A Framework for Sharing and Retaining Tacit Knowledge within Organisations

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DECLARATION

I, Jacob Solomon, declare that this project report is my own work. It is submitted in partial fulfilment of the requirements of the degree of Master of Business Administration in the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

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__ December, 2005

ABSTRACT

Organisations have in recent times realised that they base their competitive advantage on knowledge. Knowledge in the form of people's expertise is seen as an organisation's greatest value creating asset. Tacit knowledge in the form of employees' skill and their "know how" gives any organisation a competitive advantage. It is this cognitive knowledge that must be shared, retained and communicated within an organisation in order to create a sustainable competitive advantage by growing the tacit knowledge of the organisation as a whole. This valuable tacit knowledge needs to be made explicit to individuals within the organisation but obscure to those outside the organisation in order to hinder other organisations imitating or developing it to their own benefit.

The main purpose of this study was to determine what methods of knowledge sharing can be used to explicate and share knowledge in particular types of industry. The study was done by means of a literature review and considered alternative methods of knowledge sharing to propose a framework for sharing and retaining knowledge within organisations in particular types of industries.

The current research highlights what style of learning an organisation can adopt to be most effective in the industry in which they operate and suggests various methods that organisations can use for sharing and retaining knowledge within the knowledge conversion cycle. The main finding of this research presents a theoretical foundation as a conceptual framework that combines different methods for sharing and retaining knowledge within the knowledge conversion cycle and the style of learning that an organisation can adopt to be effective in that particular business environment. This framework should enable managers to identify difficulties of sharing tacit knowledge and to identify effective methods of sharing and retaining tacit knowledge within their organisation.

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1 INTRODUCTION

1.1 Context of the Research Study

Organisations have in recent times realised that they base their competitive advantage on knowledge (Sveiby, 1997; Sveiby, 1999). Bender and Fish (2000) state that "whilst the focus on technology is important, Davenport and Prusak and also Thurow argue, that in today's global economy, knowledge, skills and subsequent expertise are being considered as the most strategic resource for building and sustaining competitive advantage and in this sense are integral to business success". Sveiby (1995, 1997) and Lank (1997) concur that knowledge in the form of people's expertise is seen as an organisation's greatest value creating asset. Employees' skill and their "know how" knowledge as referred to by Nonaka (1991, 1994) and Nonaka & Takeuchi (1995) regarding the performance of tasks gives any organisation a competitive advantage. The sharing and retention of knowledge of employees can provide an organisation with a sustainable competitive advantage in the marketplace by reducing the learning cycle, resulting in expediting the efficient delivery of services and reducing the time required to skill new recruits.

Bender & Fish (2000:125) say that in the business environment, which is an integral part of the global economy, changes happen more frequently now than ever before. In order for an organisation to be successful, it "needs to manage their knowledge and to transfer existing skills, knowledge and expertise effectively within the organisation".

Many authors, including Nonaka (1991) and Sveiby (1997), refer to the distinction that Polanyi (1967) makes between explicit and tacit knowledge. Explicit knowledge, which tends by nature to be structured, can be effectively captured, shared and retained by means of advanced technology, such as knowledge management systems. However, an organisation's competitive advantage is often

present in tacit knowledge. Tacit knowledge is complex, context-sensitive and difficult, if not impossible, to codify and store in databases. Tacit knowledge is cognitive knowledge that stays with an individual. The only way in which to encourage growth in new or related areas is to capture this form of unstructured and complex knowledge in some way. Hence, tacit knowledge must be shared, retained and communicated within an organisation in order to create a sustainable competitive advantage by growing the tacit knowledge of the organisation as a whole. This valuable tacit knowledge needs to be made explicit to individuals within the organisation but obscure to those outside the organisation in order to hinder other organisations imitating or developing it to their own benefit.

The research study referred to by Holtshouse (1998:277) shows that extracting and releasing individual knowledge is fundamental to growing the knowledge base of organisations. Nonaka (1991, 1994) and Nonaka & Takeuchi (1995) suggest that managers in the western business environment esteem explicit knowledge highly, as simple data is easily captured and communicated via words and numbers. However, Nonaka (1991, 1994) regards tacit knowledge as the primary source of knowledge, seeing its value as being deeply rooted in individual insights, intuitions, hunches, experience and values. The source of tacit knowledge is complex and much more difficult to share.

The current research study highlights that the sharing of tacit knowledge is a largely interactive social process, which conflicts with other business and economic forces. The research study also highlights the difficulties intrinsic to the sharing of tacit knowledge and presents a theoretical foundation as a conceptual framework that should enable managers to share and retain tacit knowledge within their organisation. The study also shows that retaining tacit knowledge is crucial to organisations that are busy with cost-cutting initiatives, that are intent on cutting back on personal office space, that are increasing their number of mobile workers and that are experiencing skill reduction when employees resign (Holtshouse, 1998:278).

