

The conceptual dimensions can be explained as follows:

(1) *Epistemological dimension.* This dimension consists of explicit objective and formulated knowledge – tacit technical-expert knowledge based on experience that derives from action and tacit cognitive knowledge based on aesthetic experience.

(2) *Ontological dimension.* From an ontological perspective, knowledge is classified as individual or social and related to behaviour in organisations in an effort to bridge individual cognition and social cognition (Campos & Sánchez 2003:7). It is knowledge possessed by the individual person and knowledge possessed by groups and the organisation at social level. The individual has experience that can serve as the basis for collective knowledge, which is something greater than the sum of individual knowledge (Fiol & Lyles; Vicari & Troili in Campos & Sánchez 2003:7). Organisational knowledge does not depend on any given individual because it is shared by the members of the organisation. This dimension is based on the autopoietic theory (which originated in neurobiology by Maturana & Varela in Campos and Sánchez 2003:7) that Luhmann (1990) applied to the new theory of knowledge in social systems, which shows up in the study of organisations and sheds light on knowledge in organisations. Knowledge is not only found in individuals, groups or organisations, but also in interactions between these different agents (Campos & Sánchez 2003:8).

(3) *Systemic dimension.* Campos and Sánchez (2003:8) describe knowledge in this dimension from a systemic perspective, namely input – process – output. They consider data as input, information as the process and knowledge as the output. The data are groupings of elements and symbols. Information is a process of restructuring the data and giving it meaning in a specific context. The output of the process is knowledge as a set of experiences, perceptions, values, information in context and ideas that create mental structures to evaluate and incorporate new experiences, ideas and information. The level of observation (or unit of analysis – individual, group or organisation), and thus whether it is external or internal to the unit of analysis, is addressed in this dimension.

(4) *Strategic dimension.* This dimension is based on the theory of resources and capability (Selznick; Penrose; Wernerfelt; Rumelt; Barney; Amit & Schoemaker; Peteraf in Campos & Sánchez 2003:8) and its aim is to achieve greater performance by the organisation that will lead to a sustainable competitive advantage. The knowledge categories consist of intangible resources based on explicit knowledge, capabilities based on tacit technical-expert knowledge and vision based on tacit cognitive knowledge (Campos & Sánchez 2003:8–9).

The value of this model lies in its applicability to the emerging strategic process of organisations in order to improve performance and gain a sustainable competitive advantage. The four conceptual dimensions of knowledge explained above form part of this strategic process.

n Carlson (2005): knowledge matrix

According to Carlson (2005:6), there is no single view of what knowledge is, but there seems to be greater agreement on what knowledge does. For example, it allows people to solve problems, make decisions and perform. It guides thoughts, communication and behaviour.

Carlson (2005:6) suggests a functional approach towards knowledge in organisations. Only procedural knowledge (ie what knowledge can do) focuses on functional properties. Simply processing different amounts or types of knowledge is not sufficient to affect outcomes. Knowledge must be put to use in some way if it is to have an effect on outcomes. Carlson (2005:6) uses a partial model of performance called the direct determinants of performance outcomes (DDPO) (Carlson 2005). In this model, outcomes are represented as functions of the environment and individual behaviour. Anything that impacts on outcomes must have its effect through environment and behaviour. This implies that knowledge can only influence outcomes through its effects on behaviour. Behaviour is functionally decomposed of tactics (method or approach an individual uses in an attempt to influence outcomes), effort (levels and combination of physical and cognitive resources that are applied towards outcome achievement) and skilfulness (how well an individual can implement a chosen tactic with higher levels of skilfulness indicated by faster and more error free execution) (Carlson 2005:7).

The knowledge matrix consists of outcomes, environmental inputs and behaviour. In addition, each category consists of three functional types of knowledge, namely variables, theory and data (Carlson 2005:10).

Although Carlson (2005:12) argues that the knowledge matrix is valuable in determining what knowledge is relevant and should be managed, that it could guide knowledge management efforts and be used to diagnose specific knowledge deficiencies and guide

organisations' or individuals' efforts to learn what is not currently known, it is a complex model that is difficult to understand.

o Hall (2005): biological framework for the analysis of knowledge in learning organisations

Hall (2005:183) argues that many current studies and practices in knowledge management are based on limited views of what constitutes knowledge in organisations. Many of these studies have not been conducted within a visible framework of how knowledge and the processes being studied relate to the organisation's overall strategic goals, or an understanding of how organisations survive. According to Hall (2005:183), much of the published work in this field has been descriptive or classificatory.

Hall (2005:169) synthesises and applies to organisations the theoretical ideas of Maturana and Varela, Popper, Patee, Boyd and Gould. The purpose of the synthesis is to reveal the emergent, autopoietic evolutionary (ie biological) and learning nature of organisations. He developed his framework from the background of Maturana and Varela's (Maturana; Maturana & Varela; Varela; Varela et al in Hall 2005:169) concept of "autopoiesis" (their term for their definition of life applicable to complex systems); Karl Popper's three worlds and evolutionary epistemology and Boyd's (in Hall 2005:178) observing, orienting, deciding and acting (OODA) loop. The framework is referred to as the cybernetics of organisational learning, adaptation and evolution. The steps in this framework can be explained as follows:

(1) *Observing*. As an autopoietic observer (Van Glaserfeld; Krippendorff; Riegel in Hall 2005:182), the organisation's cognitive processes relating to the external environment are limited to internal observations through semantically encoded information received from autopoietic entities at focal level (eg governments at hierarchical level or individuals at lower focal level). Cognitive processes in the organisational structure further classify, store, retrieve, transmit and transform observations (Hall 2005:182). Hall refers to "organisational heredity" (or organisational memory) which consists of the genetic capabilities of the human members of the organisation and forms of knowledge, such as corporate manuals, systems, routines and forms of knowledge governing interactions of individuals in organisations (Hall 2005:183).

(2) *Orientation*. This step encompasses the bulk of cognitive processing. Analysis eliminates false and inconsistent observations. Synthesis links existing knowledge and observations into an updated view of the world. This could consist of new information, relinked memories of previous experience (which could be explicit, implicit or tacit), cultural traditions or tacit organisational knowledge and possibilities for action (Hall 2005:182). This step includes the key activities for learning new knowledge for adaptation (Hall 2005:183).

(3) *Deciding*. This step comprises new possibilities for action and tested knowledge based on previous experience gained from previous loops of the OODA (orientation, observation, deciding and acting).

(4) *Acting*. This step entails testing the decision by putting it into action and applying it to the world. As a result of the action being observed, the loop begins to repeat itself (Hall 2005:182).

Through observation, orientation, deciding and acting it may be concluded that conscious organisational learning occurs to improve organisational adaptation in both evolutionary (ie biological) and developmental sense. According to Hall (2005:183), an average organisation with more accurate and faster cognitive processes will grow to “replicate ... and diversify knowledge that has enabled their comparatively greater effectiveness”, whereas less effective organisations lose their strategic control and competitiveness that might lead to extinction of the organisation.

The value of this framework lies in it providing an understanding of an organisation’s survival imperatives and how knowledge and processes relate to the overall strategic goals of the organisation, such as survival.

p Prahalad (2005)

From a new economy perspective, Prahalad (2005:457) developed a model based on an organisational competency perspective, focusing on people-embodied knowledge and capital-embodied knowledge.

According to Prahalad (2005:449), managers will face a new set of competitive challenges that represent major discontinuities in the attempt to survive in the next millennium. These discontinuities that are shaping the new economy are as follows:

- global customers such as multinational firms
- deregulation and privatisation, for example, mergers and acquisitions, deregulation of health care, telecommunications, financial services and airlines
- volatility, for example, scaling up or down of products
- convergence of multiple technologies, for example, chemical and electronic technologies co-mingling as digital cameras and printers
- indeterminate industry boundaries, for example, the dividing line between communication and computing becoming hard to delineate
- standards, for example, new industry standards for DVD and for security and privacy before e-commerce can flourish
- disintermediation, for example, the distance between producer and end user which is shrinking
- eco-sensitivity, for example, firms moving from a compliance orientation to a business-opportunity-driven perspective of environmental issues – a case in point is China, which has a shortage of water and might need to import food without straining its own resources, but abundant water resources and land in the Americas are used, which is an ecologically sensible solution for the world (Prahalad 2005:450–453)

Core competencies in the new economy are a combination of the following:

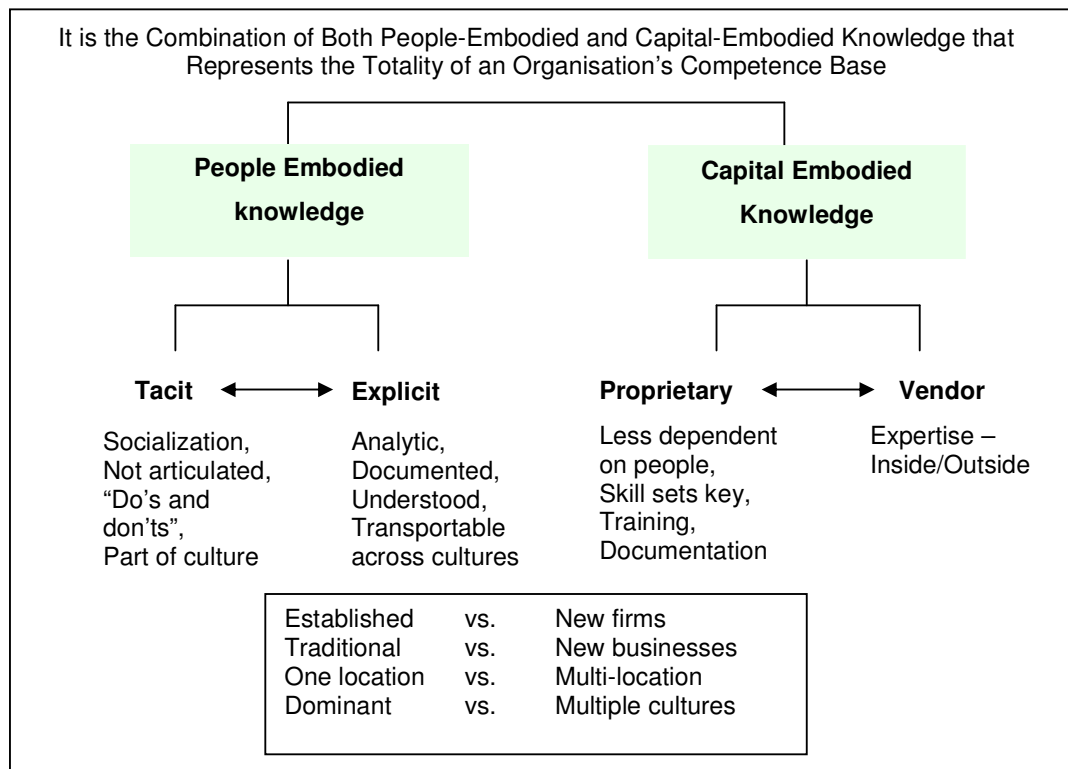
- multiple technologies such as software and hardware that will require working with a new logic (eg knowledge streams in electronics in a traditional chemical firm)

- collective learning such as multilevel and multifunctional composition of teams, for example, globalisation requiring teams from multiple cultures that learn together
- the capacity to share across business and geographic boundaries, for example, collaboration and transfer of knowledge across multiple business units (Prahalad 2005:454).

Prahalad (2005:456-457) developed a model of an organisation's competence base to cope with competitive challenges in the next millennium. This model is depicted in figure 2.8.

FIGURE 2.8

MODEL OF AN ORGANISATION'S COMPETENCE BASE



Source: Prahalad (2005:457)

It is clear from figure 2.8 that two broad elements, namely people-embodied knowledge (both tacit and explicit) and capital-embodied knowledge (both proprietary and vendor based) are needed to create a new competency base in an organisation. The organisation's existing knowledge base is combined with a new knowledge stream to

collectively create the system of competencies. The balance of the different types of knowledge will be different between established and new organisations in the same industry (eg General Motors and Samsung); traditional and new industries (eg building material manufacturing and digital imaging); organisations with one location and those with multiple locations (eg the tacit-to-explicit balance will be different in multiple organisations that require more explicit knowledge in order to manage the different locations); and dominant versus multiple cultures (eg if most of the development work is done in India, that group will work with more tacit knowledge) (Prahalad 2005:456–457). According to Prahalad (2005:457), the balance between the elements is a moving target. As the competitive landscape evolves, managers will need to continuously re-evaluate and adjust their focus accordingly.

This is a futuristic model that was developed in the organisational development field to possibly cope with new competitive challenges in the changing economy. It is interesting to note that knowledge, whether it is people or capital embodied, is the directing factor in this competency-based model to cope with emerging challenges.

The discussion on the different **epistemologies of knowledge** provides a clear understanding of what knowledge is and how it comes about (**how** we know). It is also clear that these epistemologies are approached from different philosophical perspectives, that is, cognitive, connectionist, autopoietic, hierarchical and pragmatic. Many of the epistemologies are process based (such as Davenport and Prusak's approach), in the sense that knowledge is analysed as a process that describes it in different ways, depending on the philosophical approach. Familiarity with the different approaches gives one a better idea of the limitations of each approach.

The different epistemologies appear to be context specific. Some focus on the individual (such as Polanyi's analysis of tacit and explicit knowledge), and others on the group level (such as the connectionist approach that focuses on relationships and not on the individual or the entire system, and Styhre's pragmatic, process-based view of knowledge, inter alia, being embedded in social relationships). Others again focus on the organisation (such as Venzin, Von Krogh and Roos's descriptions of the cognitive, connectionist and autopoietic approaches). Some researchers combine different epistemologies to come up with a theory of knowledge (such as Hall's combination of complexity theory, autopoiesis and evolutionary epistemology).

Another vital observation is that the concept of knowledge assumes different forms, depending on the epistemology on which it is based, such as the views of knowledge from an autopoietic perspective where knowledge is derived from information which is data put into a certain context and which is the first step in the process of acquiring knowledge, as opposed to the cognitive approach, which regards knowledge as being equal to information and data. Another example is Davenport and Prusak's focus on the creation, codification and transfer of knowledge. This implies that a researcher has to make a conscious choice of an epistemological model to make possible successful research.

It would appear that in the current research, the "bridging of epistemologies as possession of knowledge and knowing as action", developed by Cook and Brown, might be a suitable approach to follow. Key factors in this research are tacit knowledge possessed by individuals and groups, and adding to this, organisational knowledge as well as knowing (in other words, how people do their knowing – implying human action and interaction with the world). The four conceptual dimensions of knowledge (ie epistemological, ontological, systemic and strategic dimensions) described by Campos and Sánchez (based on Bueno and Salmander's model, 2000) might also apply to this research. Knowledge will be explained from an epistemological perspective. It will be examined from an ontological standpoint of individuals, groups and the organisation. It will be described from a systemic perspective (ie input – process – output) and strategically focusing on intangible resources such as tacit technical-expert knowledge and tacit cognitive knowledge to be retained in organisations. The context of the current research is thus from a knowledge loss and knowledge retention perspective.

2.4.3 Appearance of knowledge

In this section, different appearances of knowledge and knowledge-related concepts are reviewed from the contextualised theory-building perspective. The appearances of knowledge can be described by investigating different overall approaches that could be followed to categorise knowledge, the different forms that knowledge can assume (categories and types of knowledge) and identifying hidden appearances of knowledge because it appears to be wrapped up in related constructs (eg competence, invisible assets, intangible assets, strategic assets, organisational memory, capabilities and skills – Venzin et al 1998:53).

2.4.3.1 *Different overall approaches to the "appearance" of knowledge*

Venzin et al (1998:49–50) have clustered together the categories of knowledge in the following three different approaches to the nature of knowledge:

- object of knowledge development
- process of knowledge development
- location of knowledge

The **object** of knowledge focuses on biotechnology, mathematics or linguistics, for example, procedural knowledge and knowledge of events and trends both inside and outside the organisation. The **process** of knowledge development focuses on either cognitive abilities or the process of knowledge construction (creating, sharing, transferring and applying knowledge – as indicated in sec 2.4.3.3). The **location** of knowledge focuses on the carriers of knowledge, namely individuals, groups, organisations, interorganisations and customers or industries. The location of knowledge also refers to tacit knowledge that explores the development and transfer of knowledge, embodied knowledge that requires experience from physical presence and encoded knowledge which remains in the organisation after all the employees have left (Venzin et al 1998: 49–50)

According to Venzin et al (1998:49), the list of categories in these three approaches to the nature of knowledge is incomplete. They mention strategic knowledge that is also known as "meta-knowledge", which represents higher-order categories. Strategic knowledge is knowledge about knowledge, for instance:

- what type of knowledge it is
- where it is located
- how it is transferred
- how it is stored
- how swiftly it changes over time

McInerney (2002:1010) adopts a different approach to the appearance of knowledge and sees it as "a collection of **processes** that allow learning to occur and knowing to be internalised". According to him (2002:1010), it is not easy to place knowledge within strict

"rungs" or on different taxonomy levels. It is not an object that can be "placed", and it should not be confused with representations of knowledge as information in databases and documents.

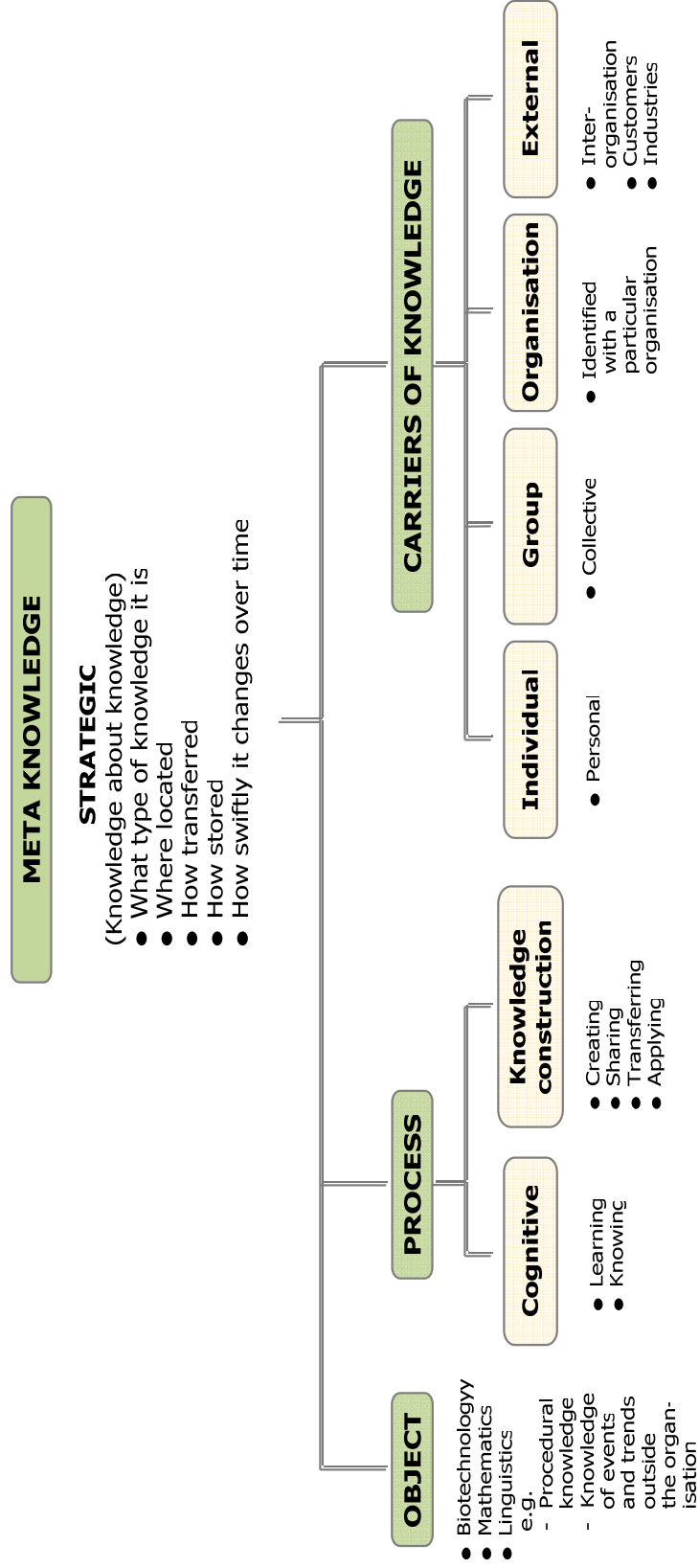
Certain key elements regarding the appearance of knowledge are revealed in the above paragraph, namely:

- processes that allow learning
- processes that allow knowing to be internalised
- the difference between information and knowledge processes

Other processes of knowledge that have been noted quite extensively in the literature by authors such as Jackson, Hitt and DeNisi (2003) and Noe et al (2003), are the processes of creating and acquiring, sharing (distributing), transferring and applying knowledge.

The different approaches that can be followed to describe the appearance of knowledge, based on the discussion above, can be represented as follows (fig 2.9).

FIGURE 2.9
OVERALL APPROACHES TO THE APPEARANCE (MANIFESTATION) OF KNOWLEDGE



Sources: Based on Jackson et al 2003; McInerney 2002; Noe et al 2003 & Venzin et al 1998

This model might be incomplete because it is difficult to place knowledge in strict categories. However, the model does give a clearer indication of the many different aspects of the term "knowledge". Knowledge as a process and the carriers of knowledge (ie where the knowledge is located) need further discussion to clarify the meaning in an organisational context.

2.4.3.2 Cognitive processes of knowledge development

Cognitive processes of knowledge development refer to the learning process and the knowing process. This assumption is based on the ideas of Venzin et al (1998:50) and McInerney (2002:1010). The two processes are discussed in more detail below.

a Connection between knowledge and learning as processes

Knowledge is what has been learnt (Kofman & Senge in McInerney 2002:1014). Bertels and Savage (1998:19) describe learning as a process and knowledge as the result of that process. This is confirmed by Vera and Crossan's (2003:132) proposition that "learning is the process through which knowledge is created and developed. Current knowledge impacts future learning". Burton-Jones (cited in Bahra 2001:35) defines learning as "knowledge acquisition" and creating as "invention or innovation", which can only occur in the human brain. In other words, acquiring and creating knowledge are two key processes in the knowledge and learning connection.

When talking about knowledge, individual learning seems to be the input. Individuals learn through stimuli and responses during acting (Devos & Willem 2006:650). Learning in its most basic form is a process of retention of response patterns for further use, but it can also be an active process of experimenting and understanding the reasons behind happenings (Hedberg in Devos & Willem 2006:650). We also need to understand collective learning processes in order to grasp the process of acquiring and sharing organisational knowledge (Bertels & Savage 1998:19). According to Kofman and Senge (in McInerney 2002:1014) the connection between knowledge and organisational learning is inevitable. Without a commitment to learning, organisations would find it difficult to succeed in sharing and managing knowledge. Organisational learning is about people working together to achieve their personal and organisational goals, "creating results that they truly care about" (Fulner & Kays, cited in Devos & Willem 2006:650). Organisational learning also enables organisations to be able to adapt to change (Argyris; Senge; Senge

et al in McInerney 2002:1014). According to McInerney (2002:1010), knowledge constantly changes through experience and learning, which makes it dynamic. Learning and creating and sharing knowledge are processes that involve change and “movement to new levels of cognition and understanding among individuals and organisations” (McInerney 2002:1014). Two types of learning are accepted in the organisational learning literature, namely single loop and double loop learning. These are both examples of a change in knowledge stocks. **Single loop learning** is the most frequently applied type of learning and entails reacting to responses from the environment. It involves adapting one’s behaviour to the impulses from others or to the results of one’s actions. **Double loop learning**, which is the more difficult of the two, goes further by questioning the underlying norms, objectives, habits and models of the action or decision. By questioning these underlying models, real innovation and structural changes can occur in organisations (Argyres & Shön in Devos & Willem 2006:651).

Hedberg (in Devos & Willem 2006:650) explains the link between organisational learning, individual learning and behaviour as follows: “Organisations store and retain behavioural patterns in routines, norms and all kinds of memory systems, which again parallels the retention of knowledge and behaviour patterns in individuals’ brains.” Both individuals and organisations filter knowledge and feedback from their environment via their mental models and memory in their brains.

The process of knowledge creation and sharing also involves unlearning or “forgetting” knowledge that is outdated and therefore purposefully removed from memory. The processes of unlearning or “forgetting” have been mentioned by authors such as Bettis and Prahalad, Day and Nystrom and Starbuck (in Deholan & Phillips 2003:396), but have not been the main object of their research. Unlearning knowledge seems to be a concept that might have an impact on the retention of knowledge as there is no point in retaining this type of knowledge in organisations. This implies that organisations might have to identify outdated knowledge that needs to be unlearned.

It is clear from the above discussion that knowledge and learning are intertwined in a mutually reinforcing process. Learning can be regarded as the process that produces new knowledge (the content), which in turn impacts on future learning (Vera & Crossan 2003:131) and unlearning.

b *Knowing as a process*

Another approach is the new orientation of analysing *knowing* as a process (already referred to under the discussion of Blackler et al 1998 in sec 2.4.2.3). The purpose of this discussion is to examine the nature of knowing as a process of action and possible integration with knowledge as a cognitive process.

Polanyi's (in Vera & Crossan 2003:125) work has been influential in this new approach when he argues that knowledge is an activity, which could be better described as a process of knowing. He believes that all knowing involves skilful action and that the knower participates in all acts of understanding (Polanyi & Prosch in Tsoukas 2003:413). This argument emphasises the dynamic nature of knowledge. Previously asked questions that dominated the literature such as "How is knowledge stored?" and "Where is knowledge stored?" have been superseded by new concerns of how and with whom people do their knowing (Blackler et al 1998:74). It analyses knowing as a process and as an active achievement instead of analysing knowledge as located in "bodies, brains, routines, technologies, cultures and symbols" (Blackler et al 1998:74, 79).

Blackler (2002:56) suggests that new approaches need to be created to conceptualise the multidimensional processes of knowing and doing. He proposes that one approach could be developed from the insights that knowing is situated, distributed and material. Activity theory seems to be a promising approach. It originated from the Russian psychologist, Vygotsky's ideas in the 1920s of developing an understanding of mind and society that did not depend on factors such as mind versus body, thought versus action or individual versus society.

Activity theory currently has a variety of forms. Some focus on the processes through which people develop shared conceptions of their activities (eg Brown et al 1989; Lave & Wenger in Blackler 2002:56). This approach develops a model of learning as socialisation. A case in point is Orr's (in Blacker 2002:56) analysis of Xerox maintenance technicians. He describes how the stories shared by maintenance technicians about complex technical problems serve a key informational and educational function and afford technicians an opportunity to establish their identity in the community of technicians.

Another approach in the activity theory (by researchers such as Hutchins; Engestrom in Blackler 2002:56) models the relationship that exists between the conceptions of a

community of its activities and the material, mental and social resources through which these conceptions are enacted. An example is the study of Engestrom (in Blackler 2002:56-57) of a medical practice in Finland that demonstrated the variety of conceptions that doctors may have of their activity. In the same medical practice, doctors may unknowingly be enacting different conceptions of health care. Refocusing priorities was hampered by the resource system in which these doctors operated – for example, the random allocation of patients in the Finnish health care system created problems of continuity of care.

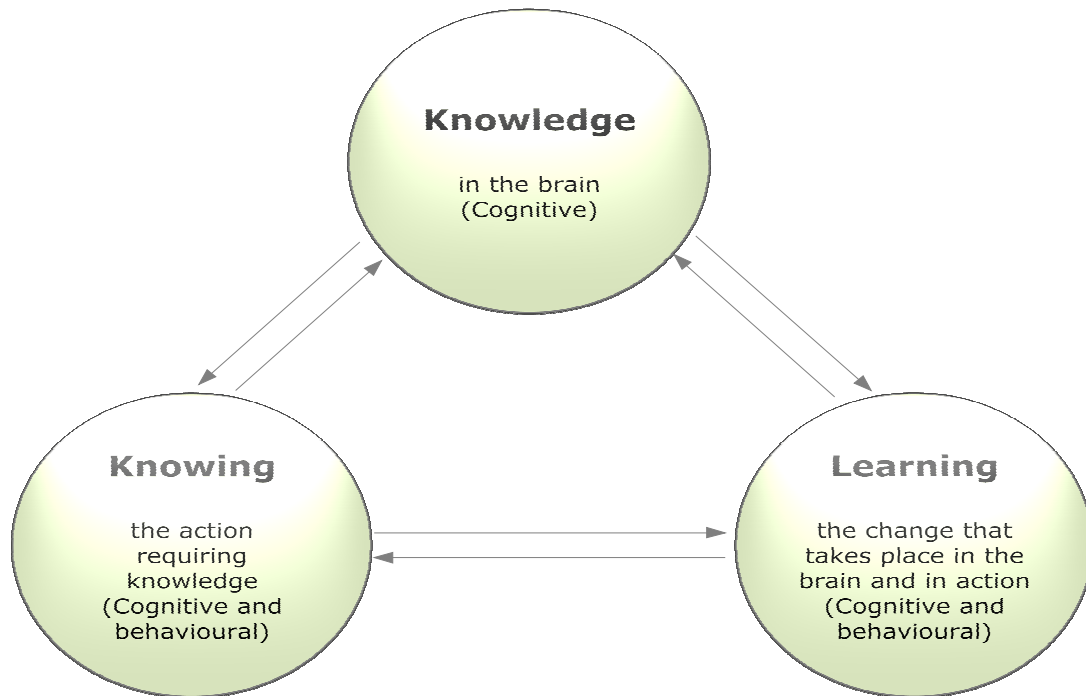
Blackler, Crump and McDonald (1998:79) and Blackler (2002:57, 58) point out that mismatches, tensions, paradoxes and contradictions may develop in activity theories providing a potential driving force for change. New ways of knowing and doing can emerge if communities engage with the tensions in their activity systems in terms of how these tensions should be treated.

Another significant aspect of the discussion on knowing is that knowledge and knowing constructs originate in different paradigms and there has been a call for multiparadigm research (Gioia & Pitres in Vera & Crossan 2003:125) in an effort to integrate these concepts. Cook and Brown (in Vera & Crossan 2003:125) argue that explicit and tacit knowledge are not enough to understand the nature of knowledge – hence the need to add knowing (as an account of what one knows). “It is by adding knowing to knowledge that we can begin to account for the relationship between what we know and what we do” (Cook & Brown 2002:87).

c Integrating knowledge, knowing and learning

Integrating knowledge into knowing has embraced behavioural components in the study of knowledge. In embracing behavioural components, the concepts of knowledge, knowing and doing become more closely aligned with learning (Crossan & Hurland 2002:712). This integration is depicted as follows (fig 2.10):

FIGURE 2.10
INTEGRATION OF COGNITIVE AND BEHAVIOURAL PROCESSES OF KNOWLEDGE



Knowledge is thought to be the cognitive process (including human skills possessed), while knowing is mainly behavioural (ie knowing in action). Organisational learning embraces both cognition and action (Vera & Crossan 2003:126; Crossan & Hulland 2002:712). Crossan and Hulland (2002:712) elaborate on the relationship between knowledge, knowing and learning. Knowledge is obtained through the mind (learning by reflection) and through the body (learning by doing). It is accumulated in the mind (know what – declarative knowledge) and in the body (know how – procedural knowledge). Knowing is practice or action (doing) that requires knowledge. Learning is the change that takes place in knowledge and in knowing, which in turn are the content of the learning process (ie what one learns or gets to know).

From the discussion above it is clear that **knowing** is an integral part of the study of knowledge, which means that both knowing or action processes and learning processes need to be considered in the understanding of knowledge on cognitive and behavioural levels in individuals, groups and organisations and in retaining knowledge in organisations.

2.4.3.3 *Knowledge construction processes*

Understanding the nature/appearance of knowledge specifically in organisations involves the processes of creating, sharing, transferring and applying knowledge (Quintas 2002:10). Each of these processes is discussed below in terms of its nature in organisations.

a Knowledge creation process

Quintas (2002:11) regards the process of knowledge creation as central to knowledge management and as a core capability in organisations. From the outset, it is important to understand the difference between *knowledge creation* and *knowledge acquisition*. Gnyawali and Grant (in Tetrick & Da Silva 2003:334) state that knowledge acquisition refers to the acquisition, distribution and interpretation of already existing knowledge that is external to the individual. DeLong (2004:23) defines **knowledge acquisition** as “the practices, processes, and routines used to move knowledge into a state where it is kept available for future use”. The examples he refers to are “one expert teaching another person or group how to perform a complex task, capturing detailed problem-solving instructions in a database, or embedding important company practises in an employee orientation program” (DeLong 2004:24). **Knowledge development** (creation) refers to the development of new knowledge that occurs in individuals through processes of dialogue and experience. People construct knowledge as they interact in social context, which creates social knowledge. This knowledge in turn influences behaviours, perceptions and understanding (Berger & Luckmann in Mohrman 2003:101–102). The view of Nonaka et al (2002:41–42) that the process of knowledge creation happens through action and interaction (organisational capabilities), corresponds to the above discussion of knowledge creation through dialogue, experience and social interaction. To this they add that the creation of new knowledge happens continuously out of existing organisation-specific capabilities and does not occur through the stock of knowledge (in other words, the knowledge that exists outside individuals such as a particular technology).

Possibly the most cited model of knowledge creation is that of Nonaka and Takeuchi (Nonaka et al 2002:43) about the knowledge-creating process in organisations. One of the most cited aspects of this model is the distinction and conversion between tacit and explicit knowledge and the cycle of four processes that creates new knowledge by converting tacit knowledge into explicit knowledge. This process is referred to as the SECI

process (socialisation – externalisation – combination – internalisation) (Choo & Bontis 2002:6), which was discussed in section 2.4.2.3. To this SECI process they add two more elements, namely "ba", the shared context for knowledge creation and knowledge assets (organisation-specific resources that are indispensable to create value for the organisation) (Nonaka et al 2002:43–44). Knowledge assets are the inputs, outputs and moderating factors of the knowledge-creating process (Nonaka et al 2002:55). These three elements have to interact with one another to form a knowledge-creating spiral (Nonaka et al 2002:44).

In the knowledge-creating process context, authors such as Cook and Brown (2002:95) and Nonaka et al (2002:41–42) agree that knowledge interacts with the environment (or world), and reshapes the environment and itself through the process of knowledge creation. However, Cook and Brown (2002:95) feel that the production of knowledge does not lie in "a continuous interaction between tacit and explicit knowledge", but in people's interaction with the environment (world). Knowledge creation to them lies in the **use** of knowledge (be it explicit or tacit) as "tools of productive inquiry" (referred to as "knowing" – discussed previously in sec 2.4.3.2b) and not in the general characteristics of tacit and explicit knowledge, as Nonaka and Takeuchi (in Cook & Brown 2002:94) suggest. Cook and Brown (2002:94) hold that explicit and tacit knowledge are generated each in their own right and that it is not possible for tacit knowledge to become explicit (or vice versa). However, one can be a useful tool in the generation of the other.

Allee (2003:97) supports this idea by pointing out that Polanyi, who first explored the tacit dimensions of knowledge, described it as "'innate' (inborn) intelligence, perception, and capacities for reasoning – rather than a type of memory or knowledge store". This means that tacit knowledge could and does not need to be converted to explicit. Thus, explicit communication and unspoken tacit communication occur at the same time when knowledge is shared. In other words, there is no linear progression of knowledge from tacit to explicit – instead, they are two aspects of the one process of knowing (Allee 2003:97). The idea of tacit knowledge that needs to be converted to explicit knowledge arose from the idea that tacit knowledge is stored memory, experience or content in people's minds that simply can be articulated (converted into explicit knowledge) (Allee 2003:97). Nonaka and Takeuchi appear to use the term "tacit knowledge" to describe **unarticulated personal knowledge or skill** that could be made explicit. This "**personal knowledge**" idea seems to fit better with the assumption that personal knowledge that is in people's minds needs to be codified, captured, stored and disseminated. The art is to

know what knowledge can be made explicit and is worth the effort, for example, the knowledge of an expert in handling a sale with a customer and the selling context as opposed to knowing what route salespeople take to an appointment (Allee 2003:98–99)

To summarise, it would appear that the **knowledge creation process** can be regarded as personal knowledge in people's minds that is shared through action and social interaction (such as dialogue and experience) with the environment, producing new knowledge. This seems to be an ongoing cycle and the knowledge created in organisations seems to be context specific.

b Knowledge-sharing process

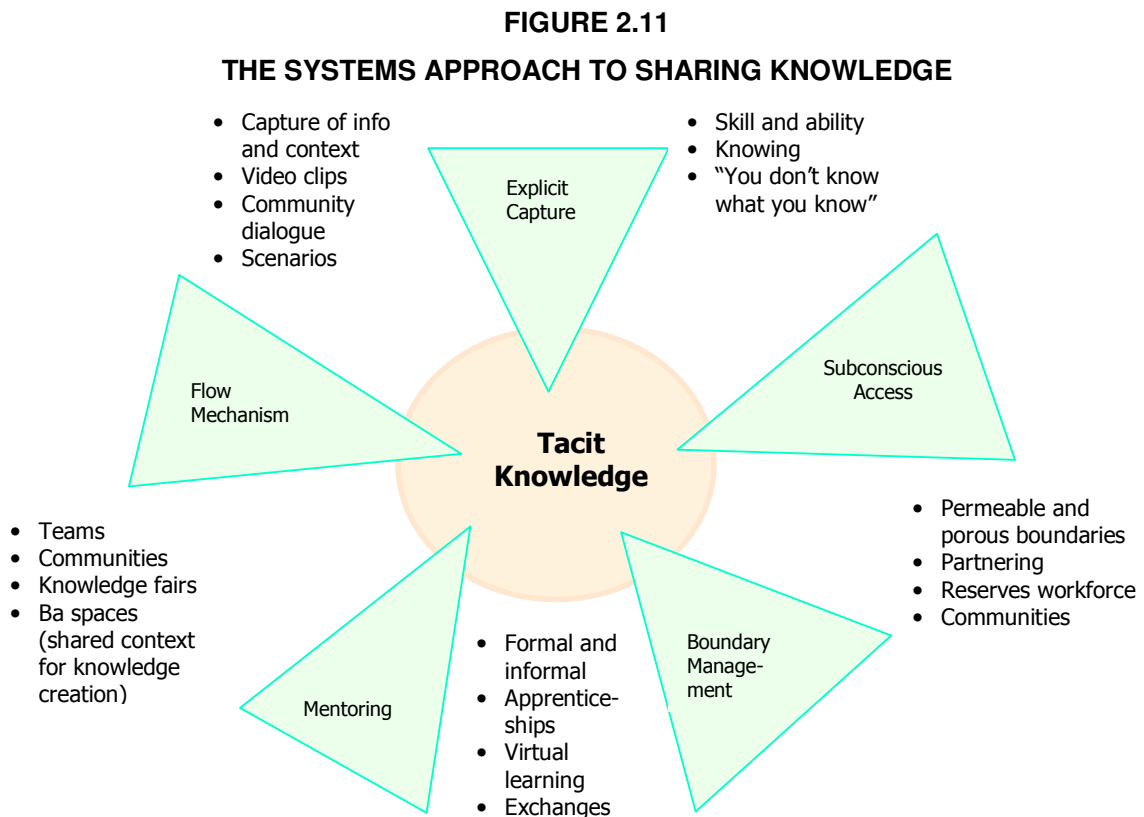
Sharing knowledge in organisations entails disseminating employees' individual (personal) knowledge so that the knowledge becomes available where it is needed. Knowledge is needed to contribute to productivity and improve an organisation's competitiveness (Bukh, Johansen & Mouritsen 2005:74). Knowledge sharing also promotes widespread learning and minimises wastage of resources to solve problems repeatedly (Jackson, Hitt & DeNisi 2003:405).

Knowledge sharing has been extensively researched and is viewed from different perspectives in the literature. There are the cultural, social and community (network) norms that support knowledge sharing and contribution (Choo & Bontis 2002:7; Yoo & Torrey 2002:424). There are the different levels of the individual, group/team and organisation through which knowledge sharing occurs in organisations. A number of authors mention the types of knowledge that can be shared, such as tacit knowledge (Von Krogh 2003:372; Allee 2003:96–99; Boisot 2002:72), and in general, the challenge of knowing what to share and what to retain or hold on to from a strategic perspective (Choo & Bontis 2002:13–14; Boisot 2002:76). Other authors mention the practices through which knowledge can be shared in organisations, such as interviews, videotaping, storytelling, mentoring, networking and communities of practice (Stewart 2002:312; DeLong 2004:51–52).

Some authors focus on the factors that would encourage or inhibit knowledge sharing, such as Jackson et al (2003:405) who emphasise the flow of knowledge instead of hoarding it. Davis-Blake and Hui (in Lepak & Snell 2003:135) emphasise the

encouragement of knowledge-sharing behaviour in terms of the willingness to share since knowledge is power in a knowledge-based context. Noe et al (2003:214) mention cultural barriers, lack of top management support, lack of shared understanding of the business strategy and lack of an appropriate organisational structure as barriers to knowledge sharing. A vital factor that is mentioned by authors such as Fineman (2003:565), Nielsen (2005:116) and Allee (2003:89) is trust or distrust, which refers to feelings of trust between individuals and an organisational culture of trust that would enhance knowledge sharing.

Bennet and Bennet (2004:245–246) discuss an interesting model of knowledge sharing as a process from a systems perspective, with five elements impacting on one another. This model focuses on tacit knowledge sharing and supports learning and flow of knowledge. The knowledge-sharing elements, namely explicit capture, flow mechanisms, mentoring, boundary management and subconscious access are depicted in figure 2.11.



Source: Adapted from Bennet & Bennet (2004:245)

The different elements of the model of knowledge sharing in figure 2.11 can be explained as follows:

(1) *Explicit capture of knowledge* is explained as developing context-rich information systems that include video clips, community dialogues, scenarios and stories.

(2) *Flow of knowledge* is facilitated through mechanisms such as teams, communities, knowledge fairs and ba spaces. Networking relationships are an integral part of these flow mechanisms. Sole and Edmondson (in Choo & Bontis 2002:7) suggest that in cross-functional **teams** members need to engage knowledge from diverse communities to address difficult problems and need to “integrate this knowledge by developing congruent understanding of the structure and goals of collective effort, and by developing norms and practices for communication and information sharing”. Stewart (2002:312) cites the example of putting designer and production engineers together in a team to design products that are easy to build with the benefits of reducing costs and adding value to the total system. The purpose of these cross-functional teams is to share knowledge and build value without diluting functional excellence. **Communities** in organisations seem to have a collective interest in sharing knowledge, members have a shared identity, language and activities, shared learning happens through storytelling and dialogue and members are experts in their area of practice (Von Krogh 2003:378–379). **Knowledge fairs** refer to the featuring of every functional and organisational area in the organisation, showing how they contribute to achieving the organisation’s vision. This creates an opportunity of sharing knowledge and better understanding among employees, stakeholders and partners (Bennet & Bennet 2004:169–170). The term “**ba spaces**” relates to Nonaka and Konno’s (cited in Little, Quintas & Ray 2002:17) interpretation of “ba” as knowledge creation. They explained “that the ‘shared space for emerging relationships’ (connoted by ‘ba’) might be physical, virtual (as in email or teleconferencing), mental (e.g. shared experiences, ideals, ideas) or any combination of them”. It explains the context of knowledge flows and why Bennet and Bennet (2004) included “ba spaces” as a knowledge flow mechanism in their model. The concept “ba” defined as the shared context of knowledge by Nonaka et al (2002:43–44) in their knowledge-creating model was discussed in section 2.4.3.3.a.

(3) *Mentoring* is an important facilitator of the knowledge-sharing process and in the learning organisation in particular. Every leader and worker should forge a continuing learning and teaching relationship to generate new ideas, share knowledge and ensure

the growth of the organisation (Bennet & Bennet 2004:245). According to Von Krogh (2003:373–374), the sharing of tacit knowledge from an apprenticeship perspective involves a “collective change in the cognition and action of both the master and the apprentice”. The apprentice’s cognition transforms through observation and imitative learning, while the master’s routines might change as a result of his or her reflections on the apprentice’s confrontations of the master with new experiences that are connected to the performance of the master’s own routines. This indicates that the process of knowledge sharing is not a one-way activity, but requires mutual adjustment between the sender and receiver of knowledge at individual level (Szulanski; Powel; Kaeser in Von Krogh 2003:373).

(4) *Boundary management* refers to the organisation purposefully creating knowledge-sharing opportunities across boundaries by developing partnering relationships, building a reserve workforce composed of former employees and known sources of special expertise. Boundaries of communities are expanded to include external sources (Bennet & Bennet 2004:245).

(5) *Subconscious access* refers to building the individual sense of intuition and knowing (ie knowledge gained from experience, but cannot be put into words) through a method of seeing beyond images, learning beyond words, sensing beyond appearances and feeling beyond emotions. This method also increases the ability to consciously integrate these sensory inputs with tacit knowledge, which resides in the unconscious mind and which one does not know that one knows (ie knowledge gained from experience and past learning that cannot be put into words) (Bennet & Bennet 2004:245, 307).

The major focus of this approach to knowledge sharing is that the sharing of knowledge requires a systems approach and that it is a continuous process that assumes many forms (Bennet & Bennet 2004:245–246). It also explains how different tools and mechanisms can be used in an organisation to facilitate the process of sharing knowledge between individuals to make it available where it is needed.

c Knowledge transfer process

Knowledge transfer is defined as applying knowledge from one setting to another (say, from the training room to on-the-job behaviour). This movement of knowledge occurs in organisations, business units, teams and groups (Boudreau 2003:376). Alavi and Tiwana

(2003:110) describe the knowledge transfer process as involving “the transmission of knowledge from the initial location to where it is needed and is applied”. Boudreau (2003:365) refers to knowledge transfer as forming part of knowledge flows, which he defines as the movement of knowledge between individuals, organisations or organisation levels. Knowledge flows include notions of knowledge transfer, organisational learning, group interaction and information flows through networks. It therefore appears to be a broader term than knowledge transfer. Jackson et al (2003:405) describe the diffusion of knowledge throughout an organisation as knowledge flow. According to Bontis and Crossan (in Jackson et al 2003:405), two types of knowledge flows are found in organisations, namely feed-backward and feed-forward. Feed-backward knowledge flows occur when organisational activities such as employee performance management and career development provide employees with information that is useful in doing their work. Feed-forward knowledge flows occur when the knowledge and experience of individuals and work teams are used to inform strategic decisions.

Davenport and Prusak (2000:88) state that knowledge is transferred in organisations whether or not the process is managed. When an employee asks a colleague how to compile a budget or report, the employee is requesting a transfer of knowledge from one person to another. They also point out that it is difficult to transfer tacit knowledge from one group to another, especially over distance, and cite an example of a group of Boston tunnellers, who were responsible for the Boston Harbour tunnel project and a group of New Zealand tunnellers, who had to be brought together physically to share and transfer their knowledge because transferring knowledge through emails, memos and manuals simply did not work (Davenport & Prusak 2000:99)

The knowledge transfer process involves two actions, namely **transmission** (sending or presenting knowledge to an individual or group – potential recipient) and **absorption** by this individual or group. Knowledge has not been transferred if it has not been absorbed. Making knowledge available cannot be seen as knowledge that was transferred. Furthermore, the knowledge has to be **applied or used** and should lead to some change in behaviour or development of new ideas which results in new behaviour. In this way, transfer of knowledge would add value to the organisation’s ability to be productive and competitive (Davenport & Prusak 2000:101). The organisation will need to deal with the factor of resistance in this transfer process, such as understanding and absorbing the information, but refusing to put it to use for various reasons, such as pride, stubbornness,

fear of taking risks, lack of opportunity to put the knowledge to use or not respecting the source (Davenport & Prusak 2000:101–102).

From a technological perspective, Alavi and Tiwana (2003:110) also identify knowledge transfer processes between individuals and knowledge repositories (ie downloading a report from a document repository or developing and storing a report in a document repository) and transfer among existing knowledge repositories (using information-filtering software to locate and transfer prespecified items among existing knowledge repositories). According to Davenport and Prusak (2000:106), knowledge transfer is often confined to technological focus through, say, electronic communication and document repositories (ie hard aspects), but urge that organisations should focus their attention to the human aspects of knowledge transfer (ie soft aspects).

In terms of the human aspect, Szulanski and Cappetta (2003:513) introduced the concept of **sticky transfers** as eventful, involving the source and recipient of knowledge transfers. They claim that the more effort a transfer requires, the stickier it can be said to be. When things do not go smoothly, the transfer is eventful. The knowledge transfer process is most frequently divided into the initiation and the implementation processes of the transfer. During implementation, further distinctions are often made between the initial implementation effort, the ramp-up to satisfactory performance and the subsequent follow-through and evaluation efforts to integrate the practice with other practices of the recipient (Szulanski & Cappetta 2003:518). Each of the four phases (initiation, implementation, ramp-up and integration) may be difficult in their own ways. Szulanski and Cappetta (2003:518) developed a typology of stickiness to describe these difficulties. Their typology refers to the following four distinct stages:

(1) *Initiation stickiness* is the difficulty in recognising opportunities to transfer and act upon them. The opportunity exists as soon as a gap and knowledge to address it are found in the organisation (say, when new people enter the organisation or when older people retire) (Szulanski & Cappetta 2003:519).

(2) *Implementation stickiness* occurs after the decision to transfer. Attention shifts to the exchange of information, knowledge and resources between the source and the recipient. Efforts are made to pre-empt problems through careful planning (Piscino in Szulanski & Cappetta 2003:519). True motivation issues (such as the recipient ignoring recommendations from the source because of a misunderstanding, resentment or to

preserve pride of ownership) and coordination issues (say, when the source or recipient deviates from agreed responsibilities) between the source and recipient are likely to be revealed during this stage (Szulanski & Cappetta 2003:520).

(3) *Ramp-up stickiness* occurs when the recipient begins using acquired knowledge (eg cuts over to a new system or starts up a new production facility). The main concern here is identifying and resolving unexpected problems (eg experts or trained people leaving the organisation) that prevent the recipient from meeting expectations of post-transfer performance (Szulanski & Cappetta 2003:520). The absorptive capacity of the recipient (ie the ability to utilise new knowledge) depends on the person's existing stock of knowledge and skills. Thus the presence of expertise is essential during the ramp-up stage (Chew, Bresnahan & Clark in Szulanski & Cappetta 2003:521).

(4) *Integration stickiness* refers to the eventfulness of the integration phase, which depends on the effort required to remove obstacles and deal with challenges to the regular use of the new practice. Once satisfactory results are obtained, the use of new knowledge gradually becomes routinised. The effort required to deal with challenges involves maintaining a truce in intra-organisational conflict (ie members are content to play their roles and manifest conflict follows mainly predictable paths) (Nelson & Winter in Szulanski & Cappetta 2003:521). This truce may be disrupted by events such as environmental changes, the departure of old members, the arrival of new members or the appearance of clearly superior alternatives (Goodman et al; Zaltman et al in Szulanski & Cappetta 2003:512), lapses in performance and a sudden change in the scale of activities. Each disturbance to the truce may cause some resistance and a need to resolve the contingency (Szulanski & Cappetta 2003:521).

The typology of transfer stickiness may point to some behavioural aspects of the sources and recipients in the transfer process that might lead to knowledge loss, on the one hand, or knowledge retention, on the other (to be addressed in ch 3).

d Knowledge application process

Knowledge application refers to the use of knowledge by individuals and groups in organisations to solve problems and make decisions (Alavi & Tiwana 2003:111). Knowledge per se does not produce value in organisations, but the action of applying it does (Alavi & Tiwana 2003:111). This implies that knowledge that is available, but never

used is of little value. Investments in knowledge acquisition, creation, sharing and transfer of knowledge will be of little use if knowledge is not applied effectively (Jackson et al 2003:406).

From a behavioural perspective, if the use of knowledge is intentional behaviour, employees must possess the required knowledge, recognise that they have required it, be motivated to use it and believe that it is feasible to use it. Various factors influence this application of the knowledge process such as a lack of awareness of the required knowledge, a lack of management support to implement new ideas and the difficulty of applying knowledge in other contexts (Jackson et al 2003:407).

Little research appears to have been conducted on the conditions that increase employees' use of available knowledge and how to ensure that the most current knowledge is used in decision-making processes (Jackson et al 2003:406–407).

To summarise, it would appear that the four **knowledge construction processes**, namely knowledge creating, sharing, transferring and application are closely intertwined and impact on one another in a continuous process that also repeats itself in organisations. All four of these construction processes are part of knowledge as a process. In the context of the current research, it is necessary to understand the knowledge construction processes in order to determine the organisational and behavioural factors that could enhance or hinder knowledge retention.

2.4.3.4 Difference between information and knowledge processes

Erlich and Cash (in Lueg 2001:154) found that it is dangerous to blur the concepts of information and knowledge. Information is typically needed to "do" something such as solving a problem or being informed about something and should therefore be placed in context if it is to be useful. Knowledge is grounded in the collective and individual experience.

Carlisle (2002:124) describes information and knowledge from a "knowledge-based" perspective of the organisation. From this perspective, organisations exist to "facilitate the acquisition, creation, explanation and transfer of useful knowledge". This view recognises that knowledge and information are two different concepts. Information is regarded as

comprising data and facts pertaining to natural or social events or states of affairs and the consequences of such events under given circumstances or situations. According to Fransman (Carlisle 2002:125), at any given point, in time the number of natural and social events in the world is finite as is the total stock of information available to an organisation. However, “knowledge is a potentially limitless wellspring” (Carlisle 2002:125), which is constantly fed with new ideas (Leonard in Carlisle 2002:125). From this perspective, knowledge is changed by adding new information.

Buckland (1991:351) identifies three principal uses of information by dividing it into three epistemological units, namely information as a process, information as knowledge and information as thing. Information as process is explained by the act of informing, telling or being told about something. It is a process of becoming informed. When someone is informed, his or her knowledge or what he or she knows about that fact or occurrence is changed. This corresponds with Carlisle’s idea (mentioned above) on knowledge that changes as new information is added. According to Buckland (1991:351), information as knowledge is intangible. Therefore to communicate knowledge, it has to be expressed, described or represented in a physical way as text, communication or a signal. Communicating knowledge is a process, but to capture and share knowledge, it is placed into storage and retrieval systems as information. These information items or “things” that represent knowledge in these systems are referred to as knowledge units (Zack in McInerney 2002:1010) or knowledge artefacts (Seiner in McInerney 2002:1010). From Buckland’s point of view as an information scientist, it is clear that there is interdependency between information and knowledge. He also distinguishes between things and processes clear (McInerney 2002:1010).

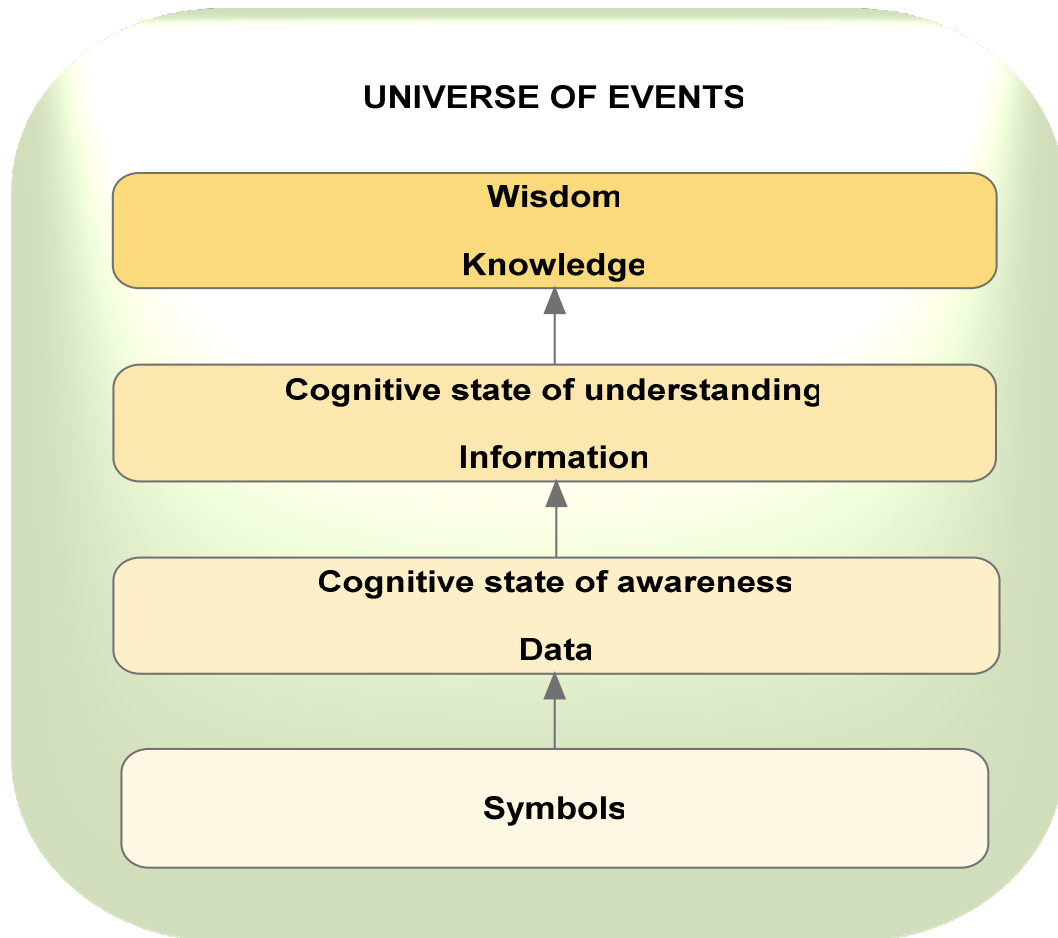
Authors such as Kermally (2002:47), Ahmed, Lim and Zairi (1999:305) and Smit (2004:277) make use of the hierarchical view of knowledge representing different levels of summarisation, namely data, information and knowledge. Data are regarded as the smallest building block of knowledge (Smit 2004:277). Data consist of facts and figures (Smit 2004:277), and when combined, yield meaningful information (Ahmed et al 1999:305). According to Godbout (in Smit 2004:277) and Kermally (2002:47), data have no meaning unless they are understood in the context in which they were gathered. They gain meaning and become informative once they are placed in context. Kermally (2002:47) describes information as “organised and categorised data put into context”. An example of data and information could be the following:

- *data*: a technical manual that contains data and text that exist online in a database
- *information*: an employee downloading and reading the manual and becoming informed on how to complete technical tasks

Only when information becomes internalised by a user, retained and accepted as useful in guiding behaviour, does it become knowledge (Smit 2004:277). According to Ahmed et al (1999:305), knowledge exists at a higher order than information where it cannot be as easily transferred as in the case of information transfer. From Kermally's (2002:47–48) point of view, "Knowledge is the *use* of information". Kermally believes that if one can persuade employees to use information and their training and experience, knowledge has been created and if captured and used, will enhance business performance.

To the breakdown of data, information and knowledge, some authors such as Bechman (in Carlson 2005:3) add more levels such as expertise and capabilities. From an information science perspective, the knowledge system consists of symbols, data, awareness, information, understanding, knowledge and wisdom operating in the universe of events (depicted in fig 2.12) (Broadbent, Cleveland, Haeckel & Nolan; Streng in McInerney 2002:1010; Debons et al 1988:7).

FIGURE 2.12
THE KNOWLEDGE SYSTEM



Source: Adapted from Debons et al (1988:7)

It is a hierarchical system in which data are transformed to knowledge and wisdom. This transformation can be presented as part of a spectrum of cognition that characterises human competence in dealing with life's events. Each transformation represents a step upwards in human cognitive functioning. An information system makes the transformation of data into information possible. A knowledge system is a greater system of which an information system is only a part. A knowledge system enables human social networks to reach a point of increased human wisdom through the different transformation steps (Debons et al 1998:6–7).

Kakabadse et al (2003:76–77) agree with McInerney that the terms "knowledge" and "information" are often used interchangeably in the literature, but that a distinction is

necessary. They describe the "chain of knowledge flow" as data – information – realisation – action or reflection – wisdom. Obtaining information one needs and assessing its value, requires both practical and theoretical knowledge, which implies operation of discipline and action. Thus realisation ("knowledge") can be understood as information put into productive use. Through action and reflection one may also gain wisdom. Wisdom is required to know how to use information in any given context.

According to Carlson (2005), hierarchical distinctions are often arbitrary and not necessarily properties of that which is to be known, as mentioned earlier in section 2.4.2.3c (Debons et al 1988) under the hierarchical discussion of knowledge. These distinctions are individual and context specific. It depends on how the individual perceives it in that context. Thus to one individual, that which is considered to be data might be information or knowledge to another. "This ambiguity is incompatible with the development of generalizable representations of knowledge constructs that can be employed across individuals and contexts" (Lang cited in Carlson 2005:4).

From the discussion above it would appear that one needs to be aware of the **distinction between information and knowledge**, but that individual perceptions in a specific context determine the distinction between data, information and knowledge. Using this information distinction as a base to work from within an organisational framework, may not be the most suitable way of approaching the appearance (nature) of knowledge in the current research, since the focus on these approaches is on the information system and knowledge flows and not on the knowledge system as a whole.

2.4.3.5 Carriers of knowledge and the types of knowledge they carry

In order to understand the types of knowledge that are applicable to this research, it is necessary to discuss in more detail the personal (individual) knowledge possessed by individual persons and social knowledge possessed by groups and the organisation. These constructs are referred to as personal knowledge, collective knowledge and organisational knowledge. This discussion involves the types of knowledge from an ontological perspective. The purpose of this discussion is to clarify these terms as part of the discussion on the appearance (nature) of knowledge.

a *Personal knowledge (tacit knowing)*

Personal knowledge relates to the knowledge and knowing of individual people. From an individual perspective, this type of knowledge resides in the minds of people (Campos & Sánchez 2003:7) and in their experience of actions (the way they do things). Li and Goa (2003:8) refer to this type of knowledge as "**tacit knowing**" and describes it as "elusive and subjective 'awareness' (author's quotes) of individual that cannot be articulated in words". Searle (in Nightingale 2003:162) explains that in an individual's dynamic interaction with the physical and cultural environment, the neurological (cognition) hardware generates many interrelated unconscious neural images because it regulates the person's behaviour. Some of these can be turned into conscious mental images and only some into words and gestures. Searle (in Nightingale 2003) therefore suggests that tacit knowledge should be contrasted with conscious mental states and speech acts instead of explicit (codified) knowledge. Tacit knowledge is extremely difficult to articulate and perhaps impossible to put into writing or codify (Wong & Radcliffe 2000:495). To McInerney (2002:1011), tacit knowledge is unspoken and hidden. It is the assumptions and expertise of individuals that develop over years and may never have been documented or recorded. In other words, it is experience based, subconscious, perceived, held within the self, transferred through conversations and demonstration and embedded in stories and narratives.

"**Implicitness**" is another form of expressing "knowing" that exists. It refers to knowledge that can be articulated, but individuals are unwilling to articulate it because of specific reasons in certain settings (such as organisational culture customs, organisational style or intrinsic, individual behaviour). Finding ways to share implicit knowledge is probably easier than ways to encourage the sharing of tacit knowledge since tacit knowledge seems to be elusive and even illusive (Li & Goa 2003:8).

Important tacit and explicit knowledge in an organisation includes, for example, knowledge about the organisation, business processes, customers, strategy, products and services (Tobin in Noe et al 2003:210). Tacit knowledge is most critical to organisations because it is based on the knowledge and skills that accumulate over time through the experience of its individual employees (King, Fowler & Zeithamel in Noe et al 2003:210).

b *Collective social knowledge of groups*

The term "collective knowledge" was used by Baumard (in McInerney, 2002:1013) to differentiate individual knowledge from knowledge shared in social groups. In the social group setting, "communities of practice" could develop where groups of people learn from one another, master the knowledge and solve work-related problems in particular situations. The type of knowledge shared and used in these social groups is therefore referred to as "collective knowledge".

This type of knowledge could also refer to **collective tacit knowledge** developed communally over time through group interactions. It exists to a lesser or greater extent in the minds of each individual member of the group and encompasses, for example, the entire production system used in their department. Individuals can contribute to innovation because they understand how all the individual operations in the organisation fit together. Even if some individuals leave an organisation, this shared collective knowledge remains as accepted organisational routines and standards (Leonard & Sensiper 2002:491). However, when it comes to specific problem solving, the knowledge and experience of individual experts may be needed as a contribution to find solutions, and this could be lost to the organisation when individual experts leave. Group knowledge may also be affected if more than one person from a particular group or community leaves the organisation.

A vital part of social knowledge that resides in individuals is **relationships** with people inside and outside the organisation – in other words, the people they know and collaborate with to get their work done on time (*Von Krogh & Roos, 1998, Cross & Davenport 2006:31*). Individuals rarely get things done on their own because they need to rely on both co-workers and relationships with external parties (Parise et al 2006:32). A case in point would be the trusted contracts that people have with, say, external customers (Parise et al 2006:32).

c *Organisational knowledge*

Nonaka and Takeuchi (cited in McInerney 2002:1013) define "organisational knowledge" as what is commonly known in a group of people associated with an organisation. Another definition of organisational knowledge is: "the accumulated know-how, expertise, and ways of working identified with a particular organization that becomes so embedded in the physical and social systems that the knowledge essentially remains accessible to the organization, even if key individuals leave" (Allee 2003:265). Quintas (2002:12) concurs

with the statement that organisational knowledge outlasts the employment of individuals, suggesting that it is greater than the sum of the currently employed individuals' expertise. However, no organisation can be aware of, mobilise and exploit all the knowledge possessed by all employees. Furthermore, knowledge is not static because employees are constantly on a journey of storytelling (conversation), sense making and creation. Knowledge is reshaped to fit new circumstances and the same knowledge is never experienced twice (Allee 2003:143-144). This means that organisational knowledge can change and reshape itself. It could imply that if large amounts of key knowledge are lost to an organisation, this could affect the organisation's overall functioning and success.

Organisational knowledge includes captured and embedded organisational routines, processes, systems, products, customers, cultures and competitive environments (Cummings & Worley 2005:505; Quintas 2002:12). This knowledge may be explicit and codified in documents, manuals or databases, or it may be tacit in the form of employees' skills, memories and intuitions (Cummings & Worley 2005:505; Droege & Hoobler 2003:52).

Codified knowledge is easily shared between individuals, but also easily copied by competitors. Tacit knowledge is less easily replicated and more difficult to share. However, attention has been focused in organisations on finding informal ways of sharing tacit knowledge across members and units in an organisation to accumulate and build organisational knowledge (Cummings & Worley 2005:505; Droege & Hoobler 2003:52).

Organisational knowledge is the key outcome of organisational learning processes and it also contributes to organisational performance to the extent that it is relevant and applied effectively to the organisation's competitive strategy. The link between the learning processes and organisational performance generates knowledge capabilities that have been referred to as "core competencies", "invisible assets" and "intellectual capital". These terms suggest the contribution of organisational knowledge to organisational performance (Cummings & Worley 2005:505).

It is necessary to distinguish the term "organisational memory" from organisational knowledge because the term relates to organisational knowledge and is used by some researchers. Nilakanta, Miller and Zhu (2006:85) base their definition of organisational memory on Ackerman and Halverson's (2000) and Nevo and Wond's (2005) descriptions, and define it as follows: "Organizational memory is the collection of historical corporate

knowledge that is employed for current use through appropriate methods of gathering, organizing, refining, and disseminating the stored information and knowledge.” The focus of organisational memory research is generally on IT-based organisational memory systems that make recorded knowledge retrievable and provide vehicles for employees (knowledge workers) to share knowledge. Organisational memory from an IT perspective is not the main focus of this research, but is mentioned here to clarify the main discussion of the different appearances (nature) of knowledge in organisations and as part of a holistic approach to knowledge retention.

It appears that all three **types of knowledge carried by** individuals, groups and organisations, namely personal (individual) knowledge/tacit knowing, collective (social) knowledge and organisational knowledge are essential for the successful operation of organisations and therefore need to be protected against loss of knowledge that could put the organisation at a disadvantage.

2.4.3.6 Categories of knowledge types (typologies/taxonomies)

It appears from the literature that there are a variety of typologies and taxonomies that categorise knowledge. Various authors in Venzin et al (1998:47–48), such as Blackler; Collins; Nonaka and Takeuchi; Polanyi; Prahalad and Bettis; authors such as Willard; Turben and Frenzel in Ponelis and Fairer-Wessels (1998:4); Shank and Abelson and Edvinson and Malone in Kakabadse et al (2003:4); Mertins, Heisig and Vorbeck; DeLong and Fahey in Danskin et al (2005:92); and Andriessen (2006:98-99), elaborate on the concept of knowledge by **categorising the types** of knowledge. This is a manifestation of the ongoing knowledge development on the nature of knowledge (Venzin et al 1998:47). According to Kuhn (in Kakabadese et al 2003:79), a multitude of factors determine knowledge subjectively, such as pedagogical, socioeconomic, cultural and psychological issues combined with language and context, which all contribute to the variety of taxonomies and typologies.