Tuggle and Goldfinger (2004), Holtshouse (1998) and Bender and Fish (2000) all state that there are many ways of efficiently and effectively sharing and retaining explicit knowledge, including data mining, document managing, and the utilisation of office automation systems, groupware, corporate yellow pages, best practices databases and databases containing information of lessons learnt. Knowledge management systems are used in organisations to capture, share and retain explicit knowledge. Successful organisations have either adopted or are currently adopting these mechanisms. Argote *et al.* (2003) note that tacit knowledge is accumulated, shared and retained at a different rate to that of explicit knowledge. As the structure of explicit knowledge differs from that of tacit knowledge, organisations need to adopt new methods as to how to effectively share tacit and retain tacit knowledge if they aim to maintain a competitive advantage in the marketplace. However, cognitive knowledge is not easily shared and retained, and organisations currently use only a few methods for explicating tacit knowledge. The current research study investigates how organisations in various industries convert tacit knowledge to explicit knowledge, which they then share as such, as well as how they convert explicit knowledge back into tacit knowledge again in order to maintain a competitive advantage over other organisations in their field.

1.2 Objective of the Research Study

The objective of the research is to conduct a literature review in order to determine what methods of knowledge sharing can be used to explicate and share knowledge in particular types of industry.

1.3 Scope and Limitations of the Research Study

The study, by means of a literature review, investigates how knowledge can be explicated and introduces the methods of knowledge sharing in particular types of

industry. The literature review considers alternative methods of knowledge sharing as documented through the literature to propose a framework for sharing and retaining knowledge within organisations in particular types of industries.

The study is restricted to a literature review and does not include primary research. As such, the study does not set out to test the practical validity of the proposed framework that emanates from the research concerned.

Much material exists on the subject and the literature review is limited to articles in accessible journals. The articles reviewed consist of secondary data sourced from peer-reviewed academic literature. Due to the limited nature of the literature that is selected and reviewed for the study, alternate theories may have been overlooked which could add still further value to the subject matter.

Time restraints prevented the wide range of literature on the topic from being fully explored. Much more exploratory work is actually required. The material selected determined restricted the scope of the study to that which the authors considered most significant. Convenience and judgement sampling were used to select the literature reviewed, so that a certain amount of bias might have been present in the selection process and might consequently have distorted the findings of the study.

The literature reviewed does not aim to prove or disprove the paradoxical views held by industry experts regarding what they deem to be the correct approach towards organisational learning and knowledge creation.

Organisations are constantly changing due to environmental pressures experienced from globalisation, time restraints and demands for exceptional business performance. The research is thus limited, as it provides a frame of reference based on the current opinions expressed in the literature under review.

The study is based on theoretical foundations that might provide a conceptual framework for further research and empirical investigation in the field.

1.4 Significance and Relevance of the Research Study

The study can assist with the sharing and retaining of tacit knowledge within an organisation. As the study shows, organisations should entrench Cole's (1998) finding that knowledge is cognitive in the way in which they conduct business in order to gain the most from such knowledge. The study is significant in:

- illustrating how knowledge can be explicated and shared.
- determining the type of learning that is required by an organisation that experiences a certain rate of change (volatility) in the particular business environment.
- determining the methods of knowledge sharing.
- providing a framework for sharing and retaining knowledge within organisations in particular types of industries.
- illustrating that the sharing of tacit knowledge must be managed differently from explicit knowledge.
- indicating that the capturing and sharing of what employees know within the organisation will not impact the organisation's competitive advantage when employees leave the organisation.

The value of this study lies in its facilitation of the determination of how to share and retain tacit knowledge which is not captured by standard knowledge management systems. The study also aims to provide managers with the tools to:

- effectively capture previously uncaptured tacit knowledge.
- retain valuable knowledge in their organisation and not lose valuable intellectual property (tacit knowledge) when employees leave the organisation.
- deliver results better and faster.
- skill individuals more effectively in less time and with new methods.

- share the intellectual property (knowledge) present in the organisation with others currently in the employ of the organisation.

The study indicates the methods of organisational learning, how tacit knowledge can be shared and retained within an organisation and what is required to share and retain tacit knowledge successfully. The study identifies what actions need to take place in order for the organisation to be able to share and retain tacit knowledge internally.

1.5 Methodology of the Research Study

This explorative study aims at determining what methods of knowledge sharing can be used to explicate and share knowledge in particular types of industry. As the study is primarily descriptive, the researcher has adopted the qualitative approach to literature review as being the most appropriate research method. The study involves an extended literature review.

Before embarking on a more focused literature review on the chosen topic, the researcher undertook a broad literature review. A search of leading journals in the field was conducted on the Wits Electronic Library and EBSCO databases. Other electronic search engines, such as Google, were also searched for relevant material. The library at the University of the Witwatersrand was accessed for books and previous research reports on the subject. The library at the Standard Bank of South Africa was also accessed for books and peer-reviewed journals. Searches were performed for key terms such as ‘individual learning’, ‘organisational learning’, ‘learning organisation’, ‘tacit knowledge’, ‘explicit knowledge’, ‘knowledge creation’, ‘knowledge sharing’ and ‘knowledge retention’. The search was limited to the period between January 1990 and July 2005, with emphasis being placed on the most recent publications.

Once collected, the material was grouped according to the following topics: the knowledge organisation; tacit and explicit knowledge; learning; sharing tacit

knowledge; and tacit knowledge retention. Collation of the data was organised according to the theme of the conversion of tacit knowledge to explicit knowledge and back again.

After the material had been appropriately organised, the literature review findings were analysed and interpreted to determine a framework for sharing and retaining tacit knowledge within organisations. The study explains the framework and to which uses it can be put by an organisation. Scope for further studies regarding the framework exists, as this study was based on the recommendations derived from the literature reviewed.

1.6 Assumptions of the Research Study

The underlying assumptions when conducting the study were that:

i. The literature reviewed would provide sufficient findings to determine a framework for sharing and retaining tacit knowledge within organisations.
ii. The literature reviewed in the study would have a high enough degree of validity and reliability to provide for determination of a framework, as described in the study.
iii. Though the implementation of the framework would not be undertaken as such, it would, nevertheless, be possible for others to implement the framework that the study would delineate.
iv. There would be sufficient published literature for the study undertaken.
v. This study would present a theoretical foundation which might provide a conceptual framework that might later be used in other research and empirical investigation in the field.

2 LITERATURE REVIEW

2.1 The Knowledge Conversion Framework

2.1.1 The definition of 'information' and 'knowledge'

Information is defined as "consisting of facts and data that are organised to describe a particular situation or condition" (Wiig, 1995:19). Bhatt (2000a) states that information is static, consisting of a flow of signals, and that knowledge involves the interpretation of those signals. The Pocket Oxford Dictionary (1975) defines knowledge as "what one knows" and knowledgeable as "intelligent". Allee (1997) similarly indicates that the dictionary definition of knowledge is that it is the state of knowing and that intelligence is the ability to attain and apply knowledge.

Bhatt (2000b:16) points out that defining knowledge accurately is difficult and that the generally agreed upon definition of knowledge is that it is "an organised combination of ideas, rules, procedures, and information". Knowledge consists of cognitively created meaning or context. Out of context what might otherwise be regarded as knowledge is merely lifeless and static "disorganised information". Information only becomes knowledge when the information has meaning and can be interpreted and applied to a particular situation.

Nonaka & Takeuchi (1995) state that "western philosophers have agreed that knowledge is 'justified true belief'". Rantasa (2004) notes that knowledge is a living asset, which is dynamic, unpredictable, and difficult to detect and comprehend. Wiig (1995:19) states that "knowledge consists of truths and beliefs, perspectives and concepts, judgements and expectations, methodologies and know-how" and that knowledge is the application of

available information to, and the interpretation of available information within, a specific situation.

Roberts (2000:430) states that “data are inputs to information and knowledge, and are defined as observations, measurements, or facts in the form of numbers, words, sounds or images”. Roberts (2000:430) defines information as data arranged with meaning and knowledge as “the application and productive use of information”. Knowledge is a higher level of information, as it “involves awareness or understanding gained through experience, familiarity or learning”.

Bender and Fish (2000:126) state that “knowledge originates in the head of an individual and builds 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.”

Bender and Fish (2000) and Tobin (1998) differentiate between information and knowledge, introducing a learning model that indicates that knowledge is a hierarchical progression from a simple to more complex form of information. They propose that information that is applied on the job has context and meaning, and possesses value as knowledge. Bender and Fish’s knowledge hierarchy model (2000), shown in Figure 1, illustrates the higher form of knowledge (expertise) accessible when intuition, in the form of experience, is applied to known knowledge. The knowledge hierarchy model differentiates between data, information and knowledge. Tobin (1998) and Bender and Fish (2000) propose that knowledge and expertise consist of

data and information that is transformed by applying meaning, understanding, purpose and relevance to the situation at hand.