One possible reason for categorising knowledge is that it may be used to indicate which of the categories of knowledge are more suitable to managers (Ponelis & Fairer-Wessels 1998:4), especially when the focus is on the retention of knowledge that could be lost to the organisation. It also promotes a better understanding of the concept of knowledge in different forms, types and manifestations (Kakabadse et al 2003:40). Although there might

be many other forms, a brief summary of typologies and taxonomies found in the literature is provided in table 2.7.

TABLE 2.7
DIFFERENT TYPOLOGIES AND TAXONOMIES OF KNOWLEDGE

AUTHORS AND REFERENCES	TYPOLOGIES AND TAXONOMIES
Polanyi (in Kakabadse et al 2003:80)	<ul style="list-style-type: none"> • Tacit (awareness of things that one may be unable to express in words) • Explicit (capable of being clearly stated)
Spender (in Nahapiet & Ghoshal 2002:677)	Collective knowing at organisational level: <ul style="list-style-type: none"> • Individual explicit knowledge • Individual tacit knowledge • Social explicit knowledge • Social tacit knowledge
Blackler et al (1998:71–72)	<ul style="list-style-type: none"> • Embodied • Encoded • Embrained • Embedded • Encultured
Venzin et al (1998:48)	<ul style="list-style-type: none"> • Tacit • Embodied • Encultured • Embedded • Embrained • Procedural • Event <div style="margin-left: 150px;"> <p> </p> <p> </p> <p> </p> </div>
Willard (in Ponelis & Fairer-Wessels 1998:4)	<ul style="list-style-type: none"> • Personal • Embedded • Recorded <div style="margin-left: 150px;"> <p> </p> </div>
Turben & Frenzel (in Ponelis & Fairer-Wessels 1998:4)	<ul style="list-style-type: none"> • Declarative • Procedural • Semantic • Episodic • Meta-knowledge
Shank & Abelson (in Kakabadse et al 2003:80)	<ul style="list-style-type: none"> • General • Specific • Expert
Edvinson & Malone (in Kakabadse et al 2003:80)	<ul style="list-style-type: none"> • Product • Routine • Process
Mertins et al (2003:1)	<ul style="list-style-type: none"> • Scientific • Experienced person's knowledge
DeLong & Fahey (in Danskin et al 2005:92)	<ul style="list-style-type: none"> • Human • Social • Structured

AUTHORS AND REFERENCES	TYPOLOGIES AND TAXONOMIES
Andriessen (2006:98–99)	Typology of metaphors: <ul style="list-style-type: none"> • Knowledge as something physical • Knowledge as a wave • Knowledge as a living organism • Knowledge as thoughts and feelings • Knowledge as a process • Knowledge as a structure

The different authors and their typologies or taxonomies are discussed below.

a Polanyi

Polanyi's categorisation, namely tacit and explicit, was referred to earlier in the discussion of the epistemologies of knowledge (sec 2.4.2.3) and under personal, individual knowledge (sec 2.4.3.5a). In this discussion, the focus is on the type of knowledge as such. According to Kakabadse et al (2003:80), all knowledge is either *tacit* or rooted in tacit knowledge. A painter or a sculptor is not able to describe in detail how he or she goes about creating his or her work of art (Venzin et al 1998:48). Nonaka and Takeuchi (1995:50) elaborate on the term "tacit" in a more practical direction. Tacit knowledge includes cognitive and technical elements. Cognitive elements focus on human beings creating working models of the world by making and manipulating analogies in their minds. These "mental models" (Johnson-Laird in Nonaka & Takeuchi 1995:60), such as perspectives, beliefs, viewpoints and paradigms, help individuals to perceive and define their world. Technical elements refer to concrete know-how, crafts and skills.

Explicit knowledge is knowledge that can be clearly described (Kakabadse et al 2003:48) and is transmittable in formal systematic language (Nonaka & Takeuchi 1995:59).

b Spender

Spender (in Nahapiet & Ghoshal 2002:677) combined the dimensions of explicit/tacit and individual/social knowledge and created a matrix of four different elements of an organisation's **intellectual capital**. This perspective acknowledges the socially and contextually embedded forms of knowledge and knowing, which differ from the simple aggregations of the knowledge of a set of individuals. According to Nahapiet and Ghoshal (2002:678), the following four elements constitute the intellectual capital of an organisation:

(1) *Individual explicit knowledge* is knowledge that is available to individuals through facts, concepts and frameworks stored in and retrieved from personal records or individual memory (Nahapiet & Ghoshal 2002:677).

(2) *Individual tacit knowledge* may take many different forms, such as practical and theoretical knowledge and the performance of different kinds of artistic, technical and physical skills (Nahapiet & Ghoshal 2002:677).

(3) *Social explicit knowledge* is the shared collection of knowledge of scientific communities, referred to as "objectified knowledge" by Spender (in Nahapiet & Ghoshal 2002:677).

(4) *Social tacit knowledge* "represents the knowledge that is fundamentally embedded in the forms of social and institutional practice and that resides in the tacit experiences and enactment of the collective" (Brown & Duguid in Nahapiet & Ghoshal 2002:677). This is the type of knowledge that distinguishes highly experienced team performance. It is accessible and sustained through group interaction (Spender, in Nahapiet & Ghoshal 2002:677).

c Blackler

Blackler et al (1998:70–72) conducted a study focusing on the literature of organisational learning and found that different authors emphasise the significance of knowledge that is embodied, encoded, embrained, embedded and encultured. Venzin et al (1998:48–50) and Mertins et al (2003:2) also refer to these categories of knowledge:

(1) *Embodied* knowledge is described as knowledge that results from experiences while being physically present. It also depends on people's sensory information, face-to-face discussions and physical cues. It is acquired by doing and takes place in a specific context (Blackler et al 1998:71). The emphasis is on the process of knowledge development, say, during project work (Venzin et al 1998:48). This knowledge is also mostly partly explicit and is actionoriented (Blackler et al 1998:71).

(2) *Encoded* knowledge is transmitted by signs and symbols, such as in books, manuals and electronic formats (Blackler et al 1998:72). It could consist of encoded knowledge such as information on customers and employees, training material, product

catalogues and codified rules and regulations. This is normally the type of knowledge that remains in the organisation after all the employees have left (Venzin et al 1998:50)

(3) *Embrained* knowledge is referred to as knowledge that requires conceptual skills and cognitive abilities (Blackler et al 1998:71) which enable one to see underlying patterns or abstractions and synthesising, and the reflection of basic assumptions (referred to as "dominant logic" by Prahalad & Bettis [in Venzin et al 1998:50] and "double loop learning" by Argyris & Schön [in Venzin et al 1998:50]).

(4) *Embedded* knowledge resides in systemic routines and is analysable in relationships between, say, emergent routines, formal procedures, technologies and roles (Blackler et al 1998:71). The emphasis is on the process of knowledge construction. According to Venzin et al (1998:50), it is embedded in a variety of contextual factors and constructed by social systems. An organisation's skills and competencies can be analysed by the physical and mental factors that comprise individual skills, but also include technological and sociostructural factors (Blackler et al 1998:71).

(5) *Encultured* knowledge refers to the process of achieving shared understanding (Blackler et al 1998:71). Venzin et al (1998:50) included this type of knowledge with embedded knowledge, but Blackler et al (1998:71) make a clear distinction between the two categories. They state that relevant theorists point out that cultural meaning systems relate to the process of socialisation and acculturation, which depend largely on language (Blackler 1998:71). Shared knowledge is generated in different language systems such as organisational culture and work groups. If these systems change, the knowledge also changes (Venzin et al 1998:50). Many theorists of organisational culture emphasise the relationship between language and thought (in the tradition of Wittgenstein). Language is understood as knowledge and thought itself: "utterances are analysed as practical acts through which meanings are shaped and negotiated" (Blackler et al 1998:72).

d Venzin et al

Venzin et al (1998:48) refer to *event* knowledge and *procedural* knowledge in their typology of knowledge. *Event* knowledge is explained as knowledge of events and trends inside and outside the organisation (eg mergers that have taken place or the effect that increased crime has on the short-term insurance industry).

Procedural knowledge refers to knowledge of processes and as opposed correlations. This could include knowledge of product processes, procedural knowledge such as negotiating contracts, and "if ... then" scenarios (Venzin et al 1998:48).

These two types of knowledge were referred to in the overall approaches to describing the appearance of knowledge as an object (as indicated in fig 2.9).

e Willard

In the categorisation of Willard (in Ponelis & Fairer-Wessels 1998:4), knowledge is not only seen as internal (subjective nature) to the human being, but also as existing externally (objective nature) (see also Popper's definitions of *subjective* and *objective* in sec 2.4.2.3). The categories of personal, embedded and recorded knowledge in this typology are directly coupled to the area of management, namely people, processes or information. Information management is therefore seen as a subdivision (or specific category) of knowledge management (Willard in Ponelis & Fairer-Wessels 1998:4).

f Turben and Frenzel

The categories of Turben and Frenzel (in Ponelis & Fairer-Wessels 1998:4) refer to the following, more subjective nature of knowledge:

(1) *declarative knowledge*: answers "what" questions and is shallow explicit knowledge

(2) *procedural knowledge*: answers "how" questions, for example, step-by-step instructions

(3) *semantic knowledge*: reflects the cognitive structure of the subject and involves the use of long-term memory

(4) *episodic knowledge*: autobiographical and experimental information organised by episode, classified by date and place and residing in long-term memory

(5) *meta-knowledge*: knowledge about how to reason, how to apply knowledge and how to learn

h Shank and Abelson

Shank and Abelson (in Kakabadse et al 2003:80) categorise knowledge into the following three categories:

- (1) *general knowledge*: interpretation of and information about human relationships, intentions and dispositions, such as satisfaction, enjoyment, achievement and crisis
- (2) *specific knowledge*: a representation of a specific, expected flow of events in a particular situation, for example, applying for a job or baking a cake
- (3) *expert knowledge*: consisting of "factual knowledge", namely knowledge about life matters, and "procedural knowledge", namely mental procedures and heuristics

i Edvinson and Malone

The categorisation of Edvinsson and Malone (in Kakabadse et al 2003:80) seems to focus on knowledge needed to accomplish or fulfil process tasks by manufacturing/creating products in organisations. The process task itself could be "seen as a knowledge processing task and analysed by a number of empirically validated and practically proven criteria" (Mertins et al 2003:2).

j Mertins et al

Scientific knowledge, as categorised by Mertins et al (2003:1) refers to knowledge that emanates from academic research facilities such as universities and research institutes. It is developed by using scientific methodologies and standards and is tested and validated by the scientific community. It is described in reports, research papers, articles and books. The research and development departments of companies produce a similar type of knowledge. This knowledge, however, is embedded in a company's products and services.

Another association with the term "knowledge" is the *knowledge that an experienced person possesses*, such as knowing that a wine or cheese has matured to the right level,

hearing that there is something wrong with a machine or finding a fault in a high-tech chip production environment (Mertins et al 2003:1).

k DeLong and Fahey

DeLong and Fahey (in Danskin et al 2005:92) developed a framework of knowledge that distinguishes between the following:

- (1) *human knowledge*: what humans know or know how to do
- (2) *social knowledge*: usually tacit knowledge that arises out of relationships – for example, the way in which (how) employees on different levels in an organisation interact with each other
- (3) *structured knowledge*: usually explicit knowledge that is rooted in systems, routines, processes, and rules of an organisation

Within these categories lie the following additional dimensions (characteristics) that make possible understanding of knowledge transfer:

- *codifiability* of explicit and tacit knowledge
- *simplicity versus complexity*: for example, the amount of information needed to communicate knowledge such as opening a software program on a computer versus teaching a colleague a new software program
- *systemic/independent versus dependent*: for example, embedded in a system such as principles of software programming versus developing a specific programme in a specific context
- *velocity versus viscosity*: say, how rapidly knowledge can move through an organisation such as news of impending lay-offs versus the richness of knowledge or the process of transferring the knowledge of a new product development such as a new software program to colleagues, which would travel slowly (Danskin et al 2005:92–93)

Andriessen (2006:93) developed a typology of metaphors used in the intellectual capital and knowledge management literatures to conceptualise knowledge. He found that over 95% of statements about knowledge identified are based on some kind of metaphor, with "knowledge as a resource" and "knowledge as capital" forming the basis of the concept of intellectual capital. The concept of knowledge produced the following six metaphors (Andriessen 2006:98–99):

(1) *knowledge as something physical*: conceptualisations of knowledge that use the physical world of substances such as land, objects and forms – for example, Nonaka and Takeuchi's (1995:81) reference to "making knowledge more fluid"

(2) *knowledge as a wave*: conceptualising knowledge as something that has a physical referent but cannot be seen or touched, such as heat, light, waves and electricity – for example, Nonaka and Takeuchi's (cited in Andriessen 2006:98) reference to "knowledge that resides in individuals must first be amplified within the organisation"

(3) *knowledge as a living organism*: highlights the abilities and active characteristics of knowledge through words such as "exists", "develops", "move" (Davenport & Prusak cited in Andriessen 2006:98)

(4) *knowledge as thoughts and feelings*: referring to bodily experiences of feelings, ideas and thoughts to conceptualise the intangible nature of knowledge – this forms the basis of the classic distinction between tacit and explicit knowledge

(5) *knowledge as a process or knowledge as action*: emphasises the dynamic nature of knowledge – for example, Davenport and Prusak (cited in Andriessen 2006:99), who refer to knowledge as both a "process" and a "stock", and their reference to "knowledge enablers"; or Nonaka and Takeuchi's (cited in Andriessen 2006:99) reference to knowledge being about action and the fact that it is always "knowledge to some end"

(6) *knowledge as a structure*: the most abstract type of metaphor referring to knowledge and emphasising the fact that knowledge consists of elements that can be arranged in a particular form – for example, Nonaka and Takeuchi's cited in Andriessen, 2006:99) reference to knowledge being like a system owing to its "cognitive elements"

When using metaphors to categorise knowledge, one should be aware of the fact that metaphors highlight certain characteristics and ignore others. Their limitations could steer one in certain directions and this may happen subconsciously (Andriessen 2006:93). Andriessen (2006:106) also emphasises the fact that the way one conceptualises knowledge will “steer the way we think about improving knowledge in organisations”. In other words, choosing a good metaphor may result in a fruitful diagnosis and a successful solution, as opposed to choosing the wrong metaphor. In Prusak’s comment on Andriessen’s research (2006:109-110), he criticises Andriessen’s (2006:105) way of thinking about knowledge as an abstract concept not having a referent in the real world and using metaphors to make knowledge comprehensible, by saying that “this is the real world and one needs no metaphors to explain it”. He cites the example of watching a knowledgeable surgeon performing his or her task, which is seeing knowledge in practice (the real world). He suggests that a movie may be a better tool to demonstrate how the world looks, sounds and feels.

According to Blackler et al (1998:84), the different types of knowledge (typologies and taxonomies) appear to be highly compartmentalised. Such approaches segment (divide) and separate issues that are closely related, such as thought and action, bodies and brains, individuals and communities (Blackler et al 1998:78). Although the traditional categorisation of knowledge is not entirely denied, they feel that knowledge is better conceptualised as an **active process** since knowledge is provisional, mediated, situated, political and emotional (as described sec 2.4.2.3). New demands are falling on the **knowing** of individuals and organisations as activity systems become increasingly complex and interrelated (Blackler et al 1998:84). They also mention that changes in the way wealth is generated have placed a premium on certain forms of knowledge and suggest “knowing” (“How do people do their knowing”?) as an approach to gain a better understanding of knowledge. To them the key insight for management is that knowledge is a collective achievement that happens through debate, improvisation, learning and collaboration (Blackler et al 1998:74, 84).

The different **typologies and taxonomies** that were developed appear to depend on the perspective from and context in which knowledge is viewed. The researcher tends to agree with Blackler et al’s (1998) view that knowledge is better conceptualised as an active process, approaching it from a “knowing” perspective. The question is: within this

maze of typologies and taxonomies, what would apply to organisations in terms of retaining knowledge that might be lost and that could have an impact on the functioning and competitive advantage of an organisation? The answer to this question will be determined in chapter 3.

2.4.3.7 *Constructs used interchangeably with knowledge*

After studying the different approaches to the appearance and categories of knowledge, the next step is to identify these appearances in their hidden forms. In the management literature, knowledge authors often use several concepts relating to knowledge interchangeably or without clearly distinguishing them. Related constructs to the term "knowledge" are, for example, invisible assets, intellectual capital, intangible resources, strategic assets, core competences, organisational memory, core capabilities, skills, absorptive capacity, architectural competence (Venzin et al 1998:53, 54), knowledge-based resources and knowledge-based competencies (DeNisi, Hitt & Jackson 2003:13–14).

Each of these terms can be briefly defined as follows:

- *invisible assets*: resources based on information such as customer trust, organisational culture and capacity of management (Ilami & Roehl; Skandia in Venzin et al 1998:54)
- *intellectual capital*: consists of **human capital** – the tacit knowledge embedded in the minds of employees, **structural capital** – organisational routines in conducting the business, **relational capital** – knowledge embedded in the relationships with the external environment (Bontis; Edvinsson & Sullivan in Bontis 2002:629); intellectual capital is also viewed as individual and organisational knowledge as a commodity or asset (McInerney 2002:1013)
- *intangible resources*: know-how of employees, customers and suppliers and the culture of the organisation which are not easily transferable (Hall in Venzin et al 1998:54)
- *strategic assets*: combination of resources and capabilities which are rare, appropriate to the organisation, difficult to imitate or transfer and specialised to

generate a competitive advantage in the organisation (Amit & Shoemaker; Winter in Venzin *et al.* 1998:54); the term “strategic capabilities” is sometimes used, but refers to systems and processes that organisations create to leverage their resources to produce a competitive advantage (DeNisi *et al* 2003:13)

- *core competences*: combination of abilities (collective learning of the organisation) and technology which is based on tacit knowledge and explicit knowledge, is durably stable and influenced by cross products (Prahalad & Hamel in Venzin *et al* 1998:54)
- *organisational memory*: capacity of storing organisational knowledge in knowledge structures (Venzin *et al* 1998:54)
- *core capabilities*: capacity of an organisation to use, integrate and deploy its resources (based on principles that structure, coordinate and communicate knowledge) (Hitt, Ireland & Hoskinson in DeNisi *et al* 2003:9; Venzin *et al* 1998:54)
- *skills*: “capabilities” and “competences” are often used synonymously and refer to social systems; “skills” describe the capabilities of individuals on which competences are based (Aaker; Edge & Kaas in Venzin *et al* 1998:54)
- *knowledge-based resources*: include intellectual abilities and knowledge possessed by employees, and their capacity to learn and acquire new knowledge (DeNisi *et al* 2003:9)
- *knowledge-based capabilities*: encompasses strategic capabilities (defined above) and consists of two types of knowledge namely, tacit knowledge (which is also referred to as subjective knowledge, personal knowledge or procedural knowledge) (DeNisi *et al* 2003:13–14) and explicit knowledge (also referred to as objective knowledge and declarative knowledge) (Kogut & Zander in DeNisi *et al* 2003:14)
- *absorptive capacity*: an organisation’s capacity to develop new knowledge through interaction with its environment (Cohan & Levinthal in Venzin *et al* 1998:54)

- *architectural competence*: the ability to integrate new knowledge into the organisation (Henderson & Cockburn in Venzin et al 1998:54)

From the above descriptions of terms it would appear that these **terms** are sometimes **used interchangeably** and that there is overlapping in some instances (eg core competences and knowledge-based capabilities both referring to tacit and explicit knowledge). This implies that researchers should have a clear understanding of the context and use of knowledge-related terms in their research.

2.4.4 Application of knowledge

As part of the conceptualisation and contextualisation of knowledge, it is necessary to explore how the concept of knowledge is applied in the current research. This means that there is a need to retrofit the existing concepts discussed thus far in this chapter, in the context of this research, namely retention of knowledge in organisations (Venzin et al 1998:29).

Knowledge in the context of this research can be **defined** as the knowledge (expertise) that exists in the minds of people (tacit), and knowing (experiential action manifesting in behaviour, ie, their work experience and applying their knowledge in the work situation), regardless of whether it exists at individual, group or organisational level. If this knowledge is lost to the organisation, it could be detrimental to the organisation's functioning and competitive advantage and could even mean the downfall of the company.

Tacit knowing as the type of knowledge that is referred to in this research can be described as the knowledge that resides in people's minds and their experience that is not easily documented. It relates to expertise and skills that were developed over time and manifests in the behaviour of individuals in their jobs, working in teams, interacting with external stakeholders, and so on.

From a **disciplinary** point of view, knowledge is examined from the knowledge management, organisational behaviour and organisational development perspective. An attempt is made to develop a holistic approach to the understanding of the nature of

knowledge in organisations, focusing specifically on knowledge loss and retention, which will be elucidated in chapter 3.

From a knowledge management perspective, the approach in this research is from a people-reliant perspective at both a strategic and operational level. The IT perspective cannot be completely ignored in a holistic approach, but is not the main focus of this research.

The organisational behaviour model elucidates knowledge from a behaviour perspective viewed from the three different levels as building blocks in developing part of the strategic knowledge retention model for this research.

The organisational development model emphasises the continuous process of implementing and evaluating the progress made in retaining knowledge in the organisation.

From an **epistemological** perspective, the following two models seem to fit into and make sense in the current research:

- the conceptual dimensions and categories of knowledge of Bueno and Salmander (in Campos & Sánchez 2003:6), who approach knowledge from four different conceptual dimensions, that is, epistemological (tacit and explicit), ontological (individual and social), systemic (external and internal to unit of analysis) and strategic (intangible resources, tacit technical expert capabilities and vision based on tacit cognitive knowledge) (as indicated in sec 2.4.2.3).
- knowledge and knowing – bridging epistemologies by Cook and Brown (2002:71), who regard explicit and tacit and individual and group as four distinct forms of knowledge on equal footing (referred to as epistemology of possession); knowing is part of action (what happens in practice – epistemology of practice); they bridge the two epistemologies by arguing that knowing is an aspect of interaction with people and all four forms of knowledge are brought into play in this interaction to give shape and order to knowing (as indicated in sec 2.4.2.3).

The current research is approached with this epistemological background of knowledge in mind.

The **appearance** or manifestation of knowledge is approached from a mainly holistic perspective, focusing on meta-knowledge (strategic perspective), the cognitive and constructive processes of knowledge and the carriers of knowledge at individual, group, organisational and external environment level where the knowledge is located. However, these manifestations of knowledge might not be complete, but they do provide a platform to work from in addressing the research issue. The investigation of the different typologies and taxonomies in this chapter indicated that the perspective and context from which knowledge was viewed gave rise to many different viewpoints. Since the concept of knowledge cannot be placed into strict categories, in the current research, knowledge is better conceptualised as an active process, approaching it from a "knowing" perspective.

2.5 SUMMARY AND CONCLUSIONS

The purpose of this chapter was to conceptualise and contextualise the construct of knowledge. The term "knowledge" was analysed, and it was concluded that knowledge originates at individual, group and organisational levels, which is derived from information that is interpreted and used by these three levels. This knowledge is created through different human processes involving social, situational, cultural and institutional factors, making use of intellectual and social contingencies which guide the thought, communication and behaviour of people and lead to definite action.

The three different disciplines from which this research is approached, were discussed to provide the background for developing a model as a knowledge retention strategy that should shed some light on the human and organisational side as part of a humanistic approach to the issue of knowledge loss or attrition.

The epistemological discussion highlighted the fact that epistemologies are viewed from different philosophical perspectives, that is, cognitive, constructionist, connectionist, autopoietic, hierarchical and pragmatic. The main views adopted in this research seem to be a combination of cognitivist, pragmatist, constructionist and autopoietic philosophies.

With this background in mind, the overall appearances (or manifestations) of knowledge were discussed by examining the cognitive processes, construction processes, location of knowledge (ie carriers of knowledge), typologies and taxonomies and constructs used interchangeably with knowledge.

It was concluded that knowledge cannot be placed into strict categories, which is in agreement with McInerney's (2002:1010) idea that knowledge cannot be placed into strict "rungs" and taxonomies. There seems to be some overlapping between different approaches to describing the concept of knowledge in different taxonomies and typologies of knowledge. These different perspectives and approaches do, however, provide a clearer understanding of the intertwining and complex characteristics of the concept "knowledge".

The discussion of the application of knowledge in this chapter revealed that the appearance or manifestation of knowledge in this research is approached from a primarily holistic perspective focusing on meta-knowledge (strategic perspective), the process of knowledge (cognitive and constructive) and the carriers of knowledge (individual, group, organisation and external). The types of knowledge dealt with in this research are viewed from a tacit knowing perspective (not explicit knowledge). This is the type of knowledge and expertise that exists in people's minds; it is not easily documented or translated into words; it develops over time and becomes part of their experience; and it manifests in their behaviour and actions. In chapter 3, these aspects of knowledge will be explored from a knowledge loss and knowledge retention perspective.

CHAPTER 3

FACTORS THAT COULD GIVE RISE TO KNOWLEDGE LOSS IN ORGANISATIONS

3.1 INTRODUCTION

The purpose of this chapter is to explore the organisational and behavioural factors that could give rise to knowledge loss, on the one hand, or enhance the retention of knowledge, on the other. The focus is on the knowledge in the minds of people that is not easily documented (tacit knowing). The concepts of knowledge loss and knowledge retention in organisations in terms of the risks and challenges involved are discussed. An in-depth literature study on the knowledge management and organisational behaviour fields is conducted to determine how knowledge behaviours manifest in organisations and the organisational and behavioural factors that enhance or impede knowledge retention. The organisational and behavioural factors are explored from the perspective of the carriers of knowledge at individual, group and organisational level and the organisation's external environment (as indicated in fig 2.9). The outcome of this chapter is to integrate the conceptualised dimensions and their constructs by developing a knowledge retention model based on the organisational and behavioural factors that could give rise to knowledge loss, on the one hand, and knowledge retention, on the other.

Grey shaded blocks are used where applicable to reflect the researcher's own interpretations of the literature and to explain how this applies to the current research.

3.2 BACKGROUND TO SET THE SCENE

In identifying the factors that could give rise to knowledge loss in organisations, it is necessary to understand what an organisation is in the context of this research. An organisation can be defined as "a consciously coordinated social unit, composed of two or more people, that functions on a relatively continuous basis to achieve a common goal or set of goals" (Robbins 2005:5). In order to achieve its goals, the organisation needs to establish a strategy, which outlines the goals and the means of attaining the strategy. The strategy will influence the power of various work groups which, in turn, will determine the

resources that top management are willing to allocate to the tasks of achieving their goals (Robbins 1996:301). The strategy is implemented by knowledgeable people working in the organisation. More recently, management scholars have come to appreciate people (human resources) as a source of competitive advantage. Systems are put in place to enhance the potential of these human resources. Because it is difficult for competitors to copy both the people and the systems, this provides the organisation with a competitive advantage (Jackson et al 2003:XV).

In the knowledge context, Nonaka and Takeuchi (cited in Buchanan & Huczynski 2004:128) argue that the “ability to create knowledge and solve new problems has become a ‘core competence’ for most organizations”. Since the 1990s, knowledge is deemed to be central to wealth creation, organised competitive performance and managed as a strategic capability (Carlisle 2002:122, 136; Lesser & Prusak 2001:101). In an abstract retrieved from the internet, which mentions economic downsizing, modification and retention of employees, the question is asked whether the focus should not shift to knowledge retention instead of people retention. The threat of losing knowledge is a reality in the face of layoffs, attrition, retirement and the fact that even the most knowledgeable employees will leave someday (Knowledge erosion poses risk 2005).

The challenges facing organisations entail identifying the risks that could lead to knowledge loss and becoming aware of the factors that could impede or enhance knowledge retention. The literature search revealed that there has not been much focus on retention of knowledge that might be lost when employees leave the organisation. It has been mentioned that when people leave, their knowledge “walks with them out the door” (Pickett 2005:3). Organisations need to find ways of retaining the critical knowledge before people leave the organisation.

There seem to be organisational factors that could prevent knowledge retention and have an impact on organisations. Organisational factors such as the risk of losing people and their knowledge through, say, retirement, staff turnover, downsizing, mergers and globalisation, are explored in this chapter. The loss of valuable knowledge of organisations would have a strategic impact on their business. It is therefore necessary to identify where lost knowledge could have an immediate threatening effect on the implementation of the organisation’s strategy which, in turn, could affect its competitive advantage. This means that the organisation needs to figure out beforehand, **which**

knowledge, if lost, could undermine the organisational strategy (DeLong 2004:30–31) and **whose knowledge** might be at risk of being lost.

The investigation of the appearance of knowledge revealed that there is a link between knowledge at cognitive level (knowing and learning) and behavioural components (as indicated in fig 2.10). According to Pollard (2005:4–5), leaders in organisations such as knowledge management leaders need to understand and accommodate **front-line knowledge behaviours** by managing the behavioural threats and enhancers in the context of the risk of knowledge loss and by attempting to retain critical knowledge in the organisation.

At this point it is necessary to distinguish between knowledge management behaviours and knowledge behaviours. Based on the literature, the researcher defines knowledge management behaviours as acquiring, documenting, distributing, applying and updating knowledge. These behaviours seem to apply largely to explicit knowledge and fall outside the ambit of this research. **Knowledge behaviours**, however, that could cause loss of the knowledge in people's minds (ie tacit knowing) refer to the behaviours of learning, knowing, creating, sharing, transferring and applying knowledge.

3.3 CONCEPTUALISATION OF KNOWLEDGE LOSS AND KNOWLEDGE RETENTION

Organisations appear to be facing an increased tendency of losing valuable knowledge that could seriously jeopardise their overall productivity and success (Seidman & McCauley 2005:34). The purpose of the next section is to discuss the landscape of lost knowledge in organisations and what is meant by knowledge retention.

3.3.1 Knowledge loss

Today managers and professionals work in rapidly evolving scientific and technical fields that bring about tremendous **experiential knowledge**. Only some of this knowledge is shared and documented (DeLong 2004:3). Employees who leave are not simply numbers that can be manipulated, because their departure leaves huge gaps of this valuable knowledge (Mayo 2003:48). These knowledge gaps are difficult to identify until unexpected quality problems, mistakes, costly disruptions in performance or operations, loss of competitive advantage and even tragic accidents occur (DeLong 2004:2, 25). An

extreme example relating to the cost of valuable lost knowledge is the landing of astronauts on the moon, which cost the National Aeronautics and Space Administration (NASA) \$24 billion over a period of 10 years. Knowledge of this US space programme has been lost. The price tag that has recently been placed on returning to the moon, is \$50 billion plus (DeLong 2004:11). It is clear from this extreme example that the cost of lost knowledge could have serious effects on an organisation.

It is estimated that 50 to 90% of the corporate know-how resides in the minds of its employees. According to Duhon (1998:1): "When an employee leaves, that knowledge walks out the door." Kermally (2002:114) supports this finding and adds that it is not possible to transform all **tacit** knowledge, but at least some knowledge can be retained. Droege and Hoobler (2003:53) argue that the greater the value of tacit knowledge in creating new knowledge and processes and maintaining ongoing processes and operations, the greater the loss will be to the organisation when employees leave.

Kermally (2002:55) describes a situation in a small printing company that consisted of three founding partners and four managers who worked with many associates and contracted staff. They felt no need to record experiences or project successes because they talked to each other regularly. Individual tacit knowledge was transferred at individual level, but not to the group as a whole. Suddenly one person died and another left the company. They then felt they could not perform properly and it was extremely difficult to conduct effective induction for the new recruits. They were faced with a situation where knowledge had literally "walked out the door".

The problem of lost knowledge is a reality. The ensuing discussion explains what is meant by knowledge loss.

3.3.1.1 What is knowledge loss?

The concept "knowledge loss" is an abstract concept that needs to be carefully defined and illustrated, otherwise it would have little value (DeLong 2004:19). The *Reader's Digest Oxford complete wordfinder* (1993:904) describes the word "lose" (past tense "lost") as follows: to "be deprived of or cease to have, especially by negligence or misadventure". In organisational terms, lost knowledge could mean that the organisation ceases to have the knowledge that "walked out the door" owing to the misadventure of people leaving and their valuable knowledge not being retained by the organisation. This

loss of knowledge could lead to attrition, that is, a reduction in or decrease of valuable knowledge in the organisation (*Roget's international thesaurus* 1988:40.12–42.12).

In organisations, individuals and groups use knowledge to solve problems, make decisions and perform actions. Knowledge is applied in all these situations (Alavi & Tiwana 2003:111). Lost knowledge would then mean a decrease in the capacity to solve problems, make decisions and perform effective actions (DeLong 2004:21). Lost knowledge could have an effect at organisational, group and individual level. The following are examples:

- *Organisational level.* The South African Airforce is one example where erosion of knowledgeable people has been taking place on a large scale. In 2007, 82% of resignations were on the noncommissioned officer level of whom more than half were from the technical division (Gibson 2008:8). This implies great loss of knowledge at a supervisory technical level.
- *Group level.* A design team with experience in repeatedly developing new products leaves the organisation before transferring their knowledge to inexperienced employees, thus exposing the organisation to the risk of losing critical knowledge.
- *Individual level.* At individual level, knowledge could be lost when a highly experienced individual retires and the people who remain in that particular section do not have the knowledge and experience to solve difficult problems – for example, a mechanical engineer who, owing to years of personal experience, knows how to search for a fault and rectify it (DeLong 2004:143)

DeLong (2004:22) argues that lost knowledge in the context of his research does not refer to an organisation's inability to replicate something that it has done only once (eg the Ford Company which was unable to recreate the success of its Taurus design team), or failed attempts to transfer best practices to other parts of the organisation. Although sharing and transferring expert knowledge is a critical activity in organisations, the inability of replicating something created only once or transferring best practices into new organisational contexts may instead be related to other barriers such as innovation, environmental fit and luck. These are totally different to capabilities that the organisation

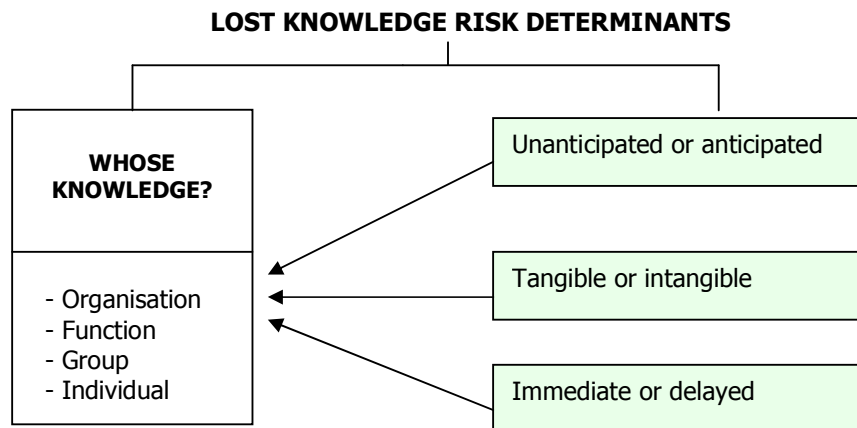
has repeatedly demonstrated in particular situations (DeLong 2004:22) and where tacit knowing has been transferred and applied.

Lost knowledge in the context of this research refers to the decreased capacity to solve problems, make decisions and perform effective actions through capabilities repeatedly demonstrated in particular situations in the organisation.

3.3.1.2 A typology of lost knowledge

DeLong (2004:26-29) describes a typology of lost knowledge that helps to define the landscape of lost knowledge problems by diagnosing the threats and enabling one to think more effectively about what intellectual capital/knowledge to retain in the organisation. The typology consists of four dimensions of lost knowledge, which, based on DeLong's discussion, can be displayed as follows (fig 3.1).

FIGURE 3.1
DETERMINING KNOWLEDGE LOSS RISKS



Knowledge lost at different **levels** (organisation, function, group and individual) could have implications for the whole organisation. The perception of lost knowledge will be influenced by the role or position of employees in the organisation, for example, senior executives will be more concerned about knowledge loss at a strategic level, whereas middle managers and supervisors will be more concerned about knowledge loss in a small group such as a project team, and individuals will be more concerned about

knowledge loss of immediate colleagues, even though loss of individual knowledge may have broader impacts (DeLong 2004:27).

Unanticipated loss of experiential knowledge could cost an organisation dearly. DeLong (2004:27) cites the example of a company that produced soyabean oil the quality of which deteriorated after the maintenance technician retired. It took the company two years to discover what the retired technician knew that had made the difference. An organisation should try and reduce these costly surprises that disrupt productivity – hence the importance of trying to anticipate areas of possible critical knowledge loss that could cause unnecessary costs to the organisation.

Sometimes the impacts of lost knowledge can be extremely **tangible** and quantifiable in financial terms. A case in point would be when the manager of an oil-drilling platform in the Gulf of Mexico shuts down the operation for safety reasons, because he cannot locate the design engineer in time to repair the fault, knowing that it will cost the company huge sums of money (De Long 2004:28). The reality of this was experienced in South Africa in early 2008 when Eskom could not supply sufficient power to the country and there were electricity cut rollouts that had a major impact on the economy. A further impact was the fact that some power stations blew owing to skills loss and the resultant lack of maintenance. At one stage, Eskom banned the appointment of white technicians despite the acknowledged shortage of suitably qualified and experienced black candidates to rectify the injustices of the past. The shortage of technical and management skills was undoubtedly a contributing factor to the ongoing power shortages (Race to the bottom 2008:12).

Knowledge loss is often **intangible** and difficult to quantify – for example, with the loss of social capital such as a retiring sales representative who has built up longstanding relationships with customers. Gradual degradation of knowledge in a specific function is also not easy to quantify, say, in a company like Sasol where knowledge and expertise might have been lost over time and only realised when there was an explosion at one of the reactors during maintenance work (Sasol explosion claims another life 2004:2). DeLong (2004:28) concludes that making the cost of lost knowledge more visible poses an obvious challenge for management.

The effects of knowledge loss due to intellectual capital disappearance can be seen almost **immediately** since it leads to production quality problems in manufacturing, faulty

outputs in computer-related work or lost capability in service delivery. Sometimes cost of lost knowledge is **delayed**, but still extremely costly, for instance, important tasks that are only performed intermittently (such as rebuilding a tank every 10 to 15 years) are at high risk because the knowledge might be lost or forgotten. This makes it more difficult to see specific knowledge loss as the cause of the current issue and it is also highly unlikely that the knowledge would ever be recovered (DeLong 2004:29).

An understanding of these dimensions of the typology of lost knowledge would make it easier to identify the risks by suggesting different places in which to look for possible knowledge loss that could have a severe impact on an organisation. This means that one needs to consider potential knowledge loss costs by identifying potential risks at all levels and in areas of anticipated or unanticipated knowledge loss, tangible or intangible knowledge loss and immediate or delayed knowledge loss.

3.3.2 Retention of knowledge

"Retaining" knowledge refers to keeping possession of, not losing, continuing to have, practising or recognising knowledge (*Reader's Digest Oxford complete wordfinder* 1993:1313). The word "retention" can be described as the act or instance of retaining (*Reader's Digest Oxford complete wordfinder* 1993:1314). If knowledge loss is the problem, then knowledge retention could be regarded as the solution (DeLong 2004:19) to combating knowledge loss by keeping possession, continuing to have, practising and recognising knowledge that could be lost to the organisation.

The terms "knowledge loss" and "knowledge retention" are not exact opposites because it is not possible for an organisation to ever retain all of the knowledge that it could lose. Even if it could retain it all, the organisation would not want to because some knowledge that might be lost, might not be relevant to organisational effectiveness (DeLong 2004:19–20).

The *Reader's Digest Oxford complete wordfinder* (1993:1314) refers to a second meaning of the word "retain" as keeping in one's memory and "retention" as the ability to retain things experienced or learned; memory. This explanation/meaning is at the cognitive level of individuals' knowledge retention.

Szulanski and Cappetta (2003:524) refer to the term "retentive capacity", which indicates the recipient's persistence in using knowledge when practicable (Glaser et al; Kostova in Szulanski & Cappetta 2003:524). It refers to long-term retention of transferred knowledge (Druckman & Bjork in Szulanski & Cappetta 2003:524). Persistence is more likely when new knowledge continues to be used until it sheds novelty and becomes part of the reality of the recipient (Rogers; Zucker in Szulanski & Cappetta 2003:524).

According to Walsh and Ungson (cited in Argote 1999:54), individuals can act as "retention facilities" for organisational memory. "To the extent that knowledge acquired through learning by doing is embedded in individuals, their turnover would be harmful to organizational learning" (Argote 1999:54), which, in turn, would also be harmful for organisational memory (Huber; Simon in Argote 1999:54). The focus of the current research is on knowledge retention (as in DeLong's research), which is "effectively the act of building organizational memory" (DeLong 2004:24). He argues that organisational memory is vague and of little use to managers in addressing the problem of knowledge loss. When knowledge is lost, it means that organisational memory has been degraded, but organisational memory does not describe a way of countering the problem of lost knowledge. Knowledge retention is more action oriented making it a more effective way of countering the loss of knowledge. Organisational memory is a more theoretical concept and little empirical analysis has been conducted on this theory, whereas knowledge retention is a grounded, practical way of addressing the threat of knowledge loss (DeLong 2004:24–25).

Knowledge retention should be regarded as a management challenge instead of focusing on labour shortages and difficulties in retaining and recruiting top talent. According to DeLong (2004:19), concentrating on employee retention overlooks the real price organisations often pay when they lose highly skilled professionals and managers to retirement or mid-career job changes. The knowledge these experienced people take with them has immediate, often hidden impacts on productivity. The real challenge is to "retain or replace the sophisticated, context-dependent knowledge that resides with the employee who is leaving". The focus should therefore be on the threat of lost knowledge and the action of retaining valuable knowledge instead of focusing on the staffing shortages. DeLong (2004:19) argues that such a focus would provide a "more accurate perspective on the real impact of turnover in the knowledge economy". Sean Barker at the Advanced Technology Centre at BAE Systems (in Wraige 2004:37) states that retention should be regarded as a business issue which impacts on future income

directions and not as an afterthought. Although Baker's statement refers to retention with regard to information technology systems, this statement can be applied to retention of valuable knowledge that might be threatened by loss in organisations in general.

To address the challenges of knowledge retention, clarity is needed on the knowledge retention focus in this research. According to DeLong (2004:23), knowledge retention consists of three activities, namely knowledge acquisition, knowledge storage and knowledge retrieval. In defining these three activities, DeLong includes both human and technological representations of the acquisition, storage and retrieval processes. He refers to the existing knowledge base being affected by lost knowledge owing to turnover, and reassignments and lost knowledge owing to poor documentation, restructuring and "forgetting" (DeLong 2004:23).

The main focus of this research is more on the human than the technological side of retaining knowledge, although, from a holistic perspective, the technological side cannot be totally ignored. Knowledge retention is therefore approached from the cognitive (learning and knowing) and knowledge construction processes (creating, sharing, transferring and applying), carriers of knowledge and strategic points of view of valuable knowledge at risk of loss (as discussed in secs 2.4.3.1–2.4.3.5 and depicted in fig 2.9). The knowledge referred to in the current research is at cognitive level and exists in the minds of people, referred to as the carriers of tacit knowing, which cannot be easily documented. Since this knowledge manifests in certain behaviours, it is necessary to focus on determining the enhancing and impeding factors that would have an impact on knowledge retention.

Knowledge retention in the context of the current research can be defined as maintaining, not losing, continuing to have, practising or recognising knowledge that exists in the minds of people (tacit – not easily documented) and knowing (experiential action manifesting in behaviour) that is vital to the organisation's overall functioning.

The discussion below explores the organisational factors that could influence knowledge retention.

3.4 ORGANISATIONAL FACTORS THAT COULD INFLUENCE KNOWLEDGE RETENTION

Organisational factors that could influence knowledge retention would stem from a strategic perspective since organisations started managing knowledge as a strategic capability during the growth spurt of the 1990s (Lesser & Prusak 2001:101). Knowledge loss could therefore have an impact on the strategy of the organisation. In chapter 2 (fig 2.9 and sec 2.4.3.5), which dealt with the appearance or manifestation of knowledge in organisations, it was pointed out that knowledge resides in the minds of people, and in a knowledge context, it was referred to as the carriers of knowledge. These carriers operate at individual, group and organisational level in the organisation, with their knowledge interacting with the environment. In this context it is essential to determine whose and what type of knowledge is at risk of loss and thus needs to be retained.

3.4.1 Impact of lost knowledge on organisational strategy

During the 1990s, when organisations started managing knowledge as a strategic capability, resources and time were applied to enhance the ability to create, share, transfer and apply individual and collective know-how. A wide range of knowledge management initiatives were implemented such as identifying and sharing relevant practices, locating and highlighting expertise, encouraging communities of practice and installing collaborative technology systems (Lesser & Prusak 2001:101).

An era of uncertainty has followed with changes such as shrinking budgets, staff reductions, job-hopping, an aging work force and skills loss in many sectors such as health care, manufacturing, education, aerospace, the legal profession, food, government, media, telecommunications, financial services, retail, advertising/marketing, information technology and university general staff, which has put knowledge at risk (DeLong 2004:25; Kransdorf 2003:42; Lesser & Prusak 2001:101).

The loss of valuable knowledge of organisations has a **strategic impact** on their business. It is therefore necessary to identify where lost knowledge could have an immediate threatening effect on the implementation of the organisation's strategy. This means that the organisation needs to figure out beforehand, which knowledge, if lost, could undermine the organisational strategy (DeLong 2004:30–31). DeLong (2004:31) identifies five ways in which this could happen, which are discussed below.

3.4.1.1 Reduced capacity to innovate

Organisations following a strategy of innovation should be particularly concerned when losing the experience and expertise associated with the knowledge required to develop new products and services or senior people retiring, because these instances could slow down innovation (DeLong 2004:31).

3.4.1.2 Threatened ability to pursue growth

Organisations that pursue a growth strategy could lose this ability because of turnover and retirements. Furthermore, retirements could also reduce the availability of potential mentors to new employees. In other words, organisations following a growth strategy need to figure out how they are going to manage knowledge loss while trying to support growth (DeLong 2004:31).

3.4.1.3 Reduced efficiency undermining low-cost strategy

When people leave, efficiency is lost, which in turn affects a cost-cutting strategy, and simply adding more human resources is not a viable solution. DeLong (2004:33) suggests that organisations faced with this situation, should identify what knowledge, if it is lost, would undermine their productivity gains and what knowledge should be retained to support continuous performance improvements.

3.4.1.4 Loss of knowledge giving competitors an advantage

When senior and highly knowledgeable people leave an organisation, they could take with them knowledge that gave the organisation a competitive advantage, for instance, extensive personal relationships with decision makers in major customer organisations. Losing that experience and knowledge, say, when the knowledgeable person retires, would open the way to competitors to steal major accounts (DeLong 2004:33). The organisation needs to identify areas in which it has a competitive advantage because of specialised knowledge.

Another variation of losing knowledge to competitors is the inability to retain people with certain specialised skills such as key engineers, which the competitors have managed to

retain. Use of contractors exacerbates the problem because skills are transferred to them, but this does not encourage their reuse since they are reluctant to share their knowledge because doing so, could reduce their value to the focal organisation (Davis-Blake & Hui 2003:192; DeLong 2004:34)

Behrend (2006:24) discusses the problem of transferring the latest technology to other organisations on account of contract deals that may later be used against the original owner of the technology. He cites the example of China signing a contract with the aircraft manufacturer, Airbus. The Airbus CEO mentioned that technology transfer would be necessary to achieve industrial cooperation. He warned, however, that the organisation needs to be the master of the newest technology and not give away technology that could be used against it tomorrow. This type of knowledge loss due to new contract deals could lead to staff loss of knowledgeable people used in the skills transfer process, which could also have a strategic impact on an organisation.

The organisation therefore needs to figure out what **essential capabilities** are of key importance to implementing its strategy and determine how it is going to develop and retain these capabilities better than its competitors (DeLong 2004:34).

3.4.1.5 Loss of specific knowledge at the wrong time increasing vulnerability

The key aspect of this particular threat to implementing strategy refers to knowledge that is relatively new, essential to the strategy and more vulnerable to loss today than it would be in a few years' time. The organisation needs to know where that knowledge is. This awareness will help identify areas in which action could be taken (DeLong 2004:34–35).

DeLong (2004:34) cites an example of a mechanical engineer at DuPont who was a key person in inventing some high-pressure compressor essential for running large polyethylene reactors. This development gave DuPont a competitive advantage, but in the early stages, many breakdowns were suffered and the knowledge of the mechanical engineer was essential to putting the reactors back on line. If he had left at that time, DuPont would have been in trouble making the organisation vulnerable to potential loss of knowledge. In the years that followed, the technology matured and maintenance procedures were well documented by the time the mechanical engineer had retired.

It can be concluded that because knowledge is managed as a strategic capability, it has an impact on the implementation of the **organisation's strategy**. The organisation needs to identify what type of knowledge gives it a competitive advantage and where that knowledge is. This would depend on the specific direction of the strategy the organisation is following, such as innovation, pursuit of growth and low-cost strategy to achieve its organisational goals. Knowledge loss influences productivity and performance improvement, may give competitors an advantage and increase vulnerability should knowledge be lost at the wrong time. The organisation should thus identify the risks of knowledge loss and retain the essential knowledge to enable it to implement its strategy successfully.

3.4.2 Whose knowledge should be retained?

In studying the literature, several pointers to whose knowledge should be retained were found. Nonaka and Takeuchi (cited in Buchanan & Huczynski 2004:12) view everyone working in an organisation as a "knowledge worker" who contributes to the creation of knowledge and problem solving. These abilities have become a "core competence" for most organisations. Drucker (cited in Blackler et al 1998:69) suggests that the generation of wealth has become dependent on the creative insights of "**knowledge workers**" (ie people who can use their specialised insights to exploit a competitive advantage). According to Blackler et al (1998:72), it would be a mistake to assume that only "knowledge workers" or knowledge-intensive organisations depend on knowledge. "Knowledge in its various forms is an integral feature of all individuals and collectivities" (Blackler et al 1998:73–74). At the same time, knowledge is highly complex and it would be extremely difficult to retain all the knowledge of all individuals in an organisation. If this is the case, whose knowledge would it then be critical to retain in an attempt to combat possible loss of valuable knowledge in an organisation?

Organisations might find it easier to focus on the following categories of people working in an organisation:

3.4.2.1 Employees approaching retirement

According to DeLong (2004:44), a growing number of organisations are facing a significant increase in retirements in the years ahead, given the current age

demographics, specifically aging Baby Boomers. This generation is categorised as the work force that was born between 1946 and 1964 or the 40 to 58 age group (Garlick & Langley 2007:1). Parise et al (2006:31) state that nearly 20% of the US workforce in executive, managerial and administrative positions are set to retire by 2008. Certain industries such as the oil and gas industry are facing an impending crisis in that it is estimated that 60% of experienced managers will retire by 2010. It appears that it is essential to retain the knowledge of employees approaching retirement. However, Seidman and McCauley (2005:34) believe that it is not possible to gather the knowledge of everyone approaching retirement, although many organisations have introduced programmes aimed at preserving the essential knowledge of retiring knowledge workers (RKW).

An inclusive approach does not provide for any quality assurance of content retained (ie people who, say, have mentally retired long before actual retirement or those who do not have a knowledge treasure in their minds [Leonard 2005:1]). Furthermore, it poses difficulty in defining what close to retirement is (eg two or five years? And when do people plan to retire – at the age of 60 or 65?), and it does not recognise the value of knowledge of best performers. These considerations indicate that an all-inclusive approach would be confusing and complex (Seidman & McCauley 2005:35), but it does not mean that this demographic should be ignored in knowledge retention programmes.

3.4.2.2 Best/high performers

Seidman and McCauley (2005:35) suggest that organisations should identify their best performers with a view to focusing on critical knowledge loss regardless of the employees' age. Parise et al (2006:31) describe the Delta Airlines example of knowledge loss in the mid 1990s, when the ranks of many experienced mechanics were downsized to reduce compensation costs, but it took the remaining, less experienced employees much longer to diagnose and repair aeroplanes. After the 9/11 terrorist attacks, Delta had to reduce its staff again, but this time focused on retaining its best/high performers or those in positions with few back-ups.

3.4.2.3 Experts/specialists

Expertise can be described as “specialised, deep knowledge and understanding in a certain field, which is far above average” (Bender & Fish 2000:126). The *Reader's Digest*

Oxford complete wordfinder (1993:519) describes "expert" as having special knowledge or skill in a subject. Some authors, such as Blackler et al (1998:68–69) refer to **specialist** knowledge and know-how, suggesting that intellectual capabilities and mental skills of individuals are becoming more significant in wealth creation. The *Reader's Digest Oxford complete wordfinder* (1993:1489) describes the word "specialist" as a person trained in a particular branch of a profession such as medicine, a person who specially or exclusively studies a subject or particular branch of a subject. It appears that the terms "specialist" and "expert" could be regarded as synonyms in the sense that both refer to the specialised knowledge of a person in a certain field.

Blackler et al (1998:69) refer to political economist Robert Reich's comment that US organisations are increasingly building their strategies around the competitive advantage that the knowledge of their "specialist employees" can provide. Individuals with expertise are able to create uniquely new knowledge and solutions in their fields of expertise. Expertise is built up over a long period of time through education, training and experience and remains with the individual person (Bender & Fish 2000:126), or as Dr Nick Milton, Nottingham's principle engineer points out, knowledge that is vital in an organisation is inside people's minds. The experts will have the most relevant and up-to-date knowledge to perform tasks optimally and will know what is really happening and what should happen (Wraige 2004:37).

There are different types of experts and different sources of experts (Wraige 2004:37). Some examples of experts that might be lost to an organisation are expatriates working on global assignments or contract workers moving to other organisations, whose expertise needs to be retained (Bender & Fish 2000:125; Parise et al 2006:31). Expatriates can be defined as people who live and work abroad for a long period (*Reader's Digest Oxford complete wordfinder* 1993:518).

Leonard (2005:1) refers to the contents in the minds of experts as "deep smarts" that enable them to make swift, wise decisions based on years of experience. They are the people one would "**go to**" during a crisis for their seemingly intuitive judgements (Leonard 2005:1; Parise et al 2006:31). Leonard (2005:1–2) cites an example of such expertise of a rocket scientist who helped his company win a contract to produce tactical missiles. This expert was not a member of the project team. After six failed working prototype attempts by different competitors, he called the project team's main participants to a meeting and for several hours walked them through a redesign of the weapon, proposing

detailed changes, without using notes. His changes were supported and the organisation won the contract. He had accrued this knowledge over a period of 20 years working on different components of the missiles. The knowledge that could be lost was proprietary to the company and it would be a severe blow to the company if such an individual had left or retired.

Another characteristic of expertise refers to the knowledge of people who have substantial **relationships** within their organisations or outside with, say, customers and stakeholders. This type of expertise refers to critical knowledge about who these experts know (Parise et al 2006:31).

According to Wraige (2004:37), the knowledge of experts (also referred to as expertise) should be gleaned efficiently in organisations in an attempt to prevent critical knowledge loss. This implies that organisations need to find ways of identifying their experts.

3.4.2.4 Few key people

It appears from the literature that each organisation has a few key people whose knowledge is of crucial importance to the survival of the organisation. Bill Gates has commented that if 20 of Microsoft's key people were to leave, his company would risk bankruptcy (Bahra 2001:49). Leonard (2005:1) also refers to every organisation having a few key people whose departure would devastate operations.

It can be concluded that an organisation needs to try and identify who these few key people are and attempt to retain their critical knowledge.

3.4.2.5 *Leaders*

DeLong (2004:45) refers to organisations that might be faced with a leadership crisis when taking its long-term human capital needs into consideration. According to Bahra (2001:54), one of the most significant contributions of leaders is to "create specialist knowledge workers". The challenge seems to be to find ways of transferring the experiential knowledge of leaders to the next generation of leaders. Organisations should be aware of who their critical leaders are.

3.4.2.6 *Industry-specific professionals*

Foster (2005:29) refers to fear of brain drain in specific industries such as technology and pharmaceutical industries that are being faced with the loss of professional positions such as engineers, account salespeople and senior managers. In South Africa, large numbers of medical practitioners and dentists have been moving abroad (Salie 2006:6), which has led to an increased loss of knowledge in these professions. Organisations might need to determine whether there are any professional positions (such as engineers, information technology professionals, accountants or sales and marketing people) in their organisation that might be affected by large amounts of knowledge loss because of the increased availability of vacancies in other organisations.

From the perspective of the carriers of knowledge operating at individual, group and organisational **levels in the organisation** in determining whose knowledge should be retained, one could argue that all the categories discussed above relate to the individual level in an organisation affecting work teams and the organisation as a whole, for example:

- **Industry-specific professionals** whose knowledge might be lost on a large scale, might be approached from the organisational (functional) level perspective, but would also affect the group level and ultimately the individuals in these professional positions. The **few key people** in an organisation would also stand out as individuals in the organisation as a whole.
- **Best performers, experts and leaders** could be identified at both organisational and work group/team level and would ultimately relate to specific individuals.

There may be a certain degree of overlapping between some of the categories in terms of the individuals identified because some might be best performers, experts, leaders and one of the few key people also fitting into one of the industry-specific professional categories, or some might fit into only one or a few of these categories. However, the categories will enable the organisation to identify individuals whose knowledge they might risk losing, eliminating the possibility of overlooking certain individuals.

Retirement age is a factor that would need to be taken into consideration in all of these categories in identifying whose knowledge, if lost, could be detrimental to the organisation.

Based on the above discussion on **whose knowledge** should be retained, it can be concluded that an organisation should identify the best performers, experts, critical leaders and industry-specific professionals whose positions might be affected by brain drain and resignations, in work groups/teams and the organisation as a whole and the few key people in the organisation whose knowledge, if lost, could be detrimental to the performance of the organisation. In all these categories, retirement age as a demographic factor should be taken into consideration to establish whose knowledge should be retained in the organisation. This process of identification of whose knowledge to retain focuses on the individual level of the organisation, but impacts on work groups/teams and the organisation as a whole.

3.4.3 What type of knowledge should be retained?

According to Seidman and McCauley (2005:36), a great deal has been written about protection against knowledge loss, but little about the nature of the **content** that should be retained and preserved. Most standard knowledge management practices focus on obtaining data, generating documents and storing them in electronic repositories. In this way, only the most superficial, explicit knowledge is retained.

Based on the overall approaches to the appearance (nature) of knowledge (already explained in secs 2.4.3.1–2.4.3.5 and fig 2.9), some pointers on what type of knowledge needs to be retained, have emerged and are discussed below from an ontological perspective, focusing on the individual, group and organisational levels. The factors that could influence the type of knowledge to be retained are also discussed.

3.4.3.1 Types of knowledge to be retained at individual level

At individual level, some authors seem to agree that tacit knowledge is the type of knowledge that is important to retain:

- According to Seidman and McCauley (2005:36), the subconscious or tacit knowledge of retiring knowledge workers (RKW) "is the secret sauce" that is the content that really needs protection as opposed to the explicit knowledge gathered by most RKW programmes.
- Bertels and Savage (1998:22) argue that the ability to track down explicit knowledge is only the tip of the iceberg. "An organization's real knowledge is often embodied in experience, skills, knowledge and capabilities of individuals and groups. ... Too often we try to change our organisations without understanding tacit knowledge ...".

According to the Delphi study on the future of knowledge management (Scholl & Heisig 2003:189), the distinction between implicit and explicit knowledge was not ranked high as a promising theoretical and practical approach in the second round of the study. Scholl and Heisig (2003:189) speculate whether this distinction is too difficult to handle or whether it seems less fruitful in solving the real knowledge management problems.

In the current research, the focus will be on retaining the personal knowledge of individuals, referred to as **tacit knowing**. To summarise the discussion in section 2.4.3.5a on personal individual knowledge, this is the knowledge that resides in people's minds and their experience of actions. It relates to expertise and skills that were developed over years and manifests in the behaviour of individuals in the way they do their knowing, whether it be to do their jobs, working in teams, interacting with external stakeholders (eg suppliers or customers) and tapping competitors. These categories all refer to the types of knowledge required in today's working environment (Invancevich et al 205:4).

Tobin (in Noe et al 2003:210) refers to knowledge about the organisation, business processes, strategy, customer products and services. The types of knowledge to be retained would then be identified in terms of what is required in today's working environment. The challenge to organisations is to find ways to transfer and retain the knowledge that is at a subconscious level and hard to articulate by focusing on the behavioural aspects of how they do their knowing and sharing of this personal knowledge (to be explored in sec 3.5).

3.4.3.2 Types of knowledge to be retained at group level

The type of knowledge that resides in individuals at group level evolves around **social interaction** and **relationships** with other people (discussed under collective social knowledge in sec 2.4.3.5b). This knowledge also develops over time through social activities in groups as a result of working together (DeLong 2004:23). It is shared by group members through, say communities of practice or through relationships with people inside and outside the organisation. Shared, collective knowledge might remain in a group when an individual leaves, but it is the collective, tacit knowledge that resides to some extent in the individuals (eg knowledge about who they know [Parise et al 2006:32] or knowledge about a specific project that later needs to be repeated by a new team [DeLong 2004:21]) that are at risk of loss. New workers require time to build a trust relationship with existing customers that might have been lost when an experienced individual left (Parise et al 2006:32). In other words, it is the knowledge pertaining to getting the job done and the knowledge of the network of relationships critical in getting the job done that resides to some extent with individuals that needs to be retained (Parise et al 2006:32).

3.4.3.3 Types of knowledge to be retained at organisational level

Organisational knowledge is accumulated know-how, expertise and ways of working and it is greater than the sum of the currently employed individuals' expertise (Alee 2003:265) as mentioned earlier under organisational knowledge in section 2.4.3.5c. The know-how may exist as tacit knowledge in people's minds in the form of skills and intuitions (Cummings & Worley 2005:505) and collectively make up organisational knowledge.

Organisational knowledge may be affected when large numbers of employees near retirement or specific industry professionals are in great demand at other organisations. DeLong (2004:21) cites the example of the US nuclear weapons industry that is concerned about losing the knowledge to safely design and test nuclear weapons, because of the retirement of so many nuclear scientists and engineers.

DeLong (2004:23) refers to cultural knowledge and structural knowledge as knowledge that could be lost at organisational level. **Cultural knowledge** is the collective understanding of how to behave and think in an organisation. Haldin-Herrgaard (2000:4) also mentions cognitive mental maps, values and organisational culture as collective

forms of tacit knowledge. Learning organisational culture or cognitive schemes (mental maps) occurs over time and through participation and interaction in the organisation (Leonard & Sensiper in Haldin-Herrgard 2000:4). Organisational culture is modelled and people are not always aware that tacit knowledge is shared (Haldin-Herrgard 2000:4). This cultural knowledge can be affected if an organisation experiences extremely high levels of turnover, for instance, if most of the sales staff leave (DeLong 2004:23) or the top leadership is affected by retirements or turnover.

Structural knowledge is embedded in the routines, processes, tools and systems (Cummings & Worley 2005:23; DeLong 2004:23; Quintas 2002:12). This knowledge is explicit and rules based and lies outside the scope of the tacit know-how – in other words, it exists independently of human knowers (DeLong 2004:23) and is not so much at risk of loss than tacit know-how (Droege & Hoobler 2003:53). In the context of the current research, it appears to be accumulated tacit know-how and cultural knowledge at organisational level that is at risk of loss and should be retained.

3.4.3.4 Factors that would influence the type of knowledge to be retained

There are several factors that need to be considered in general in determining what knowledge is to be retained, as highlighted below.

a The life cycles of knowledge

According to Danskin et al (2005:91), product life cycles have accelerated because of competition. The knowledge that is emphasised to shorten cycle times, cut costs and lower prices supports a low-cost strategy in an organisation (Danskin et al 2005:92). The main issue is how to rationalise what to keep and what to filter or suppress.

b Relevance of knowledge

Mayo (2003:48) contends that a lot of knowledge and experience is truly redundant and ways of filtering the relevant from the redundant have to be found. Duhon (1998:4) formulates this as follows: “A major challenge for a KM initiative is separating real knowledge from dross”. Bair (in Duhon 1998:4) argues that the beginning of the shift to knowledge management (KM) is by adding content and connection of experts (eg using

the content of documents based on skills and expertise) to build connections between people.

c Environmental complexity and volatility

Environmental complexity and volatility have increased, which makes the management of knowledge more complex (Danskin et al 2005:91). Shadolt (in Wraige 2004:35) argues that to be of any use, knowledge retention must be long lasting and resilient to change in this volatile environment.

d Identifying what knowledge is needed in different contexts

According to Foster (2005:4), knowing what is needed to know will better enable one to determine if one has it or how one might transfer or preserve it. It is necessary to determine the areas of critical knowledge that should not be lost (Mayo 2003:48). One needs to think about the knowledge that is critical for organisational success and optimal task performance in different **contexts** (Foster 2005:30). The richness of tacit knowledge needs to be explored in a particular context (Li & Goa 2003:13). Examples of contexts are work teams, geographical location (eg area, region or country), business units, communities of practice, age categories, job levels in the organisation and positions.

e Maintaining continuity

According to Mayo (2003:48), it is essential to maintain continuity in identifying and retaining critical knowledge. Lack of continuity poses serious problems, for instance, in the area of people development, which needs the consistent application of processes and learning support. Continuity could be affected when knowledgeable people leave. Continuity therefore applies to identifying whose knowledge and what type of knowledge should be retained.

To summarise, it would appear that at individual level, the **types of knowledge** that should be retained are at the tacit knowing level. Knowledge at this level is mainly in the minds of people, their skills and competencies and in the actions they experience in today's working environment.

At group level, the types of knowledge that need to be retained refer to collective social knowledge of individuals (primarily in their minds) and relationship network knowledge.

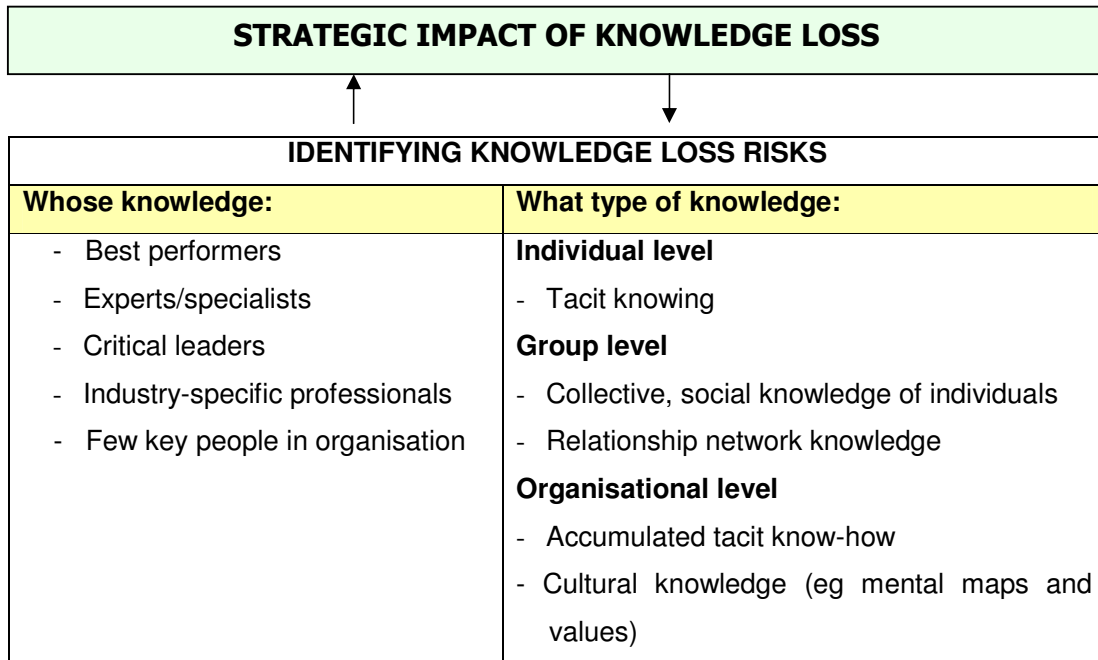
Accumulated tacit know-how that is retained on a large scale will enhance knowledge at organisational level, but if lost, could affect the organisation's performance and change its culture.

Certain factors need to be taken into consideration in the knowledge retention process, such as the life cycle and relevance of knowledge, environmental complexity and volatility, the context in which the critical knowledge is to be retained, continuity of the process of identifying critical knowledge that might be lost and what to retain.