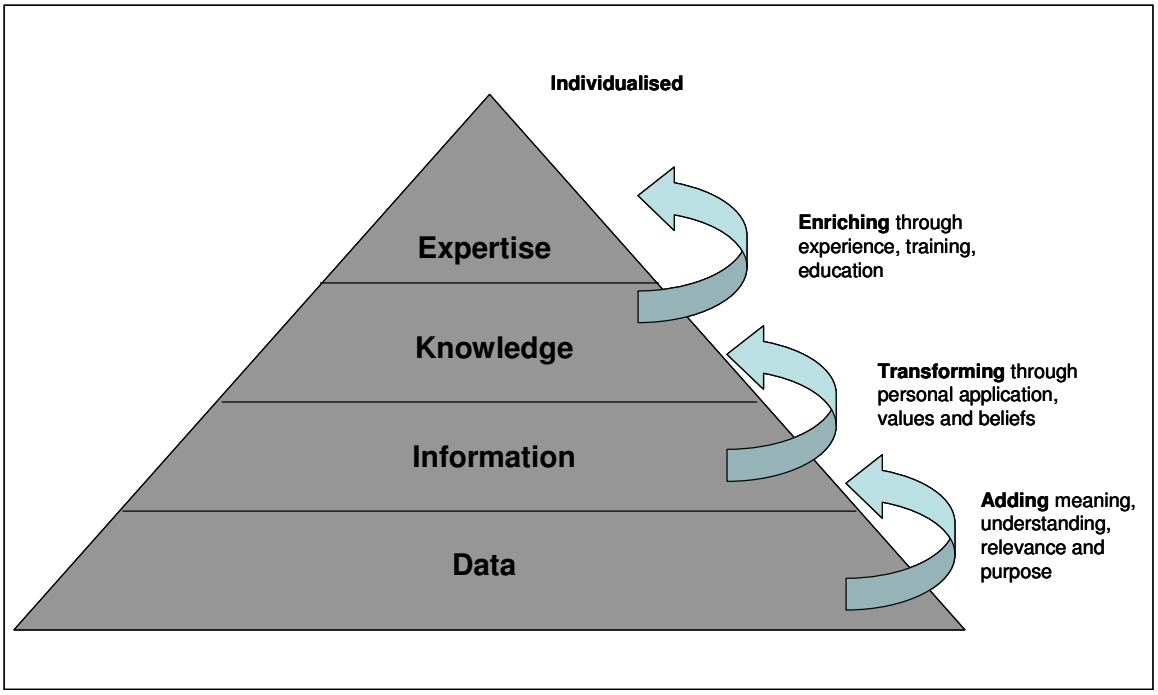

Figure 1: The knowledge hierarchy (Bender & Fish, 2000:126)

Bhatt (2000a, 2000b), Bender and Fish (2000), Tobin (1998), Allee (1997), Nonaka and Takeuchi (1995), Nonaka and Toyama (2003), Wiig (1995) and Roberts (2000) all refer to knowledge as consisting of information that has value and meaning that can be applied in a particular situation. Bhatt (2000a, 2000b), Bender and Fish (2000), Tobin (1998), Allee (1997), Nonaka and Takeuchi (1995), Nonaka and Toyama (2003), Wiig (1993) and Roberts (2000) indicate clear differences between information and knowledge, and state that every person builds up his or her own store of knowledge.

All the definitions of knowledge provided by the authors so far can be seen as variants of similar themes that suggest a hierarchical progression from data to a specialised form of knowledge referred to as alternately as expertise, wisdom or competencies. The authors, Bhatt (2000a, 2000b),

Bender and Fish (2000), Tobin (1998), Allee (1997), Nonaka and Takeuchi (1995) and Wiig (1995) affirm that knowledge has several dimensions. They insist that knowledge at the highest level constitutes competency, which is marked by the possession of specialised characteristics that are unique and hard to copy. Converting knowledge in the form of skills to a higher level that exhibits competencies, expertise and wisdoms is key to the full development of the individuals concerned.

This report, rather than focusing on the similarities and differences between information and knowledge, focuses instead on the value and use of expert knowledge or wisdom as being of special relevance for the sharing and retention of knowledge within organisations.

2.1.2 Dimensions of knowledge

Nonaka (1991, 1994) and Nonaka and Takeuchi (1995) acknowledge Polanyi's (1967) distinction between explicit knowledge and tacit knowledge. The existence of explicit knowledge and tacit knowledge as two separate entities is accepted by authors such as Bhatt (2000b), Tobin (1998), Sveiby (1997) and von Krogh (1998).

Cole (1998:17) claims that "knowledge can be tacit rather than explicit (fully 'articulated') and as a consequence it tends either to be less or more teachable. It may or may not be observable in use, it may be complex or simple, and it may be an element in a system or an independent factor. Knowledge that is visible tends to be explicit, teachable, observable in use, simple, and independent. Knowledge that is intangible tends to be tacit, less teachable, less observable in use, more complex, and an element of a system. Underlying these taxonomic dimensions is the additional complexity that knowledge carried by individuals only reaches its full potential to create economic value when it is embodied in organisational routines, that is, when

it has been converted into organisational knowledge. Such conversation is neither automatic nor easy."

Explicit knowledge (Nonaka, 1991) and tacit knowledge (Polanyi, 1967) have been referred to in the same way by other authors. In addition, explicit knowledge has also been referenced as "hard knowledge" (Nonaka, 1991); codified knowledge (Nonaka, 1991); structured knowledge (Haldin-Herrgard, 2000); articulable knowledge (Cole, 1998); and "articulated knowledge, verbal knowledge, declarative knowledge, objective knowledge" (Rantasa, 2004). The current research study draws on all the pre-existing definitions of 'explicit knowledge'. Tacit knowledge has been referenced as "soft knowledge" (Nonaka, 1991); unstructured knowledge (Haldin-Herrgard, 2000); implicit knowledge (Duguit & Brown cited in Cole, 1998); hidden knowledge (Johannessen *et al.*, 2002); and intangible knowledge (Cole, 1998). The research study treats 'tacit knowledge' as embodying the definitions provided by the above authors.

2.1.2.1 Explicit knowledge

Nonaka (1991), Nonaka and Takeuchi (1995), Nonaka and Konno (1998:42) and Allee (1997) say that explicit or "codified" knowledge can be expressed in words and numbers, and that such knowledge can be communicated between individuals in systematic ways, such as in the form of data, scientific formulae, specifications, and manuals. According to Rantasa (2004), explicit knowledge is easily communicated to others and can be stored, shared, verified and reused. Explicit knowledge records individuals' experiences as facts or as sets of instructions that can easily be explained to others. Johannessen *et al.* (undated) agree with Nonaka (1991, 1994), Nonaka and Takeuchi (1995) and Rantasa (2004) that explicit knowledge can be formulated as symbols and digitalised. This explicit knowledge can be easily transferred to others by means of information technology systems.

Nonaka (1994) refers to explicit knowledge as discrete and consisting of knowledge of the past.

Roberts (2000) points out that explicit knowledge can be codified, as it can be shared and retained in the form of symbols (viz. writing or drawings), or embodied in a tangible form, such as in the form of machinery or tools.

Meso and Smith (2000) agree with Nonaka (1991, 1994) and Haldin-Herrgard (2000) that explicit knowledge is visible, tangible, easy to find and can be captured in a mechanical or technological way. Examples of explicit knowledge can be found in documents and other sources that can be found in libraries and archives, as well as on electronic databases. Allee (1997) indicates that explicit knowledge can be transferred via documents or images. Explicit knowledge can also take the form of product specifications, scientific formulae, computer programs, books, manuals, policies and procedures, which are capable of being transmitted as data (Nonaka, 1991).

2.1.2.2 Tacit knowledge

Tacit knowledge is intangible and highly personal, consisting of information that is difficult to communicate, formalise and share. Tacit knowledge consists of individual experiences, personal skills, subjective insights, hunches, and intuitions, and is acquired through watching and doing (Johannessen *et al.*, undated), experiencing, practising, being perceptive and learning (Rantasa, 2004). Tacit knowledge cannot exist apart from the individual. Nonaka and Konno (1998) and Haldin-Herrgard (2000) find that tacit knowledge is deeply rooted in actions, ideals, values, beliefs, practices and experiences that are stored in human beings. In this way, tacit knowledge is internalised.

Nonaka and Takeuchi (1995) identify two dimensions of tacit knowledge: the technical dimension and the cognitive dimension. The technical dimension consists of information, skills, crafts and expertise in relation to the "know how" and the cognitive dimension consists of "schemata, mental models, beliefs, ideals and values" that shape the way in which individuals perceive the world around them (Gore & Gore, cited in Haldin-Herrgard, 2000; Nonaka & Konno, 1998:42).

Nonaka (1991:98) refers to tacit knowledge as "highly personal. It is hard to formalise and, therefore, difficult to communicate to others … tacit knowledge is also deeply rooted in action and in an individual's commitment to a specific context – a craft or profession, a particular technology or product market, or the activities of a work group or team. Tacit knowledge consists partly of technical skills – the kind of informal, hard-to-pin-down skills captured in the team 'know how.' … It consists of mental models, beliefs, and perspectives so ingrained that we take them for granted, and therefore cannot easily articulate them."

According to Nonaka and Takeuchi (1995) and Haldin-Herrgard (2000), tacit knowledge is difficult to codify, capture and distribute, as individuals cannot easily communicate this type of knowledge due to its transparent nature. Tacit knowledge is both complex and subjective. This type of knowledge is personal, context-specific and deeply embedded in individual intuitive personal experience, which is hard to formalise or communicate to others (Allee, 1997).

Bhatt (2000a) similarly illustrates that experience and expert skills cannot be articulated through procedures. Tacit knowledge is what is in individual minds, consisting as it does of expert craftsmanship, skills, "know-how", mental models, schemata, paradigms, beliefs, and viewpoints in terms of how individuals perceive and define their world (Nonaka, 1994). Haldin-

Herrgard (2000:361) proposes that “tacit knowledge cannot be taught, trained or educated, it can only be learnt.”

The current research study focuses on tacit knowledge as “an organisation’s core competency [which] is more than the explicit knowledge of ‘know-what’; it requires the more tacit ‘know-how’ to put ‘know-what’ into practice” (Brown & Duguid, cited in Haldin-Herrgard, 2000).

Haldin-Herrgard (2000:359) stresses that the “conversion of tacit knowledge to explicit knowledge and the ability to share this tacit knowledge offers greater value to the organisation.”

2.1.3 The value of tacit knowledge

Drucker (1992) notes that knowledge, not land, labour or capital, is the primary factor of production and Allee (1997) notes that whoever controls knowledge best will gain most economically and exert the most power.