3.4.4 Identifying organisational knowledge loss risks

Against the background of defining knowledge, the nature of knowledge in organisations and the discussion on knowledge loss and knowledge retention, two organisational factors that could influence knowledge retention appear to have been identified. These factors are the strategic impact of knowledge loss on an organisation and identifying the knowledge loss risks (ie whose knowledge and what type of knowledge could be lost that should be retained). This can be represented as follows (fig 3.2):

FIGURE 3.2
IDENTIFYING THE STRATEGIC IMPACT AND KNOWLEDGE RISKS THAT
INFLUENCE KNOWLEDGE RETENTION



It appears that knowledge loss could have an impact on the implementation of an organisation's strategy. The strategy pursued by the organisation would indicate where to look for the **risks in knowledge loss** pertaining to whose and what type of knowledge is at risk of loss that might have a detrimental effect on the performance of the organisation and that should be retained. Whose knowledge and what type of knowledge are two concepts that are closely intertwined in the sense that they interact with each other and can be viewed from individual, group/team and organisational level.

3.5 BEHAVIOURAL FACTORS THAT COULD INFLUENCE KNOWLEDGE RETENTION

There is a need to understand the factors that drive knowledge behaviours in order to have effective knowledge environments (Davenport & Prusak 1998:XIV). Based on the study of the concept "knowledge", it would appear that knowledge could be lost or retained at cognitive level and during the phases of knowledge construction (as indicated in fig 2.9 and secs 2.4.3.2–2.4.3.3 in ch 2). The cognitive processes (learning and

knowing) and the knowledge construction processes (creating, sharing, transferring and applying) manifest in certain behaviours. In chapter 2 (sec 2.3.4.2), the link between the cognitive processes was indicated in figure 2.10, which pointed out that knowledge, learning and knowing are closely integrated in terms of cognition and behaviour. The knowledge construction processes are also intertwined and impact on each other in a continuous process that constantly repeats itself.

The aim of the next section is to explore the learning, knowing, creating, sharing, transferring and applying behaviours (grouped under the term **knowledge behaviours**,) that could cause knowledge loss, on the one hand, and knowledge retention, on the other. This refers specifically to the tacit knowing and knowledge in people's minds and their experience of action, their social interaction and relationships, accumulated tacit know-how and cultural knowledge. Certain impeding or enhancing factors would influence the knowledge behaviours and identifying the factors would add to a clearer understanding of the knowledge behaviours in terms of loss or retention of knowledge. As background to the discussion, it is necessary to conceptualise the term "behaviour" by defining it, discussing the relationship between behaviour and attitude and the manifestation of behaviour at individual, group (team) and organisational level.

3.5.1 Conceptualising behaviour and attitude

The term "behaviour" is defined as "the way one conducts oneself" (*Reader's Digest Oxford complete wordfinder* 1993:125). The term "conduct" is defined as "the action or manner of directing or managing" oneself (*Reader's Digest Oxford complete wordfinder* 1993:297). Gibson, Ivancevich and Donnelly (1994:769) define behaviour as "anything that a person does, such as talking, walking, thinking, or daydreaming. The action that results from an attitude." These definitions imply that behaviour refers to the way something is done (ie action or manner).

There seems to be a connection between behaviour and attitudes in the literature and this is based on the assumption that **attitudes** somehow influence behaviour (Cools & Van den Broeck 2006:98). An attitude can be defined as a "learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" (Fishbein & Ajzen cited in Cools & Van den Broeck 2006:98). Another definition is that attitudes are "beliefs and feelings people have about specific ideas, situations and people, which influence their behaviour" (Cools & Van den Broeck 2006:98).

Attitudes consist of different components, namely affective, cognitive and behavioural components. In some descriptions, social psychologists describe an attitude in **affective** terms only (Brehm & Kassin in Dick & Ellis 2006:54) referring simply to positive or negative evaluation of any given object at a certain level of intensity (ie the emotional or feeling segment of an attitude such as liking or disliking something, willing or unwilling to share knowledge). The **cognitive** component of an attitude refers to the knowledge, beliefs, opinions and cognitions someone has about a certain object, situation or person (say, a person's opinion on sharing knowledge with co-workers in order to retain critical knowledge in the organisation. Does the person believe it is acceptable behaviour or not?) The **behavioural** component of an attitude refers to how a person intends or expects to act towards something or someone (eg how does a person intend to act when sharing knowledge. When the person has an intention to do something, or not to do something about, say, sharing knowledge, it is behavioural) (Cools & Van den Broeck 2006:98; Robbins 2005:78).

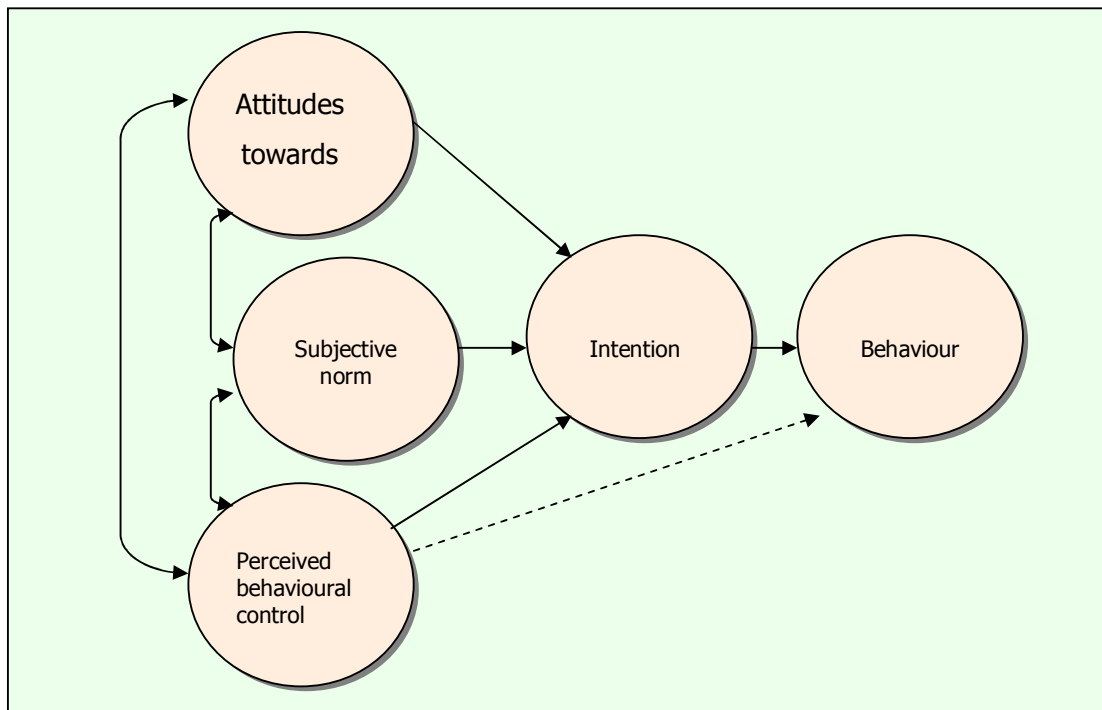
Attitudes are sometimes confused with **values** because both are social abstractions. They are not the same, but are interrelated (Robbins 2005:78). Attitudes affect behaviour at a different level than values. Values represent global beliefs that are more abstract and influence behaviour across all situations, whereas attitudes relate only to behaviour directed towards specific situations, persons, objects or goals. In a nutshell, values are more abstract, while attitudes are directed towards specific situations or goals (Cools & Van den Broeck 2006:98). An employee may strongly value sharing of knowledge. However the employee may have a negative attitude towards sharing knowledge with a colleague(s) if the employee feels that his/her position may be threatened. This example also indicates that behaviour is not necessarily predictable from a stated attitude, for example, willingness to share knowledge. According to Fishbein (in Dick & Ellis 2006:54), context appears to be significant – for instance, the way we think others might judge us is important in determining whether behaviour can be predicted from a stated attitude. People might express an intention to behave in a particular way, but then either cannot or do not (Dick & Ellis 2006:54). Attitudes are less stable than values because they can be altered (Robbins 2005:78) whereas values change over time.

Earlier researchers studied the relationship between attitudes and behaviour and assumed that there is a causal relationship between the two, implying that attitudes determine how an individual behaves or what an individual does. This relationship was

gradually criticised because research found little or no relationship between attitudes and behaviour or that other factors need to be taken into account to explain the relationship between the two (Cools & Van den Broeck 2006:99).

Martin Fishbein and Icek Ajzen (in Cools & Van den Broeck 2006:99–100), two behavioural scientists, developed a model of behavioural intentions. Originally they started off with the model of reasoned action, which later developed into a comprehensive model of behavioural intentions, namely "the theory of planned behaviour" (Ajzen in Cools & Van den Broeck 2006:99). This model is widely used to explain attitude-behaviour relationships (fig 3.3).

FIGURE 3.3
THEORY OF PLANNED BEHAVIOUR



Source: Ajzen in Cools & Van den Broeck (2006:99)

This model was refined over the years and the key link between attitudes and actual behaviour is thought to be intentions. In other words, an individual's intention to engage in a given behaviour is the best predictor of that behaviour.

The **attitude towards the behaviour** refers to the degree to which someone has a favourable or unfavourable evaluation towards the behaviour in question. **The subjective norm** refers to the perceived social pressure whether or not to engage in the behaviour. The behavioural intentions of individuals who are sensitive to the opinions of respected role models can be strongly influenced by the subjective norms. The **perceived behavioural control** refers to the perceived ease or difficulty in performing the behaviour. This control varies across situations and actions. According to Ajzen and Fishbein (in Cools & Van den Broeck 2006:100), the more favourable the attitude and subjective norm and the greater the perceived behavioural control, the stronger an individual's intention should be to perform certain behaviour. In other words, if a person has a favourable evaluation towards sharing knowledge, the role model promotes knowledge sharing by setting the example and the person finds it easy to share knowledge, then the person will have a strong intention to share knowledge. This could be applied to all the other knowledge behaviours. The significance of these three factors in predicting intentions, however, is expected to vary across situations and actions.

This model has the following serious implications for organisations:

- appreciating the dynamic relationship between beliefs, attitudes, subjective norms, perceived control and behavioural intentions when attempting to foster productive behaviour
- influencing attitudes through education and training experiences that change underlying beliefs in spite of the fact that attitudes are often resistant to change (eg redirecting subjective norms through credible and clear communication, organisational culture values and role models) (Cools & Van den Broeck 2006:100).

Behaviour in organisations is acted out by the carriers of knowledge at individual, group and organisational level. The actual knowledge behaviours and the variables that could influence knowledge behaviour at these three levels are explored in the next section.

3.5.2 Actual knowledge behaviours in the tacit knowledge sphere

It is vital to have an understanding of what actual knowledge behaviours entail as background to the study of enhancing and impeding factors that would influence these behaviours. The knowledge behaviours are discussed below.

3.5.2.1 Learning behaviour

Learning behaviour in organisations occurs when employees continuously learn to perform new and changing tasks (Hall cited in Van der Sluis 2002:19) and when they learn how to learn efficiently. “The way in which an individual actually learns, that is the learning behaviour, will affect the kind and extent of learning from any particular situation.” It is also likely to depend on the learning context and may represent an individual’s way of dealing with a particular set of circumstances (Sadler-Smith in Van der Sluis 2002:19). Van der Sluis (in Van der Sluis 2002:21) found that there are four kinds of learning behaviour among managers. These four kinds of learning behaviour as distinguished by Megginson (1996) and Hoeksema (1995) are the following:

- *Meaning-oriented learning*: looking for the deeper meaning of the experiences on the job – for example, asking questions about the things experienced or working out the consequences of a person’s work on others
- *Instruction-oriented learning*: looking for instruction to meet one’s obligations and answer expectations – for example, being told precisely where to find information and what is expected of a person (explicit knowledge), which is usually the starting point of learning and meaning-oriented learning (tacit knowledge) will follow (Hoeksema in Van der Sluis 2002:21, 23, 27)
- *planned learning*: prospective learning that includes a deliberation/forethought approach – for example, setting goals and targets for learning and development
- *emergent learning*: retrospective learning that includes unpremeditated, unexpected exploration from things that happen (Megginson in Van der Sluis 2002:19, 23)

Learning occurs all the time and could be regarded as “any relatively permanent change in behaviour that occurs as a result of experience” (Robbins 2005:48). Learning involves understanding and acceptance. Once understood and accepted, the decision to respond results in change in behaviour and a change in behaviour indicates that learning has taken place (Robbins 2005:48-49). This means that changes on the behavioural side in routines, procedures, actions and physical outputs must be reconciled with changes on the cognitive side (ie cognitive maps, mental associations, shared beliefs and understanding) (Salk & Simonin 2003:258).

3.5.2.2 Knowing behaviour

Knowing behaviour occurs when putting knowledge into action (Vera & Crossan 2003:126), for instance, physically working on a project or doing a task such as visiting a customer. Knowing, learning and knowledge from a behavioural perspective were discussed in detail in chapter 2, section 2.4.3.2.

3.5.2.3 Knowledge-creating behaviour

Starbuck (in Calhoun & Starbuck 2003:477) found that although experts characterise their activities differently in terms of **creating knowledge**, applying and preserving knowledge, the experts' actual behaviours are markedly similar. Experts imbed their new creations in the context of related investigations and familiar knowledge, which makes the innovation of their new creations of knowledge marginal. According to Starbuck (cited in Calhoun & Starbuck 2003:477): “The distinction between creation and application seems to be especially obscure in the context of complex systems because people may only be able to create valid knowledge about complex systems by testing their beliefs through application.” Some behaviours involved in creating new knowledge entail attracting attention, eliciting discussion and building widespread consensus (Calhoun & Starbuck 2003:478). At Buckman Laboratories, much of the new knowledge creation occurs at the customer interface, involving the customer and his or her problem or need, through dialogue and experience (Pan & Scarbrough 1998:62).

3.5.2.4 Knowledge-sharing behaviour

Knowledge sharing is defined as a set of behaviours that involves the exchange of knowledge or assistance to others (Connelly & Kelloway in Pai 2005:108). Extensive

research has been conducted in the field of knowledge sharing with several theories emerging from the research, such as the following:

- *economic exchange theory*: used by Bartol and Srivastava (2002) to examine the role of monetary rewards in encouraging knowledge sharing in organisations through four mechanisms of knowledge sharing
- *social exchange theory* and *theory of reasoned action*: used by Bock and Kim (2002) to explore the factors affecting the knowledge-sharing behaviour of individuals in the organisational context
- *theory of planned behaviour*: used by Ajzen (1991) to assess the factors that influence encouragement of knowledge-sharing intention and behaviour by senior managers
- *theory of reasoned action (TRA)*: used by Bock, Zmud, Kim and Lee (2005) as the theoretical framework to develop an integrative understanding of the factors that support or inhibit the intentions of individuals to share knowledge (Pai 2005:108)

These studies have provided much useful information, but none of them gives an indication of all the variables that could influence knowledge sharing from an organisation behavioural perspective focusing on individual, group and organisational level.

The movement of knowledge across individual and organisational boundaries is ultimately dependent on employees' knowledge-sharing behaviours (Bock et al 2005:88). If knowledge-sharing behaviours are limited, the likelihood that knowledge gaps will arise increases (Baird & Henderson in Bock et al 2005:88). It is a natural human tendency to hoard knowledge and look gradually at the knowledge offered by others (Davenport & Prusak in Bock et al 2005:88). Furthermore, organisations actively limit knowledge sharing because of the threats associated with industrial espionage and organisational incentive structures that pay for performance, which could serve to discourage knowledge sharing if employees believe that knowledge sharing will hinder their personal efforts to distinguish themselves from their co-workers (Huber in Bock et al 2005:88).

Tacit knowledge is not easily shared because it is bound to the senses, personal experience and bodily movement and requires close physical proximity with the work that

is being done. Tacit knowledge is shared through a combination of mechanisms such as direct observation as in a master-apprentice relationship, and narration often in the form of a narrative about similar incidents or metaphors, imitation, experimentation and comparison and joint execution (Von Krogh et al 2000:83). According to Haldin-Herrgard (2000:2), knowledge sharing takes place through methods like apprenticeship, direct interaction, networking and action learning that includes face-to-face social interaction and practical experience. Tacit knowledge sharing seems to require a high level of socialisation (Nonaka in Ojha 2005:68). Tacit knowledge is developed and reinforced by the way people actually do their work and it is difficult to rebuild once it has been lost (Quintas 2002:10). An example of tacit knowledge at cognitive level is the beliefs of a salesperson about what might appeal to a customer (Alavi & Leidner in Jones 2005:2) as well as the know-how applicable to a specific situation (Nonaka in Jones 2005:2), for example, the sales skills acquired through experience and the salesperson's involvement with the customer, products and the organisation. These sales skills and know-how in the specific situation make up the person's tacit knowledge about the best way to approach a specific customer. This is different to the explicit knowledge of specific product functionality and costs (Jones 2005:2).

3.5.2.5 Knowledge transfer behaviour

Tacit knowledge transfer requires substantial time and energy and involves an acceptable blend of reflection about group work through reflections on how the task was performed and the mechanisms through which knowledge is shared and transferred. Experts have the ability to solve tasks that are not routine and to deal with the unexpected (Dreyfus & Dreyfus in Von Krogh et al 2000:84) which makes the transfer of tacit knowledge more difficult.

Knowledge is transferred from the source to the recipient (Szulanski & Cappetta 2003:523–524). Knowledge transfer takes place through providing context to enable people to relate acquired knowledge to a specific task situation or environment; interaction with other people in daily routine activities; direct instruction (during a formal learning process such as training, which is more explicit); experience such as analogy-extending knowledge from one situation to a new situation that is similar, which is acquiring knowledge through implicit learning even though they may not observe the learning process; and imagination which helps order experiences when reflection is chaotic (ie the ability to adopt concepts and reconfigure them to fit the current situation).

Although many of these transfer methods are at cognitive level, they would manifest in knowledge transfer behaviour to some extent (Tsai & Tsai 2005:273).

3.5.2.6 *Knowledge application behaviour*

Application of knowledge refers to applying knowledge to solving problems, making decisions and performing actions (Alavi & Tiwana 2003:111) (discussed in sec 2.4.3.3d).

According to Rebernik and Sirec (2007:416), sharing and learning of tacit knowledge as well as its unlearning must be managed differently from explicit knowledge. They conclude as follows: “Even though tacit knowledge is very elusive, it is possible to create a theoretical framework that could help bring forward tacit knowledge dimensions that are potentially capable of mobilization, and which are observable through different manifestations of behaviour.” Understanding enhancing and impeding behavioural factors that could influence behaviours of learning, knowing, creation, sharing, transfer and application of tacit knowledge, could shed some light on the possibility of preventing tacit knowledge loss, on the one hand, and retaining tacit knowledge, on the other.

To summarise, the **knowledge behaviours in the tacit knowledge sphere** can be described as follows:

- Learning behaviour is the way in which individuals actually learn to perform new and changing tasks in a specific context. Learning could be regarded as any permanent change in behaviour as a result of experience. Learning behaviour could be meaning or instruction oriented, planned or emergent.
- Knowing (as an account of what a person knows) is mainly behaviour, that is, knowledge in action such as working on a project.
- Creation of new knowledge manifests in behaviours such as attracting attention, eliciting discussion and building widespread consensus through dialogue and experience.
- Knowledge sharing at tacit level is bound to the senses, personal experience and bodily movement and requires close physical proximity with the work being done,

through observation and narration, requiring a high level of socialisation.

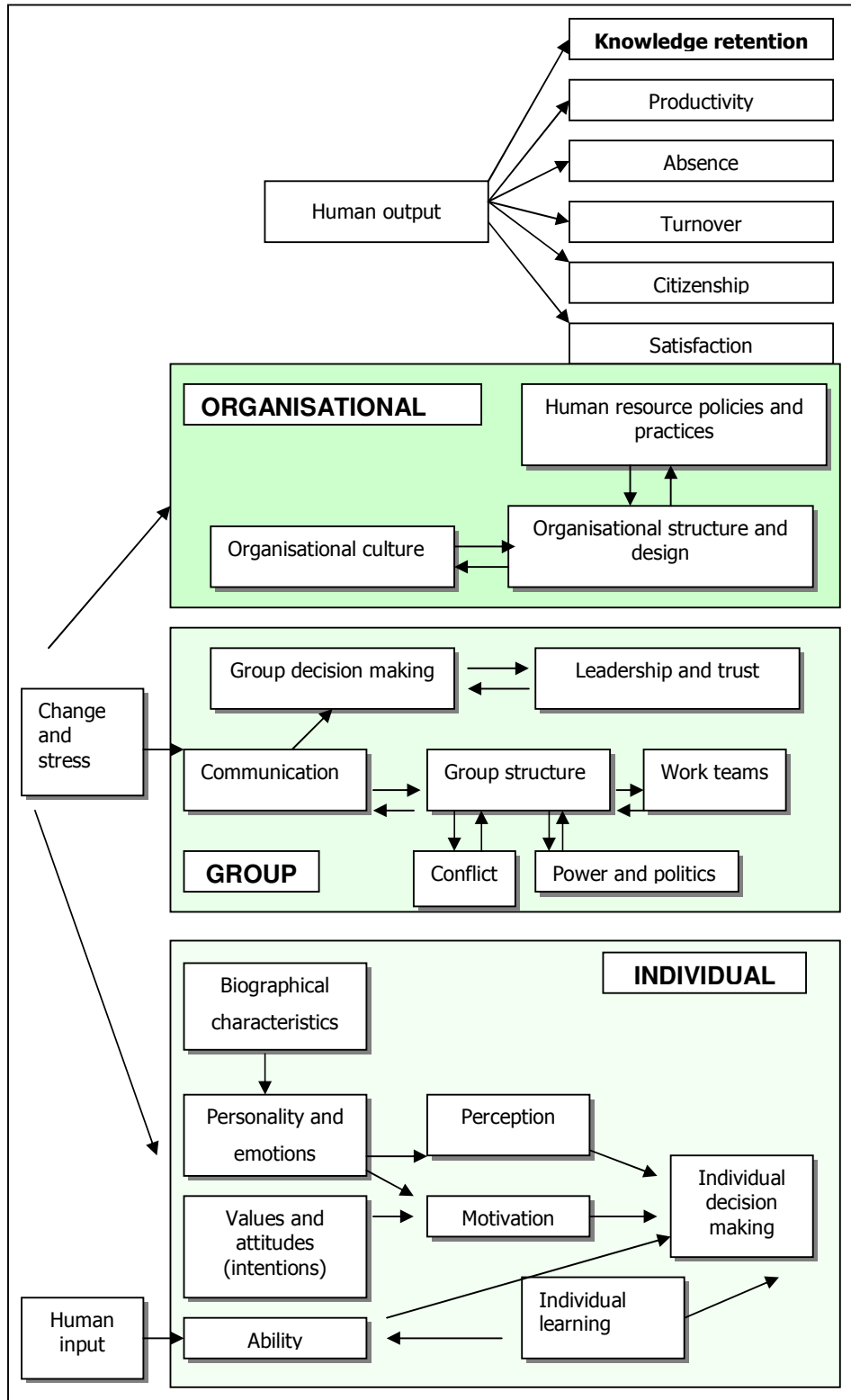
- Knowledge transfer behaviour manifests in the transfer process of knowledge from the sender to the receiver, in daily interactions with people.
- Applying knowledge manifests in problem solving, decision making and task execution behaviours.

It could be concluded that the manifestation of these cognitive and knowledge construction processes in certain behaviours could contribute to prevention of tacit knowledge loss, on the one hand, and retention of knowledge on the other – hence the need to understand the enhancing or impeding factors that play a role in these knowledge behaviours in retaining as opposed to losing tacit knowledge.

3.5.3 Organisational behaviour model

An organisational behaviour model adapted from Robbins (2005:32) is used to provide a framework for identifying the behavioural factors that would influence knowledge retention. The model was organised by level of analysis, namely an individual, a group or team and an organisational perspective, which fits well into the general approach of the current research. Knowledge retention was added as a human output factor that would be influenced by the organisational behaviour factors at organisational, group and individual levels. The model is represented in figure 3.4.

FIGURE 3.4
ORGANISATIONAL BEHAVIOUR MODEL



Source: Adapted from Robbins (2005:32)

The organisational model is complex and does not do justice to all possible independent variables at the three levels, namely individual, group and organisational level. However, it does give an indication of the factors that would help explain and predict people's behaviour. Some indication is given of the linkage between the independent and dependent variables, but it is limited on account of the complexities in depicting it in the diagram (Robbins 2005:31).

The concepts of **change** and **stress** are included to acknowledge the dynamics of behaviour and the fact that stress in the workplace is an individual, group and organisational issue (Robbins 2005:31). Change is brought about by the external environment in which organisations operate. Forces of change require managers to implement comprehensive change programmes to remain in business (Robbins 2005:548-549). Organisations and their members resist change. In a way, this is positive because it provides a degree of stability and predictability to behaviour. However, resistance to change hinders adaptation and progress (Robbins 2005:551–552). These external and internal factors require management to manage change. Managing change “involves the ability to recognise and implement needed adaptations or entirely new transformations in the people, tasks, strategies, structures, or technologies in the person's area of responsibility” (Hellriegel, Slocum & Woodman 2001:6).

“**Stress** is a dynamic condition in which an individual is confronted with an opportunity, constraint, or demand related to what he or she desires and for which the outcome is perceived to be both uncertain and important” (adapted from Schuler cited in Robbins 2005:569). Individual differences have an impact on the effects of stress – for example, to some, an increased workload could be a positive challenge that enhances the quality of their work and the satisfaction from their work, but to others their stress levels might prevent them from doing what they desire (Robbins 2005:569–570). The effects of work stress manifest in three main areas, namely physiological (high blood pressure, sweating, hot and cold spells, muscular tension, breathing difficulties and increased gastrointestinal disorders); emotional (anger, anxiety, depression, poorer intellectual functioning in terms of inability to concentrate and make decisions, lowered self-esteem, resentment of supervision, job dissatisfaction, nervousness and irritability); and behavioural effects (decreased performance, absenteeism, higher accident rates, higher turnover rates, higher alcohol and drug abuse, difficulties in communication and impulsive behaviour). These effects of work stress have a significant impact on for organisational behaviour and

effectiveness (Hellriegel et al 2001:202), and the impact on knowledge behaviours will be discussed where applicable at the three levels that exist in organisations.

In the **organisational behaviour model**, the dependent variables (productivity, absence, turnover, organisational citizenship such as helping others or volunteering for extra work and job satisfaction) are the key factors that one would want to explain or predict and that are affected by some other factors in organisations. **Knowledge retention** was added as one of the dependent variables, implying that many different behavioural factors may influence the degree to which knowledge is lost or retained in organisations. Each factor (independent variable) represented in the model is a study field on its own with its own complexities. Change and stress management seem to be an integral part of organisational behaviour, which one needs to be aware of.

The aim of the following section is to investigate the behavioural factors that may influence knowledge loss or retention in organisations at individual, group and organisational level, against the background of the organisational behaviour model.

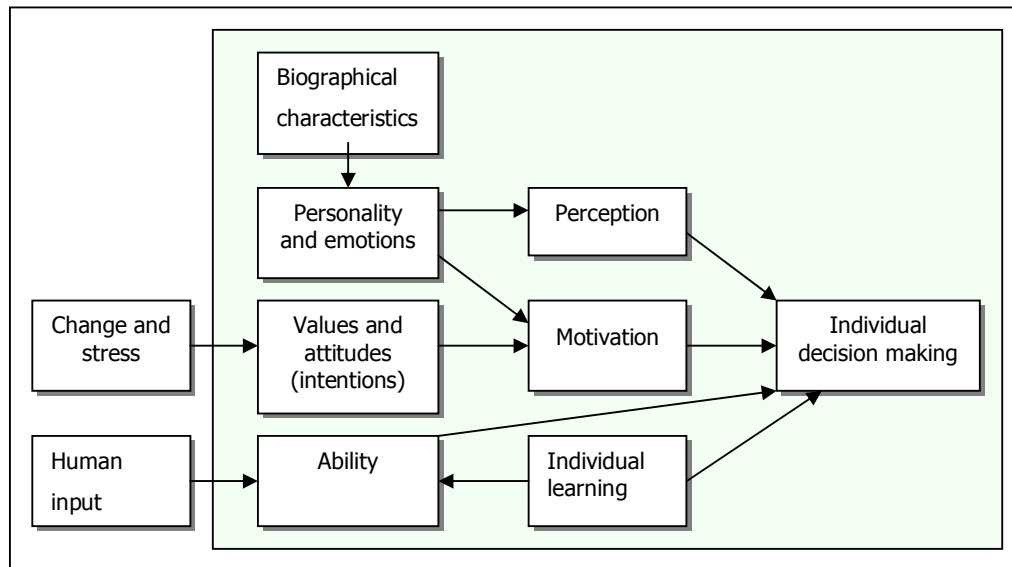
The discussion under each component will focus on describing what it means from an organisational behaviour perspective and then focusing on references and research in the literature that explain the link between these organisational behaviour components and knowledge behaviours, in order to identify factors that could enhance or impede knowledge retention.

3.5.4 Factors influencing knowledge behaviours at individual level

It is necessary to understand individual behaviour because individuals behave and react differently in different situations. According to Hellriegel et al (2001:38), behaviour always involves a complex interaction between the individual person and the situation. Events in the surrounding environment including the behaviour and presence of other people have a profound influence on the way a person behaves at any particular time.

Several factors impact on individual behaviour. The individual components of the Robbins's model (2005:32) are depicted in figure 3.5 below.

FIGURE 3.5
FACTORS THAT INFLUENCE BEHAVIOUR AT
INDIVIDUAL LEVEL



Source: Adapted from Robbins (2005:32)

Each factor is briefly explained to provide an understanding of their influence on individual behaviour, focusing specifically on the knowledge behaviours.

3.5.4.1 *Biographical characteristics*

Individuals enter organisations with certain intact biographical characteristics that influence their behaviour at work. Examples of these variables are age, race, gender and years of service (tenure) (Robbins 2005:30, 42).

The researcher of the current study found very little information in the literature on the biographical factors that influence knowledge behaviours. However, two interesting articles were found –, one by Ojha (2005) on the influence of team demography on individual knowledge-sharing behaviour in India in software development teams, and the other by Peltokorpi (2006) on cross-cultural knowledge sharing between Nordic expatriates and Japanese managers in Japan. These articles indicated the following factors that could influence knowledge-sharing behaviours:

- Individuals who perceive themselves as a minority on the basis of **gender** are less likely to participate in knowledge sharing. In India, women regard themselves as a minority (Ojha 2005:69). In Japan, women in supportive positions are assumed to adopt a submissive role in cross-gender relations (Peltokorpi 2006:143).
- **Age** and **hierarchy** make communication (eg knowledge sharing) difficult for Japanese people. The presence of elderly employees decreases the sharing of knowledge across cultures and units. Skipping status hierarchies by vocalising ideas directly to expatriates is considered to be improper for young junior employees. Junior employees need to first learn the "ropes" and act according to their position in the hierarchical system (Peltokorpi 2006:142). Furthermore, status hierarchies limit expatriate-local employee knowledge sharing. Owing to limited direct interaction with lower-level employees, expatriates might not be able to make contact with the relevant people with the right knowledge. Local managers are suspicious when expatriates interact directly with subordinates, and vice versa (Peltokorpi 2006:143).
- Married persons, whether male or female, are less likely to be part of workplace or external socialisation and therefore less likely to be part of knowledge-sharing processes if they regard themselves as a minority, on the basis of **marital status** (Ojha 2005:67, 69).
- **Education levels** in a society that is status conscious and where people with higher levels of qualifications are likely to remain aloof from the others, are likely to lead to the creation of subgroups that might hurt knowledge sharing at team level (Ojha 2005:70).
- The longer individuals have been with an organisation, the more aware they will be of the tacit knowledge relevant to their work. People with longer **tenure** will be less likely to participate in knowledge sharing (Ojha 2005:70).
- **Language**, a prominent medium for knowledge sharing, influences how much people are able to share and acquire knowledge. In India, professionals tend to use their mother tongue (India has 14 official languages), although English is the official business language. This often alienates others who do not understand the local language and they tend to withdraw from the group, which is likely to hurt

their participation in team-level knowledge-sharing processes. Japanese employees, especially at lower levels, are less proficient in English. Expatriates are not proficient in Japanese and miss knowledge shared during casual conversations. Shared language does not guarantee error-free knowledge sharing because many misinterpretations are culture related. For example, when Japanese say "yes", they do not mean "yes". In Japanese, "yes" could signify agreement or "I hear you", "maybe" or "no" (Peltokorpi 2006:145). These language-cultural issues could lead to misinterpretation of tacit meaning in knowledge sharing and rejection of ideas inconsistent with existing mental models (Peltokorpi 2006:147).

Individual demographic characteristics in isolation may not be as important as their relationship with the attributes of others in the organisational unit (Wagner, Pfeffer & O'Reilly III 1984 in Ojha 2005:69). Behaviour is influenced by the relationship between an individual's characteristics and those of other team members (Ojha 2005:69). He (2005:69, 76) refers to this concept as **relational demography** and concludes that relational demography has a significant impact on knowledge sharing in software development teams. Ojha (2005:77) suggests that management should ensure high levels of **diversity** to avoid the formation of fault lines in knowledge sharing. However, in cross-cultural situations, knowledge sharing (and other knowledge behaviours) is a complex phenomenon and he proposes the need for further research to provide a more balanced account of knowledge sharing in a cross-cultural context.

3.5.4.2 Personality and emotions

Individuals working in an organisation always bring something of themselves to a situation. This "something" refers to the individual's personality (Hellriegel et al 2001:38). Personality can be defined as follows: "a stable set of characteristics and tendencies that determine those commonalities and differences in the psychological behaviour (thoughts, feelings and actions) of people that have continuity in time and that may not be easily understood as the sole result of the social and biological pressures of the moment" (Maddi cited in Hellriegel et al 2001:38). The definition is not limited to certain behaviours or situations, but endeavours instead to focus on all behaviours all the time.

To understand the personality of an individual is to grasp both what makes the person unique and what he or she has in common with all or some other people. An individual's

personality may change over time, but not suddenly (Hellriegel et al 2001:38). Gibson et al (1994:776) link their definition of personality to behaviour by defining it as a set of characteristics that does not change and tendencies that determine differences and commonalities in people's behaviour.

The Big Five model of personality has been extensively researched in recent years. A large ("impressive") body of research supports the notion that five basic dimensions underlie all others and encompass most of the significant variation in human personality. The Big Five factors are as follows:

- *extroversion*: measures a person's comfort levels with relationships
- *agreeableness*: refers to a person's ability to get along with others
- *conscientiousness*: measures reliability, dependability and self-discipline
- *emotional stability*: describes a person's ability to cope with stress situations and experience positive emotional states
- *openness to experience*: measures a person's range of interest and fascination with novelty, that is, open to experiences or narrow-minded and resistant to change (Cools & Van den Broeck 2006:54-55; Roodt 2003:88)

Standardised personality tests determine how people score on each of these dimensions. A person's scores reveal a personality profile as unique as his or her fingerprints. Each pole of these five dimensions has negative and positive sides. One pole is not more desirable than the other because everything depends on the situation and environment (Cools & Van den Broeck 2006:55).

Cabrera (in Minbaeva & Michailova 2004:667) in studying the sociological and psychological theories to identify factors relating to **knowledge-sharing behaviour**, found that **personality traits**, in particular extroversion, agreeableness, conscientiousness and openness, are positively associated with knowledge-sharing behaviour in individuals.

In Lin's (2007:422) study to determine the mediators and antecedents of tacit knowledge sharing, he found that the **cooperativeness** of employees could lead to higher tacit knowledge sharing and organisational commitment. If employees lack cooperativeness, they might do unethical things against the organisation by not collaborating with others.

Emotions are intense feelings that are directed at something or someone – in other words, they are reactions to an object. They can be felt (the individual's actual emotions) or displayed (emotions that are required by the organisation and considered appropriate in a given job, say, employees who have learnt to cover up their anger when they have been passed over for promotion). This means that people are often required to exhibit emotional behaviours that mask their true feelings (Roodt 2003:93-94).

Emotions seem to influence people's perception of reality. Daniel Goleman (1995) explored this in his book, *Emotional intelligence: why it can matter more than IQ* (Bennet & Bennet (2004:320). According to Bennet and Bennet (2004:320): "Emotional intelligence is the ability to sense, understand, and effectively apply the power and acumen of emotions as a source of human energy, information, connection and influence." It includes self-control and persistent endeavour (Bennet & Bennet 2004:320). Goleman (in Fineman 2003:566) states that the emotionally intelligent know and manage their emotions, motivate themselves, recognise emotions in others and handle relationships. The meaning of emotional intelligence becomes clearer when studying the effects of emotions on behaviour, its influence on decisions, how it motivates people to action and influences their ability to interrelate (Bennet & Bennet 2004:320).

For a long time it was believed that rationality was the way to manage. It is now believed that both the rational and emotional parts of the mind should be used together to evoke the best performance in organisations (Bennet & Bennet 2004:320). This could be applied to preventing knowledge loss by understanding the emotions underlying the knowledge behaviours that would prevent knowledge loss and enhance knowledge retention. Emotions are generally at a subconscious level and assign values to options or alternatives, often without the individual being aware of it, forming part of individuals' mental models and the way they see the world. According to Bennet and Bennet (2004:320), "creating the deep knowledge of knowing through the effective use of emotional intelligence opens the door to learning and forgetting". The main barrier to learning and letting go (forgetting) arises from an individual's ability to develop **invisible mental defences** against changing his or her beliefs, for example, letting go of

inappropriate past assumptions, beliefs and knowledge (Bennet & Bennet 2004:321), on the one hand, or resisting being receptive to learning and accepting new knowledge, on the other.

In the literature search, some references to the impact of emotions on knowledge behaviours were found. In terms of learning behaviour, Fineman (2003:559) points out that those who have explored the possibility of emotion-learning nexus, firmly believe that emotion and learning do connect, sometimes positively, sometimes negatively. Positive feelings that could be associated with learning are excitement, joy and pride (Fineman 2003:557, 561), whereas negative feelings such as anxiety, fear, jealousy, envy, pain and emotional conflicts interfere with effective learning (More; Salzberger-Wittenberg et al in Fineman 2003:559).

Some individuals might find it difficult to accept or integrate new knowledge and this could contribute to knowledge loss. Von Krogh et al (2000:19) contend that one of the individual barriers to accepting new knowledge is the **threat to one's self-image**. Every time a person is confronted with new sensory input (say, a colleague's statement), that person approaches the new stimulus with his or her experiences and beliefs about the world. What people know and how that affects what they do, is often at the root of personal identity. Because knowledge is so closely intertwined with self-image, people often resist anything new and it feels risky to break away from known habits (Von Krogh et al 2000:21). This resistance could have an impact on knowledge retention where people resist learning, creating, sharing and using certain tacit knowledge.

Rebernik and Sirec (2007:412) note that the most important step in harnessing the tacit knowledge of individuals and teams is to "allow it to flow from the pull of **emotional commitment** and deep personal involvement" (Glyn cited in Macitelli, cited in Rebernik & Sirec 2007:412). Lin (2007:414) concurs that people who have a feeling of "emotional attachment" to their organisation are likely to share their knowledge whenever they realise that doing so is appreciated, that their knowledge will actually be used and that it will eventually be beneficial to the organisation (Hall; Van den Hoof & Van Weenen in Lin 2007:414). According to Cabrera (in Minbaeva & Michailova 2004:667), a **feeling of obligation** to share knowledge is positively related to the knowledge-sharing behaviour of individuals.

Fineman (2003:565) maintains that some **feelings about or of trust** are important if knowledge is to be exchanged for mutual benefit. Trust is described as an emotionalised commodity that is reframed and revalued in the politics of exchange. He describes Andrews and Delahaye's (2000) qualitative study of a medical scientist who was required to share information with other scientists in partner organisations. The process was fraught with anxieties, such as anticipated status loss in "giving away" important information and feeling intimidated when asking for information from a professional senior. In her empirical research study, Renzl (2008:216) found that fear of losing one's unique value plays a mediating role between trust in management and knowledge sharing.

Trust in management reduces the fear of losing one's unique value in the knowledge-sharing process. Trust is not something that is simply present or absent, but it is negotiative and contextually/structurally specific. Its structure is emotional, involving feelings such as ease, suspicion, fear, confidence, comfort and anxiety. It shapes the value and worth of knowledge and learning. If there is a strained trust relationship in an organisation, knowledge transfer and organisational changes are likely to be received cautiously, defensively or cynically, especially when management work by creating fear, anger, shame or hopelessness (Fineman 2003:565).

Based on the above discussion it can be concluded that **personality and emotions** are deep seated and can manifest in certain behaviours. From a knowledge behaviour perspective, individual personalities and emotions need to be considered when knowledge behaviours such as learning and sharing do not take place. In this context, cooperativeness and emotional and organisational commitment supported by trusting relationships appear to be significant.

3.5.4.3 *Values and attitudes*

Values are relatively permanent and deeply held desires or convictions of individuals that a specific mode of conduct is personally or socially preferable to an opposite or converse mode of conduct (Hellriegel et al 2001:421; Robbins 2005:648). Individuals use values and beliefs when confronted with a situation in which they have to make choices (Gibson et al 1994:780). Values, enduring beliefs and expectations of individuals or a group of

individuals influence and guide behaviour across all situations (Coffey, Cook & Hunsaker 1994:39; Cools & Van den Broeck 2006:98).

Attitudes and the way they relate to behaviour were discussed earlier in section 3.4.1. Hellriegel et al (2001:49) describe attitudes as “relatively lasting feelings, beliefs, and behavioural tendencies directed toward specific people, groups, ideas, issues or objectives”. An individual’s background and experiences are reflected in attitudes and significant people in a person’s life strongly influence the formation of attitudes.

Szulanski (in Bock et al 2005:89) suggests that motivational forces to encourage knowledge behaviours derive from employees’ personal **belief** structure and institutional structures (ie values, norms and accepted practices which shape individuals’ belief structures [DeLong & Fahey in Bock et al 2005:89]). Maierhofer and Finsterle (2003-2004:437, 441) conducted research on employees’ **willingness to share** knowledge in organisations and found that personal **values** (belief in the importance of knowledge sharing) emerged as the strongest link to knowledge sharing with co-workers, managers and staff from other units (compared to individual benefits and interpersonal trust). In the context of the current research, the belief that it is necessary to grow and retain knowledge might be significant. Interpersonal trust was also linked to knowledge sharing with co-workers and managers. Individual benefits were not a predictor of sharing knowledge with co-workers and managers (Maierhofer & Finsterle 2003/2004:437).

The **trustworthiness** of the source is vital in the important **knowledge transfer process**. When the source is perceived as trustworthy, the recipient will be less suspicious of the offered conception and thus more open and receptive to its detail (Hovland et al, Hovland & Weiss in Szulanski & Cappetta 2003:523). More detail can be communicated to the recipient, who will probably have a better grasp of the source’s conception of the practice. When the source is not perceived as trustworthy, knowledge transfer can be expected to be stickier (Szulanski & Cappetta 2003:534). Knowledge transfer also requires a **collaborative** effort, implying that it is dependent on the recipient’s absorptive capacity (Cohen & Levinthal in Minbaeva & Michailova 2004:666), but also on the sender’s attitude and behaviour (ie his or her willingness and ability to share [Minbaeva & Michailova 2004:668]).

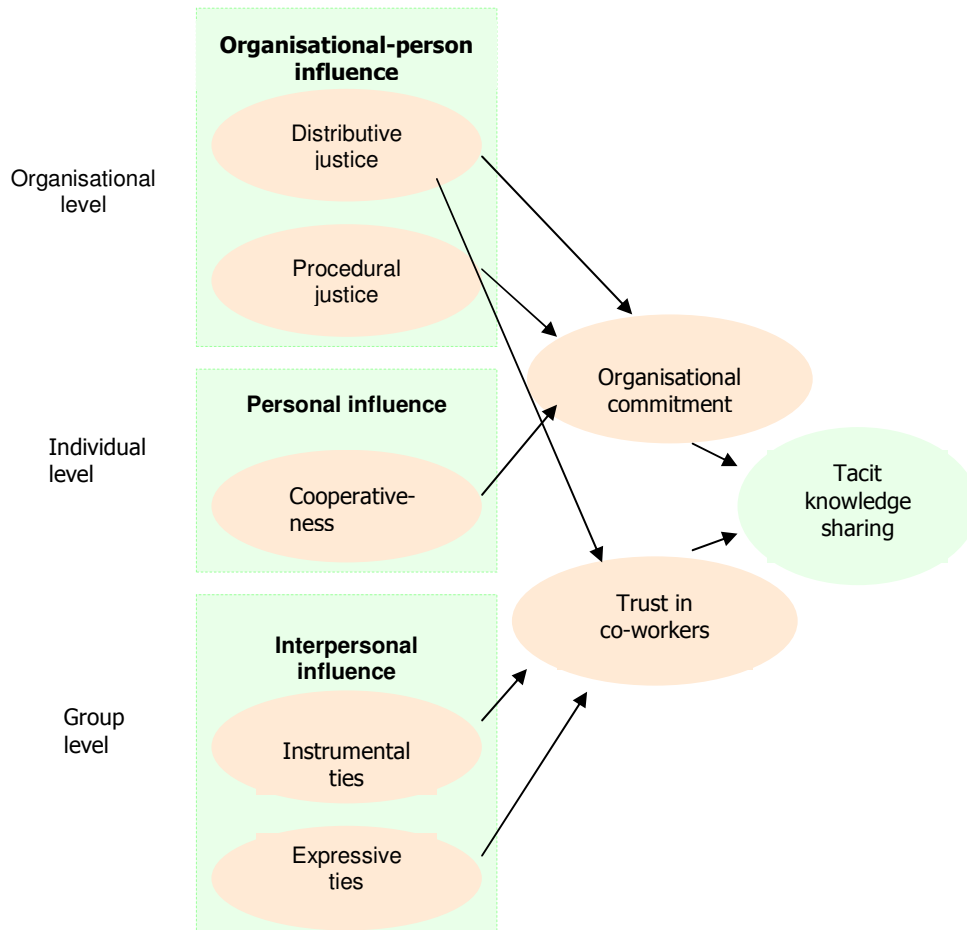
If knowledge is to be of any use it must be **applied**. Jackson et al (2003:405) argue as follows: “To the extent that knowledge use is an intentional behaviour, employees must

not only possess the required knowledge but also recognize that they have the required knowledge, be motivated to use it, and **believe** that it is feasible to use it.”

The literature search revealed **values** such as organisational commitment, trust, justice (fairness) and collaboration (cooperation) that would enhance tacit knowledge sharing. **Organisational commitment** is seen as the strength of an employee’s identification with and involvement in a particular organisation (Porter et al in Lin 2007:414). Mahee’s (2006:77) study conceptualises **affective commitment** (the result of positive work experiences that create “feelings of comfort and personal competence” [Meyer & Allen cited in Mahee 2006:77]) and **normative commitment** (reflecting “an obligation to remain resulting from internalization of a loyalty norm and/or the receipt of favors that require repayment” [Meyer & Allen cited in Mahee 2006:77]) to be antecedents of knowledge-sharing behaviour. Individuals with **continuance commitment**, reflecting “a need to remain, and resulted from recognition of the costs (for example, existence of side bets, lack of alternatives) associated with leaving” (Meyer & Allen cited in Mahee 2006:77) will not share knowledge. Individuals who feel supported and receive reciprocation for their contributions, develop affective commitment towards the organisation and will adopt the organisational values (Mahee 2006:77).

The findings of a study that utilises structural equation modelling (SEM), conducted by Lin (2007:414), on the mediators and antecedents of **tacit knowledge sharing** are highlighted in figure 3.6.

FIGURE 3.6
ANTECEDENTS AND MEDIATORS OF TACIT KNOWLEDGE SHARING



Source: Adapted from Lin (2007:413)

The study revealed that tacit knowledge sharing is affected by distributive justice (fairness of outcomes), procedural justice (fairness of procedures used to determine outcome) and cooperativeness (likeliness of individuals to assist each other and understand each other's viewpoint [Laughlin; Yilmaz & Hunt in Lin 2007:416]) indirectly via **organisational commitment**. Tacit knowledge sharing is also affected by distributive justice, instrumental ties (which arise in the performance of work and facilitate the transfer of physical, informational or financial resources to their team members [Manev & Stevenson in Lin, 2007:417]) and expressive ties (offering friendship and social support ([Manev & Stevenson in Lin, 2007:417]) via **trust** in co-workers. Low tacit knowledge sharing is likely to be attributed to a lack of organisational commitment and trust in co-workers (Lin 2007:421).

According to Rebernik and Sirec (2007:413), procedural justice in decision making (ie clarity, explanation and engagement) is a factor that could contribute to knowledge sharing. If decision-making processes are fair, employees are most likely to both share their ideas and implement decisions that are made.

In terms of **attitudes that would enhance** knowledge behaviours, it would appear from the literature search that **willingness** to learn, create, share, transfer and apply knowledge as opposed to unwillingness (resistance, hesitance or refusal) to execute these behaviours – in other words, refusing to learn or hoarding knowledge – are the key attitudes in enhancing or impeding tacit knowledge sharing (Bock et al 2005:88; Haldin-Herrgard 2000:4; Mahee 2006:74). Cabrerra (in Minbaeva & Michailova 2004:667) identified the perception that others are willing to share their knowledge as an important factor in determining whether an individual chooses to share his or her knowledge with others, based on the belief that particular knowledge is worth sharing. MacNiel (2003:299) argues that employees' willingness to share their knowledge will be influenced by their perceptions of the fairness of their psychological contract (employment conditions) with the organisation. Such perceptions influence their willingness to remain with or leave the organisation and their overall commitment to it. The level of commitment will, in turn, influence their attitudes and behaviours towards sharing their knowledge for the benefit of the organisation. Where employees have positive experiences from knowledge sharing, this is likely to influence their attitudes toward the values of the organisation. This process could influence their willingness to exert overall effort and ultimately their overall willingness to remain with the organisation (Hislop in MacNiel, 2003:300). Mahee (2006:78) concludes that organisations will become more dependent on individuals who are willing to contribute to successful change regardless of formal job requirements (Somech & Drach-Zahavy in Mahee 2006:78) and the most meaningful contribution an individual can make in this process is to share his or her knowledge.

Impeding factors that would affect the attitudes of individuals towards knowledge sharing, transferring, using and applying behaviour refer to **resistance to change** or hesitance and **unwillingness to share, use or apply knowledge**. Syed-Ikhsan and Rowland (2004:100-101) highlight two potential problems pertaining to attitude and behaviour, namely how ready employees are to share their knowledge and how easily they can overcome the resistance to change and share their knowledge in the

organisation. Employees should see knowledge sharing as natural instead of something that they are compelled to do.

It is fairly common for receivers of knowledge to understand and absorb new knowledge, but not put it to use (Davenport & Prusak 1998:101). Several reasons could be responsible for this behaviour, most of which are based on values and attitudes, namely not respecting or trusting the source of the knowledge, pride, stubbornness, fear of taking risks and lack of time or opportunity to use the knowledge (Davenport & Prusak 1998:101–102). (Time and opportunity fall outside the scope of behaviour.)

Hesitance to use the knowledge of others could also be an issue resulting from an attitude of “not invented here” (Rebernik & Sirec 2007:406). In cross-cultural knowledge sharing, beliefs in own knowledge superiority increase the chances of misinterpreting or ignoring shared knowledge, for example, an attitude of “it cannot work here”, based on the perception that knowledge from expatriates is inappropriate in local context (Peltokorpi 2006:146). An attitude of “that’s not my job” could also endanger effective sharing of tacit knowledge (Bijlsma-Frankema & Koopman 2004:207).

In knowledge transfer and sharing processes, sources (senders) may have excellent experience and strong abilities, but may be **unwilling to share** (Minbaeva & Michailova 2004:668). The reasons for this hostility can be outlined as follows in table 3.1.

TABLE 3.1
REASONS FOR HOSTILITY TOWARDS SHARING KNOWLEDGE

<ol style="list-style-type: none">(1) Protection of an individual’s competitive advantage, loss of potential value and bargaining power of personal knowledge.(2) Reluctance to spend time on knowledge sharing.(3) Imbalances in giving and receiving information.(4) Fear of hosting “knowledge parasites” (ie people who have invested little or no effort in the individual’s own development).(5) Avoidance of exposure to external assessments of the quality of their knowledge.(6) Avoidance of uncertainty regarding how the receiver will perceive and interpret the knowledge.(7) Fear of losing power (eg losing a position of privilege and superiority).
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Source: Adapted from Husted & Michailova (in Minbaeva & Michailova 2004:663); Bijlsma-Frankema & Koopman (2004:207)

"Knowledge is power" is a belief that might encourage individuals to hoard knowledge for individual use, while exploiting the knowledge of colleagues, which would not be to the benefit of the organisation (Haldin-Herrgard 2000:4). Knowledge could be regarded as a source of power, as leverage, or as a guarantee of continued employment, which will result in unwillingness (reluctance) to share (Syed-Ikhsan & Rowland 2004:101).

It would appear that **values** and beliefs such as fairness, cooperativeness, commitment, trust (in colleagues and managers) and **attitudes** such as willingness to enact knowledge behaviours (learn, share, transfer, use and apply) are an integral part of individuals' knowledge behaviours. Factors such as resistance to change or hesitance and unwillingness to enact knowledge behaviours could cause knowledge loss.

3.5.4.4 *Ability*

The abilities of an individual refer to his or her capacity or talents to perform various tasks in a job (Hellriegel et al 2001:132; Robbins 2005:45). An individual's abilities are made up of intellectual (mental) and physical abilities (Gibson et al 1994:769; Robbins 2005:45). Abilities are linked to motivation that drives behaviour (Hellriegel et al 2001:132).

The feasibility of knowledge behaviours is dependent on the individual's abilities, skills, competencies, strengths and weaknesses. People are not clones (Gilley & Boughton in Gilley & Hoekstra 2003:279) which implies that people's knowledge behaviours will differ on the basis of their abilities, skills and competencies.

Knowledge learning and creating at individual level involve the ability to deal with new situations, events, information and contexts (Von Krogh et al 2000:19). Insufficient **cognitive ability** to comprehend more complex relationships in knowledge could be a barrier to an individual's ability to, learn, create, share, transfer and absorb knowledge (Calhoun & Starbuck 2003:484).

Perceptions and beliefs regarding individual **competencies and skills** are positively associated with the knowledge-sharing behaviour of individuals (Cabrera in Minbaeva & Michailova, 2004:663). An individual might only learn and accept knowledge from another individual if he or she believes that the person has expertise in the shared knowledge.

However, a person may only share his or her knowledge with a person he or she believes will be able to absorb the knowledge and use it.

In terms of knowledge transfer, the decision to transfer knowledge is largely individual and based on ability and willingness to transfer knowledge (Minbaeva & Michailova 2004:668). Sharing and transferring knowledge depend on the ability of the source to **communicate** his or her knowledge in a way which the receiver can understand. This ability relates to previous experience and the ability to frame his or her knowledge in different ways and consider different perspectives (Reagans & McEvily in Minbaeva & Michailova 2004:666–667). Sources (senders) might not be able to transfer knowledge because they lack the skills and competencies to do so or have a language deficiency (Cabrera in Minbaeva & Michailova 2004:668), as in, say, cross-cultural knowledge transfer situations. A recipient who lacks **absorptive capacity** will be less likely to recognise the value of new knowledge, recreate that knowledge or apply it successfully (Szulanski & Cappetta 2003:524) in their own work situations or in other contexts (Jackson et al 2003:407). According to Cohen and Levinthal (in Szulanski & Cappetta 2003:524), the stock of prior related knowledge determines the absorptive capacity.

Furthermore, tacit knowledge is held in nonverbal form in the minds of people and is difficult to communicate it through language. Working alongside a person and experience might improve the ability to learn, share, transfer and apply knowledge.

In terms of **ability**, it can be concluded that knowledge behaviours will be improved by an ability to communicate knowledge in an understandable way and by working alongside colleagues (not on one's own).

3.5.4.5 *Perception*

Perception can be described as the process whereby an individual gives meaning to the environment. Individuals organise and interpret sensory impressions or stimuli into a psychological experience (Gibson et al 1994:776; Robbins 2005:644). What an individual perceives can be extremely different from objective reality. An individual's behaviour is based on his or her perception of what reality is and not on reality itself (Robbins 2005:134).

Perception seems to be an obstacle in the way of sharing tacit knowledge. Perceptually, the characteristics of unconsciousness relate to people not being aware of the full range of their knowledge (Polanyi in Haldin-Herrgard 2000:3). The feeling of a missing link or the elements of intuition are more difficult to pinpoint. This type of knowledge has often become a natural part of the individual's behaviour and way of thinking because it has become so internalised. People are not always aware of this tacit knowledge and do not exert themselves to reflect on their tacit knowledge (Haldin-Herrgard 2000:3).

Perceptions about others' willingness to share their knowledge are a key factor in determining whether an individual chooses to share his or her knowledge with others. Individuals will only be motivated to share knowledge if they believe that a particular piece of knowledge is in fact worth sharing (Cabrera in Minbaeva & Michailova 2004:667).

The **perceptions** of individuals seem to be an underlying factor that would be influenced by their attitudes, beliefs and values and have an impact on their behaviour. These issues in a knowledge behaviour context were addressed in section 3.5.4.3.

3.5.4.6 *Motivation*

Motivation is defined as the "forces acting on or within a person that causes the person to behave in a specific" (Hellriegel et al 2001:130), persistent way towards attaining a goal (Robbins 2005:643). Motivation is linked to behaviour in the sense that it drives individuals to behave in a way that would lead to desired or expected outcomes (Robbins 2005:121). Motivation theory attempts to describe and predict how the behaviour of individuals is aroused, sustained and stopped (Gibson et al 1994:11).

Learning requires a certain level of stress and motivation (Schein in Salk & Simonin 2003:256). The nature and substance of such motivations are variable across cases of collaboration, levels in the organisation and stakeholders in learning collaborations. Understanding in the field entails paying more attention to incentive systems, organisational structures and other context factors (Salk & Simonin 2003:256). In this discussion the focus is on motivation, specifically the role of intrinsic motivation (brought about by responsibility, challenge and feedback characteristics of knowledge behaviours – ie the pleasure or value one receives from the behaviour) (Gibson et al 1994:774;

Robbins 1996:G-4) and extrinsic motivation (brought about by external rewards such as pay, promotion or fringe benefits [Gibson et al 1994:772]).

Osterloh and Frey (in Von Krogh 2003:376) argue that if knowledge to be **shared** is tacit, the role of intrinsic motivation outweighs the role of extrinsic motivation. No contract or material incentive can ensure effective and efficient knowledge sharing. When individuals work together as a team to solve complex tasks, tacit knowledge sharing takes place and the satisfaction of working together to solve the task, motivates them to share their knowledge. Devos and Willem (2006:656) argue that people can be intrinsically or extrinsically motivated to share their knowledge, but intrinsic motivation based on people identifying with the group or organisation, trust and a collaborative environment are far more effective in stimulating knowledge sharing. The argument on intrinsic motivation outweighing extrinsic motivation in knowledge sharing is supported by the findings of Bock et al (2005:100) in their research based on the theory of reasoned action (TRA) examining the roles of extrinsic motivators, social-psychological forces and organisational climate, that is:

- Extrinsic rewards may hinder instead of promote the development of favourable attitudes toward knowledge sharing. In support of this finding, Bock et al (2005:98–99) refer to Kelman's argument that extrinsic rewards succeed only in securing temporary compliance, Meyer's argument that mismatches may exist between what employees and management perceive to be appropriate extrinsic rewards for the behaviours being encouraged and Eisenberger and Cameron's argument that task-contingent rewards may negatively impact intrinsic motivations (such as anticipated reciprocal relationships and sense of self-worth).
- An individual's attitude towards knowledge sharing is driven primarily by anticipated reciprocal relationships (desires to maintain ongoing relationships with others, specifically in the provision and receipt of knowledge)
- An individual's sense of self-worth through knowledge sharing intensifies the salience of the subjective norm (defined as perceived social pressure to perform or not perform a behaviour [Ajzen in Bock et al 2005:93]) regarding knowledge sharing (Bock et al 2005:99).

Various **theoretical and empirical studies** have been conducted on the use of **rewards** to encourage knowledge sharing, of which some are discussed here. Bartol and Srivastava (2002:64) theorise that team-based rewards and company-wide incentives (profit sharing, gain sharing and employee stock options) would be particularly instrumental in enhancing knowledge sharing within teams and across work units, respectively. Mahee (2006:74), however, argues that rewarding individuals and teams or units to motivate them to share knowledge, could be problematic because organisations can unintentionally inhibit knowledge sharing by rewarding individuals and units for hoarding information (Gold, Malhotra & Segars; O'Dell & Grayson in Mahee 2006:74), for example, a person who receives a large bonus for his esoteric (special expert) knowledge, might be hesitant to share this knowledge with others. As far as communities of practice are concerned, Bartol and Srivastava (2002:64) theorise that intrinsic rewards of individuals and factors that build expertise and provide recognition are the most appropriate means of fostering feelings of competence in knowledge sharing. Previous research indicates that factors such as organisational citizenship, self-actualisation, learning and advancement of the community motivate individuals participating in communities of practice (Constant, Sproull & Kiesler; Faraj & Wasko in Bartol & Srivastava 2002:73).

Cabrera (in Minbaeva & Michailova 2004:667), upon reviewing the main sociological and psychological theories to identify factors that could possibly influence knowledge sharing behaviour, found that individuals will be more willing to share their knowledge if they perceive a clear benefit (reward) for doing so. Thus the perceived cost of sharing knowledge is positively associated with the knowledge-sharing behaviour of individuals.

Reychav and Weisberg (2006:168) theorise that the more an individual employee is involved in the knowledge-sharing process of an organisation, the more he or she will benefit directly by increased performance. This, in turn, leads to increased remuneration for the employee and a possible decrease in his or her intention to leave. Although Reychav and Weisberg (2006:168) argue that employees' involvement in the knowledge-sharing process is rewarded through material (salary, bonus or economic benefits) and nonmaterial (promotion, appreciation and status) rewards, it could be argued that these rewards are specifically for increased performance, and not directly for the actual sharing of knowledge as such. Furthermore, their reasoning is based on a theoretical framework and has not been empirically tested.

Zweig (in *Sharing know-how reluctantly* 2006:16) feels that knowledge sharing of expertise should be part of employees' performance appraisals because they will be more open to share their expertise if they are rewarded. Du Plessis (2006:34) supports this approach by stating that employees see knowledge as a competitive advantage and it would therefore be contrary to their nature to share this knowledge without some sort of incentive. However, it may be difficult to measure the sharing of tacit knowledge.

An empirical study conducted by Bock and Kim (2002:14) found that expected rewards (such as monetary rewards, promotions or educational opportunity), believed by many to be the primary motivating factor for knowledge sharing, was not significantly related to the attitude towards knowledge sharing. Instead, a positive attitude towards knowledge sharing leads to positive intention and ultimately to actual knowledge sharing.

Maierhofer and Finsterle's (2003-2004:437) empirical study found that perceived individual benefits (such as status, money, goods, services or affection [Foa & Foa in Maierhofer & Finsterle 2003-2004:440]) were not a predictor of sharing knowledge with immediate co-workers and managers, as opposed to personal values and trust. Personal values emerged as the strongest link to knowledge sharing with all three targets, namely co-workers, managers and staff from other units.

At Buckman Laboratories, a reward and punishment approach was used back in the 1990s. Incentives were offered, say, by giving the best 150 knowledge sharers new computers and rewarding them with a vacation at a fashionable resort. The punishment component was more subtle, but inescapable, as Bob Buckman would write to those employees who were unwilling to participate in the sharing activities, informing them as follows: "If you are not willing to contribute or participate, then you should understand that the many opportunities offered to you in the past will no longer be available." At the core of this approach he identified trust as value, pointing out that someone cannot be empowered if there is no mutual trust (Pan & Scarbrough 1998:63).

Kohn (in Bock & Kim 2002:19) suggests the following reasons for the failure of rewards in the knowledge-sharing context:

- Rewards have a punitive effect because they are manipulative like outright punishment, say, when a person does not receive an expected reward.

- Rewards break off relations in the sense that for each person who wins, there are many others who feel they have lost. This could also give rise to unhealthy competition.
- Rewards like punishment may actually undermine intrinsic motivation, for example, when people feel that if they have to be bribed, it must be something that they would not want to do. Hence the larger the incentive, the more negatively they might view the activity for which the bonus is received. The more they experience being controlled, the less interested they become in what they are supposed to be doing.
- Instead of managers giving people what they need to do a good job, such as useful feedback, social support and room for self-determination, they often use incentive systems as a substitute.

Intrinsic motivators appear to be more useful in encouraging knowledge-sharing behaviours than extrinsic motivators such as rewards.

Motivation plays a vital role in the knowledge **transfer** process from source to recipient. The source must be willing to share knowledge, motivated by something that will make the person feel the sharing action is worthwhile for him or her (in other words, an answer to the question, "what's in it for me?"). Lack of motivation may cause fear of losing ownership, position of superiority, becoming expendable or feeling resentful for not being adequately rewarded for sharing hard-won success. However, the recipient must also be motivated to accept knowledge from an external source. Lack of motivation may result in foot dragging, passivity, feigned acceptance, hidden sabotage, or outright rejection in the implementation of new knowledge (Zaltman in Szulanski & Cappetta 2003:524).

It can be concluded that intrinsic **motivational factors** such as satisfaction gained from sharing knowledge whilst working with colleagues and other factors such as a positive attitude towards sharing, personal values and trust (addressed in sec 3.5.4.3), identifying with the group and a collaborative environment would enhance knowledge behaviours more positively than extrinsic motivational factors such as rewards. Theoretically, some authors such as Cabrera (in Minbaeva & Michailova 2004:667) and Zweig (in *Sharing know-how reluctantly* 2006:16) argue that rewards would have a positive influence on knowledge sharing, but this has not been proved empirically.

3.5.4.7 *Individual learning*

Gibson et al (1994:774) define learning as “the process by which a relatively enduring change in behaviour occurs as a result of practice”. Robbins (2005:642) uses the same concepts in his definition of learning, but links it to being the result of experience. Hellriegel et al (2001:100) define learning as a “relatively permanent change in the frequency of occurrence of a specific individual behaviour”. These definitions mean that learning has taken place when an individual behaves, reacts and responds as a result of experience or practice in a way that is different from the way he or she formerly behaved (Robbins 2005:48). Employees need to learn and practise new work behaviours that will be productive and to the benefit of the organisation (Hellriegel et al 2001:100).

Furthermore, learning involves **change** which must be relatively permanent and is concerned with behaviour. These changes could be changes in actions, thought processes or attitudes, and if not accompanied by behaviour, would not be learning. **Experience** is acquired directly through observation or practice or indirectly through reading, but learning has not occurred without permanent change in behaviour (Robbins 2005:48–49). This implies that experience or practice, behaviour and learning are intertwined (as indicated in fig 2.10 and sec 2.4.3.2 which deal with the cognitive process of learning and knowing).

Robbins (2005:48) argues that to be able to predict and explain behaviour, it is important to understand how people learn. Three popular **learning theories**, namely classical conditioning, operant conditioning and social learning better explain how individuals actually learn.

a Classical conditioning

Classical conditioning is based on the experiment of Ivan Pavlov in the early 1900s to teach dogs to salivate in response to the ringing of the bell, where the ringing of the bell was associated with the piece of meat that would subsequently be presented to the dog. Classical conditioning is passive in the sense that something happens and people react in a specific way. It is elicited in a specific identifiable event. Classical conditioning is also prevalent in organisations, for instance, when people start acting prim and proper and tidying their offices when they see that the windows are being washed and the

administrative offices are being cleaned up, because they associate this behaviour with a possible visit from the head office top management team (conditioned by previous incidents) (Robbins 2005:49–50).

b Operant conditioning

Operant conditioning refers to behaviour being a function of its consequences. People learn to behave to acquire something they desire or to avoid something they do not want. This type of behaviour is voluntary or learned (not reflexive or unlearned behaviour). It is influenced by reinforcement or lack of reinforcement brought about by the consequences of the behaviour. People will be most likely to engage in desired behaviours if they are positively reinforced for doing so. If a certain expected behaviour is not positively reinforced, the probability that the behaviour will be repeated declines – say, when a person is expected to share knowledge based on the manager’s promise that the person will be compensated at the next performance appraisal and this does not happen, he or she would be more likely to stop sharing his or her knowledge (Robbins 2005:51).

c Social learning

Social learning takes place when individuals learn by observing what happens to others, by being told about something and by direct experiences. Social learning is an extension of operant conditioning (ie behaviour is a function of consequences), but also acknowledges the role of observation (eg observing the behaviour of models such as managers and colleagues in the organisation) and perception in learning. People respond to how they perceive and define consequences, not to the objective consequences themselves (Robbins 2005:51-52).

Operant conditioning and social learning will probably be the ways of learning that would apply to knowledge behaviours of individuals in the work environment. The way that individuals actually learn will affect their knowledge behaviours. Van der Sluis (2002:21) discusses four kinds of learning behaviour as distinguished by Hoeksema (1995, 1997) discussed in section 3.5.2.1 (meaning-oriented, instruction-oriented, planned and emergent learning). Although these kinds of learning behaviour could give one some insight into how individuals learn, one should bear in mind that these are at a cognitive level and “cognitive styles are not categories or types but dimensions of continuous

variation” that help to characterise individual propensity (Messick cited in Van der Sluis 2002:21)

Impeding or enhancing individual learning factors that might have an impact on the knowledge behaviours of individuals are learning towards individual development, on the one hand, and resistance to learning, on the other. Not all people in an organisation want to put their energy into work-related development and are satisfied with what they are doing. Furthermore, it cannot be assumed that all workers have the confidence or initiative to advocate for their own development and learning (Bryson, Pajo, Ward & Mallon 2006:293). This implies that knowledge could be lost if individuals resist learning or do not take responsibility for their own learning and development – hence people who are willing to share their knowledge will not be able to transfer it to these individuals.

In terms of **individual learning**, it can be concluded that active engagement in learning opportunities, taking responsibility for his or her own learning and development and determining whether a person is satisfied with doing his or her job without further development would indicate where to focus in an attempt to retain knowledge.

3.5.4.8 *Individual decision making*

Individual decisions are described as the choices an individual makes from two or more alternatives (Robbins 2005:143). The decision-making process is rational whereby a decision is made to achieve some result or solve some problem (Gibson et al 1994:770; Robbins 2005:144). Many forces influence the decision-making process such as the person’s **emotions** and feelings, for example, fear, anxiety, frustration, envy and happiness (Bennet & Bennet 2004:320; Robbins 2005:120) and **perceptions** of a problem or situation, to name but a few. Rationality and biases, prejudices and intuition all play a role in the complex decision-making process (Robbins 2005:160). The quality of decisions and the way they are made are largely influenced by a person’s perceptions as a result of the interpretation and evaluation of information available to him or her to understand the problem that needs to be solved (Robbins 2005:143).

Individuals’ behaviour is involved during the decision-making process and once a decision has been made, it should lead to some sort of action. It is because of this that an

understanding of how people make decisions can be helpful in understanding, explaining and predicting their behaviour (Robbins 2005:160).

Elkjaer (2003:40-41) argues that enhancing decision making in organisations is something that is done by individuals' learning and processes that can be bolstered by individuals' learning. The idea is that individuals have a mental model in their minds, which is an abstract representation of their actions. It is the mental model, which can be enhanced to enable individuals to enhance information processing and improve decision making in organisations. Learning is identical to the enhancement of individuals' mental models and happens when individuals acquire information and knowledge, which can subsequently guide their behaviour. Enhancing decision making in organisations requires a focus on learning, which is directed towards what goes on in the minds of people – in other words, the knowledge in people's minds influences their decision making.

An individual's knowledge, ability and motivation affect the type of analytical procedure used in making a decision. Different decision-making styles affect individuals' approaches to decision making. A decision-making style reflects the combination of the way in which an individual perceives and comprehends stimuli (eg information) and the general manner in which the individual chooses to respond to it. A team of researchers developed a model of decision-making styles that is based on the idea that the styles vary along two different dimensions, namely value orientation (reflects the extent to which an individual focuses on task and technical concerns or on people and social concerns when making a decision) and tolerance of ambiguity (the extent to which the individual needs structure or control in his or her life) (Buelens & Van Poucke 2006:450–451). When these two dimensions are combined, they form the following four styles of decision making (Buelens & Van Poucke 2006:451–452):

a Directive

Individuals with a directive style focus their decision making from a task and technical concern viewpoint. They have a low tolerance for ambiguity and are efficient, logical, practical and systematic in their approach to problem solving. They make decisions based on facts and tend to be autocratic, exercise power and control and focus on speed and results.

b Analytical

These individuals tend to analyse situations too closely and have a much higher tolerance for ambiguity. They consider more information and alternatives than directive decision makers. They are careful and take a long time to make decisions, but when necessary, they respond well to new or uncertain situations. They are often autocratic.

c Conceptual

Conceptual decision makers tend to focus on people and social aspects of a work situation, have a high tolerance for ambiguity, take a broad perspective on problem solving, rely on intuition and discussion with others to acquire information, are willing to take risks and are adept at finding creative solutions to problems. However, a conceptual style can foster an idealistic and indecisive approach to decision making.

d Behaviour

Behavioural style decision makers focus most on the people aspect of decisions. They enjoy social interactions where opinions are shared openly, work well with others, are supportive, receptive to suggestions, show warmth and prefer verbal to written information. They tend to be too concerned about others and avoid conflict. This can lead to a "wishy-washy" approach to decision making and experiencing problems in making difficult decisions and saying "no" to others.

According to Buelens and Van Poucke (2006:452), research shows that very few people have only one dominant decision-making style, but tend to have two or even three styles. Styles also vary across occupations, job levels and countries. Knowledge of decision-making styles enables the individual to have a better self-understanding and facilitates the potential for improvement, provides the ability to influence others by being aware of styles (say, when dealing with a directive person, supply streamlined factual information to support the idea), and makes the individual aware of how people can take the same information and yet arrive at different decisions by using a variety of decision-making strategies. Different decision styles represent one likely source of conflict at work.

In terms of knowledge behaviours such as learning, knowing, sharing, transferring and applying knowledge, no information was found in the literature. However, the assumption

is made that being aware of individuals' decision-making styles would assist them in understanding how their decision-making behaviour would affect their learning, knowing, sharing, transferring and applying of knowledge.

3.5.4.9 Individual behaviour-enhancing factors to retain knowledge

The discussion of factors influencing knowledge behaviours at individual level revealed several factors that enhance or inhibit the retention of knowledge at individual level (discussed in secs 3.5.4.1–3.5.4.8). It is necessary to measure the degree to which these behavioural factors exist in organisations as contributing factors to the extent that knowledge is retained in organisations. These factors are represented as follows in table 3.2:

**TABLE 3.2
BEHAVIOURAL ENHANCERS FOR KNOWLEDGE RETENTION AT
INDIVIDUAL LEVEL**

INDIVIDUAL LEVEL			
<p>Biographical</p> <ul style="list-style-type: none"> - Sharing expert knowledge regardless of gender, age, hierarchy, marital status, education level, tenure and language differences - Diversity 	<p>Personality and emotions</p> <ul style="list-style-type: none"> - Cooperation with colleagues while learning, creating, sharing, transferring and applying knowledge (knowledge behaviours) - Personal involvement and commitment - Protection of self-image 	<p>Values and attitudes</p> <ul style="list-style-type: none"> - Belief in importance of knowledge behaviours - Willingness to display knowledge behaviours - Trust 	<p>Ability</p> <ul style="list-style-type: none"> - Perceptions and beliefs regarding other people's skills and competencies - Ability to communicate knowledge in an understandable way - Ability of other fellow workers to absorb knowledge transferred through knowledge behaviours - Working with colleagues, gaining experience improves ability to retain knowledge
<p>Perception</p> <ul style="list-style-type: none"> - Positive perception about others' willingness to display knowledge behaviours 	<p>Motivation</p> <ul style="list-style-type: none"> - Satisfaction when solving problems - Pleasures and value received from displaying knowledge behaviours (such as sharing personal knowledge) - Rewards and recognition for demonstrating knowledge behaviours 	<p>Individual learning</p> <ul style="list-style-type: none"> - Taking responsibility for own learning - Learning towards individual development versus satisfied with what person is doing 	<p>Individual decision making</p> <ul style="list-style-type: none"> - Knowledge of individual's decision-making styles to understand their impact on knowledge behaviours

The above factors are the core of enhancing factors that would contribute to preventing tacit knowledge loss, on the one hand, and retaining knowledge, on the other, at individual level in an organisation.

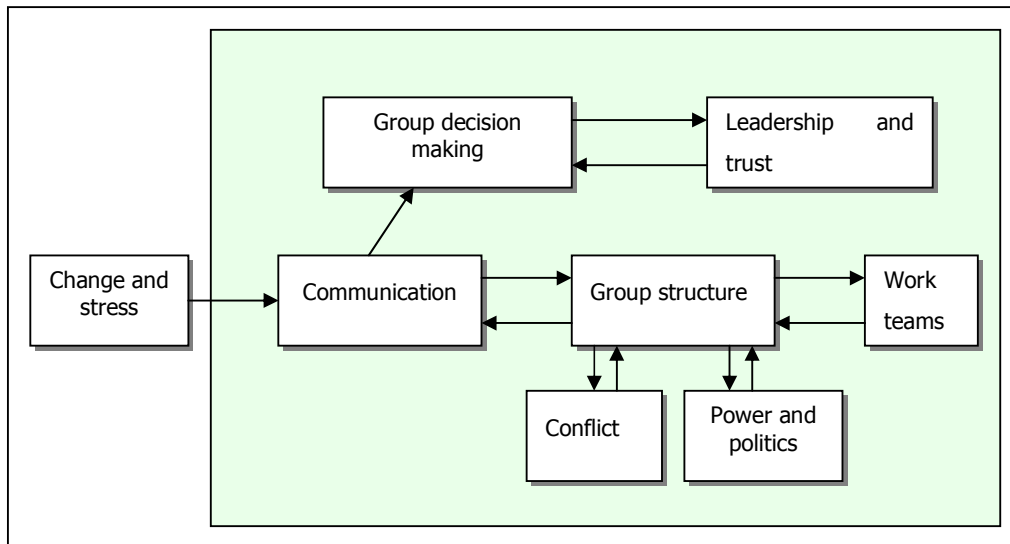
3.5.5 Factors influencing knowledge behaviours at group level

A group is defined as two or more individual employees who interact with one another in such a way that the behaviour of one member of the group influences the behaviour of other members of the group. Group members also influence one another's performance (Gibson et al 1994:772-773; Robbins 2005:239). Hellriegel et al (2001:224) describe a group as a number of people who share the same goals and often communicate with one another in the group over a period of time. They are few enough so that each individual may communicate with all the others on a person-to-person basis.

Groups can be classified as formal (ie defined by the organisation's structure with designated work assignments) or informal (ie alliances that are not formally structured or organisationally determined such as friendship groups or interest groups). In formal groups, the behaviours that members should engage in are stipulated by and directed towards organisational goals. Informal groups appear in response to the need for social contact (Robbins 2005:238).

The factors that influence behaviour at group level are highlighted in figure 3.7 and discussed below.

FIGURE 3.7
FACTORS THAT INFLUENCE BEHAVIOUR AT GROUP LEVEL



Source: Adapted from Robbins (2005:32)

Each factor is discussed below in terms of what it entails and how it is linked to knowledge behaviours.

3.5.5.1 *Communication*

People in groups communicate with one another through oral, written and nonverbal means (Robbins 2005:302). Messages conveyed between group members through these communication channels are interpreted by group members and have an impact on their decision making and behaviour in the group. Oral communication takes place through speeches, formal one-on-one and group discussions and informal rumours (known as the grapevine) (Robbins 2005:302). Written communication includes memos, emails, letters, faxes, notices placed on bulletin boards or any other device that is transmitted via words or symbols. Nonverbal communication includes body movements, facial expressions, the intonation or emphasis given to words and the physical distance between the sender and receiver. Body movements always have meaning and no movement is accidental (eg “help me, I’m lonely”; “leave me alone, I’m depressed”). These messages are rarely at a conscious level (Robbins 2005:304).

Communication must occur in order for knowledge to be learnt, created, shared and transferred between group members, across units and between groups in global organisations. In this respect, communication at group level could have an impact on knowledge behaviours resulting in either knowledge loss or retention. Taylor and Osland (2003:216–217) developed a conceptual framework on the communication barriers to organisational learning from an intercultural perspective. The focus is on how messages are perceived and interpreted. They argue that **effective intercultural communication** is a crucial determinant of **global** organisational learning and transfer of tacit knowledge between individuals and groups (Taylor & Osland 2003:228) and identified the following eight barriers in terms of sender and receiver relationships:

a Cultural marginality of senders

Cultural “marginality refers to people who have internalised two or more cultural frames of reference” (Stonequist cited in Taylor & Osland 2003:217). This can lead to internal conflict caused by culture shock as two cultural voices compete for attention (Bennet in Taylor & Osland 2003:217). On the positive side, marginal people, who could be described as being caught up between two cultures, are often ideally suited to boundary spanning or mediating roles between cultures (Bochner in Taylor & Osland 2003:217) since they understand both cultures objectively and subjectively. Taylor and Osland (2003:217) explain it as follows: “For example some expatriates interpret the actions of the foreign subsidiary to headquarters and vice versa, thereby contributing to organisational learning.” On the negative side, marginal people may feel that they live on the boundary of an area instead of at the centre of a group or community (Osland in Taylor & Osland 2003:217). This could lead to fewer opportunities to speak or be heard, and marginal people may also consciously or unconsciously monitor their communication to reflect their marginal role. Marginality thus affects perception and the influence of the sender. Marginal expatriates may often have a more accurate view of the circumstances and events than central decision makers. Yet because these expatriates are viewed as marginal, the information or knowledge they transmit is considered to be of less value or relevance than similar information from a member in the home country. An organisational norm becomes established that discourages either seeking information from the marginal people or from paying much attention when such people volunteer information. Marginality in general relates to lack of belonging to the dominant coalition in the organisation. Marginality also plays a role in horizontal relationships (Taylor & Osland 2003:218), for example, between managers of different social cultures such as a South

African manager employed by a US company in Johannesburg being receptive to information received from the home office, but may discount the same kind of information offered by an Australian manager in the affiliate company in Australia.

b Stereotypes concerning senders

Stereotyping refers to overgeneralisation of expectations and beliefs about attributes of people without considering individual variations (Ting-Toomey in Taylor & Osland 2003:218). Stereotypes combine with attitudes such as preconceptions to create expectations of how people will behave. These expectations, in turn, influence the way in which incoming stimuli are interpreted and then have an impact on the predictions people make about others' behaviours. Stereotypes affect the way in which senders communicate their messages because stereotypes "interfere with their ability to be 'heard' [author's quotes] and accurately judged" (Taylor & Osland 2003:219). Also, the sender's stereotype about receivers determines what type of and how much information he or she will share with receivers. Gudykunst and Kim (cited in Taylor & Osland 2003:219) state the following: "Using our frame of reference invariably leads to misinterpretations of the strangers' messages, as well as inaccurate predictions about their future behaviour." While stereotyping is normal behaviour, it can inhibit knowledge sharing, transfer and learning across cultural boundaries. On the positive side, when people are willing to learn about strangers to overcome stereotyping, intercultural communication could improve (Taylor & Osland 2003:219).

c Communication style differences of senders

Cultural and ethnic identities influence verbal and nonverbal communication styles (Ting-Toomey in Taylor & Osland, 2003:219). Taylor and Osland (2003:220–21) provide a detailed discussion on the different styles, which can be summarised in the words of Ting-Toomey cited in Taylor & Osland 2003:221): "In individualistic cultures, people find themselves in numerous contexts that call for direct talk, person-oriented verbal interaction, verbal self-enhancement, and talkativeness. In contrast, in collectivistic cultures, people tend to encounter more situations that emphasize the preferential use of indirect talk, status oriented verbal interaction, verbal self-effacement, and silence."

d Linguistic ability of senders

Knowledge behaviours can be influenced by the degree to which group members are able to comprehend a language and speak it fluently. Besides mutual understanding, people tend to limit their communication to those who speak their own language. When international companies appoint a local manager to act as their liaison manager, they often appoint the person who is most fluent in the language of the home country. This person might not always be the best person to be able to teach them about the local subsidiary and context (Taylor & Osland 2003:222), but communication between the different cultures is enhanced through this person in terms of comprehension and fluency.

e Cosmopolitanism of receivers

Cosmopolitanism is an attitudinal mindset – a willingness to engage with the outside world. It entails intellectual and esthetic openness towards divergent cultural experiences, seeking a contrast instead of uniformity (Merton; Hannerz in Taylor & Osland 2003:222). Cosmopolitanism is an important attitude on the receiver end that can influence the effectiveness of communication in cross-cultural environments. If a receiver at head office is not open to other cultures, it is likely that important messages on local concerns may be ignored. However, the receiver on the local side may be so locally oriented that he or she is disinterested in external operations. This is because of the lack of interest and curiosity on both receiver ends (Taylor & Osland 2003:223).

f Satisficing of receivers

Satisficing refers to the assumption of individuals that they understand enough to get by and be effective in a global context or cross-cultural environment. Satisficing behaviour is evident when plateauing occurs in both language acquisition and cultural understanding. It can also be exhibited when an individual's focus is restricted to short-term business goals. When these skills are adequate to get by, some people stop learning and there is no motivation to reach a higher level of fluency or understanding until another trigger event occurs, which initiates another round of cultural sensemaking (Osland & Bird in Taylor & Osland, 2003:223) and a need to improve intercultural communication skills.

It can be concluded that the way messages are perceived and interpreted and the exchange of ideas is filtered in a global organisation results in varying levels of intercultural sensitivity (Taylor & Osland 2003:227).

g Communication between different generations

DeLong (2004:196) addressed the issue of poor communication between generation groups and points out that veteran employees often find it difficult to communicate with junior colleagues because they lack shared symbols and metaphors to explain abstract ideas. Veterans are likely to become annoyed with younger colleagues' lack of background or training in certain areas, feeling that they have no clue what the veterans are talking about, while less experienced employees might not see the value of certain background knowledge, discounting it as irrelevant. Ways need to be found to stifle these feelings if individuals are to remain committed to the learning process.

Certain veterans might also lack communication skills and other abilities such as not being able to teach others, which could pose a problem in the knowledge transfer-learning process (DeLong 2004:196).

h Strenuous relationships between senders (sources) and receivers

Another vital contextual aspect of communication is the effect that interpersonal relationships have on the learning, sharing and transfer behaviours of individuals in groups. The transfer of knowledge is rarely a singular event, but an interactive process of exchange depends on the nature of the pre-existing relationships between senders and receivers. The success of the knowledge transfer is detectable in the ease of communication and the intimacy of the relationship. Strenuous relationships will put a strain on communication in the knowledge transfer process (Szulanski & Cappetta 2003:525).

It appears that the influence (success or failure) of **communication** between people at all levels can be seen in language and cultural diversity, generation gap and relationship differences, which could lead to loss of critical knowledge.

3.5.5.2 *Group structure*

According to Gibson et al (1994:316), within a group, some type of structure evolves over a period of time. Group members are differentiated on the basis of factors such as their expertise, aggressiveness, power and status. Each member occupies a position in the group. Members expect the occupant of a position to enact certain behaviour (eg to communicate with management or share expertise). The structure that shapes the behaviour of individuals makes it possible to explain and largely predict the behaviour of individual members as well as the performance of the group itself (Robbins 2005:242). The structural variables that explain the behaviour of individuals in groups are as follows:

a Roles

Individuals in a work group have expected roles (eg team supervisor), perceived roles (the set of behaviours a person in a position believes he or she should enact) and enacted roles which are the behaviour the person actually exhibits (Gibson et al 1994:316). No references to knowledge behaviours were found in the literature.

b Norms

Gibson et al (1994:317) define norms as “generally agreed-upon standards of individual and group behaviour developed as a result of member interaction over time”. Norms tell members what they should or should not do under certain circumstances. Norms are a means of influencing the behaviour of group members with few external controls (Robbins 2005:246).

Very little information on group norms was found in the literature, but Hayes and Walsham (2003:57) mention that knowledge sharing in communities is relatively easy because of the shared professional backgrounds of group members in the information communications technology field (based on the work of Brown & Duguid; King & Star in Hayes & Walsham 2003:57). This finding could also be true about the sharing of tacit knowledge in work groups because of people from shared professional backgrounds having similar understandings of knowledge at a tacit or implicit level.

c Status

Status is a socially defined position or rank given to groups or group members (Robbins 2005:250). In some cases, a person is assigned status because of factors such as job seniority, age or ability (Gibson et al 1994:316).

Many organisations today contain a wide range of groups with their own social identities, often based on occupation and nationality. These social identities are sustained by what the group members value as the special capabilities of the group or community to which they belong. The knowledge they possess is intrinsic to these capabilities. They are therefore concerned about protecting this personal asset and may be cautious about sharing it with members of other organisational groups or managers. Managers have to be sensitive to these social identities and provide "psychological safety" for participating groups as the basis for their willingness to contribute to the learning and sharing of knowledge through establishing constructive relationships between the parties to the learning and sharing process. The acceptance of overarching goals by the groups might also encourage the willingness of team members to share their knowledge (Child & Rodrigues 2003:552).

d Group size

Group size affects behaviour. Evidence from research, for instance, indicates that smaller groups are faster at completing tasks than larger groups. Larger groups are better at solving problems and gaining diverse inputs towards fact finding, while smaller groups are better at doing something productive with the input (Robbins 2005:253). Groups with five to seven members do a good job of exercising the best elements of both small and large groups (Robbins 2005:254).

In terms of knowledge behaviours such as knowledge creation and sharing, free-riding and team size in economic terms may pose a barrier. Free-riding can be defined as enjoying a benefit accruing from a collective effort, but with little or no effort to contribute to the effort (BusinessDictionary.com). Where measuring individual input, productivity and rewarding accordingly becomes difficult, team members might free-ride on other team members' contributions to knowledge creation and sharing with little or no contribution to the effort on their part. The larger the team becomes, the more prevalent free-riding and shirking (avoiding) might become (Foss & Mahnke 2003:92) and the less effective

knowledge behaviours (learning, knowing, creating, sharing, transferring and applying) might become.

e *Cohesiveness*

Behaviour is influenced by the degree to which group members are attracted to each other and are motivated to stay in the group. A cohesive group will be more productive than a less cohesive one (Robbins 2005:254). This implies that a cohesive group may be more willing to learn, create knowledge and share, transfer and apply knowledge.

Social relationships may play a role in group cohesiveness. The theory of social networking has divided social network ties into

- *instrumental ties*: arising in the performance of work and facilitating the transfer of physical, informational or financial resources to their team members
- *expressive ties*: offering friendships and social support (Manev & Stevenson in Lin 2007:417).

Most social network ties among group members are both instrumental and expressive features. People value social relationships differently – for example, an individual who is well identified in a specific group may wish to maintain close contact with the group members working on the same project (a form of instrumental ties), leading to a strong willingness to trust the co-members. Individuals are likely to trust those co-workers who offer friendships and social support to them, suggesting that expressive ties are influential regarding trust in co-workers (Lin 2007:417). In an empirical study conducted by Lin (2007:423), the significant influence of social network ties on **trust** in co-workers revealed that effective social relationships between co-workers help them cultivate trust in one another and then yield tacit knowledge sharing.

It would appear that the **way groups are structured** could influence the behaviour of individual group members and the performance of the group itself. Factors that could influence knowledge behaviours refer to grouping people with shared professional backgrounds together, providing a "psychologically safe" environment in which to practise these behaviours, group members' acceptance of the overarching goals of the

group as a motivator to be willing to share their knowledge and smaller work groups that avoid free-riding of group members, group cohesiveness and healthy social relationships.

3.5.5.3 Conflict

Conflict can be defined as a process that begins when one party perceives that another party has negatively affected or is about to negatively affect something the first party cares about (Robbins 2005:422). Conflict becomes visible through the behaviour of individuals, for example, the statements, actions and reactions made by the conflicting parties (Robbins 2005:429). Conflict is dysfunctional in groups and should be managed (Robbins 2005:430) to restore harmony and functionality.

According to Panteli and Sockalingam (2005:599), although conflict is an inherent issue of any organisational arrangement and central to knowledge sharing, it has received limited attention in the literature. Only one article by Fang, Tsai and Chang (2005:62) was found relating to the reciprocal impacts between knowledge sharing and communication and conflict resolution of team members. According to them, many researchers have proposed that moderate conflicts in communication and interactions could have a positive impact on members and the organisation. Moderate conflicts are necessary and helpful for organisations to avoid inertia and arouse creativity and variety, while an excess of conflicts could also be harmful for the organisation. Robbins (in Fang, Tsai & Chang 2005:64) claims that distorted or blurred information may be disseminated or propagated during the communication process, which could breed conflict and hostility among members participating in the process of communication. Fang, Tsai and Chang (2005:64, 66) agree that conflicts are manageable and need to be managed by means of conflict resolution processes to improve knowledge sharing and communication in work teams.

It could be argued that if there is **conflict** between team members, they would not learn from each other, gain experience from each other, share their knowledge with each other or apply expert knowledge. This would imply loss of knowledge to the organisation. Resolving conflict that may exist in work teams would contribute to enhanced knowledge retention.

3.5.5.4 *Power and politics*

The natural way to gain influence is to become a power holder. Hence members who want power will build a personal power base. Those who are "out of power" and wish to be in will first try to increase their power individually, but if this does not prove effective, the alternative is to form a coalition because there is strength in numbers (Robbins 2005:398).

Political behaviour in an organisation involves the attempts of some members to influence the behaviour of others and the course of events in the organisation in order to protect their self-interests, advance their own goals or meet their own needs. Political behaviour implies that certain people are gaining something at the expense of others or the organisation as a whole. Employees may justify their own political behaviour as defending their legitimate rights or interests, yet refer to similar behaviour by others "playing politics" (Hellriegel et al 2001:279).

Johan French and Bertram Raven (in Ivancevich, Konopaske & Matteson 2005:388) suggest the following five **interpersonal sources of power**: legitimate, reward, coercive, referent and expert power. Each of these sources is described as follows:

a Legitimate power

Legitimate (or position) power refers to a person's ability to influence others derived from his or her position in the organisation. This formal power is the authority the organisation gives to a person. Subordinates follow orders from a manager with authority because he or she has the legitimate power and they believe that they should comply (Ivancevich et al 2005:388).

b Reward power

Reward power is based on a person's ability to reward a person for compliance. It occurs when a person has a resource that another person wants and is willing to exchange the resource in return for certain behaviour. Compliance by the follower depends on whether the person values the reward (eg nonfinancial such as recognition, opportunities for training and development, a good job assignment or financial such as a salary increase or

bonus) (Ivancevich et al 2005:389; Robbins 2005:392). If the reward is not valued, it is unlikely to influence behaviour (Ivancevich et al 2005:389).

c Coercive power

Coercive power is influence over others based on fear – in other words, the power to punish. Followers may comply out of fear of the negative results that may occur if one fails to comply (Ivancevich et al 2005:389; Robbins 2005:391). Examples would be when a manager blocks a subordinate's promotion for lack of sharing knowledge, or fear of rejection by co-workers for not complying with what they want, even though co-workers have no formal authority (Ivancevich et al 2005:389). This type of power may lead to resistance, which "means that subordinates may only pretend to comply with your request, and they may openly resist" (Ivancevich et al 2005:391).

d Referent power

Individuals could be influenced by a person because of his or her personality or behavioural style. A person's charisma is the basis of the referent power (Ivancevich et al 2005:390), also referred to as charismatic power by Robbins (2005:393). The behavioural components relating to charisma from a power perspective are based on expertise, respect and admiration for a unique hero (Ivancevich et al 2005:509).

e Expert power

Expert power is based on the capacity to influence other people because the person possesses special expertise, skills or knowledge that is highly valued. Experts have power regardless of their formal position in the organisation. The more difficult it is to replace an expert, the greater degree of expert power the person possesses (Ivancevich et al 2005:389). Robbins (2005:396) includes specialists in this category referring to specialised jobs such as doctors, engineers and psychologists. This is in accordance with the discussion in section 3.4.2 that expert or specialist knowledge can be used interchangeably.

Both expert power and referent power are personal characteristics, and thus grounded in the person and not in the organisation. Although expert and referent power are individual characteristics, such an individual could use that power in groups and work teams to

share or withhold knowledge. The other three (legitimate, reward and coercive power) are primarily prescribed by the organisation, position or specific interaction patterns and can be changed by, say, transferring a person, rewriting a job description or reducing the power by restructuring the organisation (Ivancevich et al 2005:390). The use of expert and referent power often results in commitment when subordinates or followers exert high levels of effort to comply and may even exceed what is requested (Ivancevich et al 2005:391), whereas legitimate or reward power results in compliance without extra effort to do more than is required, that is, minimal effort (Ivancevich et al 2005:391).

Haldin-Herrgard (2000:4) refers to the phrase, "knowledge is power", pointing out in the knowledge society of today, knowledge has become a valuable asset in the labour market. He cautions against the power an individual can gain by hoarding knowledge for individual use and exploiting the knowledge of others. Individuals in large organisations may also use their critical knowledge as a source of power for personal advantage, say, as leverage or as guarantee of continued employment (Goh; Bogdanowicz & Bailey in Syed-Ikhsan & Rowland 2004:101) or to further their own careers. They feel they need to protect their knowledge because of the power they can gain by keeping it to themselves – hence their reluctance to share it. According to Stenmark (in Syed-Ikhsan & Rowland 2004:101), people will not share without strong motivation and without considering what they may gain or lose by doing so. In an empirical study conducted by Syed-Ikhsan (2004:101), there was no significant negative correlation between these two variables (viz people regarding knowledge as an asset that needs to be protected and kept to themselves and not sharing their knowledge without concern for what they may gain or lose by doing so). They conclude that although the study does not show any significant relationship, management should always consider the tendency of individuals to use knowledge as their source of power (Syed-Ikhsan & Rowland 2004:108)

In an investigation about leadership and how power and politics can influence the behaviours of learning, sharing and transfer of knowledge, Small (2006:146–147) draws the following conclusion: "While use of positional power through coercion, reward systems and withholding of information may have short-term success in gaining a knowledge advantage, it is proposed that sustainable advantage can only be achieved through a combination of legitimate political power and the application of referent and expert forms of personal power to facilitate the trust and collaboration necessary for knowledge sharing."

Politics and political behaviour exist in every organisation (Ivancevich et al 2005:401). Robbins (2005:400-401) refers to **legitimate political behaviour** as normal everyday politics (eg complaining to a supervisor, bypassing the chain of command, forming coalitions, developing contacts outside the organisation, obstructing organisational policies or decisions through excessive adherence to rules or inaction) and illegitimate political behaviour that violates the implied rules of the game such as sabotage, whistle-blowing, symbolic protests such as wearing protest buttons and groups of employees simultaneously calling in sick. Political behaviour in organisations is referred to as game playing by some researchers such as Henry Mintzberg (in Ivancevich et al 2005:401). These games, played at all levels in an organisation by both managers and nonmanagers, are intended to accomplish a variety of purposes such as to resist authority, counter the resistance to authority, build power bases, defeat rivals and effect organisational change (Ivancevich et al 2005:401). According to Mahee (2006:73), sharing knowledge requires the investment of time and effort, and individuals may not be motivated to share their knowledge because of politics in the organisation.

Power and politics can also play a role at group level when expertise is used to support the interests of specific groups. Hislop, Newell, Scarbrough and Swan (in Hayes & Walsham 2003:57, 60) highlighted the fact that in a UK organisation, Pharma Co (developer and producer of nuclear medicine), external expertise and information were utilised by groups as a political resource to reinforce and support their particular visions for change. They also reported how groups supporting the interests of senior managers received the authoritative support and financial resources to implement change.

It appears that in the interaction of individuals with one another in groups and between groups, the abuse of **power and politics** could play a role in hindering the learning, sharing and transfer of knowledge, resulting in loss of critical knowledge to the disadvantage of the organisation. Management also need to be aware of any political motives behind the encouragement of individuals and groups to display knowledge behaviours. Knowledge retention could be enhanced by experts freely sharing their knowledge, using external expertise and forming coalitions.

3.5.5.5 *Work teams*

It is important to understand the difference between work groups and work teams because both have an impact on behaviour. A work group is a group that interacts to share information and make decisions to help each member perform in his or her area of responsibility. Members have no need or opportunity to engage in collective work requiring a joint effort (Robbins 2005:273).

A work team generates positive synergy where the result is a level of performance that is greater than the sum of the individual inputs. This happens through coordinated efforts (Robbins 2005:273), and to operate effectively, requires certain team characteristics such as adequate resources, leadership, a climate of trust, performance evaluation, abilities, diversity, autonomy, common purpose and specific goals and clarity on their responsibilities as individuals and as team members (Robbins 2005:278).

Work teams are the means through which crucial **tacit knowledge can be brought to the surface** (Lakshman 2007:56). According to Zack (in Laksham 2007:56), teams are essential from the viewpoint of generating knowledge and also disseminating knowledge in organisations. The use of team-based organisational design is evident in extensive organisation-wide networks, when cross-functional and cross-divisional teams are brought together. Work teams provide a learning and sharing context in which individuals can interact (Laksham 2007:56). A strong sense of group identity influences individual knowledge-sharing behaviours (Cabrera in Minbaeva & Michailova 2004:667).

In the literature reviewed, the concepts of knowledge learning, creation, sharing and transfer in work teams featured in different ways, as elucidated below.

- In the knowledge management literature, two types of **knowledge creation** teams are distinguished, namely communities of practice and learning in epistemic groups. The former are teams of peers who learn during and about the execution of prespecified tasks with defined outcomes (Lave & Wenger; Brown & Duguid; Brown in Foss & Mahnke 2003:94), for example, fixing a work process that has broken down or dealing with customer demands more effectively. The key problem is about creating knowledge of means of which the ends are well known. The latter (epistemic groups) is about dealing with knowledge creation for nonroutine problems of which the means and ends cannot be specified up front

(Cohen in Foss & Mahnke 2003:94). The means towards an end are unknown at the time the team starts generating knowledge. The key problem is to discover the means to an unknown end. A case in point would be in two years' time, the knowledge management team developing new products they do not know which involve technologies that have not been invented, made in processes yet to be defined, by people who still have to be recruited (Foss & Mahnke 2003:94).

- From a **knowing** perspective, Yanow (2003:38-39) describes the tacit knowledge sharing in a team of flutemakers who collectively mastered the practice of flutemaking (ie knowing how). Using language and observation, the knowledge was expressed and communicated through the vehicle of the flute in acting on it, in interaction with and concerning it. Flutemakers spoke to one another about the "feel" of the flute, and these "abstract" communications prompted certain actions to correct the feel if it did not "feel right". This led to the inference that these judgements of "feel" drew on and reflected knowledge shared by the flutemakers that was tacitly known (in Polanyi's sense, in Yanow, 2003:40). Learning took place when new flutemakers were brought into the team successfully while keeping language use "abstract", communicating tacit knowledge through interaction with and through the artefacts, leaving their embodied meaning unspoken. In this sense, it could be said that the flute makers learnt to make their tacit knowledge "visible" to one another (Yanow 2003:40). As a team they knew how to make flutes – they possessed individual knowledge and learning, but their know-how was based on their interactions with one another and the artefact.
- Van der Sluis (2004:11) refers to project teams where project **learning** is about using projects as vehicles for creating a context in which the stage is set for reflective practices and inquiry at all levels of the organisation. This is about acquiring habits of learning and reflecting. Heavens and Child (in Child & Rodrigues 2003:546) examined the experience of six international project teams created to achieve specific knowledge-generating objectives. The cases pointed to problems caused by differences in national identity and how the gap created by these differences could be reduced by the management of learning teams in the process of developing a new shared identity. The role of personal trust emerged as a vital facilitating factor, especially in terms of key relationships between individual team members. Fear and mistrust were barriers to knowledge sharing. In one of the teams studied, fear and mistrust were overcome primarily through

the personal relationship developed by the new project manager with his counterpart of the other nationality. This relationship opened up communication between the different groups (British and Norwegian). As closer relationships developed between team members, they gradually became more comfortable in **sharing** their views and knowledge and more aware of common learning goals. It appears that sense of psychological safety, reconciliation of social identities and sharing of their common goals would be conditions for team members to share knowledge and thus generate organisational learning (Child & Rodrigues 2003:546–547).

Based on the above manifestations of knowledge behaviour concepts in work teams found in the literature, it can be argued that team knowledge behaviours (learning, knowing, creating, sharing and transferring) are group focused and based on sociocultural assumptions in the context of social practice (DeFillippi & Ornstein 2003:33; Gomez, Bouty & Drucker-Godard 2003:122).

Sociocultural assumptions refer to, say, openness and trust, social interactions and team relationships. Jones (2005:6) argues that factors that influence the atmosphere of **openness and trust** between people working on a common task help to facilitate tacit knowledge sharing (Gold; Hinds & Aaronson in Jones 2005:6). She explains this through the example of communities of practice that facilitate tacit knowledge sharing because a group of people engaged in a common endeavour came together to openly share stories and experiences that helped to inform one another's knowledge about how to perform their work (Brown & Duguid; Wenger & Snyder in Jones, 2005:6). Von Krogh et al (in Rebernik & Sirec 2007:413) argue that people working together are not only teams, but micro-communities of knowledge. For new tacit knowledge to emerge through **socialisation**, the group must be small. "These teams are in a better position to create competitive position-enhancing knowledge, but also to communicate and integrate this knowledge back into their own areas and across the organization" (Rebernik & Sirec 2007:413). These micro-communities are not stable and unfortunately most tacit knowledge gained and developed by them is lost through dissolution. This knowledge can be retained only through the interactions that exist in the micro-community itself (Allred in Rebernik & Sirec 2007:413). Social interactions in teams involve **interpersonal relationships**. Much of knowledge is tacit, residing in social interactions (Lang 2004:90).

A study by Mukherji (in Ojha 2005:68), which attempted to understand the role of certain contextual dimensions on knowledge sharing in software development teams, concluded that knowledge sharing is strongly influenced by interpersonal relations. When the nature of the knowledge being transferred is highly tacit, the role of relationships is more important (Curtis et al; Hansen; Nonaka in Ojha 2005:68). Knowledge sharing is better when there is a strong relationship or bond between the source and the recipient of the knowledge (Hansen; Szulanski in Ojha 2005:68).

Ojha's (2005:68) study is based on the premise that **team demography** has a significant influence on group dynamics and interpersonal relationships in teams. Of importance is the fact that as long as diversity is almost absent or extremely high in terms of the demographic variables, the influence of relational demographic variables is less noticeable (Ojha 2005:75). In this study on the impact of team demography on knowledge sharing in software project teams in India, it was found that marital status, gender and type of education had a significant impact on knowledge sharing in the teams. In this study, married people and women were a minority in the team and therefore less likely to participate in knowledge sharing. The low level of participation contributed to the fact that relative to single people and men, married people and women were less likely to participate in nonwork-related team interactions, which led to lower levels of social bonding with the rest of the team members. The findings also suggest that the proportion of people with a similar educational background (say, with engineering degrees) in a team may influence knowledge sharing based on their common experiences, when compared to others (Ojha 2005:75). He argued that marital status, gender and types of education contributed to the creation of subgroups in teams which resulted in weaker team processes, and hence lower levels of knowledge sharing. It was also found that organisational tenure had a negative impact on knowledge sharing in the teams. This implies that persons with high organisational tenure, who would be expected to have high levels of tacit knowledge, are less inclined to share knowledge (Ojha 2005:76). This could have a significant impact on the retention of knowledge when these people leave or retire.

Foss and Mahnke (2003:92–95) view knowledge creation from an organisational economics perspective and made the following propositions about knowledge creation in teams:

- Knowledge creation in teams will be more effective the more team members are entitled to exclude nonexploring team members by self-selection (ie using

exclusion rules by creating competition between idea exploitation and idea creation/exploration of team members). An exaggerated emphasis on competition may, however, drive out exploration by team members who prefer to make quick wins through exploiting the ideas of others rather than exploring new ideas on their own (Foss & Mahnke 2003:93)

- Teams employing combinations of individual incentives, team incentives and exclusion rules will be more effective at knowledge creation than teams relying on clan control (Foss & Mahnke 2003:95). Provision of incentives is complicated because the measurement bases for the provision of incentives become increasingly noisy the less means and ends can be prespecified beforehand. Uncertainty leads to performance ambiguity, which complicates incentives. If expected behaviour can be specified beforehand or processes standardised, it could form the basis of measuring performance. However, in epistemic communities where knowledge creation for nonroutine problems whose ends and means cannot be specified beforehand, standardisation of behaviour or outputs cannot be determined with precision. In this case, Ouchi (in Foss & Mahnke 2003:94) suggests that clan control might be the solution to promote cooperation and mitigate conflict of interest. The basis of control becomes a set of internalised values and norms. However, clan control could lead to normative fixation and group think that are both detrimental rather than conducive to knowledge creation in teams (Foss & Mahnke 2003:94).

Foss and Mahnke (2003:95) conclude that when moving from individual learning to knowledge creation in teams the complications of providing incentives vastly increase. Team-based learning is a particularly expensive knowledge creation mechanism riddled with many problems, including providing incentives.

In conclusion it appears that **work teams** are the means through which crucial tacit knowledge can be brought to the surface. Learning, knowing, creating, sharing, transferring and applying tacit knowledge occur through healthy social interactions between team members focusing on the tasks they are working on. This implies that sound interpersonal relationships based on trust and openness will enhance knowledge retention. It appears that team demography could have a strong influence on knowledge behaviours in work teams. These factors were discussed earlier under the biographical

characteristics of individuals (sec 3.5.4.1).

A high level of diversity in work team members will enhance knowledge behaviours and make the influence of relational demographic differences (such as marital status, gender, types of education and tenure) less noticeable.

Knowledge creation in teams will be more effective when team members are entitled to exclude nonexploring team members by self-selection, receive combinations of individual incentives and team incentives than when teams rely on clan control. However, provision of incentives is complicated and the pros and cons need to be weighed up carefully.

3.5.5.6 Group decision making

In organisations, many decisions are made through groups, teams, task forces and committees. Managers often have to seek and combine judgements in group meetings, especially when it comes to nonprogrammed problems that are novel and involve a lot of uncertainty about the outcome. The increased complexity of such problems requires specialised knowledge in numerous fields. This type of knowledge is usually not possessed by one person only (Gibson et al 1994:618). By aggregating the resources of several individuals, groups make a greater input in the decision process (Robbins 2005:255).

The collective approach in decision making enhances acceptance and implementation by many units, which is why many managers spend so much of their working time in meetings (Gibson et al 1994:618). The collective approach offers a way in which the breadth and depth of information gathered is expanded. In diverse groups, the alternatives generated are usually more extensive and analysis more critical. When the final solution is agreed on, there are more people in a group decision to support and implement it. Collective decision-making processes may create internal conflicts, pressures toward conformity and take much time, but the positive outcomes of acceptance and support for implementation seem to outweigh the negatives (Robbins 2005:257) which are manageable.

No references to the influence of group decision making on knowledge behaviour were found in the literature. It could be argued that if employees are willing to learn, share,

transfer and apply knowledge, instead of refusing to learn or withholding expert knowledge, or if the knowledge does not exist in the team owing to knowledgeable people having left the organisation, this would have a direct impact on the quality of the decision-making process. It is assumed that if knowledge is lost in the organisation, the right decisions may not be made to ensure effective problem solving and actions.

3.5.5.7 *Leadership and trust*

There is often confusion about leadership and management. Robbins (2005:332) argues that effective management brings about order and consistency by formulating detailed formal plans, designing rigid organisation structures and monitoring results against plans. Leadership is about coping with change. Leaders establish direction by creating a vision for the future. They then align people by communicating this vision, inspiring them to become part of the vision and to overcome obstacles (Robbins 2005:332). Another vital aspect of leaders is living by values that support their ideas and vision (ie setting an example) and influencing people to embrace the ideas and vision in their own behaviours (Hellriegel et al 2001:324).

Leaders should therefore have the ability to influence groups towards the achievement of goals (Robbins 2005:332). Research on **leadership traits** using the Big Five personality framework has revealed encouraging results. Traits of extroversion, conscientiousness and openness to experience show strong consistent relationships to leadership (Robbins 2005:333, 348). The other two traits are adjustment and sociability (as discussed in sec 3.5.4.2) (Hellriegel et al 2001:42). The Big Five can be used to predict leadership.

Research on **behavioural theories** and leadership revealed a large number of leadership behaviours (which were narrowed down to task-oriented and people-oriented styles) and a consistent relationship between these behaviours and group performance. However, situational factors that influence success or failure were missing. Predicting leadership success is far more complex than isolating a few traits or preferable behaviours. Isolating the **situational factors** is also quite difficult. The development of contingency theories that include situational factors such as task structure of the job, level of situational stress, level of group support, the leader's intelligence and experience and follower characteristics (such as personality, experience, motivation and ability) have been a major breakthrough in understanding leadership (Robbins 2005:338–339, 348).

Often times change, but leaders do not, and this has a profound effect on the overall business. Robbins (2005:347) concludes that leadership plays a central part in understanding group behaviour, for it is the leader who provides the direction towards goal attainment. Therefore a more accurate predictive capability should be valuable in improving group performance.

In addressing the question on how leadership relates to knowledge behaviours, Devos and Willem (2006:654) point out that involved leadership is a factor that would facilitate organisational **learning** capabilities, through articulating vision, being extremely actively engaged in its actualisation, taking ongoing steps to implement the vision and being involved hands on in educational and other implementation steps. Several authors agree that the success of knowledge behaviours fundamentally depends on leaders promoting a conducive environment and creating a managerial mindset that **promotes cooperation and flow of knowledge** throughout the organisation (DeLong; Gupta & Govindarajan; Macneil; Hislop in Lin & Lee 2004:110; Bassi, Lev, Low, McMurrer & Siesfeld; Ruggles in Noe et al 2003:214; Pan & Scarbrough 1998:62). The **role** of leaders in creating and developing a supportive environment and mechanisms that would be conducive to knowledge behaviours (eg knowing, learning, sharing and transferring tacit knowledge – creating a knowledge climate) would include the following:

- *showing role-modelling behaviours*: for example, knowing, learning, creating, sharing and transferring knowledge (Pan & Scarbrough 1998:61)
- *providing learning, creating, sharing and transferring of knowledge opportunities*: for example, story telling, mentoring and coaching, after action review, communities of practice (DeLong 2004:102)
- *building knowledge behaviours into organisational processes* (Van der Sluis 2004:11): for example, creating, sharing, transferring and applying expert knowledge in project planning or decision-making processes
- *acting as a knowledge champion* (Van der Sluis 2004:11): for example, a person arguing on behalf of the organisation for knowledge behaviours to be displayed

All of these roles would encourage knowledge retention in the organisation. The focus is on creating a positive context, because managers cannot really control what knowledge is

learnt, created, shared, transferred and used, but they can **try to influence behaviours that support knowledge retention**. However, lack of support from top management, such as not creating a social system to support knowledge behaviours, is perceived to be one of the greatest impediments of knowledge behaviours (Noe et al 2003:214).

Empirical evidence of the role of leadership in promoting knowledge behaviours is found in the study of Lin and Lee (2004:108), in which determining that the main determinant of **knowledge-sharing** behaviour in an organisation is deemed to be the encouraging intentions of senior managers. In addition, the following aspects of senior managers were found to positively influence intentions to encourage knowledge sharing:

- *senior managers' attitudes*: managers with the strongest intentions to encourage knowledge sharing also had more positive attitudes towards knowledge-sharing behaviour
- *subjective norms*: deciding whether to encourage knowledge-sharing behaviour was influenced by opinions of those influencing their decisions owing to corporate benefits and opinions of those important to them (Lin & Lee 2004:120)
- *perceived behavioural control*: the knowledge, experiences and abilities of senior managers impacting on the ease or difficulty of encouraging knowledge-sharing behaviours (Ajzen; Chau & Hu; Ruy et al in Lin & Lee 2004:115)

In a study by Chen and Barnes (2006:51, 56), it was found that the following behaviours, which are part of transactional leadership, were found to be significantly and positively correlated to knowledge sharing:

- *transformational leadership behaviours*: defined as the effect of leaders on followers whether they feel trust, admiration, loyalty and respect towards the leader and whether they are motivated to do more than they originally expected to do (Yukl in Chen & Barnes 2006:52)
- *contingent reward behaviours*: ways the leader assigns or obtains agreement on what needs to be done by promising rewards or actually rewarding others in exchange for satisfactorily executing the assignment

Chen and Barnes (2006:58) suggest that leaders who communicate a strong vision, create buy-in through jointly envisioning a positive future, communicate clear expectations and create an awareness of organisational problems, are likely to improve knowledge sharing. Leaders who also promote careful problem solving and give their employees personal attention will be more likely to improve knowledge sharing.

Trust plays a major part in leadership. Trust is defined as “a positive expectation that another will not – through words, actions, or decisions – act opportunistically” (ie the inherent risk and vulnerability associated with a trusting relationship – trust provides the opportunity for disappointment or being taken advantage of) (Boon & Holmes in Hinde & Groebel; McAllister; Rousseau, Sitkin, Burt & Carmerer in Robbins 2005:356). When trust is broken, it can have adverse affects on a group’s performance (Dirks & Fernin in Robbins 2005:357). A significant quotation relating to knowledge is the following by Zand (cited in Robbins 2005:357): “part of a leader’s task has been, and continues to be, working with people to find and solve problems, but whether leaders gain access to knowledge and creative thinking they need to solve problems depends on how much people trust them. Trust and trust-worthiness modulate the leader’s access to knowledge and cooperation.” When a leader is honest and does not take advantage of followers, they will trust him or her and will be willing to be vulnerable to his or her action (Robbins 2005:357).

Most organisational relationships are rooted in knowledge-based trust. It exists when one has adequate information about someone to understand them well enough to enable one to predict his or her behaviour accurately and comes from a history of interactions. A long history of open and honest interactions is not likely to be permanently destroyed by a single violation. Always keeping promises, for instance, will build confidence and trustworthiness and predictability (Robbins 2005:359–360).

In the literature, a number of authors discuss the factor of trust in relation to knowledge behaviours, focusing on, say, trust between international teams (Child & Rodrigues 2003:546; Lang 2004:93), between work teams, between individual co-workers (Lin 2007:414), within and between units (Cabrera in Minbaeva & Michailova 2004:667) or between stakeholders (Pai 2005:110). The focus of this discussion, however, is on the role of leadership and trust in enhancing knowledge behaviours.

Fineman (2003:565) describes trust as something that is not simply present in or absent from a social relationship, but is negotiative and contextually/structurally specific. Its texture is emotional, involving feelings such as ease, confidence, comfort, suspicion, fear, or anxiety. “In such terms, trust both frames and flavours what knowledge means to different people. It shapes the worth or value of new (or old) knowledge and learnings” (Fineman 2003:565). Von Krogh (cited in Bijlsma-Frankema & Koopman 2004:207) notes that “the company’s overall performance depends on the extent to which managers can mobilize all of the knowledge resources held by individuals and teams and turn these resources into value-creating activities”. This requires, inter alia, a trusting relationship between leaders and lower levels in the organisation. The study conducted by Bijlsma-Frankema and Koopman (2004:208) shows that the development of distrust between top management and middle managers severely hinders learning processes that may evolve between them.

Care, broadly defined as a feeling of concern or interest displayed through serious attention is deemed to promote high levels of trust in horizontal and vertical relations needed for successful sharing of tacit knowledge and knowledge creating (Creed & Miles; Dirks & Ferrin in Bijlsma-Frankema & Koopman 2004:207–208). Small (2006:141) conducted a study in which she proposes that an emotionally intelligent and intuitive leader is able to promote trusting and collaborative human interactions to make possible knowledge creation, sharing and transfer. Emotional intelligence can be defined as the ability to detect and manage emotional cues and information (Robbins 2005:120). It is composed of the following five dimensions:

- *self-awareness*: exhibiting self-confidence, realistic self-assessment and a self-deprecating sense of humour
- *self-management*: exhibiting trustworthiness and integrity, openness to change and comfort with ambiguity
- *self-motivation*: exhibiting optimism, high organisational commitment and a strong drive to achieve
- *empathy*: exhibiting expertise in building and retaining talent, service to clients and cross-cultural sensitivity

- *social skills*: exhibiting expertise in building and leading teams, ability to change and persuasiveness (Robbins 2005:368–369).

These factors may contribute to the development of trusting relationships, particularly the self-mangement, empathy and social skills components because they seem to relate to building trusting relationships in the organisation that would enhance knowledge behaviours.

In conclusion it would appear that the role of **leadership** in an organisation is crucial in the sense that it creates an environment conducive to knowledge behaviours by showing role model behaviours, providing knowledge opportunities, building knowledge behaviours and acting as a knowledge champion to retain knowledge. Leadership behaviours such as transformational and contingent reward behaviours tend to encourage knowledge behaviours. Promoting **trusting relationships** through being emotionally intelligent and specifically caring, persuasive and paying attention to employees in the organisation seem to be contributory factors in enhancing knowledge retention.

3.5.5.8 *Group behaviour-enhancing factors to retain knowledge*

Based on the discussion on factors influencing knowledge behaviours at group level, certain behavioural enhancers were identified that contribute to the retention of knowledge in an organisation (as indicated in secs 3.5.5.1–3.5.5.7). It is necessary to measure the degree to which these behavioural factors exist in organisations in order determine to what extent an organisation is retaining crucial knowledge. These factors at group level can be summarised as follows (tab 3.3).

TABLE 3.3
BEHAVIOURAL ENHANCERS FOR KNOWLEDGE RETENTION AT GROUP LEVEL

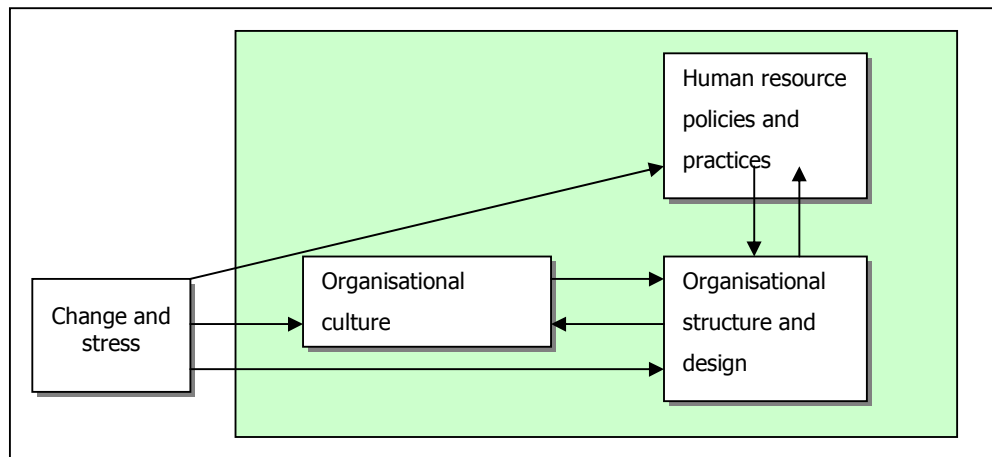
GROUP LEVEL		
<p>Communication</p> <ul style="list-style-type: none"> - Effective intercultural communication skills between senders and receivers - Effective communication between older and younger generations - Success of knowledge transfer which is detectable in the health of relationships between group members 	<p>Group structure</p> <ul style="list-style-type: none"> - People from shared professional backgrounds make tacit knowledge sharing and transfer easier owing to a similar understanding of knowledge at tacit and implicit levels - Being sensitive to protection of the special capabilities of groups by establishing constructive interpersonal relationships ("psychological safety") - Acceptance of overarching group goals - Smaller work groups that avoid free-riding of group members on other members' knowledge capabilities - Group cohesiveness to improve willingness to demonstrate knowledge behaviour 	<p>Power and politics</p> <ul style="list-style-type: none"> - Experts/specialists freely sharing their knowledge - Legitimate political behaviour (such as forming coalitions or utilising external expertise to support a vision for change) - Forming coalitions with other internal expert groups <p>Conflict</p> <ul style="list-style-type: none"> - Resolving conflict constructively
<p>Work teams</p> <ul style="list-style-type: none"> - Healthy interpersonal relationships in work teams (cultivates trust and openness that yields tacit knowledge sharing) - Social interactions conducive to knowledge behaviours - Compilation of work teams with a high level of diversity to counteract relational demographic differences 	<p>Group decision making</p> <ul style="list-style-type: none"> - Making the right decisions in problem resolution and actions to be taken - Implementing the right decisions in problem solving and actions to be taken - Having the right knowledge and skills to make the right decisions 	<p>Leadership and trust</p> <ul style="list-style-type: none"> - Emotionally intelligent leaders who care through paying personal attention to employees and have the ability to detect emotional cues and information - Leaders who create a managerial mindset that promotes cooperation and flow of knowledge throughout the organisation - Leaders who promote trust by being honest and keeping promises - Leaders who act as knowledge champions (showing role model knowledge behaviours and providing knowledge behaviour opportunities) - Leaders who communicate a strong vision and create an awareness of organisational problems

The above factors are the core of enhancing factors that would contribute to preventing tacit knowledge loss, on the one hand, and retaining knowledge, on the other, at group level in an organisation.

3.5.6 Factors influencing knowledge behaviours at organisational level

The third component of the organisational behaviour model is organisational behaviour. Organisational behaviour reaches its highest level of sophistication when formal structure is added to individual and group behaviour. Organisations are more than the sum of their member groups. The factors that have an impact on independent variables (such as knowledge retention) are depicted in figure 3.8.

FIGURE 3.8
FACTORS THAT INFLUENCE BEHAVIOUR AT
ORGANISATIONAL LEVEL



Source: Adapted from Robbins (2005:32)

According to Noe et al (2003:214), the greatest impediments to knowledge behaviours are cultural barriers, lack of support from top management, lack of shared understanding of the business strategy and model and lack of an appropriate organisational structure. Most of these factors are evident at organisational level. Each factor at organisational level indicated in figure 3.8 is described briefly by explaining what it entails in organisations and linking it to behaviour, specifically knowledge behaviour.

3.5.6.1 *Organisational culture*

Organisational culture can be defined as the deep-seated values and beliefs (often subconscious) that people share in an organisation. It manifests in the typical characteristics of the organisation. It refers to a set of basic assumptions that worked so well in the past that they are accepted as valid assumptions in the organisation. The assumptions are kept in place through a continued process of human interaction (which manifests in attitudes and behaviour) – in other words, the correct way of doing things or the way in which problems should be understood in the organisation (Martins 2000:18).

The following are components of organisational culture:

- *Routine behaviour.* This involves rituals and practices such as language use.
- *Norms.* Norms, such as "do things right the first time", are shared by groups and teams throughout the organisation.
- *Values.* These involve product quality, innovation and knowledge retention.
- *Philosophy.* This focuses on the organisation's policy towards customers and employees in the organisation.
- *Rules of the game.* These are the rules for getting along in the organisation or rules that have to be learnt by newcomers to become part of the organisation
- *Feelings.* The physical layout and the way in which employees behave towards customers and other employees in the organisation are all components of organisational culture (Hellriegel et al 2001:512).

Organisational culture is a descriptive term in the sense that it is concerned with the employees' perception of the characteristics of an organisation's culture, not whether or not they like them. Research on organisational culture measures how employees see their organisation (eg Does it encourage knowledge retention? and Is innovation rewarded?). Employee satisfaction refers to the climate of the organisation and is more evaluative than descriptive (Robbins 2005:486). The atmosphere in the organisation and

the attitudes of employees would also relate to the climate, whereas culture depicts the way things are done in the organisation.

Culture is significant because it shapes the way in which managers and employees view their jobs and influences their behaviour (Hellriegel et al 2001:474). The question is what type of culture actually enhances knowledge retention in an organisation. The focus here is not on how to create such a culture, but on the factors that influence the existence of a knowledge retention culture. **Knowledge retention-oriented cultures** value learning, knowing, creating, sharing, transferring and applying knowledge, with the emphasis on preventing knowledge loss and promoting knowledge retention (Davenport & Prusak 1998:xii).

It is essential for an organisation that opts for a knowledge retention culture to have a **clear shared vision** that provides the focus and energy to promote knowledge retention in their organisation (Pan & Scarbrough 1998:62). Employees in such a working environment should feel comfortable with knowledge and motivated (Pan & Scarbrough 1998:62) to act out the knowledge behaviours (as identified in the current research). In this respect, employees should be given time to learn, create, share, use and reflect on knowledge (Davenport & Prusak 1998:xiii).

A knowledge retention supporting culture is based on a **unified strategic plan** that will guide an organisation towards learning, knowing, creating, sharing, transferring and utilising knowledge behaviours to maintain a competitive advantage. As part of the strategy, the organisation should give priority to deciding what knowledge to retain, who to share it with and how to share it (Syed-Ikhsan & Rowland 2004:107). The critical problem is to determine whether the values of the organisational culture are in line with the chosen strategy (Armstrong; Coffey et al; *Management principles* in Martins 2000:47). DeLong (2004:68) argues that a retention culture would consist of values, norms and practices that encourage high-performing and highly skilled employees to stay. Such a culture would also encourage knowledge retention by rewarding behaviours such as mentoring, coaching and knowledge sharing. A retention culture influences who stays and who goes in an organisation and how the organisation encourages knowledge behaviours. Retention is just one of the many dimensions along which a culture can be assessed, but since the likelihood of increased attrition on account of the demographics and values in the workforce (such as lack of commitment) becomes more prevalent, retention assumes greater significance as a measure of culture (DeLong 2004:69). A

culture that focuses on knowledge retention would appear to embrace certain values and norms that may encourage knowledge behaviours.

a Values and norms that support knowledge behaviours

Very little research has been conducted on the type of organisational culture that would enhance knowledge behaviours relating to knowledge retention. However, many authors refer to values and norms in their research on the specific knowledge behaviours of learning, creating, sharing, transferring and applying tacit knowledge. Each study emphasises a few specific values that would enhance the knowledge behaviours, but there are many similarities between the studies. An attempt is made to summarise these values found in the literature study, in table 3.4.

TABLE 3.4
VALUES THAT ENHANCE KNOWLEDGE BEHAVIOURS TO SUPPORT A KNOWLEDGE RETENTION CULTURE

INDICATIVE REFERENCES	VALUES	BARRIERS	DESCRIPTION/DEFINITION OF VALUES
<p>Allee (2003:89) Bakker, Leenders, Gabbay, Kratzer & Van Engelen (2006:594) Bock et al (2005:89) Choueke & Armstrong (1998:138) Davenport & Prusak (1998:97) DeLong (2004:69) Devos & Willem (2006:658) Du Plessis (2006:7, 30–31) Fineman (2003:565) Hayes & Walsham (2003:57, 59-60) Mahee (2006:74) Nielsen (2005:116) Pan & Scarbrough (1998:61, 65) Sharkie (2004/2005:1797, 1799) Zweig in <i>Sharing know-how reluctantly</i> (2006:16)</p>	<p>Trust (and respect)</p>	<p>Distrust (and fear)</p>	<p>Trust is having confidence in the integrity, character and ability of another person in social relationships (Du Plessis 2006:30; Fiol in Sharkie 2004/2005:1799) Respect is deferential esteem felt or shown towards a person or quality (eg admiration or appreciation) (<i>Reader's Digest Oxford complete wordfinder</i> 1990:1310) Fear is an unpleasant emotion caused by exposure to danger (<i>Reader's Digest Oxford complete wordfinder</i> 1990:542), such as fear of losing one's job or status when having to share knowledge with others (as indicated in sec 3.5.4.2 and tab 3.2)</p>
<p>DeLong (2004:68) Devos & Willem (2006:656–658) Goh (in Syed-Ikhsan & Rowland 2004:96) Miles, Miles, Perrone & Edvinson (1998:4) Pan & Scarbrough (1998:60) Sveiby & Simons (in Johncock 2005/2006:139) Zack; Pan & Scarbrough (in Hayes &</p>	<p>Cooperation/collaboration/ integration/affiliation (togetherness)</p>	<p>Competition</p>	<p>Cooperation is working together to the same end (<i>Reader's Digest Oxford complete wordfinder</i> 1990:316) Collaboration is working jointly, working together or teaming up (<i>Reader's Digest Oxford complete wordfinder</i> 1990:276) Integration is bringing or coming into equal participation in an organisation (<i>Reader's Digest</i></p>

INDICATIVE REFERENCES	VALUES	BARRIERS	DESCRIPTION/DEFINITION OF VALUES
Walsham 2003:57			<p>Oxford complete wordfinder 1990:791)</p> <p>Affiliation is attaching or connecting a person or group with a larger organisation (associate oneself with a group) (<i>Reader's Digest Oxford complete wordfinder</i> 1990:27)</p> <p>Togetherhness is the condition of being together or the feeling of comfort in being together (<i>Header's Digest Oxford complete wordfinder</i> 1990:1641)</p>
Cabrera (in Minbaeva & Michailova 2004:667) Choueke & Armstrong (1998:138) Devos & Willem (2006:654) Dixon; Gibert & Krause; Hinds & Pfeffer; Leonard & Sensiper in Bock et al (2005:90) Lin & Lee (2006:74, 84) Du Plessis (2006:31) Lubit (in Rebernik & Sirec 2007:413) Pan & Scarbrough (1998:60)	Openness and transparency (open exchange/open, free-flowing, unrestricted communication)	Secretiveness Restricted communication	Communicating openly and honestly, without concealment (<i>Reader's Digest Oxford complete wordfinder</i> 1990:1064)
Bock et al (2005:107) Davenport & Prusak (1998:xiii) Hayes & Walsham (2003:57, 59) Leonard & Sensiper (in Bock et al 2005:90) Lin & Lee (2006:22) Lubit (in Rebernik & Sirec 2007:413) Pan & Scarbrough (1998:60, 61)	Innovativeness	Stifling creativity and innovativeness Intolerance of mistakes	Encouraging bringing in new ideas and methods and making changes (<i>Reader's Digest Oxford complete wordfinder</i> 1990:783) Finding innovative solutions (Pan & Scarbrough 1998:60)
DeLong (2004:69-70) Devos & Willem (2006:657) Major (2000:357, 359)	Learning and individual development	Lack of opportunities for learning and development	Learning and individual development entails encouraging continuous learning (Mirvis & Hall in Major 2000:357), encouraging employees to take

INDICATIVE REFERENCES	VALUES	BARRIERS	DESCRIPTION/DEFINITION OF VALUES
Van der Sluis (2004:12)			responsibility for their own learning and development (Hall; Mirvis & Hall in Major 2000:357) and allowing time for reflection on learning experiences (Seibert in Major 2000:358)
Bakker et al (2006:602–603) DeLong (2004:68) Du Plessis (2006:104–105)	Teamwork (experienced)	Individuals trying to do it on their own (Major 2000:358)	Teamwork to encourage flow of knowledge and creation of solutions (Du Plessis 2006:105)
Bijlsma-Frankema & Koopman (2004: 207) Von Krogh et al (2000:47, 49–54, 64–66)	Caring	Intolerance for need of help	Compassion (<i>Reader's Digest Oxford complete wordfinder</i> 1990:214)
Bock et al (2005:90) Zweig (in <i>Sharing know-how reluctantly</i> 2006:16)	Fairness	Favouritism	Justice – unbiased, equitable, in accordance with the rules (<i>Reader's Digest Oxford complete wordfinder</i> 1990:532)
Lin (2007:111) Mahee (2006:74)	Commitment	An unwillingness to share tacit knowledge which, in turn, may hurt an organisation's survival (Wang in Lin 2007:411–412)	“Organizational commitment is conceived of as the psychological attachment felt by the person for the organization; it will reflect the degree to which the individual internalizes or adopts characteristics or perspectives of the organization” (O'Reilly & Chatman cited in Virtanen 2000:340)

Table 3.4 indicates the authors found in the literature review who mention the particular value as an enhancer of one or more of the knowledge behaviours. Each value is defined and possible barriers to the enhancement of a knowledge retention culture are indicated. Each value is discussed in greater detail below.

i Trust

DeLong (2004:69) argues that a knowledge retention culture can be gauged by levels of trust in the organisation, which is often reflected in a shared sense of purpose. If employees feel emotionally committed to an organisation, they will be more willing to want to share their knowledge. Asking and expecting employees to share their intellectual capital requires considerable trust on the part of the employee. Without trust, individuals will not be prepared to give their knowledge for use by others in the knowledge exchange process (Sharkie 2004-2005:1799). Several authors (Du Plessis 2006:7; Fineman, 2003:565; Zweig in *Sharing know-how reluctantly* 2006:16) agree that trust is a vital factor if knowledge is to be exchanged for mutual benefit. People are more likely to provide job knowledge to people they trust and who treat them fairly (Zweig in *Sharing know-how reluctantly* 2006:16).

Trust in an organisational culture context can be defined as having confidence in the integrity, character and ability of another person in social relationships (Du Plessis 2006:30; Fiol in Sharkie 2004-2005:1799). Trusting relationships cannot be directly managed because they stem from the informal social relationships in the organisation. However, managers should encourage the development of trust through a culture where openness, trusting and sharing are valued (Fiol in Sharkie 2004-2005:1799). Du Plessis (2006:31) supports this idea by arguing that leaders lay the foundation of values, like trust, which filter down to the rest of the employees in the organisation.