Companies are increasingly coming to realise that their knowledge base is a source of their competitive advantage (Sveiby, 1997). Rantasa (2004) notes that for an organisation to have a sustainable competitive advantage over competitors in the field, the organisation must spread whatever knowledge it possesses throughout the organisation, while securing it from other organisations. Skills and knowledge must readily be shared within the organisation, but needs to be difficult for other organisations to copy. Rantasa (2004:24) finds that tacit knowledge is “difficult to communicate, express, formalise and share”.

Haldin-Herrgard (2000) claims that, though explicit knowledge is important, the possession of tacit knowledge enables companies to achieve excellence. Tacit knowledge, which is stored in the individual, provides whoever

possesses it with the tools to increase the quality of work performed, and with the ability to make efficient decisions, and to perform tasks more efficiently and in less time.

Tacit knowledge is easier for an organisation to protect than its explicit knowledge, as tacit knowledge is hard to imitate, copy, express and share. Rantasa (2004:27) finds that "the difficulty of copying tacit knowledge enables tacit knowledge to be the basis of an inimitable competitive advantage". Tacit knowledge is "unique, imperfectly mobile, imperfectly imitable, and not substitutable" (Rantasa, 2004:27).

Liao (2005) states that tacit knowledge comprises almost half of all existing knowledge. The Delphi Group in 1997 found that "42% of organised knowledge is contained in an employee's brain, 12% in electronic databases, 20% exists in written documents and 26% in electronic documents" (Liao, 2005:79).

Leonard and Sensiper (1998) find that the tacit dimensions of individual knowledge are embedded in employees, and that sharing this form of knowledge results in a collective knowledge possessed by an organisation, which cannot easily be imitated. Hence, tacit knowledge is a source of competitive advantage. The human mind is capable of interpreting a lifetime's worth of experience and of connecting patterns from the past to the present and future. This phenomenon makes it hard, if not impossible, to capture tacit knowledge (Leonard & Sensiper, 1998).

Leonard and Sensiper (1998) find that much knowledge remains tacit, as individuals or groups do not want to make that knowledge explicit if that knowledge provides them with an advantage over their competitors. Swap *et al.* (2001:96) state that finding ways in which to share tacit knowledge is important, as tacit knowledge is an intangible asset that is not easily codified

or captured in information systems. Organisations accumulate tacit knowledge through dynamic, unstructured, and often subtle processes that are not easily codified into formal training programmes or captured in information systems.

Sveiby (1997) and Leonard and Sensiper (1998) find that the management of tacit knowledge is relatively unexplored in comparison to the management of explicit knowledge.

As tacit knowledge holds a competitive advantage that is currently not fully exploited, the current research concentrates on this form of knowledge. Organisations need to find ways in which to share and retain knowledge, as well as ways in which to optimise their use of knowledge within the organisation. Tacit knowledge present in an organisation can be held by suppliers and clients of, or by employees in an organisation. The current research is restricted to the sharing and retention of tacit knowledge located within the organisation. Though the tacit knowledge possessed by suppliers and clients of the organisation also holds value for the organisation, such knowledge falls outside the scope of this research.

2.1.4 Nonaka and Takeuchi's SECI model of knowledge creation

Nonaka (1991, 1994) and Nonaka and Takeuchi (1995) present a model of knowledge creation in which explicit and tacit knowledge is created and transformed in an ascending process from the individual level to the group and organisational level. Nonaka and Takeuchi (1995) illustrate that the dynamics of the model arise from the interaction between tacit and explicit knowledge. These two forms of knowledge, explicit knowledge and tacit knowledge, act together as social interactions that spiral together in the knowledge transfer process. The knowledge transfer process consists of four distinct processes of knowledge conversion methods that Nonaka and

Takeuchi (1995) call the SECI model. The SECI model consists of four steps, namely the socialisation, externalisation, combination and internalisation steps. This model is represented diagrammatically in Figure 2.

Nonaka (1991, 1994) and Nonaka and Takeuchi (1995) infer that for an organisation to grow its knowledge base it is necessary for the organisation to create and share information. The sharing of information is only possible when knowledge is made visible. Nonaka (1991) emphasises that new knowledge begins with individuals and that this individual knowledge, when shared within the organisation, becomes valuable to the organisation. "Interactions between individuals play a critical role in developing ideas and 'communities of interaction' contribute to the amplification and development of new ideas" (Nonaka, 1994:14).