The way in which trust forms in an organisation is explained by Sharkie's (2004/2005:1797) argument that individuals form perceptions of the organisation by viewing it through the implicit organisational psychological contract and on the basis of this decide whether or not they trust the organisation. These perceptions are formed about HR policies and practices which they see as reflecting the values and beliefs of top management. Perceptions that the organisational culture is supportive of the value of individuals and of their ideas will correlate positively with trust and knowledge sharing.

An organisation earns trust by demonstrating **respect** (DeLong 2004:69) for employees' knowledge, skills and abilities (Du Plessis 2006:31). Respect and trust are undermined when there is rivalry and animosity between areas in the organisation or individuals. Respect is also an issue of hierarchical levels and age differences – for instance, managers higher up in the hierarchy, may not respect people on the junior levels enough to share their knowledge with them. Older generations may not share their knowledge with younger, junior employees because they may feel that the younger generation will not respect their knowledge (Du Plessis 2006:32). If there is **distrust** between units or areas in the organisation, there are likely to be pockets of knowledge in the organisation that will not be free flowing owing to the fact that knowledge is not being shared by individuals working in these pockets (Du Plessis 2006:31).

Respect and trust go hand in hand and need to be addressed together (Du Plessis 2006:32) when building a knowledge retention culture by, say, building relationships and trust through face-to-face meetings (Davenport & Prusak 1998:97), keeping promises, being open and transparent and not compelling people to comply with knowledge-sharing requirements, but respecting and valuing their contributions (eg by showing appreciation). At Buckman Laboratories, a culture of trust was created encouraging active knowledge creating and sharing across time and space by regarding employees who become a source of knowledge and actively share knowledge with other people as valuable employees (Pan & Scarbrough 1998:61).

In contrast to trust being an indicator of the degree to which knowledge is shared, the research conducted by Bakker et al (2006:602–603) indicated that trust does not explain knowledge sharing in product development projects at a significant level. Team membership has strong power in explaining who shares more knowledge than others. Knowledge-sharing social capital appears to be couched in membership of experienced teams instead of in the levels of trust between individual members. This finding emphasises the significance of teamwork as another key value to encourage knowledge behaviours.

According to Allee (2003:129), organisations that create an environment of trust with strong social connections and knowledge sharing find their culture to be a source of real competitive advantage. The large number of authors who single out trust as a factor in enhancing knowledge behaviours is an indication of the possible importance of the role of trust in a knowledge retention culture.

ii Cooperation/collaboration/integration/affiliation

Cooperation and collaboration are perceived to be one of the main enablers of knowledge behaviours. Collaboration is an aspect of a culture supportive of both tacit and explicit knowledge sharing and it manifests in behaviours and practices that demonstrate open communication and an emphasis on continual learning and development (Devos & Willem 2006:656–657). Zack (in Hayes & Walsham 2003:59) argues that the focus on technology which was at the forefront of knowledge management initiatives in the 1990s, was a major obstacle to creating an organisational culture that valued and encouraged cooperation, trust and innovation. Miles et al (1998:4) emphasise that a collaborative process lies at the heart of knowledge utilisation. “Full collaborative effort requires a recognition that working together, without holding back or ‘protecting’ vital pieces, will achieve a level of production and/or innovation that could not be reached by either party individually” (Miles et al 1998:4).

DeLong (2004:71) believes that high levels of integration and collaboration prevent the silo mentality, we/they turf issues, decisions giving preference to local interest over the entity as a whole and not recognising and sharing knowledge that others need to succeed. According to Devos and Willem (2006:657), cultural integration between different groups facilitates knowledge sharing. At Buckman Laboratories, the world’s most knowledgeable people at all levels were put in touch with one another, thus encouraging group problem solving and the sharing of ideas and knowledge (Pan & Scarbrough 1998:60).

Miles et al (1998:4) contend that the economic systems and theories of Western societies have not come to terms with collaboration. The individual economic unit and maximisation of individual utility is placed at the forefront. At the other end of the pole, are communal systems which focus on the collective, but generally at the cost of individual motivation and a reliance on centralised control, which also do not promote collaboration where individual efforts are voluntarily combined to produce outcomes that could not be achieved alone. **Competition** is the dominant way of the Western world and the way organisations operate. Although competition in itself is not a bad thing, it does entail employees competing with those people with whom they actually need to collaborate (Devos & Willem 2006:657).

In the competitive world, knowledge is power and gives the owner a competitive advantage (Dykman & Davis 2004/2005:1320). Fellow workers compete for raises and promotions and more desirable assignments, which stifles knowledge sharing (Dykman & Davis 2004:1315). Learning is prohibited because people would rather look good, than be good, and admit that they do not know something in a competitive world. However, employees hesitate to accept tasks and assignments that they are not good at. Competition removes the focus from long-term solutions to the root cause of problems, to a focus on short-term measurable results. This competition becomes a source of distrust, which is crucial to avoid in any kind of cooperation resulting in learning, knowing, creating, sharing, transferring and using knowledge (Devos & Willem 2006:657-658).

Competition between business units for projects and funding can enhance creativity, but also sustains a culture of privatising knowledge – for example, scientists and engineers at NASA not including material in reports that might compromise a unit's competitive advantage (DeLong 2004:67–68). This is a manifestation of a siloed culture. By-products of this siloed organisation were, for instance, lack of an organisation-wide strategic plan, which contributed to unhealthy competition between units and limited ability to track personnel across the organisation. Furthermore, this led to unhealthy competition between units, skills shortages, nonintegrated business and IT systems, and ultimately knowledge loss (DeLong 2004:68). DeLong (2004:68) concludes that creating a culture that emphasises collaboration and teamwork among employees and all units, would address strategic HR and knowledge retention issues.

The following question can also be posed: Who owns the employee's knowledge? A company can have a proprietary claim on any intellectual capital that an individual develops during his or her tenure with the company (through confidentiality agreements with "noncompete clauses"), but most of an employee's understanding of the job goes with him or her to the next job as a combination of work experience and education (formal or informal) (Dykman & Davis 2004:1318). According to Dykman and Davis (2004:1320), as long as knowledge has a reward value, "individuals are unlikely to be easily motivated to share that knowledge and lose their advantage in the competitive environment that serves as the basis for capitalism".

Affiliation is a factor that some authors mention in terms of knowledge behaviours. It is discussed with cooperation and collaboration as an enhancing factor that could promote cooperation and collaboration. Affiliation is characterised by prosocial norms (Constant et

al; Hinds & Pfeffer; Wasko & Faraj in Bock et al 2005:94) and defined as a sense of togetherness among employees that reflects caring and prosocial behaviour which is critical to employees helping one another (Bock et al 2005:94). Significant considerations here are keeping close ties with one another, considering other employees' standpoint, a strong feeling of "one team", cooperating well with one another (Kim & Lee; Kays & Decotiis in Bock et al 2005:107–108). Attempts to share tacit knowledge may be defined as part of the attitude towards prosocial behaviour. A prosocial attitude is about the general propensity of people anticipating positive consequences for themselves, as well as for others and the organisation (Brief & Motowidlo in Lin 2007:412).

It would appear that affiliation (a feeling of togetherness) and high levels of integration contribute to cooperation and collaboration, which enhances knowledge behaviours, whereas competition and working in silos discourages learning, knowing, creating, sharing, transferring and using knowledge to the benefit of the organisation.

iii Openness and transparency

In general, Devos and Willem (2006:654) argue that accessibility of information, opportunities to observe others, sharing and not hiding problems/errors, debate and conflict tend to encourage an open and transparent culture. If trust is a value of the organisation, it will be found to be open and transparent (Du Plessis 2006:31). Openness and transparency are referred to by authors such as Choueke and Armstrong (1998:138) as an encouraging factor of continuous learning, by Cabrerra (in Minbaeva & Michailova 2004:667) as norms that encourage open exchange of knowledge among employees, leading to greater knowledge sharing, and by Pan and Scarbrough (1998:60) as open, unrestricted communication and free exchange of ideas to encourage transfer of knowledge. However, secretiveness (withholding knowledge) tends to lead to lack of trust, openness and transparency.

iv Innovativeness

Several authors mention the following different ways of encouraging innovativeness to stimulate knowledge behaviours:

- finding innovative solutions to problems (Pan & Scarbrough 1998:60)

- encouraging questioning of the way things are conducted and permitting workers to challenge their superiors (Lubit in Rebernik & Sirec 2007:413)
- encouraging change and creativity, including risk taking in new areas where a person has little or no prior experience, even if this turns out to be a failure, and finding new methods to perform tasks (Bock et al 2005:107, 108)
- encouraging suggestions of ideas for new opportunities (Bock et al 2005:108); the stimulus to develop new ideas and respond rapidly to new ideas is likely to encourage management and employees to interact and socialise frequently, thus driving knowledge-sharing intentions (Lin & Lee 2006:74)
- evaluating decisions and making decisions on the basis of the knowledge used to arrive at them (Davenport & Prusak 1998:xiii)

Lubit (in Rebernik & Sirec 2007:413) and Leonard and Sensiper (in Bock et al 2005:90) all feel that tolerance of well-reasoned failure is a vital factor in encouraging innovativeness. A culture in which mistakes are not only permitted, but also valued, can enhance innovativeness because mistakes can be the source of new ideas and can help to identify innovative solutions to problems (Pan & Scarbrough 1998:61).

v *Learning and individual development*

DeLong (2004:69-70) argues that a culture that supports individual development where employees regard their jobs as sharing knowledge and coaching others in effective behaviours will enhance knowledge retention. Knowledge-sharing behaviours flourish only in an environment where there is a sense of mutual commitment between the organisation and the employees, and where the organisation demonstrates an interest in employees' long-term success. According to Van der Sluis (2004:12) and Major (2000:359), a culture relating to equal rights and opportunities for growth and development will encourage learning and innovation and facilitate continuous improvement and adaptation at all levels. Availability of learning opportunities is created through training and job assignments. To this Mirvis and Hall (in Major 2000:357) add that an appetite for continuous learning should be encouraged and that employees should have the capacity to cope with the ambiguity and challenge of shifting job assignments. Moreover, employees should be allowed and encouraged to take responsibility for their

own learning and development needs and seek out ways to have them met. Another key factor that could encourage learning and development is to allow reflection on learning experiences (Seibert in Major 2000:358).

vi Teamwork

Some authors have identified a team-based culture and climate as a value that will encourage knowledge behaviours, as highlighted below.

- According to Du Plessis (2006:104–105), a culture that encourages teamwork and team-based decision-making will enhance the flow of knowledge and allow the co-creation of solutions in the organisation.
- According to West and Wallace (in Van der Sluis 2004:10), a team climate for learning and innovation significantly predicted team learning and innovativeness of health care teams.
- In their empirical research on whether trust explains knowledge-sharing relationships or whether there are more important drivers of sharing of knowledge in new product development projects, Bakker et al (2006:594, 603) concluded that team membership has strong power in explaining who shares more knowledge than others. Where members of teams have been together for a long time, they tend to share more knowledge between team members than younger teams. Team membership of experienced teams thus seems to be a more potent driver of knowledge sharing than trust between individual members of a new product development team.

Core activities that are indicative of effective teamwork include knowledge sharing, monitoring (part of an implicit contract between work team members in which they agree to look out for one another in order to maintain effective group performance), feedback (as team members share their observations and evaluations with one another) and backup (actually providing needed functional assistance to co-workers in the completion of their job tasks (McIntyre & Salas in Major 2000:358). Major (2000:358) concludes that the current complex work environments preclude individuals from doing it on their own, and interdependence through teamwork heightens the need for knowledge sharing, and knowledge behaviours for that matter.

vii Caring

Caring is a specific enhancer of knowledge behaviours. Caring becomes visible when those in charge create a context in which people show the following:

- *trust*: trusting others to add personal value to teachings and recommendations and believing in the other person's well-meaning intentions
- *empathy*: proactively seeking to understand others and listening actively (Von Krogh et al 2000:50)
- *courage*: allowing people to experiment, allowing concepts to be exposed to a process of judgement, voicing opinions and giving feedback as part of a process that helps others grow (Von Krogh et al 2000:53)
- *help*: helping one another to learn by being accessible (Von Krogh et al 2000:51)
- *leniency*: being lenient in judgements about experiences and actions (Von Krogh et al 2000:53)

A caring manager understands the needs of others, the group and the organisation and must integrate these needs in such a way that individuals can contribute to knowledge creation, sharing, transferring and utilising, while learning and experimenting on their own (Von Krogh et al 2000:47). It appears to be a network of interactions determined by care and trust (Von Krogh et al 2000:49). Barriers that would work against a caring culture would be managers who are intolerant of the need for help, judgemental and lack understanding of others.

viii Fairness

Fairness can be described as the perception that organisational practices are equitable and nonarbitrary (Kim & Lee; Kays & Decotiis in cited Bock et al 2005:107). Fairness also entails trusting one's manager's evaluation to be sound and fair, regarding objectives that are given to a person to be fair and not perceiving any favouritism (Bock et al 2005:90, 108). According to Kim and Mauborgne (in Bock et al 2005:94) fairness can be expected

to lead employees to go beyond the call of duty to share their knowledge and become more knowledgeable about their work in the process. According to Zweig at Queens University (in *Sharing know-how reluctantly* 2006:16), all employees are not reluctant or do not refuse to share knowledge. They are more willing to provide job knowledge to people they trust and who treat them fairly.

ix *Commitment*

Commitment will be enforced if employees feel secure in their jobs, loyal to the organisation and are willing to learn, create knowledge, share and transfer their knowledge, since these are all functions of the employment relationship (Scarborough in Mahee 2006:74). Furthermore, the relationship between the employee and the organisation should be completely trusting. If people feel less secure in their jobs they will be unwilling to take on the "investment risks" of sharing and transferring their knowledge (Mahee 2006:75). Lin (2007:111) conducted research on tacit knowledge sharing and determined that commitment and trust seem to be the mediators that influence tacit knowledge sharing. Although many employees view tacit knowledge sharing as ethical (Wang in Lin 2007:421), their *self-interest* concerns about fairness may still impede such knowledge-sharing behaviour.

On a final note regarding the values that support the knowledge behaviours in organisations, some authors such as Davenport and Prusak (1998:xiii), Du Plessis (2006:33) and Pan and Scarborough (1998:65) regard **rewards as a value** to encourage knowledge behaviours. It can be argued, however, that giving and receiving rewards is not so much a value, but could be viewed as a mechanism that might be used to encourage knowledge behaviour. As far as tacit knowledge is concerned, intangible methods of reward would have a greater motivational effect as opposed to tangible reward systems (as mentioned in sec 3.5.4.6). This is because prosocial behaviours of tacit knowledge sharing "are above and beyond those described by job descriptions, are voluntary in nature and cannot be explicitly or directly rewarded, because of its intangibility" (Lin 2007:412). Instead of emphasising a tangible influence of rewards, Lin's research explores other intangible alternatives such as **commitment** and **trust** as the mediators that may constrain or support tacit knowledge sharing.

After exploring the values that would enhance knowledge behaviours, the question might be asked what factors would change or maintain a culture that supports knowledge behaviours. These factors are discussed below.

b Changing or maintaining an organisational culture

Organisational culture “develops over many years and is rooted in deeply held values to which employees are strongly committed” (Robbins 2005:509). It is not easy to change or maintain an organisational culture. When different behaviours are taught, coached, supported and rewarded, organisational cultures do shift (Allee 2003:129). The factors that change or maintain a culture are leadership, recruitment, appointment and promotion processes and socialisation of employees (Martins 2000:36, 39). These factors are discussed below.

i Top management support

Top management support is mentioned by Lin and Lee (2006:84) as a factor that drives knowledge behaviour intentions. Davenport and Prusak (1998:xiii) mention senior management/executives setting an example of knowledge behaviours as a factor that could promote a knowledge-oriented culture. Employees then learn, create, share, transfer and use knowledge because they see it as natural instead of being forced to do it (McDermontt & O’Dell in Syed-Ikhsan & Rowland 2004:101).

ii Recruitment, appointment and promotion processes

Davenport and Prusak (1998:xiii) refer to hiring workers taking their potential for knowledge sharing into account. Organisations behave the way they do because what appear to be nonpersonal attributes of the organisation, occurs as a direct result of the people who are attracted, appointed and remain in the organisation and they usually stay because the organisational culture is in line with their values and beliefs (Schneider; Hofstede & Neuijen in Mahee, 2006:74). At Buckman Laboratories, the most valuable employees are the ones who become a source of knowledge and actively share that knowledge with others (Pan & Scarbrough 1998:61).

iii Socialisation of employees

Employees should also be educated on the attributes of a knowledge-based business (Davenport & Prusak, 1998:xiii) during the socialisation process of adapting employees to the culture of the organisation (Robbins 2005:647). Employees should take pride in contributing and owning knowledge (Pan & Scarbrough 1998:61).

In conclusion, it would appear that an **organisational culture** should be supported by several specific values to enhance knowledge behaviours. The values of trust, cooperation, openness and innovation were mentioned the most by authors cited in the literature review. Furthermore, top management's support of knowledge behaviours, top management personally demonstrating behaviours that support knowledge retention, the type of people attracted, appointed and promoted and the socialisation of employees in adapting to the culture appear to enhance the possibility of establishing an organisational knowledge retention culture that supports knowledge behaviours on the tacit level.

3.5.6.2 Organisational structure and design

Robbins (2005:452) describes organisational structure as defining how job tasks are formally divided, grouped and coordinated. The following six elements need to be addressed when managers design their organisation's structure:

- *work specialisation*: the degree to which activities are subdivided into separate jobs
- *departmentalisation*: the basis on which jobs are grouped together, and the chain of command individuals and groups will report to
- *span of control*: the number of individuals a manager can efficiently and effectively direct
- *centralisation and decentralisation*: where decision-making authority lies

- *formalisation*: the degree to which there will be rules and regulations to direct employees and managers (Robbins 2005:452–453)

Robbins (2005:468-469) distinguishes between the following two models that apply to organisational structure:

- *a mechanistic model at the one extreme*: bureaucracy that is extremely departmentalised, highly formalised, a limited information network with mostly downward communication and hardly any participation in decision making by members at the lower levels in the organisation
- *an organic model at the other extreme*: a boundaryless, flat structure, using cross-hierarchical and cross-functional teams, low formalisation, comprehensive information network with lateral, downward and upward communication, involves high participation in decision making

Within the above model framework, there are several different organisational designs of which the simple structure, bureaucracy and matrix (combination of function and product) are the more common organisational designs (Robbins 2005:459). New design options are the team structure, virtual (or network or modular) organisations and boundaryless organisations (Robbins 2005:463). The designs range from being a **highly structured and standardised bureaucracy** (“very formalized rules and regulations, tasks that are grouped into functional departments, centralized authority, narrow spans of control, and decision-making that follows chain of command” [Robbins 2005:461]) to **loose and amorphous boundarylessness** (seeking to eliminate the chain of command, having limitless spans of control and replacing departments with empowered teams [Robbins 2005:467]) with the other designs existing somewhere between these two designs.

The different organisational designs have an impact on individuals’ behaviour and certain factors need to be considered when predicting behaviour in organisations. Organisational structure designs could have an impact on knowledge behaviour in the sense that they could cause either knowledge loss or retention. The following factors need to be considered in the knowledge loss or retention context:

a Understanding how individuals interpret their organisation's structure

In order to predict individual's behaviour, an understanding of how individuals interpret their organisation's structure is needed (Robbins 2005:476). Individual differences make it extremely difficult to generalise employee behaviour resulting from organisational structure and design – for example, some people may prefer the freedom and flexibility of organic structure, whereas others may prefer the standardised work task with minimum ambiguity of mechanistic structures (Robbins 2005:473). Besides individual differences, national culture also needs to be taken into consideration when predicting behaviour. A case in point is an organisation that operates with people from high-power distance cultures in which power is distributed unequally (eg those in Greece, France and Latin America) and employees tend to be more accepting of mechanistic structures than those who come from low-power distance countries (Robbins 2005:475).

b Top-down structures

Fiol (2003:77) refers to traditional top-down structures as the functional, divisional and matrix structures. In theory, each form represents compromises or trade-offs between efficiency and flexibility and scope of knowledge absorption (Van den Bosh et al in Fiol 2003:77). Top-down structure processes can become rather slow and cumbersome in creating, learning, sharing, transferring and applying knowledge. They also increase the power to withhold or manipulate knowledge and misuse of knowledge by a small central group at the top. A further problem in top-down structures is the loss of knowledge that often occurs in a top-down direction (Fiol 2003: 78).

c Fragmentation versus systemic relationships

Knowledge loss may emanate from fragmentation when there is a tendency to break down a problem, project or process into smaller pieces. This tends to create silos that separate people into independent groups which, in turn, create specialists who work in specific functional areas and generate battles over power, resources and control (Devos & Willem 2006:654; Braganza 2005:6), stifling the occurrence of knowledge behaviours. A strong focus on how parts of the organisation are interdependent and seeing problems and solutions in terms of systemic relationships (a systems perspective where every element is a subsystem of a larger system and every system is composed of subsystems, depending on each other and on the whole) (Devos & Willem 2006:654, 706), will

enhance knowledge retention. According to Fiol (2003:81-82), overspecification of structure can actually hinder the effective use of knowledge by encouraging mindlessness in organisations (Weick, Stuclicke & Obstfeld in Fiol 2003:81), suppressing meaningful communication and narrowing the focus of attention, ensuring that new sources of knowledge are not considered and that old irrelevant knowledge is not discarded (Fiol 2003:81–82).

d Lack of an appropriate organisational structure

According to Noe et al (2003:214), one of the greatest impediments to knowledge sharing is the lack of an appropriate organisational structure. Flattening hierarchical structures and making them less bureaucratic by relying on teams to manage and changing the role of traditional managers to coordinators of cross-functional teams (Despres in Fiol 2003:79), will preserve the tacit understanding and facilitate its dissemination through continuous informal social interactions, whereas converting tacit knowledge in a context of rules and directives involves substantial knowledge loss (Fiol 2003:79). Flatter structures draw on the core competencies of each member, which should increase access to the most valuable knowledge. New knowledge creation and destruction of knowledge that is no longer needed are encouraged through the temporary existence of relationships and focus on one opportunity, breaking up once the opportunity no longer exists (Fiol 2003:80). In flat structures, the boundaries are more permeable (penetrating throughout), in theory allowing freer flow of knowledge in unstructured informal ways mainly through conversation between employees (Sbarcea in Fiol 2003:80; Bhatt in Mahee, 2006:74). Flat structures seem more likely to enhance such conversations and knowledge behaviours than top-down structures, but the structures themselves do not produce the relationships. However, there is little solid evidence of the claimed advantages of flat structures, and according to Fiol (2003:80–81), these claims remain theoretical.

Mahee (2006:74) holds that flatter structures can influence an employee's commitment to and involvement in the organisation. There are fewer prospects for promotion, causing a feeling of less job security. When employees feel less committed to the organisation they may be less willing to share their knowledge. In terms of decision making authority, decentralisation would encourage tacit knowledge sharing (Devos & Willem 2006:657), whereas Tsai (in Minbaeva & Michailova 2004:663) concludes that hierarchical

coordination in the form of centralisation tends to have a negative impact on employees' and units' willingness to share knowledge.

Although researchers and practitioners seem to conclude that flatter structures are more conducive to encouraging knowledge flows than top-down structures, it may in fact be the extent to which the structure supports interactions of employees as members of a community as opposed to organisational structures in and of themselves.

e Formal linking mechanisms to build bridges

Van der Sluis (2004:12) suggests that organisations should form formal linking mechanisms (such as joint problem-solving teams, committees, task forces, project managers and formal meetings) to **build bridges** that connect disparate functions and encourage collaboration in problem solving, thus enhancing knowledge retention. Fiol (2003:83) supports the idea of building bridges that foster knowledge behaviours such as knowledge sharing. The focus should be on human interaction (social processes) to foster understanding among people and the organisational structures must be made subordinate to these processes. According to Taylor and Osland (2003:215), much knowledge, particularly tacit knowledge, can be lost in the process of embedding individuals' mental models owing to a lack of connections between people or parts of the organisational structure. Structures in and of themselves do not produce mindful and meaningful communication, but do serve as important enablers for building communities of knowing in organisations (Fiol 2003:82).

Communities of practice (CoPs) as a method of creating knowledge flows in organisations could face knowledge loss when these flows are cut off within and across the communities as people move from one reporting line to another. Stickiness of knowledge connotes difficulty in transferring knowledge across the organisation and functional team members withhold their specialist knowledge as a way of defending their territory. Communities become vulnerable and isolated as they lose their legitimacy and become part of the problem instead of a means to a resolution of fundamental knowledge management challenges (Braganza 2005:6). Braganza (2005:7) proposes that organisations need to reconceive themselves as *communities of purpose*, which encompass separate functional CoPs. Such communities recognise that each constituent community is independent and interdependent, autonomous and interconnected, homogeneous and heterogeneous. "The community of purpose embraces the reality that

knowledge is never within the preserve of only one CoP” (Braganza 2005:7). The key is the synthesis of knowledge in each community and across communities (Braganza 2005:7) focusing on interactions between those who share a concern or passion about a topic that gives the community a purpose.

There seem to be strong limitations in the structural solutions to encouraging knowledge behaviours. Robbins (2005:476) concludes that an understanding of the way in which individuals interpret their organisation’s structure will prove a more meaningful predictor of their behaviour than focusing on the objective characteristics such as relationship between structural variables and subsequent levels of performance or job satisfaction which produced inconsistencies in research results because of individual differences. Furthermore, simply increasing people’s exposure to functions, projects, knowledge and other people, does not safeguard the knowledge retention process in organisations. Hence the knowledge management literature suggests that well-functioning **HR management** systems are imperative (Von Krogh 2003:376).

To summarise, the key factors identified in the discussion on **organisational structure** seem to focus on designing an appropriate structure that will enhance knowledge behaviours in order to retain knowledge in organisations:

- Flatter structures seem to be theoretically accepted as the preferred design.
- The focus should be on creating formal linking mechanisms to build bridges that will bring about communities of knowing, synthesising knowledge in each community and across communities.
- An understanding of the way individuals interpret their organisational structure would be a more meaningful indicator of their learning, knowing, creating, sharing, transferring and applying knowledge behaviours, as opposed to focusing on the objective relationship between structural variables.

3.5.6.3 *HR policies and practices*

HR policies and practices refer to employee selection processes, training and development programmes and performance evaluation methods (Robbins 2005:31, 518).

These factors are significant forces in shaping employee behaviour and attitudes (Robbins 2005:538). The objective of effective **selection** is to find the right person for the job by matching individual characteristics such as ability, experience and personality traits with the requirements of the job. If management fail to match these properly, both employee performance and satisfaction suffer (Robbins 2005:518). Selection policies and practices have implications for the retention of experienced, knowledgeable staff members.

Training and development are a vital factor in organisations to keep employees competent because skills deteriorate and may become obsolete. Types of training include basic literacy skills, technical skills, interpersonal skills, problem-solving skills and ethics training (Robbins 2005:521-523). Training programmes affect work behaviour in two ways: firstly, they hone the skills necessary to successfully complete a job, and secondly, they increase an employee's self-efficacy. Self-efficacy is a person's expectation that he or she can successfully execute the behaviours required to produce an outcome. The behaviours are work tasks and the outcome is effective job performance. Employees with strong self-efficacy have great expectations about their ability to perform successfully in new situations (Robbins 2005:539).

The purpose of a **performance evaluation** system is to assess accurately individuals' performance and to reward them accordingly (Robbins 2005:539). It also identifies training and development needs, providing feedback to employees on their performance and motivating them to do their best (Robbins 2005:525). To maximise motivation, individuals need to perceive that the effort they exert leads to a favourable performance evaluation and that a favourable evaluation will lead to the rewards they value (Robbins 2005:526). The performance evaluation process should emphasise the correct criteria based on behaviour and results to be achieved, and when accurately assessed, should lead to improved performance and satisfaction of the individual (Robbins 2005:539).

In general, HR policies and practices are an organisation's primary means of directing and energising employee behaviour (eg knowledge behaviours). Employees' knowledge behaviours, in turn, are presumed to determine knowledge retention. Knowing what these behaviours are, HR policies and practices must ensure that employees have the appropriate competencies to learn, create, share, transfer and use knowledge, are motivated to do so and have opportunities to engage in such behaviours (Jackson et al 2003:400). Sharkie (2004-2005:1797) argues that potential sharers of knowledge form a

perception of the organisation, as viewed through the psychological contract, and base this perception on how they see the HR policies and practices of the organisation, which express the values and beliefs espoused by top management affecting them. If this perception is positive, it will enhance trust in the organisation which, in turn, is likely to affect their predisposition to share their tacit knowledge. Individuals make decisions about trust on the basis of their perceptions about the HR policies and practices, culture and social networks by considering how they have been treated by other employees, management and the organisation and whether these parties have been fair, kept their promises and will keep on doing so in the future (Sharkie 2004-2005:1800). Sharkie (2004/2005:1797) thus argues that HR policies and practices that are supportive of an individual will be positively correlated with trust and knowledge sharing. HR policies and procedures may in fact limit, say, flexibility and entrepreneurship, which are critical in successful knowledge creation initiatives (Kaser & Miles in Sharkie 2004-2005:1797), or limit knowledge sharing, transferring and learning if employees do not trust the organisation.

Contemporary organisations appear to be faced with several HR policy and practice-related factors in the way talent is managed that could cause knowledge loss for them. These factors will now be discussed by referring to selection, training and development and performance evaluation policies and practices that could cause knowledge loss and how to combat possible loss of knowledge.

a Employee selection policies and practices

Recruitment has indirect impacts on activities normally associated with knowledge retention in the sense that the effectiveness of an organisation's recruiting efforts will have a significant impact on the resources it has for transferring knowledge and the ability to do so (DeLong 2004:51). The recruitment process itself has become a challenge in the face of a **shrinking labour force** and the difficulties of recruiting top talent (DeLong 2004:19, 35). The inability to fill jobs at prevailing wages is not the same as replacing a large number of highly skilled employees with far less experienced people. Many experienced workers will be leaving their jobs in the next decade, resulting in huge knowledge loss in organisations on account of retirements and other forms of turnover (DeLong 2004:13).

Demographic trends seem to influence recruitment. DeLong (2004:35) predicts that recruiting younger workers is going to be increasingly difficult in many countries, given the long-term demographic trends. There seems to be a large percentage of aging workforce nearing retirement (Baby Boomers) as opposed to the shrinking workforce of the Generation X (born between 1965 and 1980), that is, a large aging workforce is being followed by a shrinking younger generation caused by lower fertility rates (DeLong, 2004:12). This is true for First World countries such as the USA. South Africa, however, is facing with a brain drain of skilled workers and a remaining large group of inexperienced workers who increasingly hop from one job to the next.

The following are additional reasons why organisations are likely to have trouble recruiting staff:

- There is a long-term orientation towards downsizing and cost-cutting.
- The worksites of traditional industries may be located in rural areas that are less attractive to young people.
- There is greater competition for top-rated engineering and science graduates who receive offers of a wider variety of potential employers such as investment banks, large consulting firms and high technology companies (DeLong 2004:36). Scientific domains (chemistry, physics, genetics, engineering and technical fields) have become increasingly complex and specialised (DeLong 2004:16), thus demanding more sophisticated and skilled employees (DeLong 2004:36).

Some sectors experience serious recruiting problems. In South Africa, the shortages experienced can be explained by the following examples:

- accountants – 20 000 qualified needed (*Dringend gesoek* 2008:18),
- lawyers – younger lawyers moving abroad – South Africa has only 17 800 practising attorneys and 3 000 advocates, which is insufficient for a population of 46 million (Temkin 2008a:2).
- an official shortage of 490 000 people with skills ranging from medicine to mechanics was reported in March 2008 (Shevel & Boyle 2008:1)

- library personnel – libraries in Tshwane being closed on Tuesdays and Saturdays owing to insufficient personnel (Helfrich 2008:8).
- technical personnel – according to Lieutenant General Carlo Gagiano, South African Air Force Chief, the greatest disappointment of 2008 was the loss of 280 technical personnel to developed countries that seem to have a shortage (Botha 2009:4)
- engineers, doctors, nurses and accountants are still in increasingly short supply and are being poached by countries like Canada, Australia and the USA (Johnson 2009:1)

Although there were signs of people returning to South Africa in 2009/2010 on account of the global economic slowdown, these shortages of skilled people still exist (Johnson 2009:1). The factors discussed above all add to the uncertainty of a more competitive recruiting market (DeLong 2004:36).

Staffing shortages give rise to increased turnover or job-hopping in organisations, which aggravates the lost knowledge issue in the sense that there is lack of continuity of knowledge transfer – and if there is nobody to transfer the knowledge to, it could be lost. Knowledge transfer cannot be separated from supply management (DeLong 2004:37). DeLong (2004:49) suggests that organisations that are “trying to sustain and improve performance need to create a working environment that minimizes attrition of high performing employees, since turnover and knowledge retention are closely connected”.

The above discussion gives an overview of the challenges organisations are facing in terms of recruitment and selection practices. HR policies relating to these challenges, such as retirement, employment equity, outsourcing and retention policies, may inhibit or enhance knowledge behaviours as elucidated below.

i Retirement policies and practices

Early retirement has become standard practice in many sectors in the past 20 years since many organisations view it as a relatively painless way of downsizing (DeLong 2004:50). Retirement policies in South Africa have evolved around offering early retirement packages to older employees to create space for the previously disadvantaged group,

leaving costly gaps in the knowledge that is lost when people take their experiential knowledge with them. Attrition due to early retirement is particularly noticeable at executive levels. Deloitte found that the main reasons for attrition at the top levels of companies included early retirement (22%) and emigration (15%) (Temkin 2008b:1).

Because knowledge retention and recruitment issues have become more acute, organisations need to look at ways to extend the tenure of their most valuable older employees (DeLong 2004:50). One way of doing this is by implementing flexible phased retirement programmes allowing older employees to create more varied and shorter work schedules. Legal barriers in some countries, however, make these difficult to implement, for example, global firms have to deal with a variety of mandatory laws that are continuously changing. In Japan, for instance, retirement age was fixed at 60, but executives are expecting it to be raised to 65 to help ease the country's labour shortage (*Mainichi Daily News* in DeLong 2004:50). These changes could add to the complexity of knowledge transfer and succession planning. From an HR perspective, the policies and practices to entice highly skilled older employees to keep working beyond retirement eligibility will be the key to minimising the cost of lost knowledge. In South Africa, some organisations have recently been deploying retired senior professionals to fill the critical skills shortage, such as the Western Cape Government Department where at least 20 engineers were reportedly deployed to municipalities and government departments. The City of Cape Town has 4 000 critical vacancies that need to be filled in various departments (Powell 2008:6).

A major barrier from a behavioural perspective would be the organisation's cultural attitude towards older workers. Younger workers may not respect their older colleagues and older workers may feel that they are not recognised for their experience and knowledge. The organisation has to be aware of these attitudes, although what the culture says about how older workers should be treated is subtle because these attitudes will be critical in determining how long older employees choose to stay with the organisation (DeLong 2004:79).

ii Employment equity policy

In South Africa, with its history of employment disparities and discriminatory practices, legislation has been enacted that has a major impact on employment policies and practices. The Employment Equity Act 55 of 1998 in particular, is of critical importance

owing to its strong regulatory influence on selection practices (Schenk 2003:352). The requirement of this Act can be explained as follows: “The purpose of the legislation is to achieve equity in the workplace by:

- firstly promoting equal opportunity and fair treatment in employment through the elimination of unfair direct or indirect discrimination
- secondly implementing affirmative action measures to redress the disadvantages in employment experience by designated groups (black people, women, and people with disabilities) in order to ensure their equitable representation in all occupational categories and levels in the workforce” (Schenk 2003:354).

This policy could have an inhibiting effect on knowledge behaviours in the sense that knowledgeable people may feel that their own positions are threatened if they have to share their knowledge with newly appointed affirmative action candidates, who would be taking over their jobs to rectify legally set targets of race and gender numbers, thus choosing to withhold their knowledge to protect their own positions.

iii Outsourcing of services policies

Outsourcing of services policies “may ‘hollow out’ organisations threatening any aspirations towards organisational learning, corporate culture and shared visions” (Storey 2002:351). This refers to the potential loss of expertise in certain areas owing to outsourcing of services, which may be difficult to recover. Outsourcing services is a speedy way of gaining specialist services, but contract workers gain the knowledge, while the company’s own employees feel that they are being deprived of that expertise knowledge.

vi Staff retention policies

Organisations are aiming to retain their best talent through staff retention policies. SA Breweries, for instance, is offering a total package that includes interesting jobs, a focus on long-term career development and succession planning, competitive pay and an environment that encourages competitiveness, innovation and sociability. Other organisations, such as Rand Merchant Bank, focus on building trusting relationships and holding people accountable, recognition and fair, consistent and sustainable financial

incentives. Eli Lilly tries to promote from within, and Discovery Health has moved away from clearly defined job descriptions, allowing individuals to create their own jobs. All these multitude of policies and practices influence organisational effectiveness (ie achieving organisational goals through a pool of talented employees) and have an influence on employee behaviour (Schenk 2003:351–352). However, knowledge may still “walk out the door”, which means that there should be a definite focus on knowledge retention as such.

DeLong (2004:38) proposes that organisations should design an integrated approach to address the impacts of the changing workforce by focusing on recruitment, retirement and retention. Focusing on only one or two of these will seriously undermine the skills and knowledge needed to achieve long-term business objectives. DeLong (2004:19) also suggests focusing on the threat of lost knowledge instead of staffing shortages because it provides a more accurate perspective on the real impact of turnover in the knowledge economy.

b Training and development

In the South African context, organisations are not only faced with a narrow national skills base skewed by race and gender, but are also under threat by a significant brain drain of highly skilled workers (Schenk 2003:352). Not only is this a major obstacle in achieving economic growth targets and global labour competitiveness, but implies major knowledge loss to organisations. The problem is intensified by losses of highly skilled persons caused by emigration (estimated at 500 000 [Schenk 2003:356]). According to Johnson (2009:1), 800 000 out of a total white population of four million have left the country since 1995, but nonwhite professionals are also expressing desires to “follow their white colleagues out the door”. At universities and technikons, enrolments are skewed in favour of the humanities and only 25% of enrolments each in business and management sciences and natural science (science, technology and engineering) translating into the current skills shortages in financial management, engineering and public service management fields (Bennet in Schenk 2003:356).

Another factor that plays a role in training and development is the fact that employees do not remain knowledgeable and skilful forever, which means that organisations have to invest in the training and development of their employees. According to DeLong (2004:48), it is necessary to understand where the risks are in terms of knowledge loss

and then shaping knowledge retention strategy accordingly. DeLong (2004:49) proposes that the first step in understanding where an organisation is most at risk for lost knowledge is having a detailed process to track current skill inventories and future needs for all essential professional and management roles in the organisation. This will enable management to determine where future knowledge gaps may arise and to plan accordingly. This type of process would include extensive succession planning and would allow more effective resource allocation focusing on knowledge retention initiatives.

In South Africa, organisations have typically been reluctant to invest in training and development at lower levels. In response to the serious skills shortages, the government has introduced the Skills Development Act of 1998 and the Skills Development Levies Act of 1999, in terms of which a skills levy of 1% of an employer's monthly payroll is payable. Organisations are expected to draw up, implement and report on a comprehensive workplace skills plan in order to qualify for a partial refunding of the levy (Bellis; Meyer, Mabaso & Lancaster in Schenk 2003:356). At SA Breweries, the third largest brewery in the world, nurturing and developing the depth of knowledge and skill in core competencies that drive their business, form part of the company's HR strategy goals (South African Breweries in Schenk 2003:356).

Factors that play a role in terms of knowledge loss, on the one hand, and knowledge retention, on the other, relating to training and development, are, for instance career development (including tools such as succession planning, formal career plans, planned job rotation, "high-flyer" schemes and assessment/development centres [Schenk 2003:360]), mentoring and coaching and understanding the differences in the knowledge behaviours of the different generation groups. These factors are discussed below in terms of knowledge behaviours.

i Career development

In general, besides the organisation's responsibility to train and develop its people, career development is the personal responsibility of each individual in the organisation. From a knowledge retention perspective, personal responsibility relates to actions such as keeping current balancing specialist and generalist competencies and building and maintaining network contacts (Schenk 2003:360). It has become the employee's responsibility to keep knowledge and skills current and manage his or her future careers (Schenk 2003:359). Not all people are willing to assume the responsibility for their own

development or have the confidence or initiative to champion their own development. A workforce with limited prior experience of formal education or training is less likely to seek and accept formal and informal opportunities unless they are consistently encouraged by their supervisors and managers (Bryson et al 2006:279).

Once leaders have identified the employees with the most critical knowledge and hard-to-replace skills, they need a way to develop and retain the knowledge and the people. This requires a sophisticated career development process, which helps build the knowledge and competencies professionals and managers need to prepare for their future roles (DeLong 2004:49, 62). Succession planning and career paths show employees the opportunities that lie ahead (DeLong 2004:49). The question asked during the career planning process is, "Who will be ready to replace our key managers in this critical skill area as they retire or move on?" DeLong (2004:66) emphasises that while succession planning can help pre-empt knowledge loss for the organisation, career development processes may be one of the most effective retention tools for key employees.

ii Mentoring and coaching or apprenticeships

Mentoring and coaching or apprenticeships would seem to be a logical choice for transferring tacit knowledge from experienced employees. Mentors and coaches can help transfer technical, operational and managerial skills (how to perform specific aspects of a job), knowledge on "who does what and how", providing introductions to influential decision makers and specialised experts helping less experienced employees develop relationships they will need to succeed in the organisation, and transferring cultural knowledge about organisational values and norms of behaviour. This tacit knowledge is almost always communicated and obtained by observing the mentor as a role model or symbol of effective performance (DeLong 2004:107) and through experience while being coached.

In practice, many organisations find this method difficult to sustain because it requires much input from the experts and it is hard to persuade them to take the time to adequately train their successors (DeLong 2004:51). Scandia National Laboratories introduced a mentoring programme in the 1990s as part of the solution for transferring crucial tacit knowledge about nuclear technologies, but middle managers have complained about the tremendous time commitment required to socialise and train new

employees. The Laboratories thus started using more retired weaponeers as mentors (DeLong 2004:107).

Resource constraints could have a negative impact on the behaviour of less experienced employees. At NASA, for example, mentoring became more problematic when the space agency implemented a project management strategy that focused on "faster, better, cheaper" projects, which resulted in the number of projects in a unit jumping from four to 40 in five years. This resulted in junior less experienced employees having to learn on-the-fly, leading to increased mistakes, reduced efficiency and missed opportunities caused by lost knowledge (DeLong 2004:109).

To eliminate the barriers of time and resource constraints, DeLong (2004:109) proposes that organisations need to focus on the critical areas where knowledge needs to be retained, anticipate time and resource constraints and manage these by, say, bringing back retirees, designing the mentoring and coaching responsibility into the job descriptions of particularly valuable experts, leaders confronting the apparent lack of time available for mentoring by modelling the behaviour themselves, training mentors specifically on how they can help their mentees and creating an effective infrastructure to support mentoring (the HR department identifies where mentoring could be of value and finds experienced people willing to serve as mentors) (DeLong 2004:109-111). These actions could enhance the knowledge behaviours required to retain knowledge.

iii Age generation differences in the workforce

Another issue in the transfer of knowledge is that not enough attention will be paid to the needs of the eventual recipient of that information. The experience and learning needs of the new generations in the workforce differ drastically from those of the more senior generations. Failure to recognise these differences could impede a successful knowledge retention programme, causing incomplete knowledge transfer from the current workforce (Juliano 2004:82). According to Garlick and Langley (2007:1) and Juliano (2004:83), the four generations are as follows:

- Generation Y (also known as Bridgers, Millennials, Generation Next) (born from ± 1978 to 2000)
- Generation X (also known as Baby Busters) (born between 1965 and 1977)

- Baby Boomers (born between 1946 to 1964)
- Silent/ GI Generation (born 1900 to 1945)

Susan El-Shamy (in Juliano 2004:83-84), in her book, *How to design and deliver training for the new and emerging generations*, notes the differences between Baby Boomers and Generation X and especially Generation Y learning environments. The differences can be depicted as follows (tab 3.5).

TABLE 3.5
LEARNING ENVIRONMENT CHARACTERISTICS OF
OLDER AND YOUNGER GENERATIONS

Learning environment characteristics	
Generations X and Y (born between 1965 and 2000)	Baby Boomers (born between 1946 and 1964)
<ul style="list-style-type: none"> – a more rapid pace – a style that relies on interactivity and hands-on approach – a need to make content delivered to them and their situations – options variety and unpredictability – game-like approaches to training – prefer activity-based transfer of knowledge – don't like reading and ... don't like being told 	<ul style="list-style-type: none"> – an even, leisurely pace – a style that relies on "telling" and text-based material (ring binders) – need to cover topics broadly and in full – linear course flow, outline and design (bullets) – serious classroom approach with a few fun activities

Source: Adapted from El-Shamy (in Juliano 2004:83–84)

According to Paul Steinberger, the training and compliance project manager at an American Transmission Company (Juliano 2004:84), today's learners are "more inclined to like to see knowledge transferred to them in an activity-based form", "don't like reading, and ... don't like being told". They seem to want to be given the duty to do, but are sometimes a little overconfident. These learning differences between the generations have to be taken into consideration when transferring knowledge from older to younger generations.

c Performance evaluation and motivation

Performance evaluation is an assessment of the amount of effort an individual exerts in his or her job. It specifically focuses on effort-performance and performance-reward

linkage. To maximise motivation, employees need to perceive that the effort they put into their jobs results in a favourable performance evaluation and subsequently leads to the rewards they deem valuable. A positive outcome of a performance evaluation is dependent on clear objectives of what the employee is supposed to achieve and clear criteria for measuring those objectives and a satisfactory payoff by the organisation when their performance objectives are achieved. The evaluating criteria influence their behaviour (Schenk 2003:362). It may be an objective for an expert employee to share expertise with other employees in the team, but it is not easy to determine the measuring criteria of such sharing.

The three most popular sets of criteria focus on individual task outcomes, behaviours and traits. It is possible to evaluate employees' knowledge behaviours by making use of a 360-degree multirater assessment where the focus is on employee development. It provides feedback from the full circle of daily contacts that employees may have, ranging from immediate supervisor/manager, peers, direct reports (subordinates), customers and the self-evaluation. Such an assessment focuses on employees' behaviours and is an easier evaluation method than task outcomes because it is difficult to identify specific task outcomes that can be directly attributed to an employee's actions (Schenk 2003:362–363). This method increases the probability of achieving more valid and reliable evaluations (Schenk 2003:365). It would also be easier to motivate employees to perform knowledge behaviours based on the fact that several different people are assessing their behaviours. The performance gap can be used as a facilitating factor to increase the organisation's learning (Devos & Willem 2006:654), knowing, knowledge creation, sharing, transferring and application capabilities.

A factor that could play a role in terms of performance appraisals is ethical tension points (Von Glinow in Mauer, Lee & Mitchell 2003:305) between experts' professional and organisational interests. These tension points cause distinctions between professional and organisational commitment and often motivate individuals to balance their standards and obligations with the demands of a job. When professional and employer loyalties, in terms of, say, sharing expert knowledge, collide, it could be a significant factor in destabilising the employment relationship (Mauer et al 2003:305). Knowledge behaviours practised by individuals should sustain their own success and that of the organisation as a whole. When this does not happen, participants either withdraw or are expelled or the overall system becomes unstable and may reconfigure or collapse (Allee 2003:238).

People need to feel that they are being treated fairly and rewarded fairly in order to be willing to offer more value. They should behave with an ethic of giving and receiving value in a way that builds adequate trust and relationships (Allee 2003:238) without sacrificing their own professional standing (eg giving up valuable personal knowledge to their own disadvantage).

Evaluation systems are used to reinforce desired behaviours. According to Kerr (in DeFillippi & Ornstein 2003:33), people learn to perform the behaviours that are rewarded rather than those that are promoted as desired behaviours. This means that reward should be linked to observing the desired knowledge behaviours which, in turn, would enhance knowledge retention.

To summarise, HR policies and practices that enhance knowledge retention appear to focus on

- retaining the most knowledgeable people and retirees beyond retirement as part of the selection policies and procedures
- encouraging individual responsibility for own training and development, effective career development process that help build knowledge and effective mentoring and coaching processes focusing on allowing sufficient time and resources as part of the training and development policies and practices
- performance evaluation processes that include knowledge behaviours and support for individuals' knowledge behaviour successes without sacrificing on professional standing when displaying knowledge behaviours

3.5.6.4 *Organisational behaviour-enhancing factors to retain knowledge*

Based on the discussion on the factors that influence knowledge behaviours at organisational level, certain behavioural enhancers were identified that contribute to knowledge retention in an organisation (as indicated in secs 3.5.6.1–3.5.6.3). It would be necessary to measure the degree to which these behavioural factors exist in organisations to indicate the extent to which an organisation is retaining crucial knowledge. These factors at organisational level can be summarised as follows (tab 3.6):

TABLE 3.6
BEHAVIOURAL ENHANCERS FOR KNOWLEDGE RETENTION AT
ORGANISATIONAL LEVEL

ORGANISATIONAL LEVEL		
<p>Organisational culture</p> <ul style="list-style-type: none"> - Culture that values knowledge behaviours, namely learning, knowing, creating, sharing, transferring and applying knowledge with a focus on preventing knowledge loss and promoting knowledge retention (ie knowledge retention culture) - Values supporting a knowledge retention culture: <ul style="list-style-type: none"> - trust and respect - cooperation/collaboration - Openness and transparency - Innovativeness - Learning and individual development - Experienced teamwork - Caring - Fairness - Commitment 	<p>Organisational structure</p> <ul style="list-style-type: none"> - Organisation structured in a way in which interdependent parts of the organisation see problems and solutions in terms of systemic relationships, that is: <ul style="list-style-type: none"> - a structure that allows bridge building between disparate functions in the organisation (cooperation) - a structure that promotes interaction between members of communities (of practice/purpose) 	<p>HR policies and practices</p> <p>Selection policies and practices</p> <ul style="list-style-type: none"> - Employee selection policies and practices that focus on recruitment, retirement and retention, that is: <ul style="list-style-type: none"> - retention of most knowledgeable workers - retention of retirees beyond retirement <p>Training and development policies and practices</p> <ul style="list-style-type: none"> - Encouragement by managers to take responsibility for own training and development - Effective career development processes which help build the knowledge and competencies professionals and managers need to prepare for their future roles - Effective mentoring, coaching and apprenticeship processes that allow sufficient time and resources for these activities - Practices that take different workforce generations' experience and learning needs into consideration <p>Performance evaluation policies and practices</p> <ul style="list-style-type: none"> - Linking knowledge behaviours to performance evaluation processes - Performance evaluation processes that support individual success without sacrificing their own professional standing (eg giving up valuable personal knowledge to their own disadvantage)

It can be concluded that the above elements are the core of enhancing factors that would contribute to preventing tacit knowledge loss, on the one hand, and retaining knowledge, on the other, at organisational level in an organisation.

3.5.7 External forces of change

Modern organisations face a dynamic and changing environment which requires them to adapt in order to survive (Van Daalen & Odendaal 2003:404). Environmental forces require managers to implement comprehensive change programmes (Robbins 2005:548; Van Daalen & Odendaal 2003:403). The way in which organisations deal with these forces of change will influence the degree to which knowledge is lost or retained in organisations. Van Daalen and Odendaal (2003:404) and Briyball and Barkhuizen (2009:483) summarise six specific forces that act as stimulants of change, as highlighted in table 3.7 below.

TABLE 3.7
FORCES OF CHANGE AND THEIR IMPLICATIONS

Forces of change	Implications
<p>Nature of workforce</p> <ul style="list-style-type: none"> • Aging population – retirement of Baby Boomers (ie USA) (Robbins 2005:549) • Migration and emigration (SA) (Babb 2007:33) • Greater degree of cultural diversity in organisations • Increase in professionals • Many new entrants and many with inadequate skills 	<p>Need for</p> <ul style="list-style-type: none"> • Effective HR practices and effective knowledge retention • “as above” • Effective management of cultural diversity • Intellectual capital management • Strategic HR management
<p>Technology</p> <ul style="list-style-type: none"> • Faster, cheaper and more mobile computers • Total quality Management (TQM) • Re-engineering programmes 	<p>Need for</p> <ul style="list-style-type: none"> • Effective technology and relationship management • Effective implementation of the principles of TQM (Today’s learning organisation [Briyball & Barkhuizen 2009:496]) • Effective knowledge management
<p>Economic shocks</p> <ul style="list-style-type: none"> • Increased oil prices • Increased Petrol prices • Volatility of the South African rand • High inflation rate • US real estate collapse (Robbins 2005:549) • Electricity shortages • Attacks on the USA 	<ul style="list-style-type: none"> • Need for sustainable development and knowledge retention in the face of downsizing
<p>Competition</p> <ul style="list-style-type: none"> • Global competitors • Mergers and Acquisitions • Interorganisational alliances and networks (Behrend 2006:24) 	<ul style="list-style-type: none"> • Need for strategic planning, management and knowledge retention

Forces of change	Implications
<ul style="list-style-type: none"> • Growth and internet commerce 	<ul style="list-style-type: none"> • Need to attain business excellence
<p>Social trends</p> <ul style="list-style-type: none"> • Delayed marriages by young people • Increased divorce rates • Smaller families • Quality of life and increased focus on leisure • Popularity of sport utility vehicles • Attitude towards smokers • HIV/AIDS 	<ul style="list-style-type: none"> • Need for early recognition of market opportunity
<p>World politics</p> <ul style="list-style-type: none"> • Opening of markets in China • Postapartheid entry into the global arena (SA) 	

Note: Forces in blue apply specifically to knowledge loss risks.

Source: Adapted from Van Daalen & Odendaal (2003:404); Briyball & Barkhuizen (2009:483).

The forces of change that seem to apply specifically to knowledge loss are the nature of the workforce, economic shocks and competition, which are discussed below.

3.5.7.1 *Nature of the workforce*

The nature of the workforce seems to be having a profound impact on knowledge loss and retention in organisations. Besides the fact that the South African population is extremely **diverse**, consisting of blacks, whites, coloureds and Indians, speaking 11 different languages (Briyball & Barkhuizen 2009:482) which complicates knowledge creation, learning, knowing, sharing, transfer, and application, there is also the trend of emigration and migration, which is causing knowledge and skills loss to organisations. There has been a gradual upward trend in emigration since 1994 with an increase of 48.5% in 2003 (16 165 emigrants) compared with 2002, of self-declared emigration. Of the self-declared emigrants, 65.2% were economically active, with 26.7% of them in the professional category and 11.7% in the sales and clerical category. Reasons for this increase in emigration are thought to be globalisation, internationalisation of higher education, a rise in crime and poor economic growth. In 2008, the economic downswing and political instability in the African National Congress (the ruling party in South Africa) were mentioned as the reasons for an increase in emigration (Kloppers 2008:1). There is also a decrease in the number of professional immigrants to South Africa (Babb 2007:33).

In the USA, it is projected that 25% of the current workforce will be **retiring** by 2010. According to Foster (2005:29), the elderly population is growing worldwide and the

workforce is shrinking. In Europe, for example, the pool of workers in the 35 to 44 age group (Generation X) is expected to shrink by 19% in the UK and 27% in Germany. In Japan, it will shrink by 10% and in China by 8%. In the USA, this age group will decline by 19% by 2010 and these are the people normally expected to move into senior management ranks. A survey conducted by Accenture (Employee knowledge and experience at risk in US 2005:9) of more than 500 full-time US workers between 40 and 50 years found that nearly half (45%) of the respondents' organisations do not have formal workforce planning processes and tools in place to capture their workplace knowledge. Moreover, 26% said that their organisations would let them retire without any transfer of knowledge. Only 20% percent stated they anticipated an intensive, months-long process of knowledge transfer prior to leaving, 28% mentioned that they believe the knowledge-transfer process will last one or two weeks and 16% believe that they will simply have an informal discussion with others in the organisation before they retire. South Africa is also faced with fairly large numbers of workforce retirements. Recent statistics suggest that 16.7% of South Africans are between the ages of 40 and 64 (Retire early, live long 2008:3).

The large increase in turnover due to the changing workforce can disrupt the efficient running of an organisation when knowledgeable and experienced people leave and new people, often with inadequate skills, must be found and prepared to assume positions of responsibility (Robbins 2005:28). These factors intensify the need for effective HR practices to manage intellectual capital and a knowledge retention strategy.

Changing *technology* has an impact on organisational structures, for example, the substitution of computer control for direct supervision, which is resulting in wider spans of control for managers and flatter organisations (Briyball & Barkhuizen 2009:482). The focus in this research is not on technology as such, but on the retention of tacit knowledge. Today's learning organisation has become what TQM was to the 1980s and re-engineering was to the early 1990s (Briyball & Barkhuizen 2009:496). According to Devos and Willem (2006:649), the learning organisation and knowledge management are closely related and are forms of organisational change. In this respect, a knowledge retention strategy would address the need of preventing knowledge loss in a learning organisation.

3.5.7.2 *Economic shocks*

Economic shocks have continued to effect organisations by imposing internal changes. Since the mid-1980s up to 2003, the price of a barrel of crude oil has averaged US\$25 per barrel. In 2008, the price reached a high of US\$115.07 per barrel. The world is currently experiencing the impact of a financial recession. South Africa faces a volatile rand and high inflation rate and these factors are leading to downsizing and retrenchments (Briyall & Barkhuizen 2009:482), which could result in serious knowledge loss and expertise by the organisations (Duhon 1998:3; Pickett 2004:248). It has been reported that companies such as Ford SA and BASF, South Africa's mobile emission catalysts division, have offered voluntary retrenchment packages to their staff because of the current poor world economy (800 retrenchments of 4 000 employees at Ford and 50 to 60 at BASF) (Cillié 2008:1; Mawanda 2008:4). Some of the consequences of downsizing and the resultant knowledge loss are that in voluntary reductions in the work force, the most knowledgeable people seem to leave first; social networks that speed up the flow of knowledge across the organisation are damaged; trust is undermined with some people seeing layoffs as the breaking of an implicit social contract and responding by withholding knowledge that is critical to organisational success; loss of thinking time and time for sharing knowledge because of increased pressure to be more productive; cutting projects that the organisation deems as nonessential, such as knowledge management efforts, directly contributing to increased knowledge loss and stagnation (Lesser & Prusak 2001:101–102). These consequences clearly indicate the need for sustainable development and a knowledge retention strategy to remain competitive and successful.

The current world recession has impacted on many South Africans who have emigrated to countries such as the USA and the UK where there is downsizing in organisations. Many of these South Africans are now returning and are hoping to find jobs in South Africa. This creates the opportunity for South African organisations to address areas in which there are skills shortages (Philp 2008:5) in order to retain knowledge.

3.5.7.3 *Competition*

Global *competition* and the growing popularity of interorganisational alliances and networks have accelerated the need for organisations to cooperate across geographical and legal boundaries. According to Behrend (2006:24), “cooperative-cum-competitive’

businesses may experience deviation between intended and actual knowledge flows". Partners have different perspectives on the direction and boundaries of the knowledge component in their exchange relationship. Despite well-designed contracts, competitors might try to pull tacit knowledge on top of the explicit knowledge that was specified in the contract. Conflicts may arise between product delivery contracts and technology transfer contracts. A considerable amount of knowledge has to be provided, on the one hand, but the know-how has to be protected, on the other. As organisations or project partners engage in these fluidly evolving exchange processes, there is a need for "adjustable and flexible control strategies, which are embedded in relational contracts that broadly outline areas of exchange and codes of conduct" (Behrend 2006:24) to attain business excellence (Briyball & Barkhuizen 2009:483). This requires transparency with respect to the tacit assets at stake, taking the degree of collaboration at the time into consideration. Behrend (2006:25) explains this as follows: "For example, the more interconnected a multi-stakeholder delivery project is and the more inherent knowledge imbalances exist, the higher the risk of potential knowledge misuse or loss."

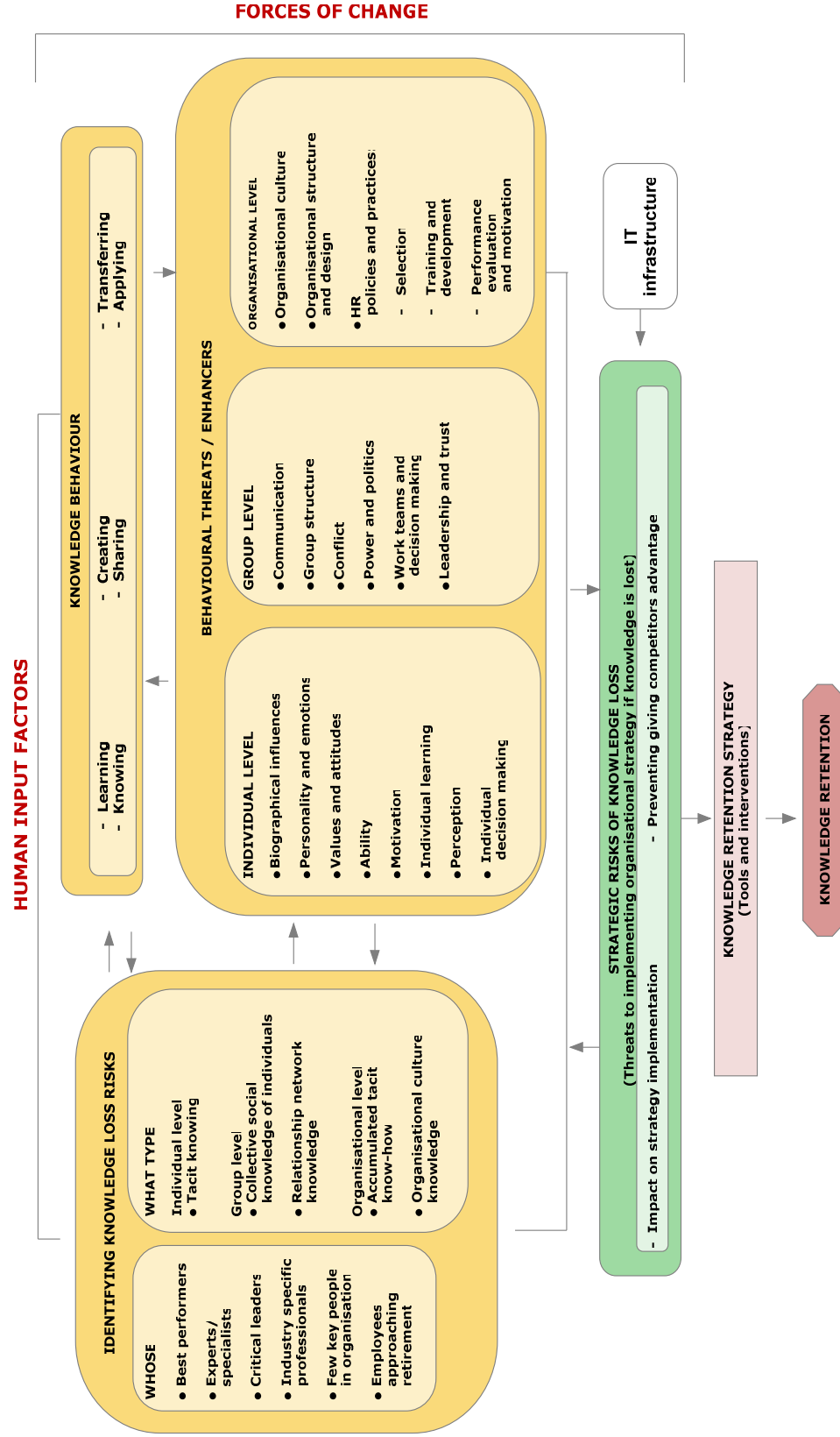
It would appear that the **forces of change** that could have a profound impact on the knowledge lost as opposed to that retained in organisations, are in particular the nature of the workforce, economic shocks and competition. It is clear that these factors imply a need for effective HR practices, effective management of cultural diversity and intellectual capital, sustainable development, strategic planning and specifically a knowledge retention strategy.

3.6 MODEL OF FACTORS THAT INFLUENCE KNOWLEDGE RETENTION

A model can be described as an abstraction of reality, a simplified representation of a certain world phenomenon (Robbins 1998:22). Models provide a framework of visualising action (Birdsall & Hensley 1994:159) and a starting point of experimentation to gain better insight into circumstances (Jankovicz 1991:134). A model offers a representation of the dynamics of a phenomenon by displaying the main elements in a process in a simplified way. It should be realised, however, that a model is only a partial representation of a phenomenon. The most obvious aspects of the model are emphasised (Mouton & Marais 1990:143).

Based on the investigation of the manifestation of knowledge in organisations in the context of knowledge loss and retention, it is possible to develop a model that identifies the factors that need to be taken into consideration when addressing the issue of knowledge loss. This theoretical model is depicted in figure 3.9.

FIGURE 3.9: ORGANISATIONAL AND BEHAVIOURAL FACTORS THAT INFLUENCE TACIT KNOWLEDGE RETENTION



The model portrays, firstly, that **external forces of change** such as the nature of the workforce, economic shocks, competition and a world recession do have an influence on the retention of knowledge in an organisation. The forces of change exist in the external environment of organisations and affect the internal operations of organisations. This implies that organisations need to manage in the organisation the changes that these forces bring about and be aware of the impact of work stress conditions on knowledge behaviours and organisational effectiveness. Secondly, human input factors play a role in the organisation in terms of knowledge loss as opposed to knowledge retention.

The following three main components of the **human input factors** have emerged in this research:

- the manifestation perspective of knowledge in both mind and body pertaining to identifying the knowledge loss risks (ie carriers of knowledge in terms of whose and what type)
- the behavioural perspective (knowledge behaviours, threats and enhancers)
- the organisational perspective (strategic risks of knowledge loss)

The manifestation perspective of knowledge in the carriers of knowledge, which are the people employed in the organisation, was regarded as an organisational factor in order to separate it from the behavioural factors and was therefore included in the discussion on organisational factors in section 3.4.

One component of the model, namely the behavioural threat/enhancer component is based on the organisational behaviour model of Robbins (2005) pertaining to the behavioural threats that could impede or enhance knowledge retention. It is clear that several factors need to be taken into consideration to combat the loss of tacit knowledge. The knowledge loss risks should be determined in terms of whose knowledge and what type of knowledge is at risk of loss. The knowledge behaviours need to be demonstrated to contribute to knowledge retention. The behavioural threats manifesting from demonstrating the knowledge behaviours could cause knowledge loss, whereas behavioural enhancers could bring about retention of critical tacit knowledge. In turn, these behavioural enhancers or threats would affect the manifestation of the knowledge behaviours. The behavioural factors manifest at individual, group and organisational level

and are interlinked in many instances. Owing to the complexities involved it is difficult to depict these links in the diagram. All these human input factors have an impact on the implementation of the organisation's strategy and it is therefore essential to determine the strategic risks of losing knowledge. The strategic risks, in turn, would have an impact on the human input factors, say, when knowledge needed to be innovative is lost, the creation of new knowledge would be difficult. It would be difficult for an organisation to implement its strategy if critical knowledge were lost.

Taking all the above factors into consideration, it might be possible to determine the extent to which these factors have an impact on possible knowledge loss. Once the inhibiting factors that would prevent knowledge retention have been identified, a knowledge retention strategy could be implemented with the intention of retaining critical tacit knowledge in the organisation, thus ensuring organisational effectiveness and competitive advantage. As part of a holistic approach to knowledge retention, the IT infrastructure element cannot be totally ignored and certain IT tools might be implemented to assist in retaining tacit knowledge.

3.7 SUMMARY AND CONCLUSIONS

The purpose of this chapter was to conceptualise and contextualise the constructs of knowledge loss and retention and determine the factors that could give rise to knowledge loss in organisations. Knowledge loss was defined as the decreased capacity to solve problems, make decisions and perform effective actions through capabilities repeatedly demonstrated in particular situations in the organisation. Knowledge retention was defined as maintaining and not losing knowledge that exists in the minds of people and knowing that is vital to the organisation's overall functioning.

The organisational knowledge loss risks pertaining to the strategic impact of knowledge loss and the carriers of knowledge in terms of whose knowledge and what type of knowledge should be retained were discussed. Knowledge could be lost at cognitive level (learning and knowing) and during the construction phases (creating, sharing, transferring and applying knowledge). These knowledge processes manifest in certain knowledge behaviours and the enhancing or impeding behavioural factors that drive these behaviours were explained. The organisational behaviour model of Robbins (2005:32) was used to determine these influencing factors at individual, group and organisational level.

Based on all the factors identified in this research that would influence knowledge loss, on the one hand, and knowledge retention, on the other, a model was developed to provide a framework of the factors that need to be taken into consideration to combat knowledge loss. These factors are mainly organisational and behavioural focusing on the human perspective of knowledge loss and retention and are influenced by external forces of change. In chapter 4 this model will be operationalised and tested in an organisation.

CHAPTER 4

EMPIRICAL RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The purpose of this chapter is to discuss the empirical research with the focus on aims 1 to 4 formulated in section 1.4.2 in chapter 1. The theoretical study revealed that certain factors need to be considered in order to retain knowledge in organisations. These factors pertain to determining whose and what type of knowledge is at risk of loss, behavioural threats and the strategic risks of knowledge loss. The purpose of the research study is to empirically determine by means of quantitative research the degree to which these factors enhance or impede knowledge retention in an organisation. The constructs that were conceptualised in the theoretical study were operationalised to determine the degree to which the independent variables influence (enhance or impede) the dependent variable "knowledge retention". The dependent variable will change as a result of variations in the independent variables (Welman & Kruger 2001:13-14).

Ultimately, the purpose was to develop a structural equation model of knowledge retention to verify the theoretical model. The research design, research method (population and sample design, instrument development and data collection) and statistical analyses (descriptive statistics, factor analysis and structural equation modelling) to achieve the aim of this study are subsequently discussed. The discussion focuses on guidelines found in the literature and application thereof by the researcher in order to achieve the empirical research aims. The exploratory principal component factor analysis used in this research to identify the factors that influence knowledge retention and the structural equation modelling (SEM) technique used to develop the knowledge retention model will be discussed in depth.

4.2 RESEARCH DESIGN

In chapters 2 and 3 a conceptual analysis was undertaken to describe the organisational factors that could cause knowledge loss in organisation, on the one hand, and effect knowledge retention, on the other. A theoretical model was designed to explain these phenomena as accurately as possible.

The survey method was deemed to be the most appropriate empirical research method to obtain the research aims. The survey method provides an overview of a representative sample of a large population (Mouton 2001:152). The survey method is a cost-effective method compared with, say, conducting interviews and focus groups, and was agreed to and accepted by the organisation in which the survey was to be conducted, in terms of feasible given time, resource and organisational constraints (Brewerton & Millward 2001:68). The quantitative data to be collected in the survey process would enable the researcher to measure the extent to which certain organisational and behavioural factors influence knowledge retention in an organisation. Furthermore, quantitative data could be used to conduct multivariate statistics in an attempt to develop a new model based on the empirical results and compare it to the theoretical model.

The purpose of the survey method in this research was to operationalise the constructs described in the theoretical model by compiling a questionnaire and diagnosing the degree to which knowledge is retained in an organisation (Babbie 1998:107, 109). The specific aims of the empirical research were to

- (1) determine statistically the enhancing or impeding organisational factors that influence knowledge retention
- (2) compile a structural equation model to verify the theoretical model and determine whether any new constructs emerged

The ultimate aim was to develop a knowledge retention tool (questionnaire) that could be used in organisations to determine the extent to which they retain knowledge in order to be sustainable, grow and remain competitive.

According to Mouton (2001:177), the main sources of error in model-building studies relate to the assumptions made in specifying the model and the incorrect use of statistical procedures. Mouton and Marais (1990:35) and Sekaran (1992:92) argue that the research design should be structured in a way that will enhance the validity of the research findings. The empirical research method steps are consequently described in terms of the questionnaire design, sample design, data collection methods, data-capturing methods and statistical analyses explaining how the validity of the research findings could be enhanced.

4.3 RESEARCH METHOD

The survey research method involves the administration of a questionnaire to a sample of respondents (Babbie 1998:8). Church and Waclawski (1998:5) define a survey as “a systematic process of data collection to quantitatively measure specific aspects of organizational members’ experience as they relate to work”. The strengths of survey research are high measurement reliability if the questionnaire construction is done properly and high construct validity if proper controls are implemented. Possible limitations relate to survey data sometimes being sample and context specific (Mouton 2001:153).

The purpose of the questionnaire designed for this research was to explore employees’ attitudes and behaviours in their day-to-day work experience (Church & Waclawski 1998:12) regarding knowledge retention. The process followed to design the measuring instrument is described below.

4.3.1 Questionnaire design

The measurement process for quantitative research follows the sequence of first conceptualising, then operationalising, followed by measuring, in order to collect data (Neuman 2000:161). Conceptualisation is the process whereby the meaning that will be used for particular terms are specified (Babbie 1998:120). Conceptualisation in this research was done by developing a theoretical model based on a literature study on the concept of knowledge, behavioural and organisational factors that would cause knowledge loss, on the one hand, and knowledge retention, on the other. These concepts were then operationalised in worded items as a measuring instrument.

According to Neuman (2000:163), quantitative operationalisation refers to the researcher operationalising variables by turning a conceptual definition into a set of operations or procedures to be used subsequently in data collection. The survey instrument (questionnaire) in this research was designed by converting definitions of constructs (the variables) into a questionnaire format and making use of and adapting a few measures that had been validated by other researchers (Wei, Stankosky, Calabrese & Lu 2008:226-227). The definitions of constructs (the variables) were summarised in chapter 3, tables 3.1, 3.2 and 3.4. Statements were formulated to operationalise the constructs. The

researcher went through a rigorous process of question/statement formulation in six draft versions to finally construct the questionnaire that was pretested before actually administering the survey.

4.3.1.1 *Purpose of the survey instrument*

The purpose of the survey is its hoped-for outcome (Fink 2003:8). In this research, the intended (hoped-for) outcome was to determine the extent to which the organisational factors identified in the literature review would enhance or impede knowledge retention in an attempt to combat knowledge loss. The more specific aims were to formulate statements/questions that would indicate the extent to which the organisation identifies the risks of losing knowledge in the minds of people in terms of

- the impact of lost knowledge on strategy implementation
- whose and what type of knowledge
- the behavioural threats versus enhancers to knowledge retention
- an awareness of the impact of external forces on knowledge retention, although the last factor was not specifically measured in the survey

The focus of the survey was not on knowledge that can be easily documented (explicit knowledge), but in a holistic approach to managing the knowledge in an organisation, this type of knowledge cannot be totally ignored. The focus of the survey was thus based on the knowledge that accumulates over time through the experience of its individual employees and that is critical to the organisation's overall functioning and competitive advantage.

To ensure that the respondents had absolute clarity on the meaning of terminology used in the questionnaire, the following **definitions** were included in the questionnaire:

- **Knowledge** is defined as the knowledge (expertise) that exists in the minds of people, their work experience and the application of their knowledge in the work situation, which if lost to the organisation, could be detrimental to the functioning and competitive advantage of the organisation.

- **Knowledge retention** is defined as maintaining, not losing, important knowledge that exists in the minds of people (not easily documented) and that is relevant to the overall functioning of the organisation.
- **Our team** refers to the group of colleagues you work with on a daily basis.
- **My manager** refers to the person to whom you report directly.
- **Our customers** refer to internal or external customers.
- **Diverse backgrounds** refer to factors such as job level, education level, length of service and language

4.3.1.2 *Selecting areas for statement formulation*

Questionnaire construction can follow different approaches depending on the purpose of the research and involves the areas that need to be focused on when formulating the questions. According to De Vaus (1986:70), the research problem will affect which concepts need to be measured. The design of the questionnaire in this research was based on the theoretical model that was developed. Since this was an explanatory research process, the following aspects of constructing questionnaires which De Vaus (1986:71) specifies, assisted the researcher in designing statements:

- Measures of the **dependent variable** clarified what it was that the researcher was trying to explain. In this research, the dependent variable was knowledge retention.
- Measures of the **independent variables** covered statements that tap each of the causal variables such as the behavioural factors that would enhance or impede knowledge retention.
- **Background measures** had to do with characteristics such as age in terms of the generation gaps, gender, race groups, education levels, home language, job levels, departments and sections in the organisation. These measures would enable the researcher to determine whether patterns differed for various

subgroups. The above background measures were selected on the basis of the literature review findings of the researcher about characteristics that would influence knowledge retention in organisations.

4.3.1.3 *Measures of other authors*

In the literature study, the researcher encountered some statements (measures) that were used by other authors which could be adapted for use in the survey instrument. These items pertained to the following:

- The following two statements from the Trust Relationship Audit by Martins and Von der Ohe (2002) were used in several follow-up surveys, the last one conducted in 2008: "I trust my team members" and "My team members trust me" were changed to the statement: "Staff members in my team trust each other". This formulation was meant to indicate whether team members observe trusting relationships in their teams.
- The following three statements developed by Bock et al (2005:108) referring to "My department ..." were used in the context of "Our organisation ...", namely:
 - Our organisation encourages suggesting ideas for new opportunities.
 - Our organisation places much value on taking risks even if it turns out to be a failure.
 - Our organisation encourages finding new methods to perform tasks.
- The statement: "Our organisation supports interaction between those who share a concern/passion about a topic" was formulated on the basis of the definition of Wenger et al (2002:4) of communities of practice as an organisational structure that could contribute to knowledge retention. Their definition of communities of practice is: "... groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis".

4.3.1.4 *Formulating the questionnaire*

The formulation (wording) of questions is fundamental to ensure that the questions are phrased clearly and unambiguously. Questions can be formulated as questions or as statements, depending on the type of data the researcher wishes to collect. Closed-ended statements that provide respondents with preselected answers from which to choose are used in the survey instrument. Closed-ended statements produce standardised data that can be analysed statistically. Statistical analysis is essential for making sense of survey data. The answers also provide a better chance of being reliable or consistent over time. Closed-ended statements are easy to standardise (Fink 2003:36–37). Although open-ended questions provide richer explanatory data, they are more difficult to analyse (compare and interpret) (Fink 2003:36) and were not part of the purpose of this research.

The following factors were considered in formulating the statements:

- keeping the language simple, unambiguous and clear by avoiding jargon and technical terms (De Vaus 1986:71–72; Booysen 2003:132)
- avoiding double-barrelled questions by asking one concept per item (De Vaus, 1986:72)
- avoiding leading and biased questions that could lead respondents in a direction of a particular answer trying to ensure that respondents can give any answer without feeling that they are giving a wrong answer or a disapproved-of response (De Vaus 1986:72; Booysen 2003:134)
- phrasing questions positively by avoiding use of the word "not" which is negative and can be difficult to understand (De Vaus 1986:72)
- clarifying the meaning of the context (ie individual, group or organisational level) in which the question is to be answered by use of the following words: "Our organisation"; "In our team"; "Our team members"; "Our team"; "My colleagues"; and "My manager". The "team" has become the universal organisational unit, is "vested with high importance and advantages, and accounts for organisational

service tasks in many work settings and industries” (Fang et al 2005:66). This is why many of the questions in the survey instrument refer to “team”.

- avoiding questions that require specialised knowledge (De Vaus 1986:72), but questions that relate to their daily working environment and their views on strategy implementation and knowledge loss risks

4.3.1.5 *Measurement*

Measurement enables researchers to describe the characteristics of an entity, make comparisons and determine whether any changes have occurred. Measurement can be defined as “... the assignment of numbers or numerals, according to fixed rules, to persons or objects in order to reflect differences between them in the attribute or characteristic of interest” (Huysamen in Uys 2003:118). In quantitative research, data are collected that can be presented in the form of numbers, in other words representing some measurement. This provides an answer to the question “How much?” (Uys 2003:118-119) or how an individual feels or thinks about something (Neuman 2000:180).

In the current research, nominal measurement (if people can be divided into different mutually exclusive categories according to the measurement) was used for the demographical/biographical questions such as age, gender, race, education level and others. The people in a particular category are then similar to one another according to the characteristic that is measured and differ from those who are placed in another category (Uys 2003:119).

Scales are used as a technique for measuring variables (Neuman 2000:182). A scale is a measure in which a researcher captures the intensity or direction or level of a variable construct (Neuman 2000:176). Responses are arranged on a continuum and are generally at the ordinal level of measurement (Neuman 2000:176). The Likert scale (developed by Rensis Likert in the 1930s to provide an ordinal level measure of a person’s attitude [Neuman 2000:182]) with five categories was used in this research. This scale was used to determine the relative intensity of different items (Babbie 1998:183). The scale categories are represented in table 4.1.

TABLE 4.1
LIKERT SCALE USED IN THE QUESTIONNAIRE

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5

Respondents had to indicate the degree to which they agreed or disagreed with the statement. The middle alternative was used to allow respondents to select this option if they were uncertain whether to disagree or agree. As early as 1944, Rugg and Cantril (Converse & Presser 1986:36) argued for offering the middle alternative “in that it provides for an additional graduation of opinion”. Some researchers purposely omit a middle alternative in order to force respondents into one of the polar positions (Schuman & Presser 1981:177), but it is quite possible that respondents might omit answering questions of which they are unsure, resulting in missing values, which tends to complicate the analysis of the data. In the current research, the middle value could be interpreted as a negative response because people were not in a position to take a stand or did not know, which could indicate a need for intervention towards improvement of the particular aspects in the organisation.

A no-opinion option such as “Don’t know” was not included in the scale because experimental research shows that many more people will select this option when that alternative is explicitly offered than when it is not (Converse & Presser 1986:35).

4.3.1.6 Length of the questionnaire

For the purposes of the current study, two methods of distribution were used, namely a paper format to be completed by employees who did not have access to the internet and an electronic format on the web, which required internet access. Paper and electronic surveys are directly affected by length. Sudman and Bradburn (1982:227) and Neuman (2000:265) argue that on highly salient topics and with well-educated respondents, questionnaires of 12 to 16 pages are possible without serious losses in cooperation. Beyond this point, noticeable drops in cooperation occur. For example, when the length of a questionnaire is increased from 16 to 32 pages, cooperation declines to about 60%. Neuman (2000:264) argues that there is no absolute proper length and that some

researchers have had success with questionnaires as long as 10 pages (about 100 questions).

In the current research, the questionnaire in paper format was 11 pages in length, consisting of nine demographical/biographical questions and 88 statements with a Likert scale. The questionnaire was programmed in an electronic format for the respondents with computers.

4.3.1.7 Layout of the questionnaire

Since the questionnaire's appearance persuades the respondents to participate and should leave them with a positive feeling about the survey and a sense that their participation is appreciated (Neuman 2000:270), the overall physical layout of the questionnaire and the format of questions and responses need to be clear, neat and easy to follow (Neuman 2000:269). Types of instructions to be included in a questionnaire are the general instructions explaining the purpose of the questionnaire, assurance of confidentiality and how and when to return questionnaires. Each section in the questionnaire should also have clear instructions (De Vaus 1986:80). The sequencing of questions is important in that respondents might become confused, irritated and alienated if the questions are incoherently strung together. Questions should follow one after the other in a logical order (Booyesen 2003:138) and moving from easy to more difficult questions (De Vaus 1986:81).

The questionnaire in the current research was designed in a paper format and an electronic format hosted on the internet for users with access to personal computers and the internet. The paper format allowed for a cross or tick to be made in the applicable check box. The electronic format allowed for a click with the mouse in the applicable check box. A different set of general instructions was developed for each of the two formats to ensure that the respondents understood the purpose of the questionnaire, how they were to respond to the survey, by when the questionnaire had to be completed and how their answers were to be submitted. At the end of each questionnaire, the respondents were thanked for their participation. Questions were asked in a logical order starting with easy questions and grouping those relating to the organisation, team and individual together to ensure an easy flow of questions.

4.3.1.8 *Pretesting the questionnaire for validity*

The final stage of questionnaire design and construction process is that of pretesting or a pilot study. Several experts (Babbie 1998:159; Booyesen 2003:140; Welman & Kruger 2001:141) agree that pretesting a questionnaire is essential and it may be conducted on a small sample or on five to ten experienced researchers or experts in the field, or subjects from the same population as that for which the eventual survey is intended. Babbie (1998:159) argues that it is not essential that the pretest subjects comprise a representative sample, although people to whom the questionnaire is at least relevant should be used.

It is not uncommon to have four to seven drafts before the process of pretesting the questionnaire starts. Pretests are conducted once the researcher comes up with the completed questionnaire. Various pretests may lead to further drafts. The researcher should carefully consider all the comments of the respondents who participated in the pretest because they are often insightful and helpful, but he or she need not accept all comments (Booyesen 2003:140).

Measurement validity of the questionnaire might be obtained in this phase through **face validity**. It is a judgement of the scientific community that the indicator really measures the construct. One could ask whether on the face of it, experts do believe that the questions measure the different constructs specified by the researcher (Neuman 2000:168).

Before the pretesting phase in this research, the researcher worked through six drafts while operationalising the concepts into statements that would measure the concepts. The first phase in the pretesting phase that the researcher followed was to ask specialist in the disciplinary fields of this research (organisational behaviour and knowledge management), namely two industrial psychologists and two knowledge management and information science specialists to pretest the questionnaire. This group made recommendations to improve the questionnaire and established that the questionnaire was valid on the face of it.

After adapting the questionnaire, the next phase was to ask experts from the same type of population for which the survey was intended to pretest the questionnaire. This group consisted of two IT specialists, a medical doctor, a mechanical engineer and an HR

manager. This group of experts established whether the questionnaire was clear and understandable to them, and easy to complete. In total, the two groups comprised nine people, all of whom work in organisations where knowledge loss could be an issue. The purpose of a pretest was to

- reduce the questionnaire down to an appropriate length
- test questions for difficulty of comprehension
- clarify the instructions
- critically analyse question wording, question order and redundant questions (Booyesen 2003:140).

After careful consideration of the second pretest group's comments, the questionnaire was adapted and finalised to be administered in the organisation that gave the researcher permission to conduct the survey in exchange for a written report and presentation to the executive committee of the organisation. The paper format of the questionnaire was finalised (see appendix) and the questionnaire then programmed in an electronic format to be hosted on the internet.

4.3.1.9 Content and construct validity

The concept of validity of a measurement tool refers to the degree to which an instrument actually represents what it purports to represent. It is a multidimensional concept comprising different forms of validity (Brewerton & Millward 2001:90). Face validity was discussed above. The other two forms that were applicable to the current research are content and construct validity.

To determine whether a measurement tool is **content valid**, a thorough analysis of the target domain is required, usually drawing on expert judgement from appropriate sources (Brewerton & Millward 2001:90). Babbie (1998:134) refers to content validity as "how much a measure covers the range of meanings included within the concept".

To ensure content validity, the researchers compiled the items in the measurement tool drawing from the theoretical study on the factors that could have an impact on knowledge retention in organisations. The team of experts in the disciplinary fields assessed the content validity of the instrument to ensure that the domain was adequately covered.

Construct validity refers to determining the degree to which the different indicators of the measurement provide corresponding results (Uys 2003:124). It is closely related to theory development and testing, with an instrument being assessed while its underlying theoretical concepts are being rigorously investigated (Brewerton & Millward 2001:92). Factor analysis is often used to determine construct validity (Uys 2003:124). Validation of the factor analysis constructs will be discussed in more depth in the statistical analysis section (sec 4.4.2.6).

4.3.2 Sample population

Since the purpose of the survey was to determine the factors that enhance or impede knowledge retention in organisations, the sample population should come from an organisation, which is a system of two or more persons, engaged in cooperative activities, working towards the same goal (Champoux 2006:6, 16). For the purposes of this investigation, three organisations were contacted to possibly participate in the survey, two of which declined for various reasons. The HR director of a large organisation in the water industry granted the researcher permission to conduct the knowledge retention survey in the organisation. The research purpose, measuring instrument, survey process, indirect costs to the organisation such as their time and effort should they participate in the survey, the value of the survey and who should participate in the survey (sample) were explained and discussed with the project team. A proposal document was submitted to the CEO of the organisation to obtain his permission and support for conducting the survey. It was agreed that the organisation would receive a full report with survey results, interpretations and recommendations that could be considered to improve knowledge retention, in return for the privilege of conducting the survey in the organisation.

The next phase was to send a communiqué by the CEO explaining the purpose of the forthcoming survey, possible benefits the organisation could derive from the survey and the importance of participation to obtain meaningful results. The sample group subsequently received an email invitation to participate in the survey and submit their responses.

4.3.2.1 Sample design

The decisions that a researcher has to make about the population and sample of the particular population are directly influenced by the nature of the research problem and the

type of research design that will be used (Uys & Puttergill 2003:109). The sample must reflect the characteristics of the group the researcher wishes to make statements about. Sampling is the process through which it is decided who will be observed (Uys & Puttergill 2003:108).

There are two main types of sampling, namely probability (or random) sampling where all members in the population have a known chance of selection (Brewerton & Millward 2001:115) reflecting the variation in the population (Uys & Puttergill 2003:109), and nonprobability sampling where it is not possible to select the kinds of probability samples (such as random, systematic and stratified sampling [Brewerton & Millward 2001:116]) used in large-scale social surveys (Babbie 1998:194). Nonprobability sampling includes snowball, purposive, quota and convenience sampling techniques (Babbie 1998:195–196; Brewerton & Millward 2001:117–118).

In the current research, the nonprobability sampling method, namely purposive sampling, was chosen to compile the sample. Purposive sampling is appropriate when the researcher wishes to select unique cases that can provide special information (Uys & Puttergill 2003:113). The sample was selected on the basis of the researcher's knowledge of the population, its elements and the nature of the research aims, in short the researcher's "judgment and the purpose of the study" (Babbie 1998:195).

The purpose of this research was to determine the degree to which the organisation retains the knowledge and expertise that accumulates over time through the experience of its individual employees and that is critical to the organisation's overall functioning and competitive advantage. Some of the questions in the questionnaire were at a strategic level, and it may not have been possible for employees at lower levels in the organisation to answer. After a discussion with the organisation's project team, it was decided to limit the sample to supervisory level, the middle, senior and top management levels, as well as specialists (IT, researchers, HR, engineers, etc) in the organisation. The reasoning here was that they would have a sound understanding of knowledge retention behaviours, influencing factors and strategic impact that knowledge loss could have on their organisation. The size of the population based on these sample specifications was 1 070 in the participating organisation and included all employees from levels 18 upwards on their job levels grading system.

4.3.2.2 *Sample size*

One of the research aims was to apply statistical analyses to the data, implying that total sample sizes will significantly influence the accuracy of results reported by statistical tests. “This is due to the statistical ‘power’ required to report significance or non-significance accurately, taking into account type of statistical test, effect sizes observed by the research, significance level employed and sample size” (Brewerton & Millward 2001:118).

The researcher decided to invite all members of the population as specified (1 017) to participate in the survey, in the hope of collecting a sufficient number of respondents to make the statistical analyses possible. Of the 1 017 possible observations, after cleaning the data, the final number of observations was 455 (as indicated in sec 4.3.4).

The sample size is related to the degree of representativeness demanded. The data collected in this survey complied with the following guidelines and were therefore deemed sufficient to achieve the aims of the research:

- The number of variables being studied plays a role in that an increase in the number of variables implies an increase in the size of the sample. There were 88 statements in the questionnaire and 455 observations were received, complying with the general rule that a minimum of **at least five times** as many observations as there are variables to be analysed, should be obtained (Hair, Anderson, Tatham & Black 1995:373). The more acceptable range would be ten respondents for each variable (Uys & Puttergil 2003:114).
- In order to conduct **multivariate statistics**, the 455 observations received, complied with the preferable sample size of 100 or larger needed to factor analyse (Hair et al 1995:373), or at least three times the number of observations as items required for exploratory factor analysis (principal component) as suggested by Brewerton and Millward (2001:149). As explained above, five times the number of observations was received. Uys and Puttergill (2003:115) argue that a sample of at least 200 is required to ensure meaningful analyses. Based on these different guidelines, the data received would be sufficient to conduct multivariate analyses.

- As argued by Uys and Puttergil (2003:115), the size of the **sample is proportional to the size of the population**, based on the population specified by the researcher and the organisation (1 077 at supervisory, management and specialist levels) and the number of observations received (455, which was a 42.2% response rate). The sample size needed to be representative of a given population of 1 100 is 285 observations (Kregcie & Morgan 1970:608). Neuman (2000:217) estimates a sample ratio of a small population of 1 000 at about 30% (ie 300 respondents) required for a high degree of accuracy.

Based on these guidelines, the number of observations received was sufficient to ensure a high degree of accuracy, enabling the researcher to conduct the necessary multivariate statistics to achieve the aims of the research.

4.3.3 Data collection

A decision that needs to be made in the survey administration and data collection process is the method or type of administration desired. The choices are not mutually exclusive and more than one method can be employed to administer the survey and collect the data (Church & Waclawski 1998:122). The methods chosen should be appropriate to the research objective; able to elicit a form of data that would address the research question; feasible to the organisation in terms of time, resources, requirements and organisational constraints; ethically sound, agreed to and accepted by the organisation (Brewerton & Millward 2001:68). The anonymity (protecting the subjects' privacy) and confidentiality of participants (protecting the identity of specific individuals) (Neuman 2000:98-99) are crucial to the ethical administration of the survey and data collection process. Adherence to the above is discussed in sections 4.3.4.1 to 4.3.4.3 below.

4.3.3.1 Survey administration project plan

Well-defined goals and objectives outlined in a survey administration project plan helped lead the researcher through the different stages of the survey administration and data collection process. These goals and objectives drove the entire survey process. The project plan should consist of details of when the survey will be launched, to whom, the method(s) to be used and the length of time the respondents will have to complete and return the questionnaire. This plan also provided the opportunity to clarify the specific

roles and responsibilities of each of the parties involved in the process (Church & Waclawski 1998:116).

The researcher discussed the project plan with the HR department project team and it was approved by the HR director and CEO. The project plan consisted of time frames (the start and end dates for each step in the process), specified who was responsible for each step and covered the following broad steps:

- approval of the project and determining the target population and method(s) of survey administration
- testing the survey instrument for face and content validity
- the communication process
- finalising the paper and electronic format of the survey
- the distribution process for paper and electronic formats
- data analysis and reporting (including graphical representation and a written report with interpretations and recommendations)
- presentation of results to the project team and top management team

Once the project plan had been approved, the researcher liaised with the IT manager and the HR project team regarding the survey administration process. The invitation to participate in the survey was compiled by the researcher, adapted by the HR project team and approved and signed by the CEO before it was sent via email to participants. A time period of two weeks was allowed for completion and collection of the questionnaires. A reminder was sent out to encourage sample members to participate in the survey, and another two weeks was allowed for data collection in an effort to collect as many completed questionnaires as possible. After the analysis of the data, the preparation of the report and the presentation of the results, the report was delivered to the HR project team, the company secretary and the knowledge management manager.

4.3.3.2 *Method of survey administration and data collection*

The researcher needed to decide what method(s) of survey administration and data collection would be suitable to meet the aims of the research. The methods of survey administration could be to individuals or collectively. Individual survey questionnaires were distributed to the sample members via paper, email accounts or hosted electronically on the web. According to Church and Waclawski (1998:123), collective administration of the survey questionnaires entails on-site "capture sessions" offered at multiple times of the day in different locations and across several weeks. Both methods require secure data collection receptacles such as handing in questionnaires in sealed envelopes or boxes, locked drop bags in a central location or multiple stations for online survey completion.

The researcher used the individual method of administering the survey questionnaire. The chosen methods of collecting the data were a paper format designed in Microsoft Word and an electronic format hosted on the web (internet). The **paper format** afforded people without access to the internet an opportunity to complete the survey. These paper questionnaires were either emailed to the sample subjects or delivered to them in a printed format by the HR consultants of the organisation. The completed questionnaires were returned to the researcher via fax or email, or on hard copy in sealed envelopes. The researcher collected the envelopes at the organisation. One of the advantages of paper survey completion is being able to complete the questionnaire anywhere at any time, but the disadvantage is that the questionnaires are costly to print (Church & Waclawski 1998:130).

The **electronic version** was uploaded on an external internet web server and tested with the assistance of the IT manager, who made the survey link accessible to sample subjects with access to computers. The researcher compiled the email invitation containing the survey link and the HR project team sent out the invitations to the sample subjects. The process of data collection and processing is fast and immediate, but the response requires access to a computer.

On average it took 20 to 30 minutes to complete the questionnaire. A slight technological glitch was experienced at the organisation in terms of their online systems timing out in some instances. The respondents who experienced this glitch reverted to the paper or Microsoft Word method of questionnaire completion.

4.3.3.3 *Confidentiality and anonymity*

Since the privacy of subjects is transgressed in order to study social behaviour in organisations, the researcher should take certain steps to ensure anonymity and confidentiality. Neuman (2000:99) suggests doing it by not disclosing a subject's identity after information is gathered and presenting results only in an aggregate form (eg percentages and means) (Neuman 2000:99).

In order to protect the subjects' privacy, anonymity was ensured as follows:

- Paper surveys were returned directly to the researcher via fax or email or collected by the researcher at the organisation.
- The electronic survey was hosted on an external website and did not exist on any of the organisation's systems.
- Data collected over the internet were stored on an external web server.
- When the data responses were submitted by the respondent, they could not be traced back to the respondents on the organisation's systems.
- Survey completion was anonymous and completely voluntary (ie no names of individuals were provided by respondents, however, although email messages contained the names of individuals, the researcher regarded this information as confidential and did not disclose it to the organisation).

Confidentiality in reporting the results of the survey to the organisation was ensured by means of the following methods:

- Demographical/biographical groups with small numbers of respondents (say, fewer than five respondents) could be grouped together in a meaningful way. All demographical/biographical categories had sufficient respondents to be analysed as separate groups.

- The focus of the analyses was on overall and collective analyses and reporting. Results were reported in aggregate form (eg means and percentages) ensuring that the information was not released in a way that permitted linking specific individuals to responses.

4.3.3.4 *Response rates*

Two factors are important in terms of survey response rates, namely tracking the response rates and the actual responses received. In terms of tracking responses, Church and Waclawski (1998:166) suggest that response rates should be monitored regularly, updates should be provided on a weekly basis, incoming data should be compared with the population data and general follow-up and specific follow-up with nonrespondents should be conducted.

The researcher monitored the response rates of the electronic submissions on a daily basis and determined the response rates of paper submissions from the different departments on a regular basis as the questionnaires were collected. The researcher provided two-weekly updates on the response rate to the project team. The project team compared the incoming data with the population data by comparing the actual number of responses with the actual population pertaining to the different biographical/demographical categories such as job levels and departments. The project team followed up with the sample subjects in general by sending out reminders and specifically with the different department managers whose staff members from levels 18 and upwards on their job level grading system, were slow to respond to the survey.

In general, Church and Waclawski (1998:143) argue that, in practice, a response rate of somewhere between 30 and 85% can be expected. The response rate is calculated by taking the number of completed usable survey responses, divided by the total number of survey instruments distributed, into consideration (Church & Waclawski 1998:143; Neuman 2000:267). When using the individual method of data collection, most survey professionals agree (Babbie; Edwards et al; Rea & Parker in Church & Waclawski 1998:144) that a response rate of 50% or more is adequate for analysis purposes. Church and Waclawski (1998:144) contend that survey response rates lower than 50% are common in organisations owing to problems such as a resistive organisational culture and apathy on account of oversurveying, or poor project planning, communication and survey leadership.

In the current research, the population consisted of 1 070 staff members at levels 18 and above of the organisation's job grading system, namely the supervisory, management and specialist levels in the organisation (see discussion on sample design and sample size in secs 4.3.2.1 & 4.3.2.2). A total of 488 questionnaires were received. This is 45.6% of the population specified for the research. Unfortunately, only 455 questionnaires could be used because 33 hard copies were not completed in full or completed incorrectly (eg selecting the same response throughout) or duplicate copies from the same individual (see tab 4.2). This reduced the overall **response rate of usable response to 42.5%**. However, in terms of the requirements to make statistical analyses possible, the response rate was sufficient and calculated at **five responses per number of items (88) in the questionnaire**.

4.3.4 Data capturing

The first stage of any sort of analysis or interpretation process requires that the survey responses be entered into a database. The individual responses must be converted from their natural state, whether in the form of email responses, pen-and-paper responses or a web-based response system, and converted into a grid format of rows of data comprising numbers that reflect the code for each scale choice (eg 1 for strongly disagree) (Church & Waclawski 1998:159, Neuman 2000:314). The streams of numbers can be entered directly, read, manipulated and analysed by some type of sophisticated computer software package (Church & Waclawski 1998:159; Babbie 1998:365).

In the current research, the SurveyTracker software program, developed in the USA was used to capture the data. The web-based data were stored in a data file on the web-based server, downloaded and read into the software system. The researcher captured the data manually from the pen-and-paper questionnaires and the questionnaires received via e-mail, in Microsoft Word format.

The next stage in the process is data preparation (cleaning). This involves identifying and removing, or at least correcting, the various types of problematic responses that occur in any data collection process (Church & Waclawski 1998:163–164). Errors made when entering data into a computer can threaten the validity of measures and cause misleading results (Neuman 2000:316). Common problems or issues must be identified in the data

preparation process. The main issues encountered in the current research are discussed below:

4.3.4.1 Missing, incomplete or partially completed responses

In some instances, **missing data** can threaten the validity and reliability of the survey (Neuman 2000:179). The best option to deal with missing data is to discard persons who have not answered all the questions, as long as this does not lead to an unacceptable loss of large number of cases (De Vaus 1986:93). Church and Waclawski (1998:164) recommend that partially completed responses should be retained and used for analysis purposes, unless the number of completed items is less than 10% of the total set of questions provided. **Blank returns** can be accidentally counted towards the total response rates. These returns should be identified and discarded or removed from the database.

In the web-based data file the researcher found one blank row of data, which was removed. Two rows of data contained too few data because all the questions had not been answered, but the responses were more than 10% (about 50%) of the total number of questions and these rows were retained in the data file. Four pen-and-paper questionnaires were removed because only a few items had been answered.

4.3.4.2 Duplicate responses from one individual

One possible problem is duplicate responses, particularly when multiple forms of response options such as paper and web-based replies are used to administer the survey. The dataset should be examined for duplicate responses because they can artificially alter the mean score and response rate obtained (Church & Waclawski 1998:167).

The researcher manually scanned the web-based data file for duplicate rows of data, in case some individuals submitted their responses more than once. No duplicate rows of data were found. The paper questionnaires collected were checked for duplicates and 22 copies of one questionnaire was found, which were not entered into the system.

4.3.4.3 Problematic or intentional response patterns

Problematic or intentional response patterns refer to patterns where the respondent selected all middle or extreme scores (say, all 3s, 1s or 5s on a 5-point scale). Hostility, fear, apathy and anxiety are typically the reasons for this problem. These data represent totally meaningless results at best or totally biased ones at worst. They need to be removed before analysis so that conclusions may be drawn with confidence (Church & Waclawski 1998:168).

In the current research, seven paper questionnaires were found in which the respondents marked 1s, 3s or 5s throughout the questionnaire. These questionnaires were removed before entering the data.

Table 4.2 provides a summary of the outcome of the cleaning process of the data.

TABLE 4.2
SUMMARY OF QUESTIONNAIRES RECEIVED, REMOVED AND USED

DESCRIPTION	NUMBER OF QUESTIONNAIRES
Total number of questionnaires received	488
Data cleaning	
- 4 questionnaires contained only a few responses	- 4
- 7 questionnaires were marked with either 1s, 3s or 5s	- 7
- 22 questionnaires were duplicate photocopies of 1 questionnaire	<u>- 22</u>
Total number of questionnaires removed	- 33
Usable data after cleaning for analysis purposes	
Total number of web-based questionnaires received	119
Total number of email and paper copies received	<u>336</u>
Total number of questionnaires used	<u>455</u>

4.3.5 Data analysis for reporting to the organisation

One of the aims of the research was to analyse the data, interpret the results, compile a report and present it to the organisation that allowed the researcher to conduct the

empirical research with their supervisory, management and specialist employees. According to the guidelines to achieve this aim found in the literature, an appropriate statistical procedure to analyse the data should be decided on before starting the data collection process (Welman & Kruger 2001:194). Data analysis looks for patterns in what is observed (Babbie 1998:24). These patterns should be interpreted, and the researcher should then indicate where the results lead to next. From an organisational reporting perspective, the presentation of data, the manipulations thereof and the interpretations should be integrated into a logical whole (Babbie 1998:A19).

In the current research, a theory was generated that had to be tested against the reality of what had been observed. The collection of facts resulted in the creation of a data file suitable for quantitative (ie numerical) analyses and statistical manipulation (Babbie 1998:9). In the current research, the software package, SurveyTracker, was used to analyse the results. The researcher interpreted the results, compiled a written report, integrated the tables, charts and figures into the text of the report, drew conclusions and made recommendations about what the organisation could do to enhance knowledge retention. The results were presented in means, frequencies and percentage response distribution based on the five-point Likert scale. The final step of the survey process was to present the results to the project and management teams.

4.4 STATISTICAL ANALYSIS

The analytical approach followed in quantitative research requires descriptive statistics that describe numerical data (Brewerton & Millward 2001:143; Neuman 2000:317). Multivariate statistics (involving three or more variables) applied to this research. The purpose of the research conducted involved exploring the research-derived quantitative data by examining patterns in the data set (ie in the questionnaire measure which purports to tap into various different constructs) (Brewerton & Millward 2001:144, 146).

The following statistical techniques are most appropriate to the aims and data:

- **Descriptive statistics** are used to describe the characteristics of research units in the population and relationships between variables in the sample. These statistics summarise a set of sample observations (Babbie 1998:G2; Tabachnick & Fidell 1983:11).

- **Exploratory principal component factor analysis** looks for groups of variables that share common variance, on the basis of the assumption that these groupings are caused by the same underlying factors (Brewerton & Millward 2001:146).
- **The Cronbach alpha to test reliability** is the “commonly used measure of reliability for a set of two or more construct indicators” (Hair et al 1995:618). An indicator is a single variable used in conjunction with one or more other variables to form a composite measurement (or factor) (Hair et al 1995:1).
- **Structural equation modelling (SEM)** is “a technique that allows separate relationships for each of a set of dependent variables” (Hair et al 1995:15). Other multivariate analysis techniques are not suitable in this situation because they allow only a single relationship between dependent and independent variables (Hair et al 1995:15).
- **Multiple regression analysis** is a statistical technique used to measure linear relationships between one dependent and several independent variables (Tabachnick & Fidell 1983:86).

An explanation of the multivariate statistics used in the current research is necessary because of the complexity of these techniques and to provide background in order to explain the choices the researcher made during the process of conducting the analysis. Each of these statistical techniques is discussed below.

4.4.1 Descriptive statistics

Descriptive statistics were used in this research to summarise the different units in the sample of data collected from the population. Frequencies and the percentage of frequencies were used to show the number of participants in each category of the different job levels, gender, race, age and years of service categories (Brace, Kemp & Snelgar 2003:49). Means, the count of participants, the **standard deviation (based on the mean and giving an average distance between all scores and the mean – dispersion – the greater the standard deviation, the more dispersed the results are [Neuman 2000:320]) and the percentage of response distribution on the five-point scale were used to describe the results of the dimensions that were based on the theoretical model. These statistics are appropriate to display central tendency (eg means) and dispersion (standard

deviation) (Brace et al 2003:48). This provided an overview of areas that were enhancing or impeding knowledge retention in the organisation.

4.4.2 Factor analysis

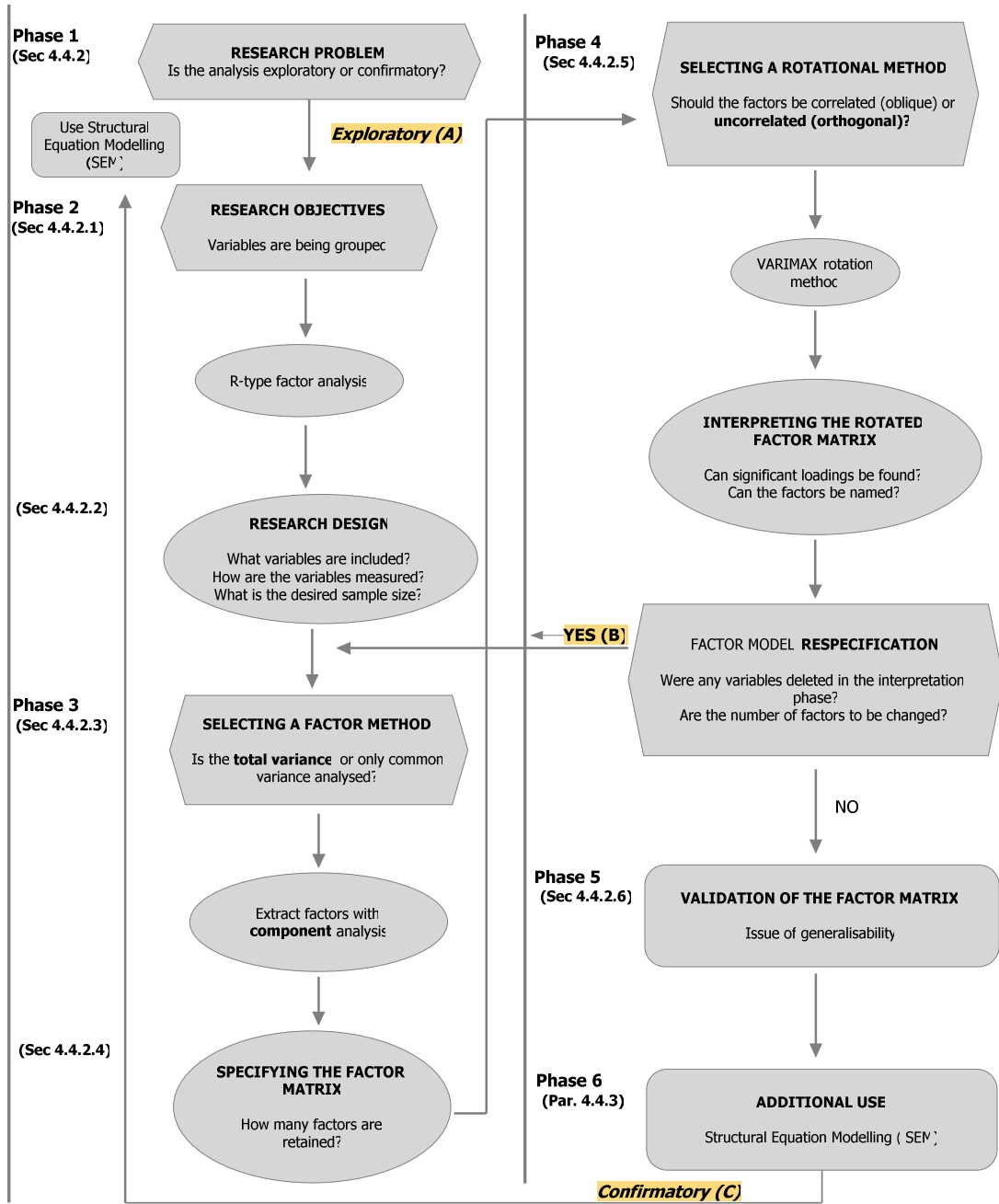
Factor analysis is the generic name given to a group of multivariate statistical methods whose primary purpose is to define the underlying structure in the data matrix (Hair et al 1995:366-367). Factor analysis is the way in which one investigates whether items (variables) can be reduced to factors (dimensions or components). The factors are extracted from the variables (Brace et al 2003:278). Factor analysis addresses the problem of analysing the structure of the interrelationships (correlations) between a large number of questionnaire responses by defining a set of common underlying dimensions known as factors. The separate dimensions of the structure are identified and then the extent to which each dimension is explained by each variable is determined. It is an interdependence technique in which all variables are simultaneously considered. The variates (factors) are formed to maximise their explanation of the entire variable set. Factor analysis is not used to predict a dependent variable or variables (Hair et al 1995:367).

The purpose of factor analysis can be achieved from either an exploratory or a confirmatory perspective. Exploratory factor analysis explores the possibility of a factor structure underlying the variables. The analysis identifies the number of factors as well as which of the variables make up which factor (Brace et al 2003:278). Confirmatory factor analysis is used to confirm a prespecified relationship (eg when testing a hypothesis about which variables should be grouped in a factor or testing the precise number of factors). It generally occurs later in the research process when a theory about structure is to be tested. Variables are specifically chosen to reveal underlying structural processes (Tabachnick & Fidell 1983:373).

In the current research, the **exploratory factor analysis technique** was used to explore the factor structure underlying the variables (see *Exploratory (A)* in fig 4.1 below). Several choices and decisions had to be made to achieve the required outcomes of the research. The steps, choices and decisions that the researcher had to make are discussed in the following section. The factor diagram represents the steps in figure 4.1.

FIGURE 4.1

FACTOR ANALYSIS DIAGRAM



Section reference numbers in parenthesis ()

Source: Adapted from Hair et al (1995:369-370)

4.4.2.1 Objectives of the factor analysis

The objectives of the factor analysis in this research are twofold, namely to

- identify the structure of relationships between the variables. The factor analysis examines the correlations between the variables. The **R factor** analysis is used to analyse a set of variables to identify the dimensions that are latent (ie not easily observed). The correlation between the variables is computed and the resulting factor pattern demonstrates the underlying relationships between the variables (Hair et al 1995:372)
- identify representative variables from a much larger set of variables for use in subsequent multivariate analyses. This objective relies on the factor loadings, “but uses them as the basis for identifying variables to be used in subsequent analysis with other techniques” (Hair et al 1995:368, 371).

4.4.2.2 Sample size

The sample size was discussed in section 4.3.2.2. The aim is to obtain a sample size that is larger than 100 and at least five times as many observations as there are variables to be analysed. The more acceptable range would be a ten-to-one ratio. When dealing with smaller sample sizes and/or lower cases-to-variable ratio, the researcher should interpret the findings cautiously (Hair et al 1995:373–374). A total of 455 respondents completed the questionnaire in the current study. There were 88 variable to be analysed, making the ratio five-to-one.

4.4.2.3 Method of factor analysis to derive factors

In applying factor analysis, the researcher has to decide on the method of extracting the factors (common factor analysis versus principal component factor analysis) and the number of factors to be selected to represent the underlying structure of the data. According to Tucker, Koopman and Lin (in Odendaal 1997:115) the researcher should already decide in the research design phase, which of the two methods are going to be used. The **principal component analysis** was used in the current research because the objective was to summarise most of the original information (variance) in a minimum

number of factors for prediction purposes. In other words, the objective was to determine what factors will predict the extent of knowledge retention in organisations.

When using component analysis, the researcher “must consider the total variance and derive factors that contain small proportions of unique variance and, in some instances, error variance” (Hair et al 1995:375).

4.4.2.4 *Number of factors to be extracted*

When a large number of variables are factored, the analysis extracts the largest and best combinations and then proceeds to smaller less understandable combinations. An exact quantitative basis for deciding on the number of factors to extract has not yet been developed (Hair et al 1995:377). Most analyses use more than one criterion to determine how many factors should be extracted (Hair et al 1995:379), and the following criteria were used in the current research:

a Latent root criterion (eigenvalues)

The eigenvalue is the measure of how much variance in all the data is explained by a single factor. The higher the value, the more variance that will be explained by the factor. This value can be used to determine whether a factor explains sufficient variance for it to be a useful factor (Brace et al 2003:288). Using the eigenvalue to establish a cut-off is most reliable when the number of variables is between 20 and 50. When more than 50 variables are involved, too many factors could be extracted. As a general rule, in deciding on the number of factors that can be extracted, an eigenvalue greater than 1.00 is deemed to be significant (Hair et al 1995:377).

b Scree test

Cartell (in *NCSS user's guide II* 1997:1244) documented the scree test. This test is probably not the best method to determine the number of factors to be extracted owing to its subjectivity in the sense that when the same data are analysed by different people, different results might be obtained. However, the scree test can be used to identify the optimum number of factors that can be extracted before the common variance is dominated by the unique variance structure. Unique variance is higher in later than in earlier factors (Hair et al 1995:378).

The scree test is generated by plotting the eigenvalues against the number of factors in their order of extraction. The curve, which normally starts with the first factor, is used to determine the cut-off point of the factors. The plot slopes steeply downwards and then slowly becomes a more or less horizontal line. The point at which the line begins to straighten is regarded as the cut-off point for the number of factors to be extracted, starting with the first factor (Hair et al 1995:378; Pallant in Castro 2008:148–149).

c Percentage of eigenvalues

The percentages of eigenvalues (variance criterion) are the criterion in which the cumulative percentages of the variance are extracted by successive factors (Hair et al 1995:378). A certain percentage of the variance that must be accounted for, can be preset and then enough factors are kept so that this variance is achieved. The number of factors extracted should account for at least 50% of the variance (*NCSS user's guide II* 1997:1245).

According to Hair et al (1995:378), a solution that accounts for 60% of the variance (and even less) should be satisfactory in the social sciences where information is less precise. In the natural sciences, the extracted factors should account for at least 95% of the variance.

4.4.2.5 Interpreting the factors

The purpose of rotation is to obtain a factor matrix in which each variable has a high loading on as few as possible factors and zero loading on as many as possible other factors. This would result in a more meaningful factor matrix (Hair et al 1995:380). There is a choice of two rotational methods, namely orthogonal (each factor is independent of all other factors) or oblique (factors correlate with each other) (Hair et al 1995:366)

A final factor solution is obtained by means of an uncorrelated (orthogonal) method which is more commonly used (Hair et al 1995:370, 383), comprising the following three steps:

- computing an **unrotated factor matrix** to obtain a preliminary indication of the number of factors to extract, followed by a **rotated factor matrix**

- interpreting **factor loadings** and the **communality** of each variable to determine the role each variable plays in defining each factor
- assessing the need to **respecify** the factor model owing to, say, deletion of variable(s) from the analysis, or the need to extract a different number of factors. Respecification requires the researcher to return to the extraction phase and repeat the steps for factor extraction and interpret them again (Hair et al 1995:380). In figure 4.1 above, this step is indicated by the YES (B), which takes the analyst back to phase 3 of the factor analysis process.

Rotation is used to simplify the rows and columns of a factor matrix. This means making as many values in each column (that represent factors) as close to zero as possible and making as many values in each row (corresponding to a variable's loading across the factors) as close to zero as possible. The purpose of this is to facilitate interpretation of factors (Hair et al 1995:383).

There are basically three major orthogonal rotation approaches, namely QUARTIMAX (not in line with the goals of rotation as it has not been successful in producing simpler structures), EQUIMAX (used infrequently) and VARIMAX. The **VARIMAX** approach seems to provide a clearer separation of factors and has proven highly successful as an analytic approach to obtain the best orthogonal rotation of factors (Hair et al 1995:383-384). VARIMAX rotation seeks to maximise the variance of the factor loading for each factor by making the low loadings lower and the high loadings higher (Tabachnick & Fidell 1983:387). The VARIMAX rotation approach was used in the current research.

Factor loadings enable the researcher to interpret the role each variable plays in defining each factor. Factor loadings are the correlation of each variable and each factor (Babbie 1998:419; Hair et al 1995:380). Loadings provide a means of indicating the degree of correspondence between the variables. Higher loadings make the variable representative of the factor (Hair et al 1995:380).

Researchers have developed guidelines on the interpretation of factors to eliminate subjectivity. The rules are as follows:

- Loadings greater than .30 meet the minimum level for inclusion in the factor.

- Loadings of .40 are considered to be important.
- Loadings of .50 and higher are considered to be significant.

This means that the higher the factor loading is, the more important the loading will be in interpreting the factor matrix (Hair et al 1995:385).

Another criterion used in the interpretation of factors, is the squared loading (the amount of the variables' total variance accounted for by the factor). This is known as the **communality** of each variable and it is the proportion of the variance of the variable which is represented by the factor. The communality shows how well a variable is predicted by the retained factors (*NCSS user's guide II* 1997:1253). The researcher should view each variable's communality and could specify that each variable should account for at least one-half of the variance of each variable. This means that variables with communalities of less than .50 would not have sufficient explanation (Hair et al 1995:387). The total communality, obtained by adding the individual sums of squares for each of the factors, will represent the total amount of variance extracted by the factor solution (Hair et al 1995:395).

If there are any variables that do not comply with the specified guidelines of factor loadings and communalities, the researcher has to choose one of the following two options:

- Interpret the solution as it is, explaining which variable(s) are poorly represented in the factor solution.
- Eliminate the variables that are not well represented, if they are of minor importance to the overall research and **respecify the factor model** by deriving a new factor solution excluding the eliminated variable(s) (Hair et al 1995:387).

The final step in this phase of the factor analysis is to **assign some meaning to the pattern of factor loadings**. The factor analysis identifies factors based on the correlation patterns between the items without any interpretive meaning (Hair et al 1995:387; Mouton & Marais 1990:71–72). Variables with higher loadings can be regarded as more important and have a greater influence on the name (or label) selected to represent the factor. The ability to assign some meaning to factors by interpreting the nature of the variables

becomes crucial in determining the number of factors to be extracted (Hair et al 1995:387–388).

4.4.2.6 *Validation of the factor analysis*

This stage of the factor analysis involves the extent to which the results can be generalised to the population and the potential influence of individual respondents on the overall results (Hair et al 1995:388). The Cronbach alpha coefficient is used to determine the internal reliability of the variables in the newly proposed factor model. The purpose is to determine how accurately the items measure the factors and whether they can be considered reliable to produce the same results when the measurement is repeated.

The Cronbach alpha is a reliability coefficient that reflects how well the items in a factor correlate with one another (Sekaran 1992:284). The coefficient values of the Cronbach alpha vary between -1 and 1, with higher values indicating higher reliability among the indicators (Hair et al 1995:618; *NCSS user's guide II* 1997:1172). Carmines (in *NCSS user's guide II* 1997:1172) argues that generally, a value of at least .80 would be acceptable for instruments that are widely used. According to Sekaran (1992:287), values of less than .60 are regarded as poor, values of .70 as acceptable and values of .80 and higher as good. The closer the reliability coefficient is to 1.0, the better the correlation. De Vaus (1986:89) agrees that as a rule of thumb, the alpha should be at least .70 before the scale can be regarded as reliable. The size of alpha is affected by the reliability of individual items. To increase the alpha (reliability), unreliable items should be discarded and to do this, one would need to look at the calculation of what the alpha would be if the particular item had been dropped.

After completing this process, the researcher can stop with factor interpretation or proceed to other uses for factor analysis (Hair et al 1995:389). It is commendable to follow principal component factor analysis with some form of confirmatory factor analysis such as SEM (Hair et al 1995:398). The objective of the current research was to compile a structural equation model to verify the theoretical model and determine whether any new constructs emerged, as well as to establish the underlying structure of the variables, that is, the direct and indirect effects of independent (exogenous) variables on the dependent variable (endogenous), which is knowledge retention. The outcome of this process, using SEM) could produce a new model to be proposed as the factors influencing knowledge retention. The technique is described below.

4.4.3 SEM

SEM has been described as a collection of statistical techniques that allows examination of a set of relationships between one or more independent variables, and one or more dependent variables, either discrete or continuous in both independent and dependent cases (Tabachnick & Fidell in Brewerton & Millward 2001:165). Kaplan (cited in Nachtigall, Kroehne, Funke & Steyer 2003:3) describes SEM as "... a class of methodologies that seeks to represent hypotheses about means, variances and covariances of observed data in items of a smaller number of 'structural' parameters defined by a hypothesized underlying model". Hair et al (1995:621) describe SEM as a "Multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts – factors – with multiple variables) to estimate a series of interrelated dependence relationships simultaneously."

SEM in the current research can be defined as described by Hair et al (1995:621) above. The purpose is not hypothesis testing as described by Kaplan (in Nachtigall et al 2003:3), but to confirm the exploratory factor structure and determine multiple relationships between the constructs. Application of this technique could enable the researcher to produce a new model based on the empirical research that will be compared to the theoretical model. SEM is a complex statistical technique requiring a detailed discussion to ensure that the researcher applies the method in a scientifically sound way in order to achieve the aim as specified above.

4.4.3.1 *Characteristics of SEM*

SEM has been used in many different fields of study such as psychology, sociology, management, organisational behaviour, biology, education and marketing. There are basically two reasons for its attractiveness as highlighted below.

- SEM deals with multiple relationships simultaneously while providing statistical efficiency.
- SEM's ability to assess relationships comprehensively has provided a transition from exploratory to confirmatory analysis (Hair et al 1995:617).

The researcher distinguishes which independent variables predict each dependent variable by drawing upon theory, prior experience and the objectives of the research. The **structural model** has an interdependent nature because of some dependent variables becoming independent variables in subsequent relationships. The structural model expresses these relationships and displays when a dependent variable becomes an independent variable in another relationship or other relationships (Hair et al 1995:623).

The most prominent feature of SEM is its capability to deal with **latent variables** (ie nonobservable quantities like factors underlying observed variables). According to Hair et al 1995:623), "A latent variable is a hypothesized and unobserved concept that can only be approximated by observable or measured variables." The observed variables, which are gathered from respondents by means of data collection methods, are known as manifest variables (Hair et al 1995:623). Latent variables are connected to observable variables by a **measurement model** (Hair et al 1995:632; Nachtigall et al 2003:4). SEM "therefore, consists of a structural model representing relationships between latent variables of interest and measurement models representing the relationship between the latent variables and their manifest or observable indicators" (Nachtigall et al 2003:4). A model (system of equations) is a statistical statement about the relationships between variables (Nachtigall et al 2003:4).

The relationships between latent variables are usually formulated by means of linear regression equations. Arrows are used to represent these relationships graphically (Nachtigall et al 2003:3). A **straight arrow** indicates a direct causal relationship from one construct to another, while a **curved line** between constructs indicates a correlation between constructs (Hair et al 1995:630). The graphic representations are referred to as path diagrams. SEM is extremely flexible because it deals with a system of regression equations considering several equations simultaneously (not only single or multiple linear regression) (Nachtigall et al 2003:3–4).

4.4.3.2 *Main purpose of SEM*

SEM is a powerful analytical tool appropriate for many research objectives. When relationships are strictly specified, the objective is confirmation, whereas when they are loosely recognised, the objective is discovery. There is no single correct way to apply multivariate techniques, but the researcher formulates the objectives of the analysis and

applies the appropriate techniques in order to achieve the research objectives. Hence in each extreme instance and points in between, the researcher formulates the use of the technique that will produce the desired outcome in order to meet the research objectives. The ultimate outcome of SEM is always the assessment of a series of relationships (Hair et al 1995:625).

The main purpose of SEM is to compare the model to empirical data. The comparison leads to so-called "fit-statistics". If the fit is acceptable, measurement models and structural models are regarded as being supported by the data. In other words, the assumed model is not rejected. Measurement models refer to the assumed relationship between latent and observed variables, whereas structural models refer to assumed dependencies between various latent variables. In some instances, only the fit of a measurement model is of interest (Nachtigall et al 2003:5). In practice, SEM seems to be used to configure path diagrams, calculate model fit and estimate parameters using software programs like AMOS 5, LISREL or EQS (Nachtigall et al 2003:6).

4.4.3.3 Sample size

Sample size plays a vital role in the estimation and interpretation of SEM, although individual observations are not needed. Sample size provides the basis for determining sampling error (Hair et al 1995:637). Schumacker and Lomax (1996:20) state that in their examination of the published research, many articles used from 250 to 500 subjects, which means that the sample of 455 respondents in the current research is sufficient to conduct SEM. Bentler and Chou (in Schumacker & Lomax 1996:20) argue that a ratio of five respondents per variable would be sufficient for normal and elliptical distributions when the latent variable has several indicators. As explained previously in the discussion on sample size in section 4.3.2.2, the ratio of the data collected in this research was five respondents per variable, which meets the stated requirement for conducting SEM.

4.4.3.4 Advantages and disadvantages of SEM

The advantages and disadvantages of SEM found in the literature are summarised as follows in tab 4.4.

TABLE 4.3
ADVANTAGES AND DISADVANTAGES OF
SEM

ADVANTAGES	DISADVANTAGES
(1) Offers the possibility of modelling complex dependencies.	(1) The theory and application are complex.
(2) Models latent variables.	(2) There is a danger of producing models post hoc.
(3) Offers the opportunity to analyse dependencies of psychological constructs with measurement errors.	(3) Substantive background may be neglected.
(4) Is a powerful analytical tool for developing complex attitudinal/behaviour models where numerous relationships can be assessed simultaneously.	(4) There are high data requirements.
(5) Represents a significant step forward in statistical model building and hypothesis testing.	(5) A reasonable sample size is required.
(6) Is becoming increasingly widely used in the social sciences.	(6) It requires comprehensive understanding of its statistical underpinnings before it should even be attempted.
(7) Improved software packages enhance its strengths.	
(8) There is wider recognition of its strengths.	

Source: Adapted from Brewerton & Millward (2001:169); Nachtigall et al (2003:8, 10)

The popularity of SEM rests on the power of its path diagrams which illustrate relationships (Nachtigall et al 2003:12). Although SEM is an extremely powerful analytical tool and its strengths are widely recognised, the researcher needs to design a plan of action/strategy that will deliver the required outcomes and take care of the errors that might be encountered during SEM.

4.4.3.5 *General SEM strategy*

The researcher needs to design a plan of action/strategy towards a specific outcome. Hair et al (1995:625–626) describe three distinct strategies that can be followed, namely:

a Confirmatory modelling strategy

The analyst specifies a single model and SEM is used to assess its significance. This is not the best method to prove the proposed model if it has an acceptable fit, but only confirms that it is one of several possible acceptable models, which might have an equally acceptable model fit. Hence comparing alternative models would be the more rigorous test to find the best model (Garson 2009:1–2; Hair et al 1995:625).

b Competing models strategy

This strategy is used to perform overall model comparisons as a means to evaluate the estimated model with alternative models. This strategy is followed to assure the researcher that the best model has been found, since obtaining acceptable levels of fit for the overall, measurement and structural models does not mean it is the best model. A better fit might be obtained by means of numerous alternative models that represent truly different hypothetical structural relationships. This brings the researcher closer to a test of competing "theories", which can be regarded as a stronger test than a slight modification of a single "theory" (Garson 2009:2; Hair et al 1995:627).

c Model development strategy

The purpose of this strategy is a combination of confirmatory and exploratory approach (Garson 2009:2). A model is tested using SEM procedures, and if found to be deficient, an alternative model is tested on the basis of the changes to the structural and/or measurement models suggested by the SEM modification indices (Garson 2009:1–2; Hair et al 1995). Theory provides a starting point for the development of a theoretically justified model that can be empirically supported. SEM is thus not only used to empirically test the model, but also to provide clarity on its respecification. The respecification of the model should always be based on theoretical support and not only empirical justification (Hair et al 1995:626).

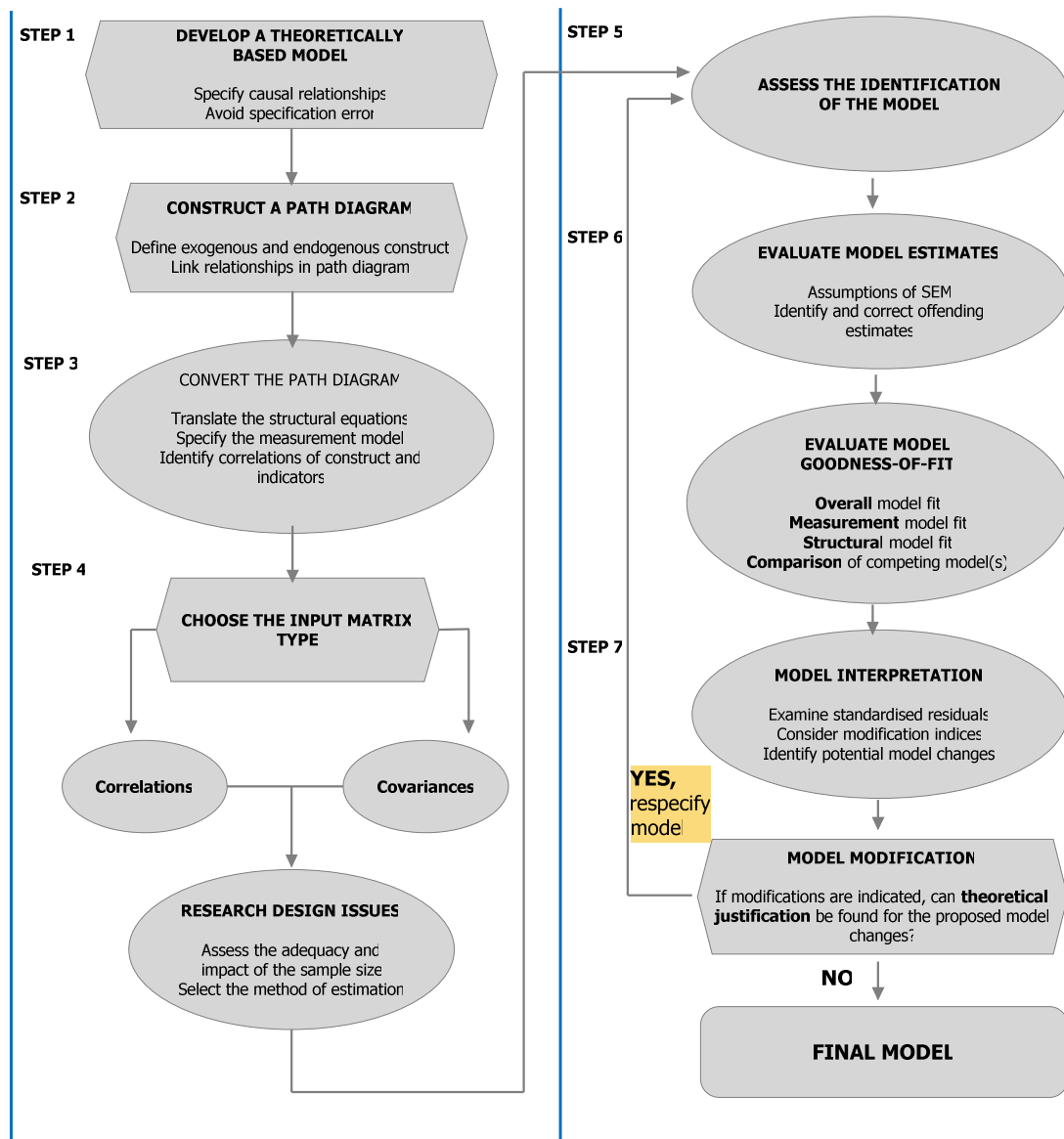
Following this strategy would enable the researcher to accomplish the aim of the current research. The plan of action/strategy comprises several steps that the researcher needs to undertake. Bollen and Long (in Schumacker & Lomax 1996:63) list the following five steps:

- model specification (the initial theoretical model the researcher formulates)
- identification (determining whether unique values can be found for the parameters to be estimated in the theoretical model)
- estimation (requiring knowledge of the various estimation techniques that are used, depending on the variable scale and distributional properties of variables used in the model)
- testing fit (interpreting model fit or comparing fit indices for alternative models)
- respecification (when the model fit indices suggest a poor fit and the researcher makes decisions on how to delete, add or modify paths in the model and reruns the model)

Hair et al (1995:626) list seven steps that incorporate the five steps of Bollen and Long (in Schumacker & Lomax 1996:63) described above, but provides more detail on the process. Bollen's first step, namely model specification, is covered by steps 1 to 4 in Hair et al's (1995:626) description. The seven steps are depicted in figure 4.2 and briefly described below to enable the researcher to make the right decisions when conducting the SEM testing.

FIGURE 4.2

STRUCTURAL EQUATION MODELLING STRATEGY



Source: Adapted from Hair et al (1995:628-629)

i Step 1: Developing a theoretically based model based on causal relationships

In causal relationships the change in one variable is assumed to cause change in another variable (in the current research, the variables that would cause/lead to knowledge retention). Causation lies in the theoretical justification provided to support the analyses and is expressed in terms of equations. The most critical error (known as specification

error) that might occur is when one or more key variables is/are omitted in developing the theoretically based model. Omission of a significant variable could imply a biased assessment of the importance of other variables (Hair et al 1995:626–627).

ii Step 2: Constructing a path diagram of causal relationships

Path diagrams are useful in depicting a series of causal relationships. Separate equations are required for each dependent construct. SEM makes it possible to estimate all the equations simultaneously. Path diagrams are based on two underlying assumptions. Firstly, all causal relationships are indicated and theory is the basis for omission or inclusion of relationships. Secondly, it is assumed that causal relationships are linear. Nonlinear relationships cannot be directly estimated in structural equation modelling, but structural models can **estimate** nonlinear relationships (Hayduk; Loehlin in Hair et al 1995:631).

The terms **exogenous constructs** (also known as independent variables) and **endogenous constructs** are used to describe constructs in the model. Exogenous constructs are not caused or predicted by any other variables in the model (ie there are no arrows pointing to these constructs). Endogenous constructs (or dependent variables) are predicted by one or more other constructs. The endogenous and exogenous constructs are determined solely by the researcher (Hair et al 1995:631).

iii Step 3: Converting the path diagram into a set of structural equations and specifying the measurement model

In this step the analyst specifies the model through a series of equations that define the following:

- **Structural equations** linking constructs, including prediction error for each equation. The effects of specification error and random measurement error are represented by the error term, which is the sum of the effects of these errors (Hair et al 1995:632). Structural models describe the relationships between the latent constructs themselves (Brewerton & Millward 2001:166).
- The **measurement model** specifying which variables measure which constructs. To specify the measurement model, the researcher specifies which variables

define each construct (factor) (confirmatory mode), which is a transition from the initial factor analysis where the analyst had no control over which variables describe each factor (exploratory mode) (Garson 2009:8; Hair et al 1995:632). Measurement models describe the relationships between measured variables and latent constructs or underlying factors (Brewerton & Millward 2001:166).