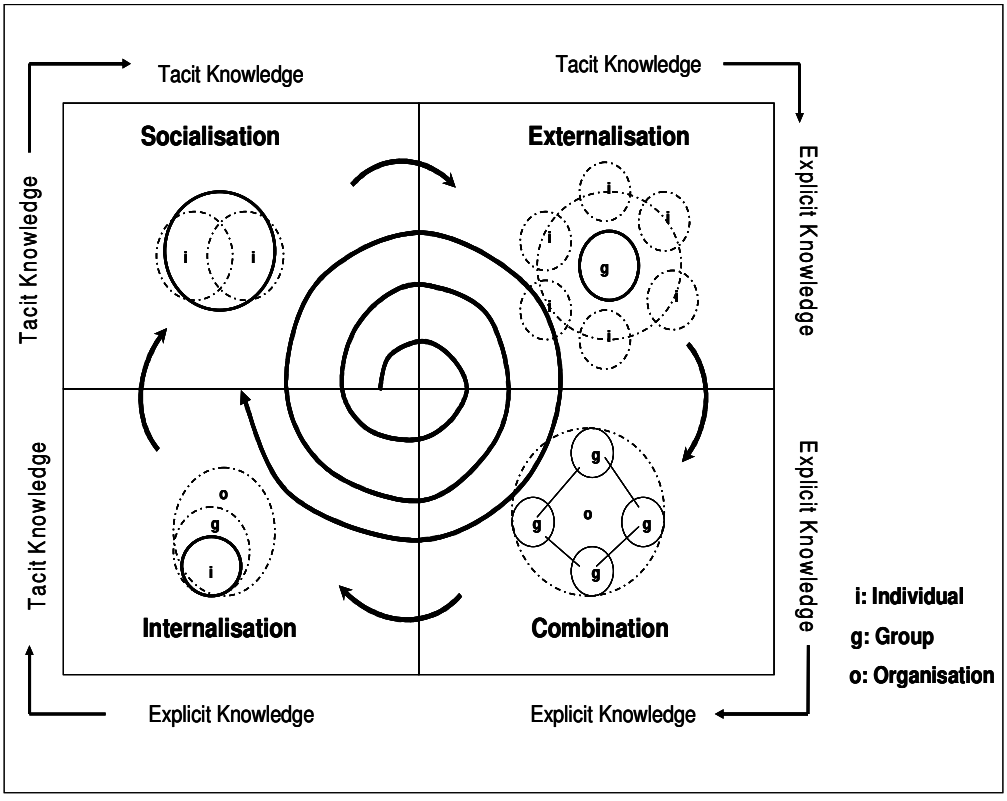

Figure 2: The spiral evolution of knowledge conversion – SECI model (Nonaka & Konno, 1998:43)

The “socialisation” phase involves the conversion of tacit knowledge to tacit knowledge through socialisation. This phase involves the sharing of tacit knowledge between individuals through direct interactions, such as those present in apprenticeship, mentoring, or collegial relations (Stover, 2004). Individuals share tacit knowledge during joint activities undertaken when they spend time together with one another or stay in the same environment as one another for some time. The time spent in this way allows individuals to come to understand other ways of thinking and feeling experienced in coping with situations that are the same as their own. During this phase, the individual learns on the job and tacit knowledge expands within the organisation as tacit knowledge, in the form of personal experience, is shared with colleagues or subordinates of the same organisation (Nonaka & Konno, 1998). Individuals share skills or mental models with one another by means of observation, imitation and practice. This knowledge, once learnt by the individual, becomes part of his or her own tacit knowledge base. An example of socialisation is apprenticeship, during which the apprentice learns skills from the master tradesperson (Nonaka, 1991).

The “externalisation” phase involves the conversion of tacit knowledge to explicit knowledge by way of communicating the tacit knowledge into explicit concepts. During this phase, individuals form part of a group or team. The individuals articulate their ideas by sharing their ideas with each member in the group, in this way developing common beliefs and ideas within the group (Nonaka & Konno, 1998). The externalisation phase involves the transferral of knowledge by means of the telling of stories, narratives, multi-media presentations, group reflections, conversations, e-mails and memos, so that the knowledge is written down or communicated in some other permanent way (Stover, 2004:165). This process allows knowledge that was previously hidden and ingrained in people’s minds to be shared with other individuals throughout the organisation. According to Nonaka (1991), this is where value

lies for the organisation. The externalisation phase consists of the translation of tacit knowledge into metaphors, models, concepts or equations.

The “combination” phase involves the conversion of explicit knowledge to explicit knowledge. This phase involves the transfer of knowledge by means of standardised and systematic procedures, such as databases or expert systems (Stover, 2004). New knowledge generated is made available to other groups within the organisation. This phase is about capturing and integrating new explicit knowledge, and then spreading the explicit knowledge among members in the organisation (Nonaka & Konno, 1998).

The “internalisation” phase involves the conversion of explicit knowledge back to tacit knowledge. This phase is about growing the knowledge base and distributing the gained knowledge throughout the organisation by means of active participation and repetition. The knowledge becomes tacit again, so that an organisation’s competitive advantage appears unique and hard to copy (Stover, 2004). This new tacit knowledge becomes available to other members or groups in the organisation through learning-by-doing, training and exercises (Nonaka & Konno, 1998). The explicit knowledge is shared amongst other individuals in the organisation, who use this knowledge to extend and broaden their own tacit knowledge. This knowledge is eventually taken for granted as part of the way in which they perform at work.