- A set of matrices indicating any hypothesised correlations between constructs or variables (Hair et al 1995:50). The researcher can specify correlations between the exogenous constructs or between the endogenous constructs (Hair et al 1995:635).

iv Step 4: Choosing the input matrix type and estimating the proposed model

The researcher has the choice to input raw data, a correlation matrix or a variance-covariance matrix. Boomsa (in Schumacker & Lomax 1996:25) concluded that the analysis of correlation matrices led to imprecise values for the parameter estimates in SEM, specifically with the estimation of standard errors for the parameter estimates. However, corrections for standard errors can be used. Schumacker and Lomax (1996:25) recommend that, in general, a **variance-covariance matrix** should be used in SEM, which is what the analyst used in the current research.

v Step 5: Assessing the identification of the structural model

Identification problems could occur at this stage of SEM. This has to do with the inability of the proposed model to generate unique estimates. Symptoms of an identification problem could include the following:

- huge standard errors for some coefficients
- the software program not being able to invert the information matrix
- unreasonable or impossible estimates such as negative error variances
- high correlations (.90 or greater) between the estimated coefficients (Hair et al 1995:638)

The model can be re-estimated several times with different starting values. If an identification problem is identified, the only solution is to define more constraints in the model by following a structured process, that is, deleting paths from the path diagram,

until the problem has been remedied. Hair et al (1995:639) recommend the following steps to provide better estimates of the "true" causal relationships:

- The model should be built with the minimum number of coefficients (unknowns) that can be justified.
- If possible, measurement error variances of constructs should be fixed.
- The structural coefficients that are reliably known should be fixed.
- Troublesome variables should be eliminated.

The researcher must reformulate the theoretical model if identification problems still exist, to provide more constructs relative to the causal relationships examined.

vi Step 6: Evaluating goodness-of-fit criteria

The first step in evaluating the results is to assess the degree to which the data and proposed models meet the **assumptions of SEM**. Initially, the results are inspected for **offending estimates** (estimated coefficients that indicate problems in other areas of the model or that violate accepted ranges, say, exceeding 1.0 or very large standard errors associated with coefficients). Then the **goodness-of-fit** is established at several levels for the overall model, the measurement model and the structural model separately (Hair et al 1995:639).

Overall model fit is assessed by means of one or more goodness-of-fit measures. There are three types of goodness-of-fit statistics, as elucidated below (Hair et al 1995:640–641):

- absolute fit measures (assessing only the overall model fit of both structural and measurement models collectively)
- incremental fit measures (comparing the proposed model with a comparison model specified by the researcher)
- parsimonious fit measures (parsimony refers to the number of estimated coefficients required to produce a specific level of fit, in order to determine the amount of fit achieved by each estimated coefficient: their use is limited in most

instances to comparison between models [Hair et al 1995:641, 687; Schumacker & Lomax 1996:126])

Based on the above description of goodness-of-fit measures, absolute fit measures and incremental fit measures appeared to be applicable to the current research in which a model development strategy was followed (as indicated in sec 4.4.3.5).

Brewerton and Millward (2001:168) suggest that goodness-of-fit statistics should be considered along with other criteria such as overall fit between theoretically derived covariance matrix and data-derived covariance/correlation matrix, adequacy of individual parameter estimates and theoretical implications for the model.

Once the overall model fit has been assessed, the measurement model fit is assessed. The next step is to examine the **estimated loadings** and the statistical significance of each one. The **composite reliability** and **variance extracted measures** for each construct are then used to assess the measurement model (Hair et al 1995:641).

Examination of the **structural model** involves the significance of estimated coefficients. SEM methods provide estimated coefficients, standard errors and calculated *t* values for each coefficient. Several means of evaluation can be used to examine the structural model fit, such as specifying a significance level (say .5) and then testing each estimated coefficient for statistical significance (viz that it is different from zero) for the hypothesised causal relationship. The researcher can examine the standardised solution where the estimated coefficients all have equal variances and a maximum value of 1.0. Coefficients near 0 have little effect, whereas increased values correspond to increased importance in the causal relationship. If large values appear in the estimated values of the correlation matrix provided by the computer program, corrective action should be taken, such as reformulating the causal relationships (Hair et al 1995:643).

According to Hair et al (1995:643), the more common modelling strategies, such as competing models or **model development strategy**, involve the comparison of model results to determine the best fitting model from a set of models. The latter strategy was followed in the current research. The analyst postulated a number of alternative models starting with an initial model and engaging in a series of model respecifications, each time improving the model fit while maintaining accordance with the underlying theory. A large number of measures have been developed to assess model fit in a model development

strategy. One class of measure assesses overall fit, but a drawback is that these measures do not account for the number of relationships used in obtaining model fit (Hair et al 1995:643). Overall tests do not determine that particular paths in the model are significant in the model. If the model is accepted, the researcher will then go on to interpret the path coefficients and determine whether they are significant (Garson 2009:23). Parsimonious fit measures have been proposed with a view to determining the "fit per coefficient" and avoiding overfitting the model with additional coefficients that achieve only small gains in model fit, because the absolute fit will always improve as estimated coefficients are added (Hair et al 1995:620, 643).

The choice of goodness-of-fit measures is a matter of dispute among statisticians. Jaccard and Wan (in Garson, 2009:23) recommend the use of at least three fit tests. There is agreement that researchers should avoid the shotgun approach of reporting all goodness-of-fit measures.

Some of the goodness-of-fit measures indicating the criteria for a good fit are depicted in table 4.4.

TABLE 4.4
GOODNESS-OF-FIT CRITERIA FOR COMPARATIVE MODELS DEVELOPED IN
MODELLING STRATEGY

LEVELS OF FIT	GOODNESS-OF-FIT CRITERION (GOF)	ACCEPTABLE LEVEL	INTERPRETATION
Level 1: Measures of absolute fit	Chi-square	Tables χ^2 value	Compares obtained χ^2 value with tabled value for given <i>df</i>
	Goodness-of-fit (GFI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit
Level 2: Incremental fit measures	Normed fit index (NFI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit
	Tucker-Lewis index (TLI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit
	Relative fit index (RFI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit
	Incremental fit index (IFI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit
	Comparative fit index (CFI)	0 (no fit) to 1 (perfect fit)	Values close to .90 reflects a good fit

Source: Adapted from Hair et al (1995:683–687, 689–690); Schumacker & Lomax (1996:121)

The measures above will be explained in chapter 5, depending on the actual goodness-of-fit measures that will be reported on to explain the model development strategy that was followed.

vii Step 7: Interpreting and modifying the model if theoretically justified

The final step in the SEM process involves the researcher examining possible model modifications to improve the theoretical explanation or goodness-of-fit of the model deemed acceptable. If model respecifications are made, the researcher returns to step 4 of the SEM process (choosing the input matrix and estimating the proposed model) and re-evaluates the modified models.

The researcher can look for model improvements by examining the residuals of the **predicted covariance or correlation matrix** or using **modification indices** which are calculated for each nonestimated relationship. The modification index values correspond more or less to the reduction in chi-square that would occur if the coefficient were estimated. Hair et al (1995:644) suggest that a value of 3.84 or greater indicates that a statistically significant reduction in the chi-square is obtained when the coefficient is estimated. Brewerton and Millward (2001:168) caution researchers against the use of chi-square statistics to provide a general indication of the general fit of the model, because they are sensitive to large sample sizes and to non-normal data. Statistics not requiring normal data are the goodness-of-fit index (GFI) requiring a value of $>.95$; the adjusted goodness-of-fit index (AGFI) requiring a value of $>.95$; the root mean square error of approximation (RMSEA) requiring a value of $<.05$; and the root mean square residual (RMR) requiring a value of $<.05$ (Brewerton & Millward 2001:168).

4.4.4 Multiple regression analysis

Multiple regression is a statistical technique that allows the researcher to identify a set of predictor variables (independent variables) that will influence the dependent variable, indicating how well a set of variables explains a dependent variable – **knowledge retention** in the current research. Predicting knowledge retention is likely to be influenced by some combination of several factors. The use of multiple regression should enable the researcher to test the models about precisely which set of variables is influencing knowledge retention, by giving the direction and size of the effect of the independent

variables on the dependent variable (Brace et al 2003:210–211, Neuman 2000:337). Multiple regression requires a large sample of observations and an absolute minimum of five times as many respondents as predictor variables (Brace et al 2003:212), which was sufficient in the current research, as explained in the discussion on sample size and response rates in sections 4.3.2.2, 4.3.3.4 and 4.4.2.2.

4.5 SUMMARY AND CONCLUSIONS

In this chapter, the research design and methodology of the empirical research study were described. The purpose of the study was to empirically determine by means of quantitative research the degree to which the influencing organisational factors (knowledge loss risks, behavioural threats and strategic risks of knowledge loss) would enhance or impede knowledge retention in an organisation.

The research design was based on the survey method. The purpose of the survey method was to operationalise the constructs described in the theoretical model by compiling a questionnaire and determining the degree to which knowledge is retained in an organisation. The questionnaire and validation process, obtaining access to the organisation, the sample population and sample size, the survey administration and the data collection phase were described as part of the research method followed in the current research.

A total of 488 questionnaires were received and after the data-capturing, preparation, cleaning and editing process, there were 455 usable questionnaires – a response rate of 42.5%. The survey process was concluded by analysing the results, compiling a written report and presenting the results to the project and management teams of the organisation.

The analytical process that was followed in this quantitative research requires multivariate statistics to explore the research-derived quantitative data for patterns in the data set, tapping into various different constructs. The following statistical techniques were deemed to be appropriate to this research: (1) descriptive statistics to summarise the different units (such as job levels, age and years of service) in the sample of data collected; (2) exploratory principal component factor analysis that looks for groups of variables that share common variance, exploring the possibility of a factor structure underlying the variables; (3) the Cronbach alpha to measure the reliability for a set of construct

indicators; and (4) SEM to confirm the exploratory factor structure and improve the theoretically justified model. These techniques were discussed in detail. Different choices the researcher had to make, were emphasised and different criteria that needed to be met were specified.

In chapter 5, the results and findings of the empirical research are discussed, applying the criteria that were explained in this chapter.

CHAPTER 5

RESULTS OF THE EMPIRICAL RESEARCH

5.1 INTRODUCTION

As indicated in chapter 4, statistical analyses were done to address the research aims of determining statistically the enhancing or impeding organisational factors that influence knowledge retention through exploratory factor analysis, compiling an SEM model to validate the theoretical model and determine whether any new constructs emerged. The aim of this chapter is to report on and discuss the results of the exploratory factor analysis and the outcomes of SEM. The results are presented in relation to the research design steps discussed in chapter 4.

5.2 DESCRIPTIVE STATISTICS

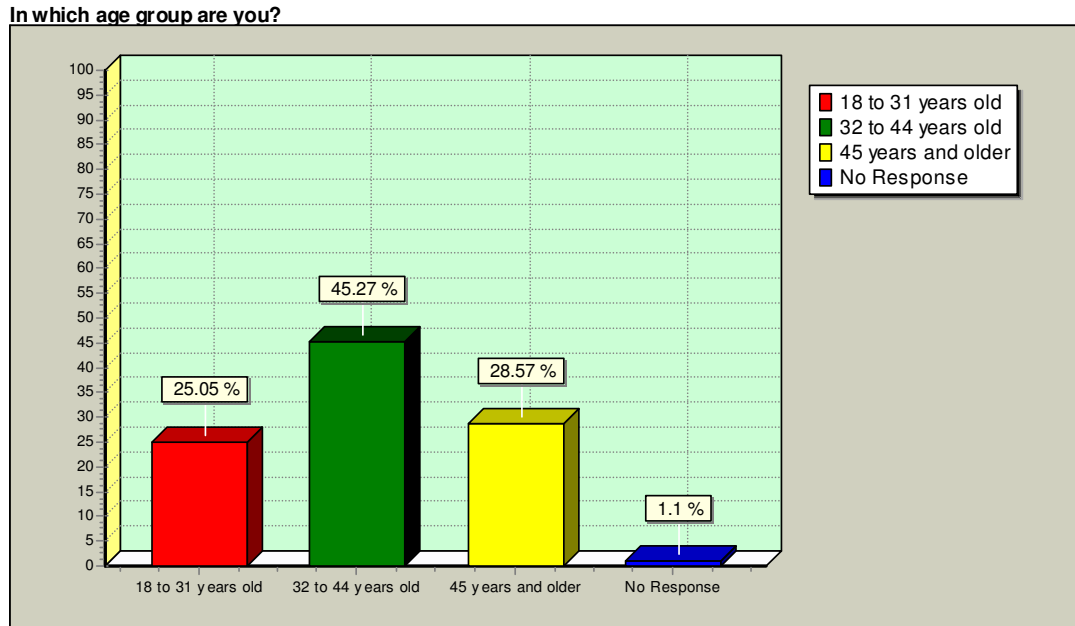
The descriptive statistics calculated for the sample are provided to indicate the spread of the sample in the different biographical and organisational categories. The data gathered via the questionnaire are summarised by making use of graphs and a table/graph to display the results of the theoretically composed dimensions measured in the questionnaire.

5.2.1 Biographical profile of the sample

The biographical variables that are relevant to this study include age, gender, race groups and education level. The organisational variable of relevance is job levels. Each of these variables is depicted graphically below.

Figure 5.1 is the graphical representation of the age categories of the sample.

FIGURE 5.1
AGE GROUPS



As illustrated in figure 5.1 above, the majority of respondents are between 32 to 44 years of age, representing 45.27% (n=206) of the sample. The other two groups are similar in size, namely the 18 to 31 age group representing 25.05% (n=114) and the 45 and older age group representing 28.57% (n=130) of the sample. Five (1.1%) respondents did not answer this question.

Figure 5.2 depicts the breakdown of gender. The graph indicates that 54.95% (n=250) of the respondents are male and 42.86% (n=195) female. It is clear that the male group is larger than the female group, which is in line with the gender population at the organisation, employing more males than females at job levels 18 and above.

FIGURE 5.2
GENDER

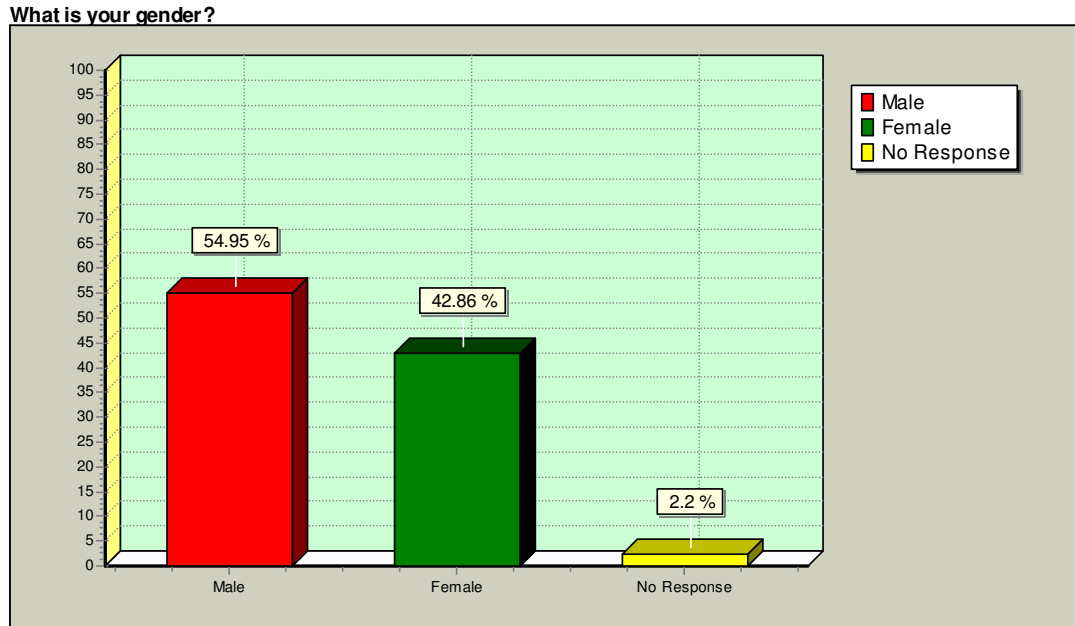
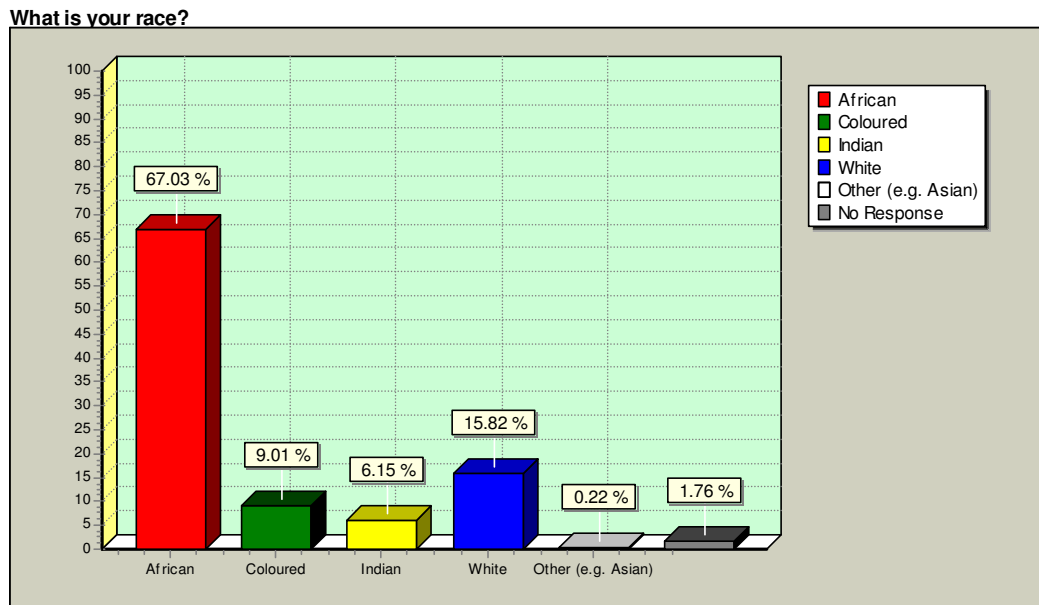


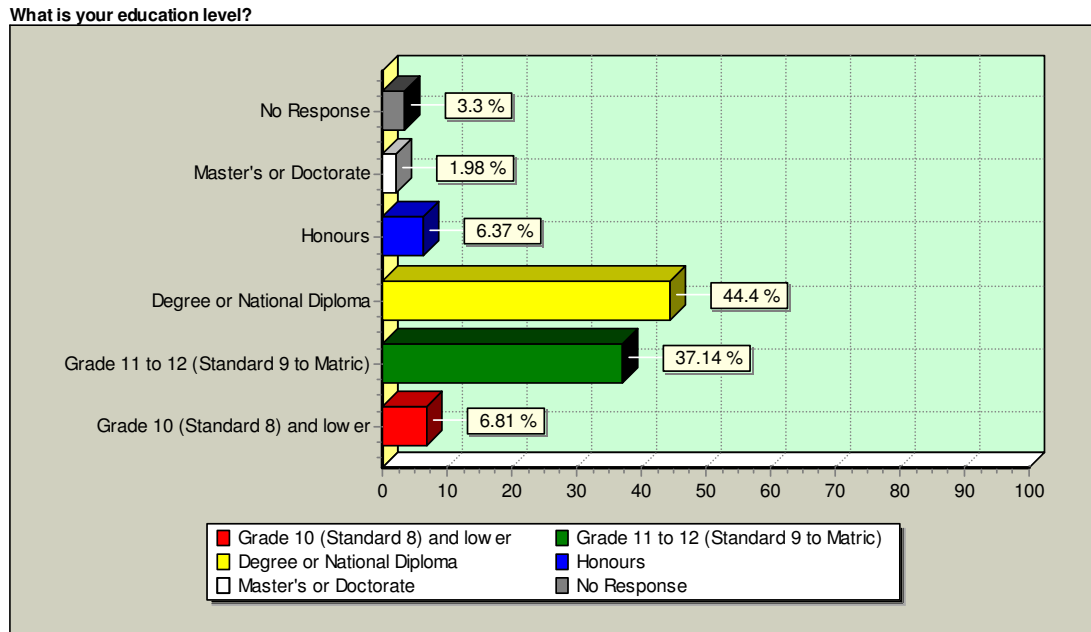
FIGURE 5.3
RACE GROUPS



The graph above indicates that 67.03% (n=305) of the sample are Africans. The rest of the sample, 31.2% (n=141), comprises of coloureds, Indians and whites. Only one (0.22%) respondent is in the “Other” (eg Asian) category.

Figure 5.4 below indicates that most of the respondents have a degree or national diploma qualification (44.4%) (n=202), with very few (1.98%) (n=9) at master's and doctoral levels. The grade 11 to 12 group is the second largest group, representing 37.14% (n=169) of the sample.

FIGURE 5.4
EDUCATION LEVELS

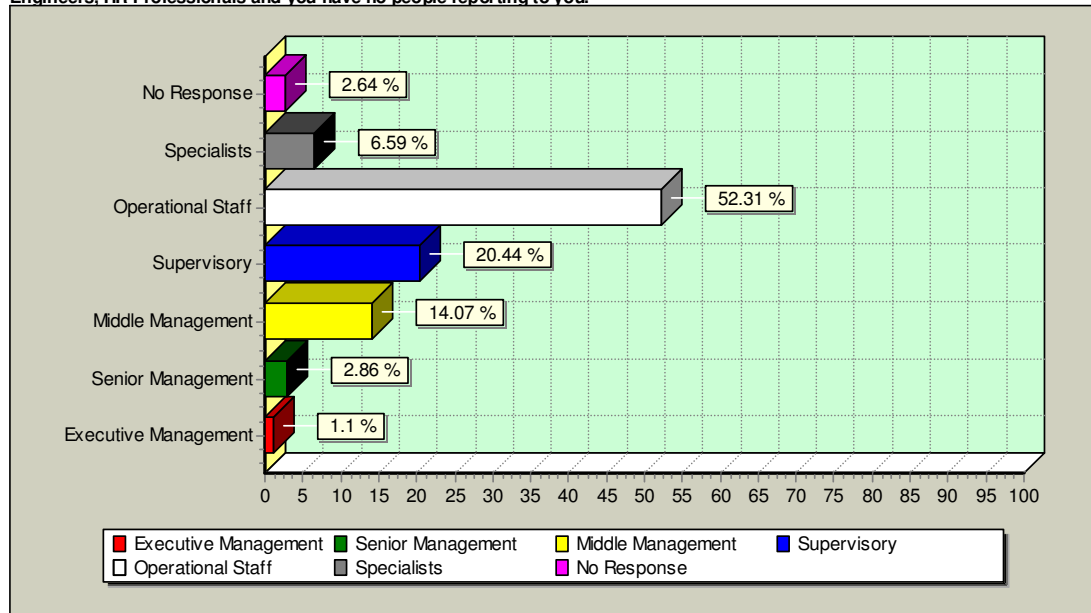


In figure 5.5, the breakdown of the different job levels at job grade 18 and above is depicted, indicating that the majority (52.31%) (n=238) are at the operational staff level, which includes customer service representatives and administrators. The second largest group is the supervisory level comprising 20.44% (n=93), followed by the middle management group comprising 14.07% (n=64). The smallest groups are the executive manager group and the senior management group comprising 3.96% (n=18). The specialist group consisting of IT specialists, scientists, engineers and HR professionals forms 6.59% (n=30) of the sample.

FIGURE 5.5

JOB LEVELS

What is your job level? Note: Executive Management includes Managing Director and Executive Managers. Senior Management includes heads of Departments, Divisional Heads and Department Managers. Middle Management includes Regional Managers: Works, Depots and Managers. Supervisory includes Operational Managers, Foreman, Team leaders, etc. Operational staff includes Customers Services representatives, Administrators. Specialists include IT specialists, Best Practices Manager, Scientists, Engineers, HR Professionals and you have no people reporting to you.



5.2.2 Results of the knowledge retention questionnaire

The extent to which the organisation is successful in retaining knowledge was measured by means of the knowledge retention questionnaire that was compiled for the empirical research, based on the theoretical model that was developed and discussed in chapter 3 (fig 3.9). The descriptive statistics presented in table 5.1 were computed for the various dimensions assessed at individual, group and organisational levels in the questionnaire.

TABLE 5.1
RESULTS OF THE THEORETICALLY COMPOSED DIMENSIONS OF THE
KNOWLEDGE RETENTION QUESTIONNAIRE

Groups	Count	Mean	Std. Dev.	Category Percentages					
				0	20	40	60	80	100
Ind: Motivation	447.0	3.68	1.150	17.1%	16.7%	66.2%			
Ind: Ability	445.0	3.56	1.060	17.1%	18.4%	64.5%			
Ind: Values and Attitudes	445.8	3.44	1.149	20.9%	22.4%	56.7%			
Knowledge Behaviours	445.2	3.33	1.200	25.9%	18.8%	55.3%			
Grp: Conflict	444.5	3.28	1.182	26.9%	20.9%	52.2%			
Ind: Biographical Influence	447.5	3.24	1.135	24.8%	24.9%	50.3%			
Grp: Work Teams	443.3	3.20	1.215	28.5%	23.5%	47.9%			
Grp: Communication	449.0	3.19	1.229	28.6%	22.2%	49.2%			
Ind: Personality and Emotions	445.3	3.15	1.099	29.0%	27.7%	43.3%			
Grp: Structure	444.2	3.15	1.136	29.9%	24.5%	45.5%			
Ind: Individual Learning	445.3	3.10	1.094	36.1%	14.8%	49.2%			
Grp: Leadership and Trust	444.7	3.07	1.218	31.6%	25.0%	43.4%			
Identifying Types of Knowledge	446.0	2.82	1.215	42.7%	19.4%	38.0%			
Org: Structure	442.5	2.82	1.186	41.3%	26.5%	32.2%			
Grp: Power and Politics	442.0	2.78	1.170	39.4%	30.2%	30.3%			
Preventing Competitor Advantage	442.5	2.69	1.138	42.0%	31.5%	26.6%			
Org: Culture and Values	442.3	2.59	1.194	49.8%	23.4%	26.8%			
Identifying Individuals	437.0	2.52	1.166	50.3%	28.2%	21.5%			
Org: Human Resource Practices	443.4	2.52	1.216	51.7%	22.6%	25.7%			
Strategic Impact	446.5	2.49	1.125	52.5%	25.9%	21.6%			
Overall Averages	443.9	2.96	1.1745	36.7%	23.6%	39.7%			

Count = Number of respondents. This is an accumulated figure. All respondents did not respond to all statements in each dimension.
Mean = The total of the scores divided by the number of responses.

CATEGORY PERCENTAGES/SCALES
Green (favourable %) = 5 - Strongly agree, 4 - Agree
Yellow (neutral %) = 3 - Unsure
Red (unfavourable %) = 2 - Disagree, 1 - Strongly disagree

The results in table 5.1 indicate that only 39.7% agree and strongly agree that conditions are favourable for retaining knowledge in the organisation. The highest ranked dimensions are individual motivation (mean of 3.68 and 66.2% agreement), ability to communicate and retain knowledge (mean of 3.56 and 64.5% agreement) and values and attitudes regarding willingness to share knowledge and the importance of knowledge retention (mean of 3.44 and 56.7% agreement). The knowledge behaviours (ie learning, knowing, sharing, transferring and applying knowledge) are enacted in the organisation to some extent (mean of 3.33 and 55.3% agreement). Strategic impact (mean of 2.49 and 21.6% agreement), HR practices (mean of 2.52 and 25.7% agreement), identifying individuals whose knowledge might be lost (mean of 2.52 and 21.5% agreement) and organisational culture (mean of 2.59 and 26.8% agreement) are the lowest-ranked dimensions.

The standard deviation indicates that there is a fairly even spread of the results over the five-point scale. This means that the factors that influence knowledge retention are perceived differently in different areas of the organisation.

5.3 EXPLORATORY FACTOR ANALYSIS

The exploratory factor analysis was conducted with SPSS version 17.0. The first step in the process is to extract the factors based on the data collected from the respondents for each item in the questionnaire. Factor extraction involves determining the number of factors that would best represent the interrelationships between the set of variables (Pallant in Castro 2008:147). The initial unrotated factor matrix was computed to assist in obtaining a preliminary indication of the number of factors to be extracted (Hair et al 1995:379-380). The first specification of the principal component factor analysis (PCFA) produced a reasonably acceptable factor model. Eleven factors were produced. However, two of the factors consisted of only one item each. It was decided to eliminate these two factors. The reliability test (the Cronbach alpha) was conducted and the Cronbach alphas of the nine remaining factors varied between .960 and .787. The factor loadings were investigated, and respecification of the factor model was computed by returning to the extraction stage, extracting factors and reinterpreting (Hair et al 1995:380). Items that had low scores (lower than .400) in the first factor analysis were removed before the second factor analysis was conducted. These items, based on the first factor analysis loadings, are depicted in table 5.2.

TABLE 5.2
ITEMS REMOVED AFTER FIRST FACTOR ANALYSIS
(SCORES BELOW .400)

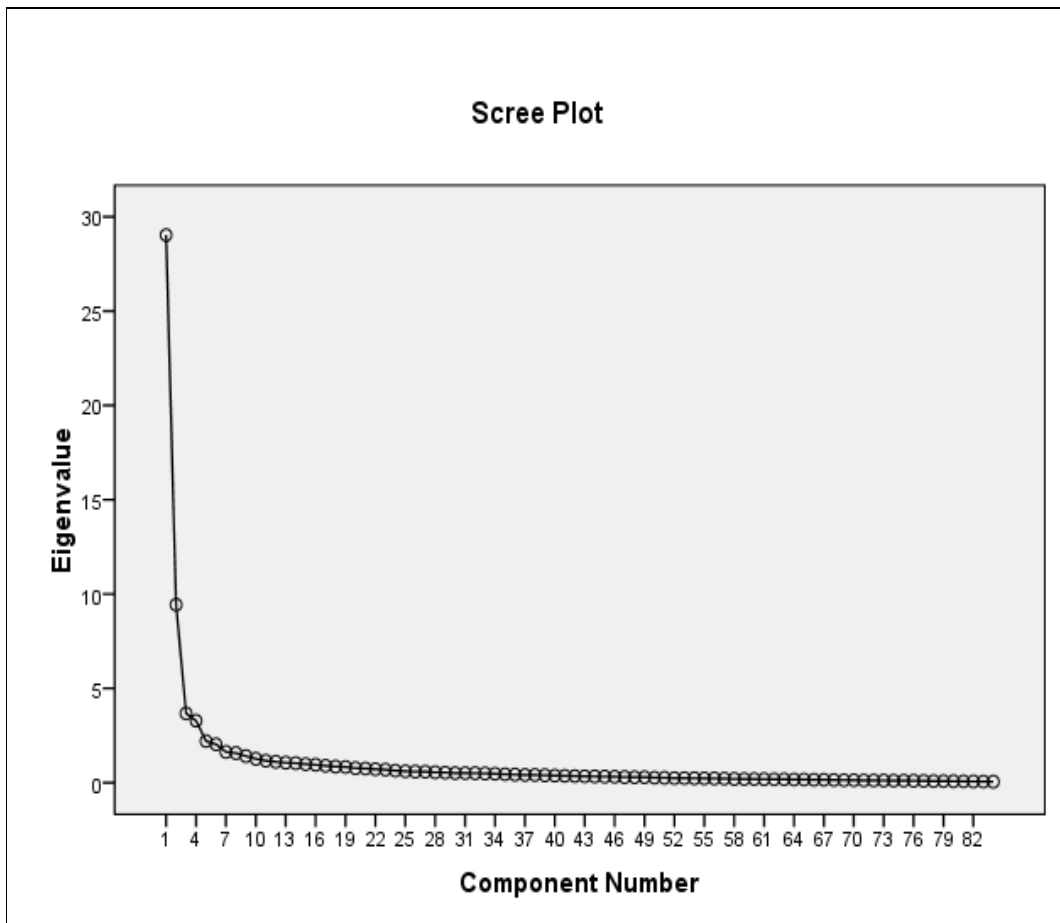
Item number	Statement	Factor loading
14	Our organisation retains knowledgeable retirees beyond retirement.	.393
77	When I contribute to knowledge retention in my team, it is acknowledged.	.373
92	We have the necessary knowledge and skills in our team to make the right decisions.	.384
93	Leaders communicate a strong positive vision of our organisation.	.335

The second factor analysis included items with a loading above .400. The results of the second factor analysis are discussed below.

5.3.1 Number of factors to be extracted

Three different criteria were used to determine the number of factors to be extracted in the second factor analysis, namely the scree test, the latent root criterion (eigenvalues) and the percentage of eigenvalues. Cartell's scree test produced the following results (fig 5.6):

FIGURE 5.6
SCREE PLOT OF THE OVERALL SCALE OF THE
KNOWLEDGE RETENTION QUESTIONNAIRE



Inspection of the scree test revealed that there is a change in direction after the fourth factor and the point at which the line seems to straighten could possibly be after the ninth factor. It was decided to retain nine factors.

The analysis of the latent root criterion (eigenvalues) and percentage of eigenvalues (or variance criteria) produced the following results (tab 5.3):

TABLE 5.3
TOTAL VARIANCE EXPLAINED

Component	Initial eigenvalues			Extraction sums of squared Loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	29.031	34.561	34.561	29.031	34.561	34.561	11.864	14.124	14.124
2	9.436	11.233	45.794	9.436	11.233	45.794	9.738	11.593	25.718
3	3.671	4.371	50.165	3.671	4.371	50.165	8.487	10.104	35.821
4	3.284	3.910	54.074	3.284	3.910	54.074	7.014	8.350	44.171
5	2.206	2.626	56.700	2.206	2.626	56.700	5.371	6.395	50.566
6	2.034	2.421	59.121	2.034	2.421	59.121	3.378	4.021	54.586
7	1.631	1.942	61.063	1.631	1.942	61.063	2.966	3.531	58.117
8	1.567	1.866	62.928	1.567	1.866	62.928	2.921	3.478	61.594
9	1.410	1.678	64.607	1.410	1.678	64.607	2.530	3.012	64.607
10	1.265	1.506	66.113						
11	1.165	1.387	67.500						
12	1.107	1.318	68.818						
13	1.059	1.261	70.078						
14	1.037	1.234	71.312						
15	.983	1.170	72.482						

Although 14 components appeared to have an eigenvalue greater than 1.00 which is considered significant, the extraction sum of squared values and the rotation sum of squared values indicated that nine factors accounted for 64.61% of the total variance, based on the cumulative percentage of eigenvalues. This percentage is above the criterion stated by Hair et al (1995:378) that a solution in the social sciences should

account for 60% (or even less) of the variance. The nine-factor structure appears to provide a satisfactory solution.

The next step was to conduct factor rotation to determine the most interpretable factors, producing factor loadings that indicate the correlation of each variable with each factor. The VARIMAX rotational method, which seems to be the approach that provides a clearer separation of factors, was used. A summary of the factor structure after VARIMAX rotation of the second factor analysis is provided in table 5.4 indicating the item numbers under each factor.

TABLE 5.4
SUMMARY OF FACTOR STRUCTURE AFTER VARIMAX ROTATION BASED ON
FACTOR LOADINGS OF .400 AND ABOVE

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
44	31	69	21	61	87	82	85	10 *
47	27	68	20	62	94	84	96 *	15 *
46	26	72	23	60	86	78	97 *	16
43	30	65	19	58	79	81	95 *	(83 negative loading)
45	28	80	22	59	90		89	
40	32	64	24	63	88			
41	33	66	25	57 *	91			
48	29 *	67	13					
51	35	70	18 *					
39	34	71	17 *					
50	37	73						
42	74							
53 *	12 *							
54	36							
38	75							
52								
56*								
49								
55								

Numbers in bold with asterisk (*): Items that loaded higher than .400 on two factors.

Numbers in red: Items that would measure knowledge retention as a dependent variable.

The items in bold, with an asterisk, loaded on another factor as well. However, the items were retained in the factors (as displayed above) where they had the highest score. In the factor analysis, items 11 and 76 had scores below .400 and were thus not listed in table 5.4 (details are indicated in tabs 5.7 & 5.14). Items 1 to 9 were the demographical/biographical statements that do not form part of the items used for the factor analysis.

5.3.2 Interpretation of factor loadings

The factors produced in the first principal component factor analysis were initially named meaningfully, ignoring items that had a factor loading below .500 (not considered to be significant). However, upon investigating the items and their factor loadings, it was decided to respecify the factor model including all items with a factor loading above .400 (which is deemed to be important). The researcher felt that items with loadings above .400 would be meaningful in measuring the extent of knowledge retention in an organisation.

5.3.3 Conceptual naming of factors

The interpretation of the refined second factor analysis produced the following factors (tab 5.5):

**TABLE 5.5
NAMING OF FACTORS**

FACTOR	NAME
Factor 1	Knowledge behaviours
Factor 2	Strategy implementation
Factor 3	Leadership
Factor 4	People knowledge loss risks
Factor 5	Knowledge attitudes and emotions
Factor 6	Power play
Factor 7	Knowledge growth and development
Factor 8	Performance management
Factor 9	Organisational support and encouragement

5.3.4 Description of factors

The nine factors postulated by the second factor analysis are described in tables 5.6 to 5.14. The purpose of the tables is to indicate the content of each factor by providing the wording of each item and consequently naming the factors in a conceptual manner. A factor loading of .400 was used as the cut-off point to eliminate items with lower scores, and items that did not fit into the conceptual naming of the factors were also eliminated. These items are specified in the blue (low score) or light purple (did not fit) shaded rows in the different tables.

The communality (h^2) of each item is indicated in the tables, representing the amount of variance accounted for by the factor solution for each variable. The researcher specified that if the communalities were below .50, the variable would be evaluated for possible deletion, but taking the variables' overall contribution to the research into account. It was found that only three variables had communalities below .50 (item 55 in factor 1, item 75 in factor 2 and item 63 in factor 5). However, the variables were included in the factors because they all had factor loadings above .400 and were deemed to make a contribution to the research in the sense that measuring these items would contribute to knowledge retention.

5.3.4.1 *Factor 1: Knowledge behaviours*

The content of factor 1 relates to the different behaviours that employees in an organisation need to exhibit in their teams in order to prevent knowledge loss and contribute to knowledge retention. Most of the behaviours relate specifically to knowledge behaviours, namely reflecting on completed work tasks; applying experience to take effective action; improving decision making and problem solving; sharing work experiences; learning to perform new and changing tasks; creating new knowledge; determining the type of knowledge that is critical to get the job done; having a shared understanding of the field of expertise; transferring knowledge to help deal with the unexpected; and avoiding free-riding of group members on other members' knowledge. Some of the items refer to behavioural factors that would promote knowledge retention, namely healthy interpersonal relationships (item 48); effective communication between older and younger team members (item 51) and between members from diverse backgrounds (item 50); acceptance of team goals (item 54); and constructive solving of conflict (item 56). The conceptual naming of "knowledge behaviours" encompasses all the

items, but focuses specifically on the knowledge behaviour variables with the highest factor loadings.

The variables belonging to the first factor are provided in table 5.6. The statements in red text are the items that were extracted to measure the dependent variable, knowledge retention (as indicated in sec 5.3.4.10) and are not referred to in the discussion of this factor.

TABLE 5.6
FACTOR 1: KNOWLEDGE BEHAVIOURS

Item number	Question	Factor loading	Communality * h ²
44	In our team we reflect on completed work tasks	.803	.762
47	In our team we apply our experience to take effective action	.786	.746
46	In our team we apply our experience to improve decision making	.781	.729
43	In our team we share work experiences with each other	.773	.708
45	In our team we apply our experience to improve problem solving	.766	.720
40	In our team we continuously learn to perform new and changing tasks	.761	.699
41	In our team we create new knowledge through eliciting discussions amongst each other	.750	.692
48	In our team we have healthy interpersonal relationships	.724	.724
51	In our team there is effective communication between older and younger team members	.696	.636
39	In our team we determine the type of knowledge that is critical to getting the job done	.679	.623
50	In our team there is effective communication between people with diverse backgrounds	.653	.658
42	In our team we create new knowledge through interacting with our customers	.653	.574
53	Our team members have a shared understanding of our field of expertise	.630	.611
54	Our team members accept our team goals	.641	.594
38	In our team we determine the expertise and skills of individuals that must be retained	.596	.603
52	In our team the retention of knowledge is encouraged	.594	.646
56	Our team is able to constructively solve conflicts	.529	.670

49	In our team experts transfer knowledge to prepare us to deal with the unexpected	.523	.509
55	Our team avoids free-riding of group members on other members' knowledge	.404	.427
	TOTAL COMMUNALITY (excluding items 38 and 52)		11.082

Note: Item numbers and figures in red refer to items to be extracted for independent variable: knowledge retention.

* h^2 = communality.

Although item 55 had a communality (h^2) score under the specified cut-off point of .50, it was decided to retain this variable on the strength of the contribution it should make to the overall research and because the factor loading was above .400.

5.3.4.2 Factor 2: Strategy implementation

The loss of knowledge in an organisation will have a direct impact on the implementation of the organisation's strategy. The items in this factor would enable organisations to determine the elements that hinder or enhance successful implementation of the organisational strategy. These pertain to the extent to which maintaining organisational growth and developing of new products and services regardless of knowledge loss are achieved, and determining areas of competitive advantage because of specialised knowledge. **Values** that would contribute to successful strategy implementation and ultimately knowledge retention appear to be openness (items 34 and 35), respect (item 37), innovativeness (item 12) and organisational trust (item 36). The results of factor 2 are indicated in table 5.7.

TABLE 5.7
FACTOR 2: STRATEGY IMPLEMENTATION

Item number	Question	Factor loading	Communality * h^2
31	In our organisation we determine the essential knowledge needed to implement our strategy successfully	.789	.761
27	In our organisation we are able to maintain organisational growth regardless of the loss of knowledge	.742	.678
26	In our organisation we are able to develop new products and services regardless of the loss of knowledge	.736	.619
30	In our organisation we determine the areas where we have a competitive advantage because of our specialised knowledge	.735	.752
28	In our organisation we determine what type of		

	knowledge, if lost, would undermine productivity	.732	.717
32	In our organisation we retain the essential knowledge needed to implement our strategy successfully	.729	.724
33	In our organisation we identify the risks of losing knowledge when knowledgeable people leave the organisation	.685	.673
29	In our organisation we determine the type of knowledge that must be retained to support continuous performance improvement	.669	.684
35	In our organisation we have opportunities to observe experts doing their jobs [Value: openness]	.611	.589
34	In our organisation we are encouraged to openly exchange knowledge [Value: openness]	.605	.642
37	In our organisation our contributions to retaining knowledge, through sharing expertise, are appreciated [Value: respect]	.555	.601
74	Our organisation has an effective mentoring (coaching, apprenticeship) process that helps build knowledge	.526	.599
12	Our organisation encourages finding new methods to perform a task [Value: innovativeness]	.487	.639
36	In our organisation there is a trust relationship between management and staff [Value: trust]	.477	.589
75	When we have outside negotiations we are cautious about protecting our own knowledge	.404	.474
76 REMOVED	Employees share their expertise regardless of diverse backgrounds	LOW SCORE	.532
	TOTAL COMMUNALITY (excluding items 31, 28, 32, 33 and 29 and item 76 which was removed)		6.182

Note: Item numbers and figures in red refer to items to be extracted for independent variable: knowledge retention.

* h^2 = communality.

The items with red item numbers were extracted to measure the dependent variable, knowledge retention (as indicated in sec 5.3.4.10) and are not referred to in the discussion of this factor. It was decided to remove item 76 since no score was produced in the second factor analysis, indicating that the factor loading was lower than .400. Although item 75 had a communality score below .500, it was decided to retain the variable on the strength of its contribution to the overall research.

5.3.4.3 Factor 3: Leadership

This factor relates to leadership behaviours that would contribute to enhancing knowledge retention. Managers should lead by keeping promises, being honest, trustworthy, fair, caring and emotionally intelligent by interpreting people's emotions correctly. They should enhance (contribute to) knowledge retention by encouraging the flow of knowledge, promoting cooperation, facilitating knowledge exchange and retention, creating an awareness of organisational challenges and encouraging employees to take responsibility for their own development and training. The items in factor 3, leadership, are depicted in table 5.8.

TABLE 5.8
FACTOR 3: LEADERSHIP

Item Number	Question	Factor loading	Communality * h ²
69	My manager keeps promises	.834	.792
68	My manager is honest	.830	.756
72	My manager treats all members fairly (without favouritism)	.794	.759
65	My manager interprets other people's emotions correctly	.792	.762
80	I trust my manager	.787	.755
64	My manager shows caring through paying personal attention to team members	.771	.747
66	My manager encourages the flow (movement) of knowledge in our team	.723	.761
67	My manager promotes cooperation between team members	.721	.734
70	My manager facilitates knowledge exchange and retention	.685	.676
71	My manager creates an awareness of organisational problems/challenges	.673	.627
73	My manager encourages employees to take responsibility for their own training and development	.608	.626
	TOTAL COMMUNALITY		7.995

* h² = communality

5.3.4.4 Factor 4: People knowledge loss risks

The content of this factor refers to identifying the experts/specialists, highly experienced employees, best performers, leaders, industry-specific professionals, key people whose knowledge is critical to the survival and growth of the organisation and employees

approaching retirement. These are the groups of people whose knowledge, if lost, is a risk to the organisation. Retaining the most knowledgeable people, being sensitive to teams' expertise and retaining employees through an effective career development process pose risks to the organisation if not handled correctly, resulting in people knowledge loss risks in this context.

TABLE 5.9
FACTOR 4: PEOPLE KNOWLEDGE LOSS RISKS

Item number	Question	Factor loading	Communality * h ²
21	In our organisation the individuals are identified whose knowledge, if lost, could be detrimental to the organisation, pertaining to: experts / specialists	.825	.821
20	- highly experienced employees	.812	.815
23	- key people in the organisation whose knowledge is critical to the survival and growth of the organisation	.808	.806
19	- best performers	.795	.773
22	- leaders	.786	.786
24	- industry-specific professionals (such as engineers, IT specialists, doctors, lawyers, accountants)	.763	.694
25	- employees approaching retirement	.661	.587
13	Our organisation retains our most knowledgeable people	.491	.590
18	Our organisation is sensitive to the protection of our team's expertise	.474	.658
17	Our organisation has an effective career development process that helps build knowledge and competencies	.418	.634
	TOTAL COMMUNALITY		7.164

* h² = communality.

5.3.4.5 Factor 5: Knowledge attitudes and emotions

The content of this factor focuses on the perception of employees about the attitudes and emotions of their colleagues regarding willingness to use expertise, share expertise, communicate in an understandable way, cooperate with each other, taking responsibility for their own development and being personally committed to the organisation to prevent knowledge loss. Table 5.10 indicates the items in factor 5.

TABLE 5.10
FACTOR 5: KNOWLEDGE ATTITUDES AND EMOTIONS

Item number	Question	Factor loading	Communality * h ²
61	My colleagues are willing to use expertise that others in the organisation share with them	.754	.784
62	My colleagues have the ability to communicate knowledge in an understandable way	.745	.764
60	My colleagues are willing to share their expertise and knowledge	.722	.735
58	My colleagues cooperate with each other constructively	.710	.684
59	My colleagues are personally committed to the organisation to prevent knowledge loss	.597	.557
63	My colleagues take responsibility for their own development	.594	.481
57 REMOVED	Our team consists of diverse members bringing valuable knowledge to the table	.517	.671
	TOTAL COMMUNALITY (excluding item 57 which was removed)		4.005

* h² = communality

Since item 57 above did not fit meaningfully into the factor structure, it was decided to remove it. A possible reason for the item not fitting was that it does not measure any attitude or emotion relating to knowledge retention, but instead, measured the structure of a team. Although item 63 had a communality score below .50, it was decided to retain this variable on the strength of its contribution to the overall research.

5.3.4.6 Factor 6: Power play

The items in this factor would influence the extent to which power and politics play a role in preventing or enhancing knowledge retention. The items refer to team members solving differences, trusting each other and colleagues, making use of external expertise, experts sharing their knowledge, group cohesiveness and enjoying social interactions in the work place. The items belonging to factor 6 are indicated in table 5.11.

TABLE 5.11
FACTOR 6: POWER PLAY

Item number	Question	Factor loading	Communality * h ²
87	We solve our differences by getting to the root cause of the problem	.586	.606
94	Team members in our team trust each other	.575	.590
86	Group cohesiveness (sticking together) is encouraged in our team	.530	.611
79	I trust my colleagues	.525	.541
90	Making use of external expertise is encouraged in our team	.457	.530
88	Experts/specialists freely share their knowledge with other team members	.428	.561
91	We have enjoyable social interactions in the workplace	.405	.502
	TOTAL COMMUNALITY		3.941

* h² = communality.

5.3.4.7 *Factor 7: Knowledge growth and development*

The content of this factor relates to behaviours of sharing knowledge whilst working with colleagues, engaging in learning opportunities and working with colleagues (not on one's own) to contribute to knowledge growth and development. In other words, gaining satisfaction from sharing knowledge, working with colleagues and engaging in learning opportunities would enhance knowledge retention. The results of factor 7 are indicated in table 5.12.

TABLE 5.12
FACTOR 7: KNOWLEDGE GROWTH AND DEVELOPMENT

Item number	Question	Factor loading	Communality * h ²
82	I gain satisfaction from sharing my knowledge whilst working with colleagues	.729	.718
84	I actively engage in learning opportunities to further develop myself	.657	.512
78	It is important to grow and retain knowledge in our organisation	.633	.563
81	Working with my colleagues (not on my own) improves my ability to retain knowledge	.538	.571
	TOTAL COMMUNALITY (excluding item 78)		1.801

Note: Item numbers and figures in red refer to items to be extracted for independent variable: knowledge retention.

* h² = communality.

The item with red text was extracted to measure the dependent variable, knowledge retention (as indicated in sec 5.3.4.10) and is not referred to in the discussion of this factor.

5.3.4.8 *Factor 8: Performance management*

The items in this factor refer to performance evaluation recognising individuals' unique expertise and knowledge and taking the sharing of knowledge into consideration. Performance management includes training and development in organisations and in this context two items in this factor refer to the need for further development and taking the needs of different age generations into consideration in training and development processes. Performance management that includes these elements would enhance retention of knowledge. Items belonging to factor 8 and the results are depicted in table 5.13.

TABLE 5.13
FACTOR 8: PERFORMANCE MANAGEMENT

Item number	Question	Factor loading	Communality * h ²
85	I am satisfied to keep doing the job I do without any further development	.618	.409
96	Performance evaluation in our organisation takes the sharing of knowledge into consideration	.594	.653
97	Our performance evaluation recognises each individual's unique expertise and knowledge	.530	.614
95	Training and development processes in our organisation take the needs of different age generations into consideration	.479	.527
89 REMOVED	Forming relationships and networking with other internal expert groups are encouraged in our organisation.	.478	.602
	TOTAL COMMUNALITY (excluding item 89)		2.203

* h² = communality

Although item 89 above had a factor loading above .400, on closer investigation, the statement did not appear to be well formulated (including two concepts: relationships and networking). It could be argued that the extent to which employees form relationships and network with other expert groups are part of performance evaluation, but it was decided to remove this item because the researcher was not sure whether a high score would

indicate either relationship forming or networking encouragement with expert groups, or both. One might network with experts, but not necessarily form a relationship with them.

5.3.4.9 *Factor 9: Organisational support and encouragement*

An interesting new factor evolved in the second factor analysis referring to the support and encouragement from the organisation in terms of suggesting new ideas, cooperation between different departments and interaction between those who share a concern or passion about a topic, which are all elements that would enhance knowledge retention from an organisational perspective. The results of factor 9 are indicated in table 5.14.

TABLE 5.14
FACTOR 9: ORGANISATIONAL SUPPORT AND ENCOURAGEMENT

Item number	Question	Factor loading	Communality * h ²
10	Our organisation encourages us to suggest ideas for new opportunities	.584	.728
15	Our organisation supports cooperation between different departments/sections	.457	.567
16	Our organisation supports interaction between those who share a concern/passion about a topic	.452	.625
83 REMOVED	Receiving financial rewards will motivate me to share my knowledge with my colleagues	-.423	(.406)
11 REMOVED	Our organisation places value on taking risks even if it turns out to be a failure	LOW SCORE	.398
	TOTAL COMMUNALITY (excluding items 83 and 11 that were removed)		1.920

* h² = communality

One item, referring to the organisation placing value on taking risks, appeared to have no score in the second factor analysis, indication that the loading was below .400. Item 11 was removed on the basis of the factor loading being below .400 and the communality being below .50. The item (83) referring to receiving financial rewards as motivation to share knowledge with colleagues had a negative loading. This negative loading is caused by a statement that is negatively oriented to the factor – hence receiving financial rewards has a negative loading on the organisational support and encouragement factor (Stanek 1993:4). This item was removed from this factor.

5.3.4.10 Composite variable: knowledge retention

The factor structure did not produce a dependent variable to measure knowledge retention. Rowe (2006:3) contends that most theories and models in applied psychosocial research are formulated in terms of latent variables (or hypothetical constructs) that are not directly measurable or observable. As a means of data reduction, it is acceptable to compute latent or composite variables, such as knowledge retention, from several observed indicators (or response items), each requiring responses in Likert-type ordered categories. Measurements on a number of distinct features are available, all with a bearing on the same broad element, namely knowledge retention in this research. According to Cox (2008:1002), such direct measurements are sometimes called pointer readings. It may be helpful to combine the pointer readings into one composite or derived variable, where “the pointer readings are of no intrinsic interest and the derived variable is intended to estimate some latent feature, which is the real object of concern” (Cox 2008:1002). In other words, the statements and responses serve only as indicators of a dependent variable, namely knowledge retention (Cox 2008:1002). After careful investigation of the questionnaire items and the theoretical discussion (especially in sec 3.3.2 on knowledge retention), the researcher combined the relevant items into a composite variable by extracting from the existing questionnaire, the variables/items that would measure knowledge retention.

The items composed to measure knowledge retention as a dependent variable are depicted in table 5.15, indicating from which factor the item/s was/were extracted.

TABLE 5.15
FACTOR 10: KNOWLEDGE RETENTION (composite variable)

Item number	Question	Factor loading	Communality * h ²
31	In our organisation we determine the essential knowledge needed to implement our strategy successfully (from factor 2)	.789	.761
28	In our organisation we determine what type of knowledge , if lost, would undermine productivity (from factor 2)	.732	.717
32	In our organisation we retain the essential knowledge needed to implement our strategy successfully (from factor 2)	.729	.724
33	In our organisation we identify the risks of losing knowledge when knowledgeable people leave the organisation (from factor 2)	.685	.673

29	In our organisation we determine the type of knowledge that must be retained to support continuous performance improvement (from factor 2)	.669	.684
78	It is important to grow and retain knowledge in our organisation (from factor 7)	.633	.563
38	In our team we determine the expertise and skills of individuals that must be retained (from factor 1)	.596	.603
52	In our team the retention of knowledge is encouraged (from factor 1)	.594	.646
	TOTAL COMMUNALITY		5.371

* h^2 = communality

Rowe (2006:5) proposes that some form of confirmatory factor analysis (CFA) should be applied because “CFA models allow for unequal contributions of indicators towards the measurement of latent variables, and the models will fit only when the indicator variables associated with any one latent variable are valid indicators of that trait”. In the current research, CFA is part of the SEM process. Knowledge retention is used as a latent variable to determine whether the model will fit, indicating that the variables chosen to represent knowledge retention are valid indicators of knowledge retention.

5.3.4.11 Summary of principal component factor analysis results

To summarise, the following items were **removed** from the nine factors specified in the second factor analysis, before conducting the reliability test:

- factor 2: item 76 (low factor loading score)
- factor 5: item 57 (does not fit)
- factor 8: item 89 (does not fit – badly formulated – 2 concepts)
- factor 9: item 83 (loaded negatively)
- factor 9: item 11 (low factor loading score)

This means that in total, nine items were removed from the knowledge retention questionnaire (14, 77, 92, 93 after the first factor analysis and 76, 57, 89, 83 and 11 after the second factor analysis). It was decided to retain the items that loaded on two factors with the factor where the highest factor loading was evident. Coincidentally, the items fitted conceptually well in these factors. Only three variables were found to have communalities below .50 (item 55 in factor 1, item 75 in factor 2 and item 63 in factor 5). However, the variables were included in the factors because they all had factor loadings

above .400 and were deemed to make a contribution to the research in the sense that they would contribute to knowledge retention. After removing items with scores lower than .400 or that did not fit into the factor structure, **79 items in total remained**.

The total communality obtained by adding the individual sums of squares for each of the factors is 51.062 (including the total communality of knowledge retention – see tab 5.15), which represents the total amount of variance extracted by the factor solution (Hair et al 1995:395). This indicates that the factor solution accounts for at least one-half of the variance of all the variables.

5.4 RELIABILITY ANALYSIS

The Cronbach alpha was used to determine the internal reliability of items in each factor. The test was conducted on the second factor analysis to validate the factor structure. These results are indicated in table 5.16 and include all statements with a factor loading above .400.

TABLE 5.16
RESULTS OF RELIABILITY OF FACTORS
(INCLUDING COMPOSITE VARIABLE ITEMS)

Factor	Cronbach alpha	Cronbach alpha based on standardised items	N of items
Factor 1 Knowledge behaviours	.959965	.959958	19
Factor 2 Strategy implementation and values	.940314	.939676	15
Factor 3 Leadership	.958008	.958159	11
Factor 4 People knowledge loss risks	.938447	.938646	10
Factor 5 Knowledge attitudes and emotions	.897459	.898581	6
Factor 6 Power play	.847315	.847416	7
Factor 9 Organisational support and encouragement	.811864	.815229	3
Factor 7 Knowledge growth and development	.748458	.761046	4
Factor 8 Performance management	.751401	.744182	4

After extracting the items from factors 1, 2 and 7 for the composite variable measuring knowledge retention, the reliability of the factors that was affected, was revised to prevent built-in correlation of variables. The results, including the results of the composite factor: knowledge retention, are indicated in table 5.17.

TABLE 5.17
RESULTS OF RELIABILITY OF FACTORS
(INCLUDING COMPOSITE VARIABLE ITEMS AS FACTOR 10:
KNOWLEDGE RETENTION)

Factor	Cronbach alpha	Cronbach alpha based on standardised items	N of items
1 Knowledge behaviours	.954460	.954028	17
3 Leadership	.958008	.958159	11
4 People knowledge loss risks	.938447	.938646	10
5 Knowledge attitudes and emotions	.897459	.898581	6
2 Strategy implementation and values	.893887	.893001	10
6 Power play	.847315	.847416	7
9 Organisational support and encouragement	.811864	.815229	3
8 Performance management	.751401	.744182	4
7 Knowledge growth and development	.721514	.729639	3
Total number of questions (excluding items extracted for composite factor: knowledge retention)			71
10 Knowledge retention	.859876	.861362	8
OVERALL RELIABILITY OF QUESTIONNAIRE OF 79 ITEMS	.975803	.975578	79

The factors that were affected in terms of reliability as a result of the extraction of the knowledge retention items are depicted in bold in the table above. Comparing the two reliability tests (tabs 5.16 & table 5.17), there appears to be some reduction in the scores of the three affected factors (knowledge behaviours had a reduction of .005505; strategy implementation and values a reduction of .046427; and knowledge growth and development a reduction of .026944). The order of the latter two factors also changed to a lower position in the ranking order of the Cronbach alphas (factor 2: strategy

implementation moving from second position to fifth position and factor 7: knowledge growth and development moving from eighth position to ninth position).

The overall Cronbach alpha coefficient obtained for the knowledge retention questionnaire was .975803 for the total 79 items. Since the total value was above .7, the instrument (scale) can be deemed to be reliable (De Vaus 1986:89; Pallant in Castro 2008:141). The reliability coefficient of the factors appears to vary between .954460 and .721541 after extraction of the composite variable which measures knowledge retention. Three of the reliability coefficients are above .9 and four above .8, which can be regarded as acceptable internal consistency reliability (Sekaran 1992:287). The composite variable: knowledge retention had a reliability coefficient above .8, indicating that it can be regarded as satisfactory. This means that the correlation between the items in each factor is strong. The closer the reliability coefficient is to 1.0, the better the correlation. Two of the reliability coefficients are above .7, namely performance management and knowledge growth and development, which can be regarded as acceptable.

It can be concluded that the internal consistency (reliability) of the overall knowledge retention questionnaire and the factors are consistent in what it is intended to measure. If multiple measurements are taken, the reliability measures will all be highly consistent in their values (Hair et al 1995:2).

5.5 SEM

SEM analysis was undertaken using the AMOS statistical program (version 18.0) to complete the model development strategy by developing different models. Several models were tested using SEM procedures such as a multiple regression model, a model with covariance and one without covariance. The next set of models was tested using the correlation matrix. All models were found to be deficient. Alternative models were tested on the basis of the theory and changes to the structural and/or measurement models suggested by the SEM modification indices. Three different models were selected to be compared with one another in order to select the best fitting model. The three models are described in the next section.

5.5.1 Model 1: Influence of knowledge behaviours on strategy implementation

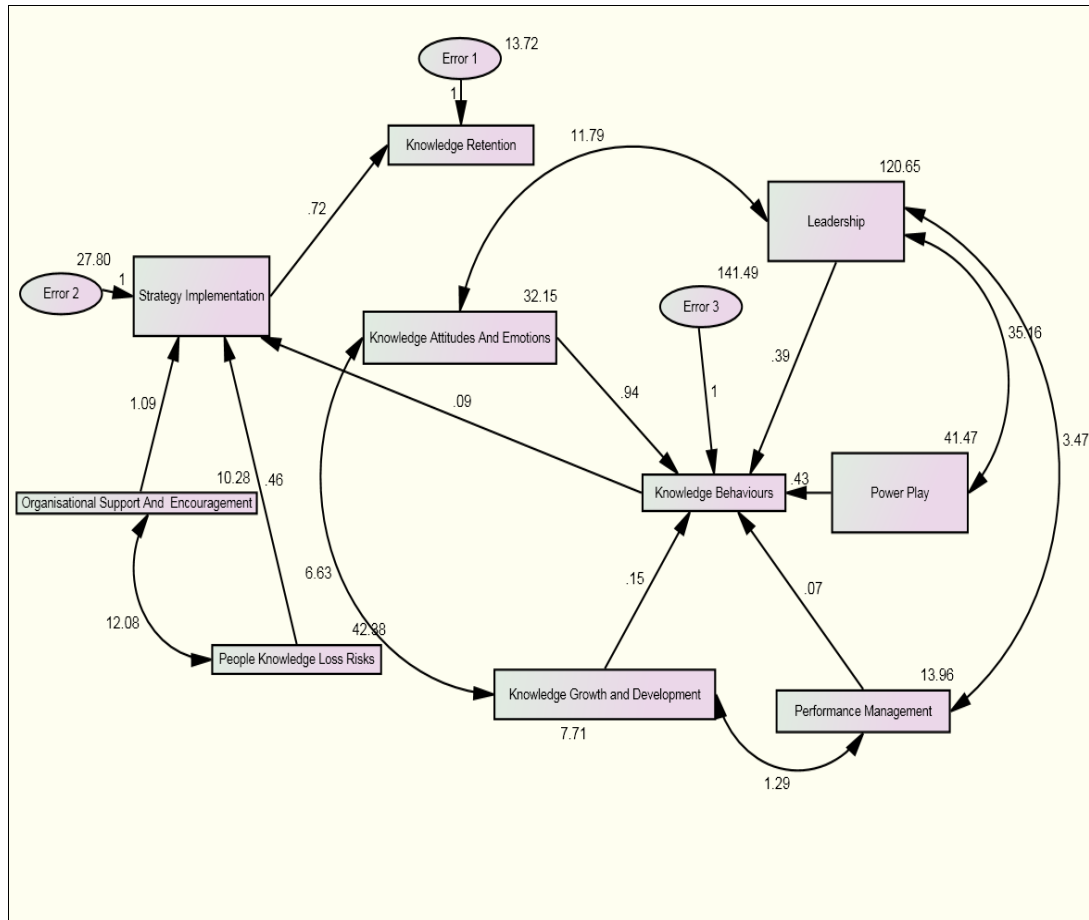
In this model, the influence of the exogenous variable, knowledge behaviours, on the endogenous variable, strategy implementation, was measured. The influence of organisational support and encouragement and people knowledge loss risk on strategy implementation and of strategy implementation on the endogenous variable, knowledge retention, was also measured. The path diagram and parameter estimates are depicted in figure 5.7.

Interpreting the regression coefficients, the knowledge behaviours appear to have less impact on strategy implementation (estimate of .09), explaining 35.3% of the variance, than organisational support and encouragement (estimate of 1.09) and people knowledge loss risks (estimate of .46), and both explain 55.7% of the variance. Strategy implementation explains knowledge retention, estimated (predicted) at .72 and it explains 70.3% of the variance (see squared multiple correlations below and fig 5.7).

Squared multiple correlations

	Estimate
Knowledge behaviours	.353
Strategy implementation	.557
Knowledge retention	.703

FIGURE 5.7
MODEL 1: INFLUENCE OF KNOWLEDGE BEHAVIOURS ON
STRATEGY IMPLEMENTATION



- direct causal relationship
- correlation between variables
- error between actual and predicted value

5.5.2 Model 2: Influence of knowledge behaviours on knowledge retention

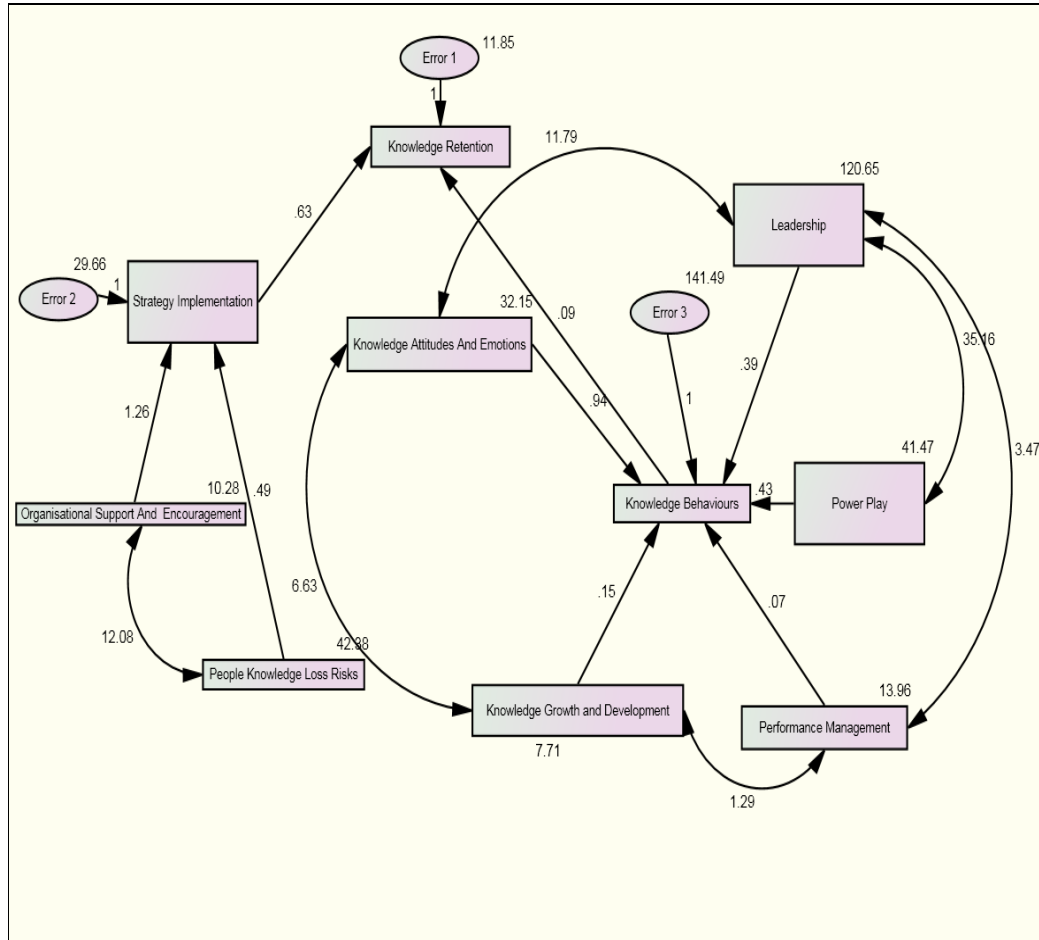
In model 2, the influence of the exogenous variables organisational support and encouragement and people knowledge loss risk on strategy implementation and of strategy implementation on endogenous variable knowledge retention was retained, but the direct influence of exogenous variable knowledge behaviours on endogenous variable knowledge retention was measured. The path diagram and parameter estimates are depicted in figure 5.8.

Interpreting the regression coefficients, knowledge behaviours have less impact on knowledge retention (estimate of .09) explaining 35.3% of the variance, than strategy implementation, which explains more of knowledge retention (estimate of .63), and it explains 58.0% of the variance. Both knowledge retention and strategy implementation combined explain 71.8% of the variance. The regression coefficient for strategy implementation and knowledge retention between model 1 and 2 differed by 12.2%. The estimated degree to which organisational support and encouragement explain strategy implementation increased from 1.09 in model 1 to 1.26 in model 2 (squared multiple correlations and fig 5.8 below).

Squared multiple correlations

	Estimate
Knowledge behaviours	.353
Strategy implementation	.580
Knowledge retention	.718

FIGURE 5.8
MODEL 2: INFLUENCE OF KNOWLEDGE BEHAVIOURS ON
KNOWLEDGE RETENTION



Note: Legend indicated below figure 5.7.

At this point in the model development strategy process, the goodness-of-fit indices were examined to determine which of models 1 and 2 would prove to be acceptable.

5.5.3 Goodness-of-fit indices

The test statistics and goodness-of-fit indices generated by AMOS were inspected, and did not produce good model fit for either models 1 or 2 (as indicated in tab 5.18). Up to this point, model building was approached by examining the influencing factors of strategy implementation and knowledge behaviours as two separate sets of variables that would influence or explain knowledge retention. The researcher decided to change the

model on the basis of a truer reflection of theory that suggests that most of the factors influencing knowledge retention are interrelated. Once again, making use of modification indices, the third model was developed. The test statistics and fit indices for models 1, 2 and 3 are indicated in table 5.18.

TABLE 5.18
GOODNESS-OF-FIT INDICES WITH COEFFICIENT VALUES
FOR MODELS 1, 2 AND 3

GOODNESS-OF-FIT CRITERION	MEASURES OF ABSOLUTE FIT			INCREMENTAL FIT MEASURES		
	Chi-square (CMIN) χ^2	P	Goodness-of-fit (GFI)	Normed fit index (NFI)	Incremental fit index (IFI)	Comparative fit index (CFI)
Model 1: Knowledge behaviours' influence on strategy implementation	887.064	.000	.710	.676	.684	.682
Model 2: Knowledge behaviours' influence on knowledge retention	849.989	.000	.719	.690	.697	.696
Model 3: Knowledge behaviours' influence on strategy implementation and knowledge retention [including relationships between most exogenous variables]	155.805	.000	.937	.943	.948	.947

Note: Conventional cut-off: Good fit is indicated by GFI \geq .90; NFI, IFI and CFI \geq .90 (Garson 2010:7; Hu & Bentler in Castro 2008:169; Schumacker & Lomax 1996:121)

Measures of absolute fit such as Chi-square statistics and goodness-of-fit statistics indicate the degree to which the overall model predicts the observed correlation or covariance matrix (Hair et al 1995:683). Although a goodness-of-fit (GOF) measure with a value of .90 or higher indicates an acceptable fit (Baldwin; Bentler & Bonett in Schumacker & Lomax 1996:120), it is recommended that it be used in combination with other GOF criteria to assess model fit, model comparison and model parsimony (Schumacker & Lomax 1996:121). Different goodness-of-fit measures that are relevant to the SEM strategy of model development conducted in this research are discussed below.

Model chi-square (CMIN) is the most common fit test. Hair et al (1995:683) indicate that a large value of chi-square relative to the degrees of freedom means that the observed and predicted (estimated) matrices differ considerably. The chi-square value should **not** be significant showing that the model describes the relationship between the variables well (Garson 2009:25; Tabachnick & Fidell in Castro 2008:169). Low CMIN (χ^2) values, which result in significance levels (ie probability values – P) greater than .05, indicate that the observed and estimated (predicted) input matrices are not statistically different (Hair et al 1995:683). P values less than .05 indicate that the actual (observed) and estimated (predicted) input matrices are significantly different, implying that the model is rejected as not being a good fit with the data. However, the chi-square test is extremely sensitive to sample size, especially where sample size exceeds 200 respondents (Hair et al 1995:683). Even statistical nonsignificance does not guarantee that the best model has been identified, but only that the proposed model fits the observed correlations or covariances well. There might be other models that fit the data well or better (Garson 2009:25; Garson 2010:4; Hair et al 1995:683). Regarding SEM, Garson (2009:25) states that “researchers may well discount a negative model chi-square finding if other model fit measures support the model”.

The goodness-of-fit index (GFI) is a nonstatistical measure of the percent of observed covariance explained by the covariances that the model implies. It represents the overall degree of fit. Measures range between 0 (poor fit) to 1.0 (perfect fit). It is not adjusted for the degrees of freedom. A good fit for the model to be accepted is suggested to be .90 (Garson 2009:26; Hair et al 1995:684). GFI is no longer a preferred measure of goodness-of-fit owing to problems associated with the measure (Garson 2009:26, 27), and it should therefore be used with other GOF measures. However, it does give an indication of absolute fit.

Incremental fit measures compare the given or proposed model to some baseline model (Hair et al 1995:658). Some of the goodness-of-fit tests that are used when comparing the given model with a null model (usually the independence model which is regarded as the worst case – maximum chi-square) or alternative models, are comparative fit index (CFI), normed fit index (NFI) and incremental fit index (IFI) (Garson 2009:31–32). The conventional cut-off point for all three these measures was .90 (Schumacker & Lomax 1996:121). More recently, a CFI value close to 1 indicates a very good fit and IFI values of .90 are suggested as indicating acceptable fit. Both CFI and IFI are independent of

sample size and for this reason are preferred by some researchers as goodness-of-fit measures (Garson 2009:31, 32). By convention, NFI values above .95 are interpreted as good (Schumacker & Lomax in Garson 2009:32). NFI values between .90 and .95 are acceptable, and a value below .90 indicates that the model needs to be respecified (Garson 2009:32). When the researcher's model is compared to the null model (independence model baseline value of .000), the NFI value reflects the proportion by which the researcher's model improves fit (eg if the NFI is .943 as in the case of model 3 in the table above, the researcher's model improves fit by 94% compared with the null model).

Based on the discussion and results provided in table 5.18, the results of the goodness-of-fit indices can be interpreted as follows:

- Models 1 and 2 did not produce any acceptable goodness-of-fit indices.
- In model 3, model adequacy was improved by model modification indices, even though the CMIN was significant and did not improve as the model was respecified. Lack of chi-square nonsignificance could have been the result of the large sample size of 455.
- Model 3 produced an acceptable **absolute goodness-of-fit index**, GFI = .937, which is above the .90 cut-off that reflects a good model fit
- Model 3 produced acceptable **incremental fit** measures for the following:
 - NFI = .943, which is above the conventional .90 cut-off, which reflects a good model fit (improves model fit by 94%)
 - IFI = .948, which is above the conventional .90 cut-off, which reflects a good model fit
 - CFI = .947, which is above the conventional .90 cut-off, which reflects a good model fit

The results indicate that model 3 can be accepted as a model with a good fit, on the basis of the data in this research. The outcome of the model is discussed in the next section.

5.5.4 Model 3: Influence of knowledge behaviours on strategy implementation and knowledge retention

In this model, the focus was on the overall relationships between the different dimensions of the two groups, namely strategy implementation and knowledge behaviours, which is in line with the theory. An attempt was made to indicate the relationships to the extent that the fit indices would indicate an acceptable model depicted in figure 5.9.

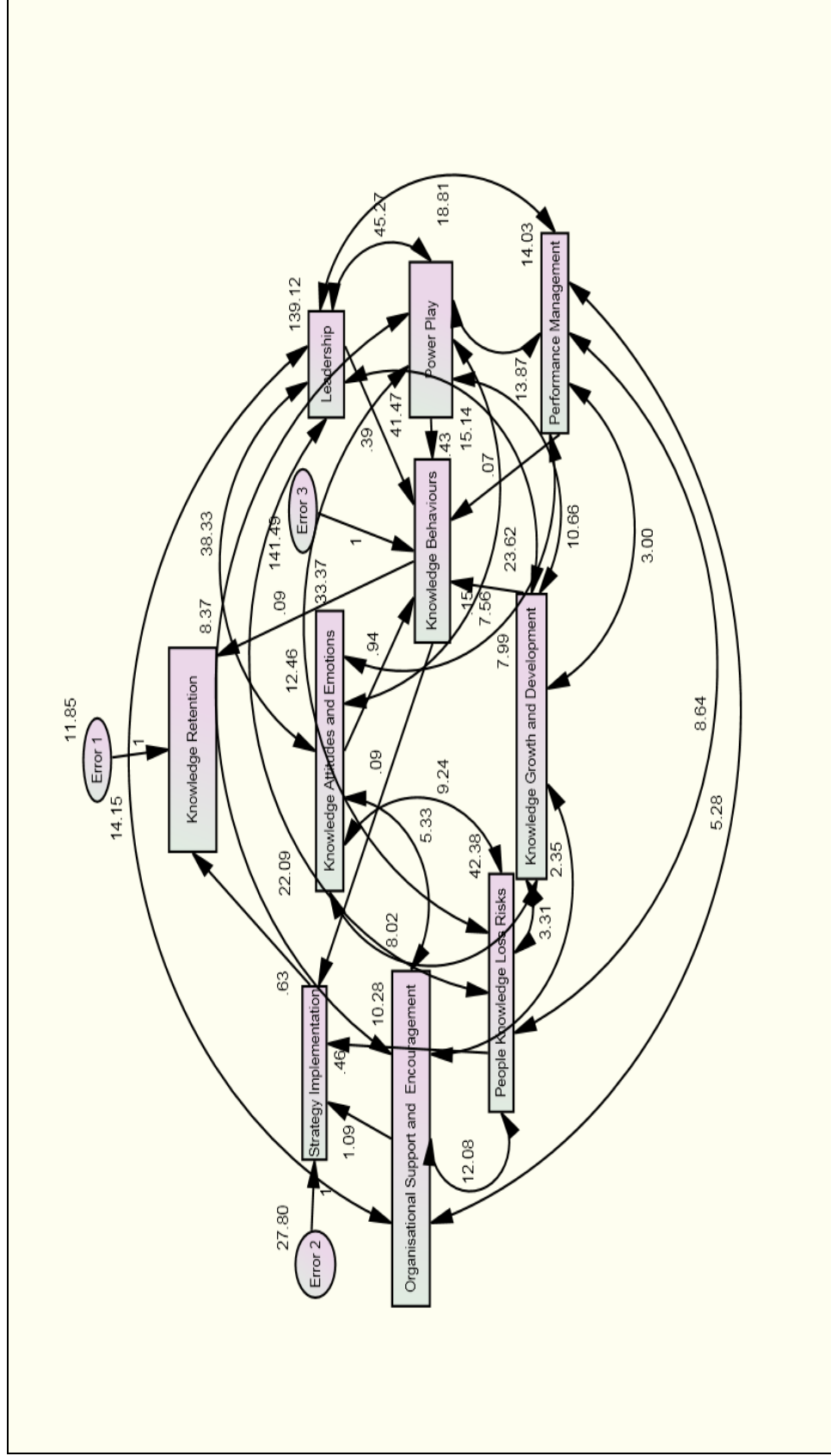
The estimated results of prediction in this model, when interpreting the regression model with strategy implementation as an endogenous (dependent variable), indicated that organisational support (estimate of 1.09) has more of an impact on **strategy implementation** than people knowledge loss risks (estimate of .46), and both combined explain 59.3% of the variance. Strategy implementation (estimate of .63) explains more of **knowledge retention** than knowledge behaviours (estimate of .09), explaining 47.8% of the variance, and both combined (strategy implementation and knowledge behaviours) explain 75.2% of the variance. Knowledge attitudes and emotions (estimate of .94) explain more of **knowledge behaviours** than power play (estimate of .43), leadership (estimate of .39), knowledge growth and development (estimate of .15) and performance management (estimate of .07). This implies that strategy implementation (influenced especially by organisational support and encouragement) would have a stronger effect on knowledge retention than knowledge behaviours. Knowledge attitudes and emotions would have an extremely strong effect on knowledge behaviours (squared multiple correlations and fig 5.9 below).

Squared multiple correlations

	Estimate
Knowledge behaviours	.478
Strategy implementation	.593
Knowledge retention	.752

FIGURE 5.9

MODEL 3: INFLUENCE OF KNOWLEDGE BEHAVIOURS ON STRATEGY IMPLEMENTATION AND KNOWLEDGE RETENTION



The regression model that forms part of the SEM process confirmed that there are relationships between most dimensions, which are in line with the theory. The results of the SEM regression analysis indicating causal relationships are indicated in table 5.19.

TABLE 5.19
CAUSAL RELATIONSHIPS IN SEM

	Estimate	SE	CR	P
Knowledge behaviours <--- Knowledge growth and development	.147	.251	.586	.558
Knowledge behaviours <--- Performance management	.067	.185	.363	.716
Knowledge behaviours <--- Power play	.428	.143	2.993	.003
Knowledge behaviours <--- Knowledge attitudes	.943	.133	7.109	***
Knowledge behaviours <--- Leadership	.391	.063	6.218	***
Strategy implementation <--- Organisational support	1.088	.096	11.281	***
Strategy implementation <--- People knowledge loss risks	.459	.047	9.814	***
Strategy implementation <--- knowledge behaviours	.092	.016	5.856	***
Knowledge retention <--- Strategy implementation	.633	.021	29.896	***
Knowledge retention <--- Knowledge behaviours	.094	.011	8.863	***

Estimate = estimated path coefficient (prediction) for arrows in the model (Garson 2010:4)

SE = standard error

CR = critical ratio (estimate divided by its standard error [Garson 2010:4]) (>1.96 = significant at the .05 level (Garson 2009:22; Garson 2010:4)

P = probability value (<.05 = significant on the .001 level *** [Garson 2009:60])

The results indicate that power play, knowledge attitudes and leadership have a significant causal relationship with **knowledge behaviours** as a dependent variable. Organisational support, people knowledge loss risks and knowledge behaviours have a significant causal relationship with **strategy implementation** as a dependent variable. Strategy implementation and knowledge behaviours have a direct causal relationship with **knowledge retention** as a dependent variable. All the significant causal relationships are indicated by p values below .05 or *** on the .001 level (two tailed). Two asterisks would indicate a p value for the .1 level (10%), and one asterisk would indicate a p value for the .05 level (5%) (Garson 2009:60). In the causal relationship structure, only two dimensions **do not** have a significant direct impact on **knowledge behaviours**, namely knowledge growth and development and performance management. However, these two dimensions are intercorrelated with several other dimensions, which indicates an indirect bearing on knowledge retention. The intercorrelations between dimensions are indicated in table 5.20.

TABLE 5.20
CORRELATIONS IN SEM

		Estimate	SE	CR	P
Organisational support	<--> People knowledge loss risks	12.081	1.132	10.674	***
Power play	<--> Leadership	45.269	4.150	10.909	***
Performance management	<--> Leadership	18.807	2.254	8.345	***
Knowledge growth and development	<--> Performance management	3.000	.517	5.807	***
Knowledge growth and development	<--> Knowledge attitudes	8.018	.854	9.391	***
Knowledge attitudes	<--> Leadership	38.333	3.669	10.447	***
Power play	<--> Knowledge attitudes	23.620	2.068	11.421	***
Performance management	<--> Power play	13.868	1.306	10.619	***
Performance management	<--> Knowledge attitudes	7.563	1.076	7.029	***
Knowledge growth and development	<--> Leadership	15.138	1.718	8.809	***
Knowledge growth and development	<--> Power play	10.657	.990	10.766	***
Organisational support	<--> Performance management	5.282	.616	8.578	***
Organisational support	<--> Knowledge growth and development	2.353	.439	5.354	***
People knowledge loss risks	<--> Performance management	8.637	1.214	7.114	***
Organisational support	<--> Leadership	14.151	1.895	7.468	***
Organisational support	<--> Power play	8.370	1.046	8.006	***
People knowledge loss risks	<--> Leadership	22.087	3.750	5.890	***
People Knowledge Loss Risks	<--> Power play	12.455	2.052	6.068	***
Organisational support	<--> Knowledge attitudes	5.334	.905	5.897	***
People knowledge loss risks	<--> Knowledge attitudes	9.238	1.818	5.083	***
People knowledge loss risks	<--> Knowledge growth and development	3.311	.877	3.774	***

All the intercorrelations indicated above are **significant** with p values below .05 at the .001 (two-tailed) level. This confirms the theory that the dimensions are for the most part intercorrelated to a great extent.

5.6 MULTIPLE REGRESSION ANALYSIS

In order to obtain further confirmation of the conclusions drawn from SEM model 3, multiple regression analysis was performed to determine the degree to which different dimensions predict **knowledge retention**. The results are indicated in table 5.21.

TABLE 5.21
RESULTS OF MULTIPLE REGRESSION ANALYSIS: PREDICTORS OF KNOWLEDGE
RETENTION

DIMENSIONS	UNSTANDARDISED COEFFICIENTS		STANDARDISED COEFFICIENTS		
	B	Std error	Beta	t	Significance
(Constant)	-.457	.753		-.607	.544
Knowledge behaviours	.081	.014	.188	5.996	.000
Strategy implementation	.543	.033	.643	16.613	.000
Leadership	.007	.018	.012	.385	.701
People knowledge loss risks	.151	.033	.139	4.616	.000
Knowledge attitudes and emotions	.022	.039	.018	.563	.574
Power play	-.071	.041	-.065	-1.736	.083
Organisational support and encouragement	.093	.071	.042	1.307	.192
Performance management	-.004	.056	-.002	-.073	.942
Knowledge growth and development	.266	.070	.090	3.206	.001

Dependent variable: Knowledge retention

The following dimensions appear to be significant (p-values less than a .05 critical value) and would predict knowledge retention, which means that should an organisation focus on these dimensions, knowledge retention could be improved:

- knowledge behaviours
- strategy implementation
- people knowledge loss risks
- knowledge growth and development

When compared to the findings of the SEM model 3, the multiple regression analysis confirms that knowledge behaviours and strategy implementation predict knowledge retention significantly. However, the findings differ in the sense that people knowledge loss risks were found to predict strategy implementation in model 3. The direct causal relationship between knowledge growth and development and knowledge retention was not tested in model 3, but it showed significant correlations with people knowledge loss risks, organisational support, performance management, knowledge attitudes and emotions, leadership and power play.

The results of the multiple regression analysis indicate that power play (beta = -.065) and performance management (beta = -.002) have a **negative impact** on knowledge retention. In the SEM model 3, performance management was significantly intercorrelated with knowledge growth and development, organisational support, people knowledge loss risks, leadership, power play and knowledge attitudes. Power play was significantly intercorrelated with performance management, knowledge growth and development, organisational support, people knowledge loss risks, leadership and knowledge attitudes and emotions (as indicated in tab 5.20).

An interesting observation from the multiple regression analysis is that the following dimensions **do not predict knowledge retention** (as indicated in tab 5.20):

- leadership (.701)
- knowledge attitudes and emotions (.574)
- performance management (.942)

However, these dimensions seem to have significant direct causal relationships and correlations with some of the other dimensions in the model 3, namely (as indicated in tabs 5.19 & 5.20):

- Leadership has a significant direct causal relationship with knowledge behaviours.
- Leadership is significantly intercorrelated with power play, performance management, knowledge attitudes, knowledge growth and development and organisational support.
- Knowledge attitudes and emotions have a significant direct causal relationship with knowledge behaviours.
- Knowledge attitudes and emotions are significantly intercorrelated with knowledge growth and development, power play, performance management, organisational support and people knowledge loss risks.
- Performance management does **not** have a direct causal relationship with knowledge behaviours.

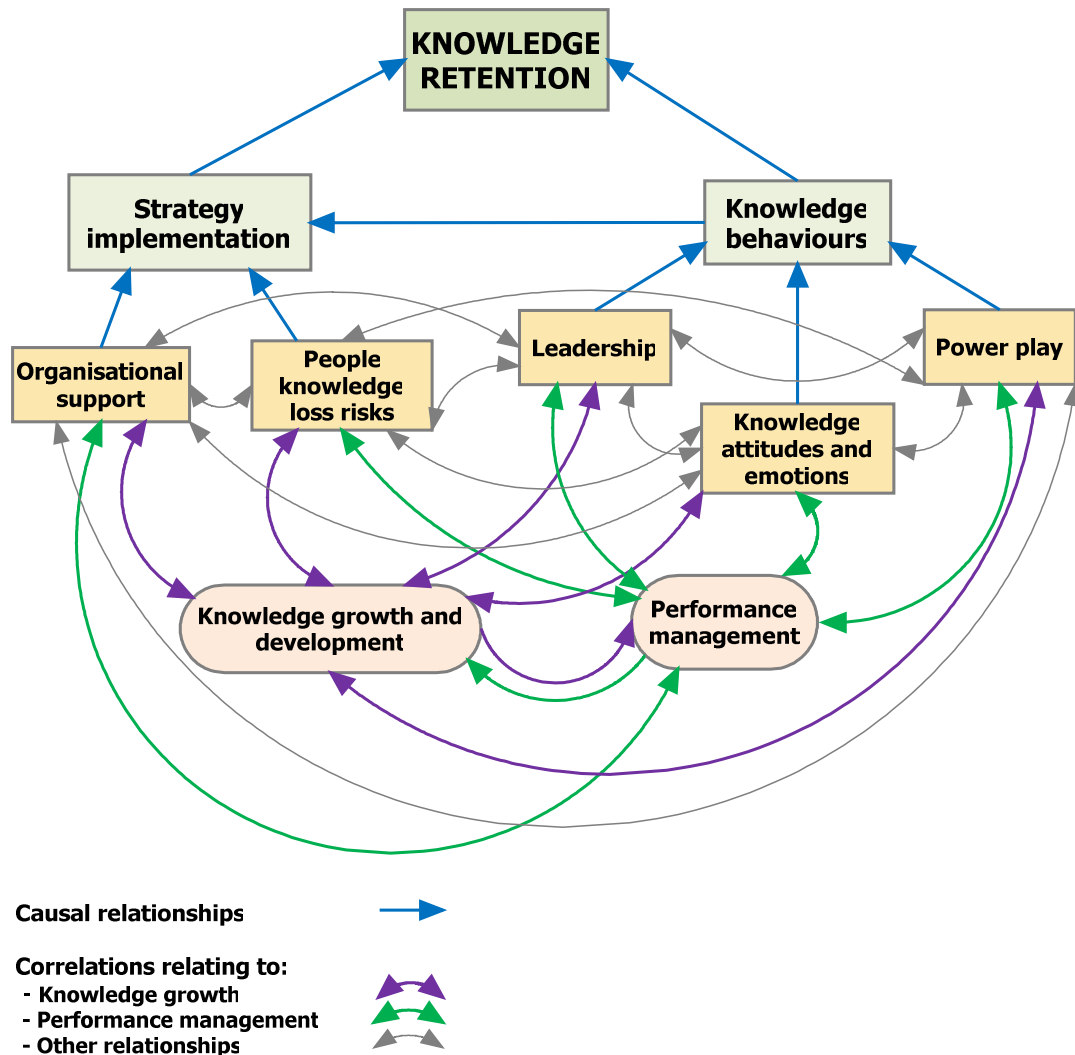
- Performance management is significantly intercorrelated with knowledge growth and development, organisational support, leadership, power play and knowledge attitudes.

The above causal relationships and correlations based on the multiple regression analysis and SEM construction confirm that model 3 is an acceptable model in the sense that most of the causal relations in the SEM are confirmed by the multiple regression analysis and the intercorrelations between most of the dimensions are confirmed by both SEM model 3 and the multiple regression analysis. These relationships will be discussed and compared with the theoretical model in chapter 6.

5.7 MODEL OF KNOWLEDGE RETENTION

The empirical study revealed that a new knowledge retention model can be compiled that would explain the factors that could impact on retaining knowledge, on the one hand, and preventing knowledge loss, on the other. This model, which is based on model 3 of SEM, is depicted in figure 5.10.

**FIGURE 5.10
MODEL OF KNOWLEDGE RETENTION**



The model of knowledge retention indicates that two main factors, namely strategy implementation and knowledge behaviours would contribute to knowledge retention. Organisational support, people knowledge loss risks and knowledge behaviours have a direct impact on strategy implementation. Leadership, knowledge attitudes and emotions and power play have a direct impact on knowledge behaviours. The influencing factors of strategy implementation and knowledge behaviours, including knowledge growth and development and performance management, are mostly intercorrelated, indicating that all these factors would have some bearing on knowledge retention.

5.8 SUMMARY AND CONCLUSIONS

In this chapter the profile of the sample from which the data were collected to be used in the research and the results of the extent to which the organisation retained knowledge were explained. The results indicated that individual motivation, ability to communicate and retain knowledge and values and attitudes regarding willingness to share knowledge were the primary contributing factors to knowledge retention in the organisation. The strategic impact, HR practices and identification of individuals whose knowledge might be lost were the impeding factors in terms of retaining knowledge.

In the exploratory factor analysis process, principal component factor analysis was conducted, which postulated nine factors that would influence knowledge retention. The factor structure postulation did not produce a dependent factor to measure knowledge retention. Eight items were thus extracted as a composite factor to measure knowledge retention. In total, nine items were removed, with 79 items remaining as the empirically researched knowledge retention questionnaire. The questionnaire was found to be reliable with a Cronbach alpha of .975. The results that were obtained enabled the researcher to meet the research aim of determining statistically the enhancing or impeding factors that influence knowledge retention.

The SEM building strategy that was followed gave rise to the comparison of three models by applying different goodness-of-fit indices in order to find the best fitting model. The model that was found to be the best fitting indicated that there is a direct causal relationship between strategy implementation and knowledge retention and between knowledge behaviours and knowledge retention. The results showed that strategy implementation (influenced especially by organisational support and encouragement) would have a stronger effect on knowledge retention than knowledge behaviours. Knowledge attitudes and emotions would have an extremely strong effect on knowledge behaviours.

The regression model that forms part of the SEM process confirmed that there are relationships between most dimensions, which are in line with the theory. All the relationships proved to be significant. The multiple regression analysis indicated that strategy implementation, knowledge behaviours, people knowledge loss risks and knowledge growth and development would significantly predict knowledge retention.

Power play and performance management seem to have a negative impact on knowledge retention.

The findings in the model development strategy of the SEM produced a new knowledge retention model using the new constructs that were postulated in the factor analysis. The comparison of this new model with the theoretical model and the literature, conclusions and recommendations for this research will be discussed in chapter 6.

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The focus in this chapter is on drawing conclusions on the basis of the literature study and the results of the empirical research. The research limitations of the literature review and the empirical investigation will be explained in the context of the conclusions of the research. Recommendations for further research, for the organisation that participated in the empirical research and for practitioners in the research disciplines, will be discussed.

6.2 CONCLUSIONS

The literature review on the concepts of knowledge and knowledge retention and the factors that could contribute to knowledge loss will enable the researcher to draw certain conclusions.

6.2.1 Conclusions relating to the literature study

Conclusions will be drawn about knowledge, knowledge loss and knowledge retention with specific reference to the contextual framework of the research and the literature reviewed culminating in the conceptualisation of these concepts.

6.2.1.1 Aim 1: Conceptualise the nature of knowledge in terms of how it should be understood in organisations relating to the type of knowledge that could be lost and should be retained

The first aim of the literature study was to conceptualise the nature of knowledge in terms of how it should be understood in organisations relating to the type of knowledge that could be lost and should be retained. After examining several different definitions of knowledge in general, it was concluded that the concept "knowledge" can be defined as follows:

Knowledge originates at individual, group and organisational level. It is derived from information, is interpreted and used by these three levels. It is created through different human processes involving social, situational, cultural and institutional factors. It makes use of intellectual and social contingencies, which guide the thoughts, communications and behaviours of people, and leads to definite action (as indicated in sec 2.2).

Using the contextualised theory-building framework of Venzin et al (1998), the nature of knowledge was contextualised from a disciplinary, epistemological, appearance and application point of view. A **multidisciplinary** approach focusing on knowledge management, organisational behaviour and organisational development was followed in this research. Several **epistemological** theories and models were investigated. These models covered the research of some of the best-known researchers on knowledge in the three disciplines focusing on the individual, group and organisational context. It was concluded that epistemologies appear to be context specific and that the concept of knowledge assumes different forms, depending on the epistemology on which they are based, which implies that a researcher has to make a conscious choice of an epistemological model or models to ensure successful research. In this research, the following models of Bueno and Salamander (in Campos and Sánchez 2003) and Cook and Brown (2002) provided the background framework:

- The conceptual dimensions and categories of knowledge of Bueno and Salamander (in Campos & Sánchez 2003:6) approaches knowledge from four different conceptual dimensions, that is, epistemological (tacit and explicit), ontological (individual and social), systemic (external and internal to unit of analysis) and strategic (intangible resources, tacit technical-expert capabilities and vision based on tacit cognitive knowledge).
- Knowledge and knowing – the bridging epistemologies by Cook and Brown (2002:71) regard explicit and tacit and individual and group as four distinct forms of knowledge on equal footing (referred to as epistemology of possession). Knowing is part of action (what happens in practice – epistemology of practice). The above authors bridge the two epistemologies by arguing that knowing is an aspect of interaction with

people and all four forms of knowledge come into play in this interaction to give shape and order to knowing.

The philosophical perspective of this research seems to be a combination of cognitivist, pragmatist, constructionist and autopoietic philosophies, but excluding the hierarchical perspective. From this background, an investigation of the overall **appearance** (manifestation) of knowledge produced a clear understanding of the concept “knowledge” in organisations. It became clear that knowledge from a construction process perspective would entail a **cognitive process** of learning and knowing and **knowledge construction processes** of creating, sharing, transferring and applying knowledge. At the cognitive level, the integration of knowledge into knowing has embraced behavioural components in the study of knowledge (Crossan & Hulland 2002). It could be argued that the manifestation of these cognitive and knowledge construction processes in certain behaviours could cause tacit knowledge loss, on the one hand, and retention of tacit knowledge, on the other.

Furthermore, the appearance of knowledge pointed to the **carriers of knowledge** from a humanistic perspective, which operate at individual, group, organisational and external levels and pertain to the types of knowledge and whose knowledge might be at risk of loss. The types of knowledge that exist at these levels refer to personal, collective, identified with the particular organisation and interorganisation, customer and industry knowledge.

The investigation of the different typologies and taxonomies revealed that the perspective and context from which knowledge is viewed gives rise to many different viewpoints. It was concluded that knowledge cannot be placed into strict categories. This led to the conclusion that the concept of knowledge in this research is better conceptualised as an active process, approaching it from a “knowing” perspective.

Knowledge as applied in the context of this research (as indicated in sec 2.4.4) was therefore defined as the knowledge (expertise) that exists in the minds of people (tacit), and knowing (experiential action manifesting in behaviour, ie, their work experience and applying their knowledge in the work situation), regardless of whether it exists at individual, group or organisational level, which, if lost to the organisation, could be detrimental to the functioning and competitive advantage of the organisation and could even lead to its demise.

Tacit knowing, as the type of knowledge referred to in this research, can be described as knowledge that resides in people's minds and their experience, which is difficult to document. It relates to expertise and skills that were developed over time and manifests in the behaviour of individuals in their jobs, working in teams and interacting with external stakeholders (as indicated in sec 2.4.4).

6.2.1.2 Aim 2: Define the concepts of "knowledge loss" and "knowledge retention" in organisations in terms of the risks and challenges involved

Knowledge loss in the context of this research refers to the decreased capacity to solve problems, make decisions and perform effective actions through capabilities repeatedly demonstrated in particular situations in the organisation.

Knowledge retention in the context of this research can be defined as maintaining, not losing, continuing to have, practising or recognising knowledge that exists in the minds of people (tacit – not easily documented) and knowing (experiential action manifesting in behaviour), which is crucial to the overall functioning of the organisation.

Organisations risk losing critical knowledge at individual, group and organisational level in the face of different external challenges that are affecting organisations. Losing knowledge could seriously jeopardise their overall productivity and success, and ultimately, their competitive advantage. In identifying the risks of losing knowledge, attention should be focused on identifying potential risks at all levels and in all areas of anticipated or unanticipated knowledge loss, tangible or intangible knowledge loss and immediate or delayed knowledge loss.

The challenge organisations face, is to retain the critical knowledge by identifying where and what knowledge is at risk of loss and what organisational factors would enhance or impede its retention.

6.2.1.3 Aim 3: Identify the organisational factors that could impede or enhance knowledge retention

The aim of identifying the organisational factors that influence knowledge retention was formulated by determining that there are two organisational factors that could influence knowledge retention. These factors are the strategic impact of knowledge loss on an organisation and identifying the knowledge loss risks (ie whose knowledge and what type of knowledge could be lost that should be retained).

In terms of the strategic impact of knowledge loss, it can be concluded that because knowledge is managed as a strategic capability, it could have an impact on the implementation of the strategy of the organisation. Organisations need to identify what type of knowledge gives them a competitive advantage and where that knowledge is. This would depend on the specific direction of the strategy they are following, such as innovation, pursuit of growth and a low-cost strategy to achieve their organisational goals. Knowledge loss can influence productivity and performance improvement, give competitors an advantage and increase vulnerability if knowledge is lost at the wrong time. The organisation should identify the risks of knowledge loss and retain the essential knowledge to enable it to implement its strategy successfully.

Identifying knowledge loss risks pertains to determining the best performers, experts, critical leaders and industry-specific professionals whose positions could be affected by brain drain and resignations, in work groups/teams and the organisation as a whole and the few key people in the organisation whose knowledge, if lost, could be detrimental to the performance of the organisation. In all of these categories, retirement age as a demographic factor should be taken into consideration to establish whose knowledge needs to be retained in the organisation.

The types of knowledge that should be retained pertain to knowledge at the tacit knowing level of individuals. Knowledge at this level is mainly in the minds of people, their skills and competencies and in the actions that they experience in today's working environment. At group level, the types of knowledge that need to be retained refer to the collective social knowledge of individuals (primarily in their minds) and relationship network knowledge.

Accumulated tacit know-how that is retained on a large scale will enhance knowledge at organisational level, but if lost, could affect the organisation's performance and change its culture.

Certain factors need to be taken into consideration in the knowledge retention process, such as the life cycle and relevance of knowledge, environmental complexity and volatility, the context in which the critical knowledge is to be retained, the continuity of the process of identifying critical knowledge that might be lost and what to retain.

The strategy pursued by the organisation would indicate where to look for the risks in knowledge loss pertaining to whose and what type of knowledge is at risk of lost which could have a detrimental effect on the organisation's performance. The concepts of whose knowledge and what type of knowledge are closely interrelated in the sense that they interact with each other and can be viewed from individual, group/team and organisational level.

6.2.1.4 Aim 4: Identify the different knowledge behaviours in organisations and the effects of enhancing or impeding behaviour on knowledge retention

The knowledge behaviours were identified as learning, knowing, creating, sharing, transferring and applying knowledge. Behaviours in organisations are acted out by the carriers of knowledge at individual, group or organisational level. It was determined that learning behaviour is the way in which individuals actually learn to perform new and changing tasks in a specific context and could be meaning or instruction oriented, planned or emergent. Knowing is knowledge in action. The creation of knowledge manifests in behaviours such as eliciting discussion and building widespread consensus through dialogue and experience. Knowledge sharing at tacit level is bound to the senses, personal experience and bodily movement requiring high levels of socialisation. Knowledge transfer behaviour manifests in the transfer processes between senders and receivers during daily interactions. Knowledge application manifests in problem solving, decision making and task execution behaviours. It can be concluded that the manifestation of these cognitive and knowledge construction processes in certain behaviours could contribute to the prevention of tacit knowledge loss, on the one hand, and the retention of knowledge, on the other – hence

the need to understand the enhancing or impeding factors that play a role in these knowledge behaviours in retaining instead of losing tacit knowledge.

The organisational behaviour model of Robbins (2005:32) was used to determine the effects of enhancing or impeding behavioural factors on knowledge retention. At individual level, several enhancing or inhibiting factors were determined that could lead to knowledge loss, on the one hand, and knowledge retention, on the other, such as practising knowledge behaviours regardless of demographical influences; cooperation; personal involvement; threats to one's self-image; willingness to use knowledge behaviours; the ability to communicate and absorb knowledge; the perception about others' willingness to use knowledge behaviours; satisfaction, pleasures and rewards that motivate people to engage in knowledge behaviours; personal responsibility to learn and develop; and knowledge of individuals' decision-making styles to understand its impact on knowledge behaviours.

At group level, the enhancing or impeding factors in the engagement in knowledge behaviours seem to be the following: effective communication while enacting knowledge behaviours; structuring groups with people from shared professional backgrounds, smaller cohesive groups that avoid free-riding and accept overarching group goals; legitimate political behaviour; healthy interpersonal behaviour; diversity; and emotionally intelligent leaders who care, promote cooperation and trust, act as knowledge champions, communicate strong vision and create an awareness of organisational problems.

At organisational level, it was determined that a knowledge retention culture supported by values such as trust, cooperation, openness and innovation, could enhance knowledge behaviours that would contribute to knowledge retention. An organisational structure that promotes interaction between members of communities and allows building of bridges between disparate functions should enhance knowledge behaviours that would contribute to knowledge retention.

HR policies and practices should focus on the retention of the most knowledgeable workers and of retirees beyond retirement in order to retain knowledge in the organisation; allow managers to encourage employees to take responsibility for their own development; promote career development processes; ensure effective mentoring, coaching and apprenticeship

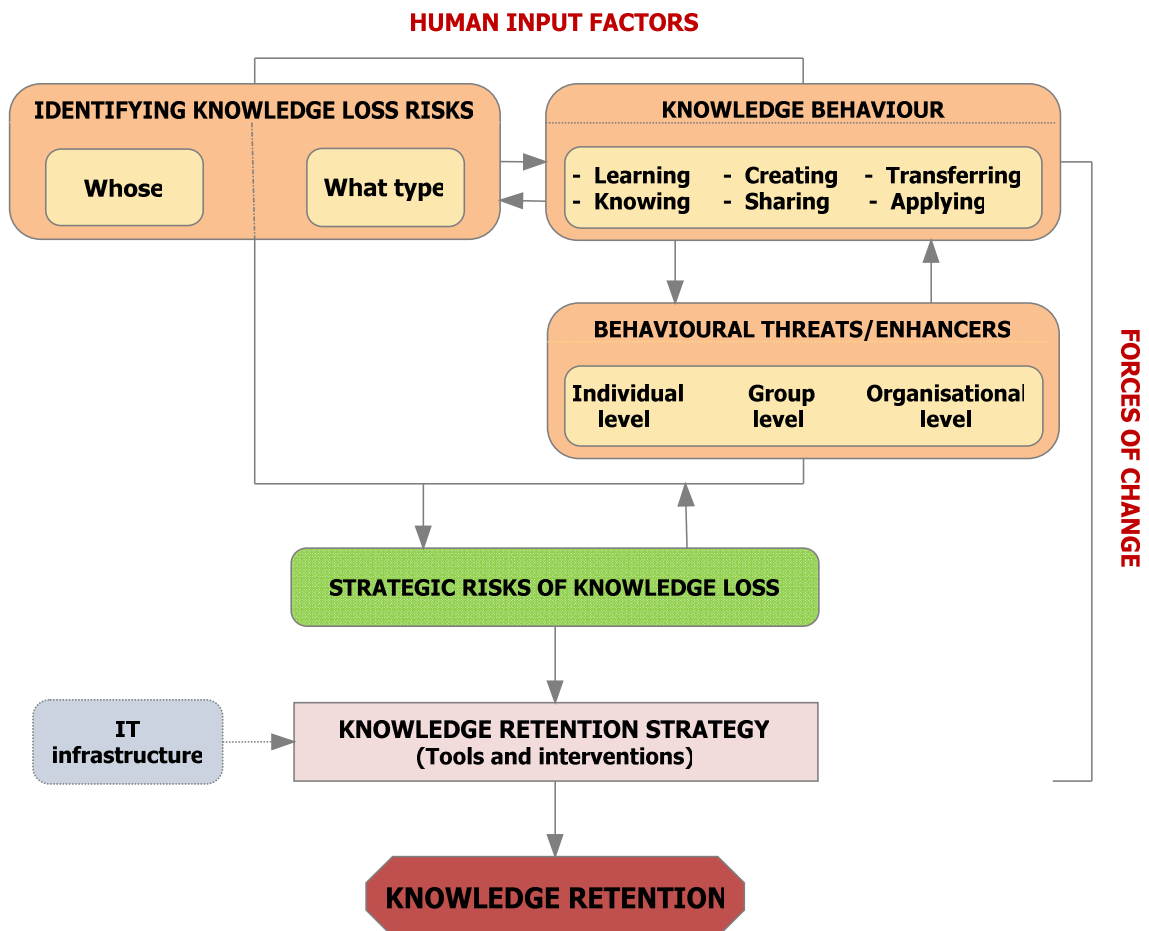
processes; take different generation needs into consideration; link knowledge behaviours to performance evaluation; and support individual successes without sacrificing personal professional standing.

The external forces of change that have a noticeable influence on knowledge behaviours and could lead to severe knowledge loss through people "walking out the door" are the nature of the workforce such as an aging population, emigration and diversity of workers; economic shocks such as world recessions, oil and petrol price increases and volatility of the financial currency (South African rand), which could lead to downsizing resulting in knowledge loss; and competition in terms of controlling knowledge exchange in interorganisational alliances and networks. These factors imply the need for an effective knowledge retention strategy that includes effective HR practices, effective management of cultural diversity and intellectual capital, sustainable development and strategic planning.

6.2.1.5 Aim 5: Integrate the factors into a knowledge retention model by conceptualising the dimensions and their constructs

A theoretical model that identifies the factors that need to be taken into consideration in addressing the issue of knowledge loss was developed on basis of the investigation of the manifestation of knowledge in organisations in the context of knowledge loss and retention. A condensed theoretical model based on the detailed model displayed in chapter 3 (fig 3.9) is provided in figure 6.1.

**FIGURE 6.1
CONDENSED THEORETICAL MODEL: IDENTIFYING THE FACTORS THAT COULD
ENHANCE OR IMPEDE TACIT KNOWLEDGE RETENTION**



The two main focus points of the model are the external forces of change and the human input factors. The external forces refer to factors such as the nature of the workforce, economic shocks, competition and a world recession that could influence knowledge retention in organisations. The human input factors refer to the carriers of knowledge pertaining to identifying the tacit knowledge loss risks of whose knowledge and what type of knowledge need to be retained. The knowledge behaviours need to be demonstrated to contribute to knowledge retention. The behavioural threats manifesting from demonstrating the knowledge behaviours could cause knowledge loss, whereas behavioural enhancers could affect the retention of critical tacit knowledge. In turn, these behavioural enhancers or threats could impact the manifestation of the knowledge behaviours. All these factors could

impact on the implementation of the organisation's strategy. Identifying the strategic risks of knowledge loss is therefore imperative. A holistic approach would imply that the information technology infrastructure is also taken into consideration, but the focus in this research was on the human perspective of knowledge loss and retention.

It can be concluded that identifying the risks and enhancing or impeding factors would indicate to the organisation where to focus its efforts to retain knowledge and enable it to design and implement a knowledge retention strategy that would ultimately contribute to knowledge retention.

6.2.2 Conclusions relating to the empirical study

Conclusions will be drawn about knowledge retention with specific reference to the empirical investigation in this study.

6.2.2.1 Aim 1: Operationalise the theoretically derived knowledge retention constructs (identification of critical knowledge in the organisation, behavioural clusters and influencing factors) by developing a questionnaire to diagnose the degree to which knowledge retention is maintained in an organisation

The empirical study aim 1, namely to operationalise the theoretically derived knowledge retention constructs (identification of critical knowledge in the organisation, behavioural clusters and influencing factors) by developing a questionnaire to diagnose the degree to which knowledge retention is maintained in an organisation, was achieved in chapter 4. It was concluded that a quantitative research process, specifically the survey method, would be the most appropriate empirical research method to determine organisation members' experience as they relate to the constructs to be measured with the questionnaire.

A thorough literature review revealed the theoretically based organisational and behavioural constructs that would enhance or impede (influence) knowledge retention. These constructs were operationalised into worded items as a questionnaire, which was used to collect the data. A rigorous process of statement formulation in several draft versions was followed and the questionnaire was pretested. Measurement validity was obtained by pretesting the

questionnaire with a group of specialists in the organisational behaviour and knowledge management fields and with a group of experts from the same type of population for which the survey was intended, namely information technology specialists, a medical doctor, a mechanical engineer and an HR manager. Construct validity was obtained by conducting a factor analysis (discussed in sec 6.2.2.3).

The final questionnaire consisted of statements on whose and what type of knowledge is at risk of loss, behavioural threats versus enhancers of knowledge retention and the impact of knowledge loss on strategy implementation. The focus of the questionnaire was on the knowledge (expertise) that exists in the minds of people, their work experience and applying their knowledge in the work situation, which if lost to the organisation, could be detrimental to the functioning and competitive advantage of the organisation. Knowledge retention was defined as maintaining and not losing important knowledge that exists in the minds of people (not easily documented) and that is vital for the overall functioning of the organisation.

6.2.2.2 Aim 2: Investigate the extent to which knowledge retention is influenced by the organisational and behavioural factors in a South African organisation

The empirical study aim 2, namely to investigate the extent to which knowledge retention is influenced by behavioural and organisational factors in a South African organisation, was obtained in chapter 4 and the main results discussed in chapter 5. The first step in achieving this aim was to determine what type of sample and population would enable the researcher to determine the extent of the influence. The population and sample reflected the characteristics of an organisation, and the nonprobability sampling method, in particular, was used to select the cases at supervisory and management level, as well as specialists. Employees at these levels were thought to be able to answer the questions relating to strategy implementation that employees at lower levels might not be able to answer meaningfully. Furthermore, employees at the selected levels would have a sound understanding of knowledge retention behaviours and the enhancing and impeding factors of knowledge retention.

The data collection process was administered electronically and on paper for those without access to computers. Sufficient data were obtained through the survey administration

process to enable the researcher to conduct the statistical analyses. The overall response rate was 42.5% of the total sample population.

The main findings of the data that were analysed for the organisation pertaining to the biographical questions (age, education and job levels) and the knowledge retention dimensions, revealed the following:

a *Age groups*

The largest age group was between 32 to 44 (representing 45.2% of the sample), followed by the 45 and older age group (representing 28.6% of the sample). At the time of the survey, in 2009, the group aged 32 to 44, were born between 1965 and 1977 (Generation X), while the group aged 45 and older, were born between 1946 and 1964 (Baby Boomers). It can be concluded that the 45 and older age group are nearing retirement and the organisation risks losing their knowledge in the near future. The age group between 32 and 44, is the group who easily changes jobs or emigrates to other countries, putting the organisation at risk of losing their knowledge and expertise.

b *Education levels*

Education levels indicated that the postgraduate groups, namely the honours group represents 6.37% of the sample population, while the master's and doctoral group represents only 1.98% of the total population. It can be concluded that these people are highly knowledgeable and that they possibly represent the few key people, leaders or industry-specific professionals or experts/specialists whose knowledge retention would be critical to the organisation

c *Job levels*

The job levels indicated that specialists represent 6.59% of the sample population with senior and executive management representing 3.96% of the sample population. Although this is a small group in comparison with the operational, supervisory and management levels, they

could represent the experts and leadership levels whose knowledge retention would be critical to the organisation.

d Knowledge retention dimension

In interpreting the results of the knowledge retention dimensions that were measured in the questionnaire, it can be concluded that respondents are generally motivated, have the ability to communicate and retain knowledge, express positive values and attitudes towards willingness to share knowledge and the importance of knowledge retention and engage in the knowledge behaviours (ie learning, knowing, sharing, transferring and applying knowledge) that are needed to retain knowledge. These positive indicators of factors influencing knowledge retention in this organisation are all at individual level.

The areas that merit serious attention pertain to addressing the impact on implementing the organisational strategy successfully, identifying whose and what type of knowledge is at risk of loss and therefore needs to be retained, creating a culture and structure that support knowledge retention, focusing on HR practices that would enhance knowledge retention, and addressing power and politics where these are problematic. All these inhibiting factors are at organisational level.

6.2.2.3 Aim 3: Determine statistically the enhancing or impeding organisational factors that influence knowledge retention

Empirical aim 3, namely to determine statistically the factors that influence knowledge retention, was achieved in chapter 5 by means of exploratory factor analysis using the principal component factor analysis technique. The first specification produced a reasonably acceptable factor model with 11 factors. The factor loadings were investigated, respecification of the factor model was computed by returning to the extraction stage, extracting factors and naming them. A total of nine items with low scores (below .400), that did not fit in with the factor or were not formulated adequately were removed. The factor structure did not produce a dependent variable to measure knowledge retention and a factor, knowledge retention, consisting of eight items was composed by extracting items that would measure the construct of knowledge retention. The overall reliability of the questionnaire was

.975803 (Cronbach alpha coefficient) and on standardised items it was .975578. It thus can be concluded that the internal consistency (reliability) of the knowledge retention questionnaire indicates that it measures what it is supposed to measure. Reliability measures should prove to be extremely consistent in their values if multiple measures are taken (Hair et al 1995:2).

The theoretical model consisted of the following four main factors: identifying knowledge loss risks (in terms of whose and what type of knowledge is at risk), knowledge behaviours, behavioural threats versus enhancers (at individual, group and organisational level) and strategic risks of knowledge loss. The statistical procedure (described above) produced the following nine factors: knowledge behaviours, strategy implementation, leadership, people knowledge loss risks, knowledge attitudes and emotions, power play, knowledge growth and development, performance management and organisational support and encouragement. In comparing the two sets of factor structures, some factors basically remained the same with a few changes, and a number of new factors emerged. Using the new factor postulation as the point of departure, the comparisons and differences to the theoretically derived factors are discussed below.

The new factor 1, **knowledge behaviours**, remained basically the same as in the theoretical factor, knowledge behaviours, focusing on learning, creating, sharing, knowing, transferring and applying knowledge. A new perspective was added to this factor, which focuses on behaviours that could indirectly be regarded as knowledge behaviours in the sense that they would enhance the knowledge behaviours and therefore knowledge retention. These elements refer to identifying the type of knowledge that needs to be retained, the effectiveness of communication between different age groups and diverse team members' acceptance of team goals (an indication of what knowledge should be retained) and constructive solving of conflict (because conflict may hamper knowledge behaviours such as sharing and learning).

The new factor 2, **strategy implementation**, remained basically the same as the theoretical factor, strategic risks of knowledge loss, focusing on the extent to which maintaining organisational growth and developing of new products and services, regardless of knowledge loss, is achieved, determining areas of competitive advantage because of specialised

knowledge and preventing giving competitors advantage by protecting own knowledge during outside negotiations. An interesting new focus emerged in this factor, namely the values of openness, respect, innovativeness and trust that could contribute to strategy implementation, and ultimately, knowledge retention. Another contributing factor that was grouped with the strategy implementation dimension appears to be an effective mentoring (coaching, apprenticeship) process that helps build knowledge retention. This corresponds to DeLong's perspective discussed in the theory (as indicated in sec 3.4.1.2) that knowledge loss caused by turnover and retirements could reduce the availability of potential mentors which, in turn, could hamper a strategy of growth.

The new factor 4, **people knowledge loss risks**, encompasses the theoretical factor, identifying whose knowledge is at risk of loss (ie highly experienced, best performers, leaders, industry-specific professionals and employees approaching retirement), with an added focus on retaining knowledgeable people, an effective career development process that helps build knowledge and competencies and being sensitive to the protection of expert knowledge.

The remaining factors all refer to the behavioural threats/enhancers at individual, group and organisational level. However, the individual, group and organisational levels disappeared in the new postulation. The new factor 3, **leadership**, remained basically the same as the leadership and trust factor at group level in the theoretical model, and now also includes the value of individuals trusting their manager and managers encouraging employees to take responsibility for their own training and development. The new leadership factor still focuses on managers behaving in a trustworthy manner and being emotionally intelligent in terms of interpreting employees' emotions correctly. Knowledge retention could be enhanced by managers encouraging the flow of knowledge, promoting cooperation, facilitating knowledge exchange and retention and creating an awareness of organisational challenges.

The new factor 5, **knowledge attitudes and emotions**, appears to be at individual level, when comparing it with the theoretical factors. It encompasses aspects of the original personality and emotions regarding cooperation and commitment to prevent knowledge loss, the original values and attitudes regarding willingness to share and use expertise, the original ability to communicate knowledge and the original individual learning element regarding

colleagues taking responsibility for their own development. All the new items appear to relate to individuals' perceptions of their colleagues since all items start with the words, "My colleagues ...". It can be concluded that perceptions of colleagues that manifest in attitudes and emotions regarding knowledge loss, on the one hand, and willingness to share, ability to communicate knowledge and taking responsibility for own development, on the other, could affect the degree to which knowledge is retained.

The new factor 6, **power play**, appears to combine mainly elements at group level, namely group cohesiveness from group structure, resolving differences from conflict, making use of external expertise and experts freely sharing their knowledge from power and politics. The trust element at individual level (trusting colleagues) and the team member trust element (team members trust one another) are combined in this factor. The team member trust element formed part of organisational culture as a value at organisational level, but from the team member perspective could have formed part of the group level in the theoretical model. It can be concluded that if trusting relationships, conflict resolution, making use of and sharing expertise freely are negative, power and politics could come into play, preventing knowledge retention.

The new factor 7, **knowledge growth and development**, covers elements at individual level of the theoretical model ranging from ability (working with colleagues to improve one's ability to retain knowledge), motivation (gaining satisfaction from sharing knowledge whilst working with colleagues) to individual learning (actively engaging in learning opportunities to further develop oneself). It may be concluded that intrinsic motivation, actively engaging in learning opportunities and working with colleagues could contribute to knowledge growth and development, as a contributing factor to knowledge retention.

The new factor 8, **performance management**, covers elements at organisational level which form part of HR practices, namely performance evaluation taking knowledge sharing into account and recognising individuals' expertise, and training and development processes taking heed of the needs of different age generations. Satisfaction to continue doing a job without further development from the individual learning factor of the theoretical model fits into this new factor because it could be regarded as part of performance management.

The new factor 9, **organisational support and encouragement**, is a combination of an organisational culture item (encouragement to suggest ideas for new opportunities) and two items of the structure and design factor at organisational level (support for cooperation between different departments and interaction between those who share a concern/passion for a topic). In chapter 3, section 3.5.5.7 (leadership and trust), it was mentioned that lack of support from top management such as creating a social system to support knowledge behaviours is perceived to be one of the greatest impeding factors of knowledge behaviour. This offers support for the new organisational support and encouragement factor that was postulated.

An interesting finding regarding the organisational support and encouragement factor was that the item dealing with financial rewards as motivation to share knowledge with colleagues was grouped with this factor, but was ultimately removed owing to a negative factor loading. However, it would appear that, although some researchers theorised that extrinsic rewards would enhance knowledge sharing behaviour, the negative loading proves that this is not the case. This confirms Bock et al's (2005:98-99) finding that extrinsic rewards can in fact hinder rather than motivate people to share their knowledge.

In chapter 3, section 3.3.2, the concept of **knowledge retention** was discussed in relation to focusing on the threat of knowledge loss and the action of retaining valuable knowledge instead of focusing on staff shortages. The construct of knowledge retention in the current research, was approached from a strategic perspective, the carriers of knowledge and creating a culture that would support knowledge loss. The new composite factor 10, **knowledge retention**, was composed of items from the strategic risks of knowledge loss factor in the theoretical model (ie determining and retaining the essential knowledge needed to implement the strategy successfully, and to promote productivity and performance improvement), from a knowledge carrier perspective, the risks of losing knowledge when knowledgeable people leave the organisation and determining the expertise of individuals that must be retained, and from a cultural point of view, belief in the significance of growing and retaining knowledge and encouraging retention of knowledge in teams.

To summarise, it can be concluded that some factors such as people knowledge loss risks, knowledge behaviours, leadership and strategy implementation in the new factor postulation

remained largely the same as in the theoretical model, with a few new perspectives (as discussed above). Behavioural factors at individual, group and organisational level were grouped differently in the new factor postulation, with a strong emphasis on knowledge attitudes and emotions, knowledge growth and development, power play and performance management. A surprising factor that was postulated in the principal component factor analysis, was organisational support and encouragement, which did not exist as such in the theoretical model, and added a new perspective to the factors influencing knowledge retention.

6.2.2.4 Aim 4: Develop a structural equation model to verify the theoretical model and determine whether any new constructs have emerged

Aim 4 namely, compile a structural equation model to verify the theoretical model, was realised in chapter 5. The focus of the discussion was on the concluding outcome of the structural equation model, comparing the dimensions of and interrelationships between the theoretical and the empirical model. In the first two structural equation models, the impact of strategy implementation and knowledge behaviours as two separate components (each with their influencing factors) on knowledge retention was investigated. In model 1, the influence of knowledge behaviours (with their influencing factors) on strategy implementation and of strategy implementation (with its influencing factors) on knowledge retention was measured. In model 2, the only difference was that the direct influence of knowledge behaviours (with their influencing factors) on knowledge retention was measured. Neither of these models produced a model with a good fit.

Model 3 was based on the theory, which suggested that all the factors (dimensions) were intercorrelated and could have an impact on knowledge retention. In the theoretical model, most of the influences could be illustrated with the emphasis on the influence of the different factors on strategy implementation and then on knowledge retention. Although all the influencing relationships could not be illustrated in the theoretical model, namely the influence of knowledge behaviours on knowledge retention, this relationship was measured in the structural equation model. Model 3 produced an acceptable absolute goodness-of-fit index and acceptable incremental fit measures, based on the data in this research.

The multiple regression analysis offered significant support for most of the causal relationships, particularly of both knowledge behaviours and strategy implementation on knowledge retention. The intercorrelations between most of the dimensions were confirmed by both structural equation model 3 and the multiple regression analysis. An interesting observation was that two dimensions were not significantly correlated with knowledge behaviours as such, namely knowledge growth and development and performance management. These two dimensions focus more on the development of knowledge and management of performance than on measuring the actual behaviours that demonstrate knowledge, which could explain why there is no correlation.

In comparing the third structural equation model and the theoretical model, it can be concluded that the dimension, **people knowledge loss risks** (the new SEM model), remained basically the same as the theoretical dimension (factor), identifying knowledge loss risks. In both models, this factor had a direct causal relationship with strategy implementation. A new dimension, **organisational support** and encouragement, emerged that has a direct causal relationship with strategy implementation. **Strategy implementation** in both the theoretical and SEM derived models had a direct causal relationship with **knowledge retention**. **Knowledge behaviours** remained the same as the knowledge behaviour dimension in the theoretical model. In the SEM model, leadership, power play and knowledge attitudes and emotions had a direct causal relationship with knowledge behaviours. Knowledge behaviours had a direct causal relationship with strategy implementation and **knowledge retention**. The individual group and organisational levels disappeared in the SEM model, with the **behavioural threats of the theoretical model** producing a new set of factors of which the leadership dimension remained the same in both models. The new set of factors refers to knowledge attitudes and emotions (with a strong influence on knowledge behaviours), power play, knowledge growth and development and performance management.

It can be concluded that the SEM model produced a more streamlined factor structure that would be easier to interpret than the theoretically derived model, which consists of a number of dimensions and subdimensions. Furthermore, it would appear that if enhancing behavioural factors are in place, knowledge behaviours could improve, which in turn would enhance knowledge retention and strategy implementation. If knowledge behaviours are not

demonstrated, knowledge could be lost and if there is no organisational support or the risks of people knowledge loss are not taken into consideration, it might not be possible to implement the strategy successfully. Successful strategy implementation should contribute to knowledge retention. In other words, successful strategy implementation which consists of maintaining organisational growth, developing new products and services, knowing areas of competitive advantage owing to specialised knowledge, effective mentoring and coaching processes, protecting own knowledge, all supported by values of openness, respect, innovativeness and trust, should support knowledge retention.

A further conclusion, based on the findings of the multiple regression analysis, is that if an organisation intends to improve knowledge retention, it should focus on promoting knowledge behaviours, determining people knowledge loss risks, developing and growing knowledge and successful strategy implementation elements, supported by the enhancing behavioural factors in an integrated manner.

6.2.3 Concluding answer to the overall research question

The behavioural and organisational factors that an organisation would consider to combat the increasing knowledge loss and attrition that are affecting it are strategy implementation and knowledge behaviours. Strategy implementation is affected by organisational support and people knowledge loss risks. Knowledge behaviours are influenced by leadership, power play and knowledge attitudes and emotions. Most of the factors seem to be interrelated, including knowledge growth and development and performance management (as indicated in fig 5.10).

6.3 LIMITATIONS OF THE RESEARCH

The limitations of the literature study, theory and the empirical study are discussed below.

6.3.1 Limitations of the literature study and theory

The literature study revealed that hardly any research has been conducted in the field of knowledge retention, on the one hand, but a vast amount of literature was found on

knowledge, knowledge management and organisational behaviour, on the other, thus facilitating the application of the relevant concepts to knowledge retention.

6.3.2 Limitations of the empirical study

The limitations of the empirical study relate to the questionnaire, sample and the new model that was developed.

6.3.2.1 Questionnaire

One of the limitations of the research was that no empirical research on the influencing factors of knowledge retention was found in the literature, which meant that a new questionnaire had to be constructed. Areas that were not sufficiently measured were forming relationships and networking with other internal expert groups, the impact of diversity on knowledge retention and whether or not decision making plays a role in knowledge retention.

6.3.2.2 Sample

Since the research was conducted in only one South African organisation, the results cannot be generalised to other South African organisations.

6.3.2.3 Model

The model development approach of SEM that was followed in this research could be regarded as post hoc because of the fact that it was based on one initial set of data from one organisation, which may not have been stable (the model may not fit new data). However, researchers could test the model in further research or make use of a cross-validation strategy “under which the model is developed using a calibration data sample and then confirmed using an independent validation sample” (Garson 2009:2). (See sec 6.4.1 below.)

6.4 RECOMMENDATIONS

The recommendations relate to the empirically formulated aim 5, namely formulate recommendations based on the findings of this research for further research, for the organisation to retain knowledge and for practitioners in the field. The recommendations are discussed below.

6.4.1 Recommendations for further research

The research that was conducted revealed that some areas could offer opportunities for further research in the field of knowledge retention. These areas are as follows:

- *The impact of diversity on knowledge retention.* The impact of diversity on knowledge behaviours and knowledge retention was not satisfactorily covered in this research study. The literature study highlighted the fact that further research is necessary on the impact of diversity on knowledge behaviours, such as knowledge sharing to provide a more balanced account, especially in a cross-cultural context (Ojha 2005:77).
- *Decision making.* The influence of decision making on knowledge behaviours and knowledge retention is another area for future research, which was not adequately covered in this research. The question could be asked whether the decision-making process (such as its fairness) at individual and group level could impact on their knowledge behaviours and whether or not it would influence knowledge retention.
- *Knowledge retention strategies.* An area for further research that was not researched in depth in this study was the type of knowledge retention strategies that could be implemented to retain tacit knowledge and the extent to which knowledge retention approaches have been implemented in South African organisations.
- *Empirical research.* A calibration data sample could be used in future studies and then confirmed using an independent validation sample (Garson 2009:2). A new

empirical study could be conducted with an adapted questionnaire applying the structural equation model to new data in order to refine the model.

6.4.2 Recommendations for the participating organisation

In the light of the results (discussed in sec 5.2.2) and the conclusions (discussed in sec 6.2.2.2), recommendations can be made to the participating organisation on implementing a knowledge retention strategy. The strategy that an organisation pursues would indicate where to look for risks in knowledge loss in terms of whose and what type of knowledge needs to be retained at individual, group and organisational level. The focus of the analysis should be on the knowledge in the minds of people which is difficult to document. This survey did not focus on the explicit knowledge of individuals and groups, and corporate memory, all of which are part of the total body of data, information and knowledge required to attain the strategic aims and objectives of an organisation. A corporate memory is the combination of a repository, the space where objects and artefacts are stored, and the "community", the people who interact with those objects to learn, make decisions, understand context or find colleagues (Encyclopedia Dictionaries & Glossaries 2010). A holistic approach to retaining this type of knowledge (making use of information technology systems) should, however, not be ignored. The following actions are proposed to maintain the positive results and improve the retention of knowledge:

- The organisation could use its strategy as a baseline to determine what and where the risks of knowledge loss are in terms of growth, innovation, productivity and continuous performance.
- The management team could determine **who** actually has critical knowledge by identifying the top performers, experts/specialists, critical leaders, key people in the organisation, industry-specific professionals and knowledgeable experts approaching retirement (selectively, not all inclusive). The process should be handled with sensitivity when singling out individuals by also encouraging work teams to identify critical knowledge to be retained in their teams.
- In the context of the organisation's strategy, the **type of knowledge** that could be at risk of loss could be determined. For instance, at organisational level, the focus could

be on accumulated organisational know-how, expertise and ways of working and cultural knowledge on how to behave and think, cognitive mental maps, values and organisational culture norms that need to be retained. At group level, it would be necessary to determine the collective and social networking knowledge, and at individual level, the expertise of getting the job done (their "knowing") that needs to be retained.

- HR practices that would enhance the retention of critical knowledge in the minds of people are, say, a talent retention programme, mentoring and coaching processes, training and coaching programmes that take the needs of different age generations in terms of learning into account, career development processes and a performance evaluation process that takes cognisance of knowledge sharing and recognises expertise.
- In terms of building an organisational culture that would encourage knowledge retention, managers could be trained to become knowledge champions (Van der Sluis 2004:10), trust relationships could be improved by not forcing people to comply with knowledge-sharing requirements, but respecting and valuing their contributions, encouraging cooperation and interaction between individuals and departments to collaborate in solving problems and recognising and managing power and politics as an impediment to knowledge retention when and where it poses a threat to knowledge behaviours.

These recommendations are specific to the organisation that participated in the investigation. The results of other organisations might differ and a different set of recommendations would apply to them, depending on the enhancing and impeding factors that influence their knowledge retention.

The recommendations for the organisation cut across the fields of knowledge management (eg risks of strategy implementation in terms of what type of knowledge and whose knowledge is at risk of loss), HR (eg policies and practices explained above) and organisational development supported by top management and the leadership roles. This implies that the organisation could appoint an interdisciplinary team to investigate and

implement a knowledge retention strategy, using the survey results as an indicator of where to focus.

6.4.3 Recommendations for practitioners

Practitioners need to take cognisance of the fact that organisations are different and that the enhancing and impeding factors need to be determined in an organisation before attempting to put a knowledge retention strategy in place in order to clarify where the focus of the strategy should be in terms of behaviour and organisational influencing factors. Furthermore, practitioners should realise that tacit knowledge (ie the knowledge in the minds of people that is difficult to put into words) is not easy to retain, but there are strategies that could enhance any attempts to retain this type of knowledge. Another vital consideration is the fact that tacit knowledge retention is but one type of knowledge that should be retained – hence the need for the knowledge retention strategy to include other types of knowledge such as explicit knowledge retention.

6.5 INTEGRATION OF THE RESEARCH

This research study relating to identifying the factors that could give rise to tacit knowledge loss, on the one hand, or contribute to knowledge retention, on the other, which was conducted from a humanistic perspective, contributes to the disciplines of knowledge management, organisational behaviour and organisational development. It is thus an interdisciplinary study that provides a broader view on the topic of knowledge retention.

The study has practical value in the sense that the newly developed questionnaire and model should enable organisations to measure the degree to which the enhancing organisational and behavioural factors to retain knowledge, are in place and the measurement results will pinpoint the factors that need to be focused on to improve knowledge retention. The measurement results will enable an organisation to develop a knowledge retention strategy, which should include organisational development interventions aimed at retaining knowledge that exists in the minds of people (not easily documented) and is essential for maintaining a competitive advantage in the organisation.

6.6 SUMMARY AND FINAL COMMENTS

In this chapter, the main findings were discussed by combining the results from previous chapters. The overall research question was answered and the limitations of the research, opportunities for further research, recommendations for the organisation and practitioners were discussed. Finally, the value of the study for theory and practice was highlighted.

The research should be regarded as a stepping stone towards conducting more insightful and significant research to assist organisations in retaining one of their most valuable assets – knowledge (tacit knowing) in the minds of people.

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APPENDIX

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