According to Nonaka and Takeuchi (1995) and Paavola *et al.* (2004:559) the knowledge creation spiral begins with socialisation, when tacit knowledge, such as that consisting of experiential learning, is shared at group level. At this stage, interactions and collaboration within a group are required in order to create common understanding and trust within the group. During the next stage, externalisation, tacit knowledge is converted to explicit knowledge by means of metaphors, analogies and concepts. This stage, according to Nonaka and Takeuchi (1995), is the most important, as innovation results

from tacit knowledge that is made explicit in such a way that it facilitates the sharing of knowledge at the individual, group and organisational level. The next stage in the knowledge conversion process, called combination, is where the knowledge that has been made explicit is shared and amplified to other groups in the organisation. During the final stage, internalisation, the explicit knowledge of the individual, group or organisation is internalised by the individuals and reconverted into tacit knowledge by means of action learning activities, such as learning by doing. During this stage, the amount of knowledge increases, and is once more made tacit in order to enable the organisation to maintain and sustain its competitive advantage. After internalisation, the knowledge creation process continues to spiral on once more through the cycle. The four phases spiral continuously, so as to enrich and grow the knowledge held by the organisation to a higher level and, in this way, "the organisation's knowledge base grows ever broader" (Nonaka, 1991:99), with new and ever-evolving concepts being developed, clarified and spread to an expanding community of individuals (Nonaka, 1994:15).

Nonaka (1991) points out that the critical steps of knowledge conversion involve the conversion of tacit knowledge to explicit knowledge (externalisation) and the conversion of that explicit knowledge back into tacit knowledge (internalisation), so as to grow the knowledge base of an organisation in order for it to maintain its competitive advantage. An organisation's competitive advantage exists in its tacit knowledge and not in its explicit knowledge, as tacit knowledge is complex, unsystematic, hard to copy and difficult to articulate.

2.2 The Organisational Learning Volatility Matrix Model

2.2.1 The definition of 'learning'

To investigate the usefulness of sharing and retention of tacit knowledge, some understanding of the nature of the learning process undertaken by individuals and organisations is crucial. The literature review will suggest the type of learning that is most effective when organisations undergo changes in the business environment.

The Pocket Oxford English Dictionary (1975) defines "learning" as "knowledge got by study, erudition", while to "learn" is defined as acquiring "knowledge of, or skill in, by study, experience or being taught". Table 1 illustrates the various definitions of learning provided by Robbins (2001), Kolb (1984), Allee (1997), Kim (1993) and Tobin (1998). All these authors note that learning is a process that continuously takes place whenever skills applicable to a specific situation are acquired by means of new experiences. The learning process involves continuously gaining knowledge that increases one's capacity to act effectively in different situations under various conditions.

Author	Definition of learning
Robbins (2001:39)	"Any relatively permanent change in behaviour that occurs as a result of experience"
Kolb (1984)	Experience that is converted into concepts, which can then be used to guide and develop the acquisition of new experiences
Allee (1997:50)	"gaining knowledge, comprehension, or mastery through experience or study"
Kim (1993:38)	The "acquisition of skill" in order to produce an action, and the ability to communicate the experience and to apply the experience to a situation. Learning is defined as "increasing one's capacity to take effective action"
Tobin (1998)	The operational definition of learning is as a way to find relevant information and to apply the information to the way in which employees do their work so as to improve the way in which a business operates. In the context of the knowledge-enabled organisation, learning is about attaining relevant knowledge and skills that facilitate the achievement of individual, group and company objectives

Table 1: Definitions of learning

Tobin (1998) and Allee (1997) claim that people learn from experience, observing other people, reading, listening, feeling, smelling, hearing and discovery. Robbins (2001), Kolb (1984), Allee (1997) and Tobin (1998) all consider that experience or some expertise is required for learning to take place. They infer that experience will facilitate additional knowledge, growth or change taking place.

Learning in an interactive learning environment takes place in the form of knowledge and skill acquisition in the presence of competing ideas and views referred to as frameworks (Klabbers, cited in Borodzicz & van Haperen, 2002). Borodzicz and van Haperen (2002) point out that people learn through practice, discussion, communication, interaction and participation together with other individuals, and organisational learning focuses on the development of roles, rules, procedures and routines through social experiences.

In summary, learning is a process of creating new knowledge from experience. Learning takes place through experience and discovery. However, we mostly learn from other people by listening to those who already possess knowledge, by brainstorming with others who have in the past experienced, or who are currently experiencing, similar situations, or by observing how people handle certain situations. Thus, knowledge is developed by applying experience on the job and knowledge can only be stored by people (Tobin, 1998:28).

This research concentrates on the sharing of tacit knowledge by means of engaging in learning activities and the retention of tacit knowledge of people, who are the only repositories of tacit knowledge.

2.2.2 Individual and organisational learning

Tobin (1998) states that individuals acquire explicit knowledge by means of formal methods and that they acquire tacit knowledge by means of informal methods. Table 2 illustrates the various effective learning methods referred to by Tobin (1998), Robbins (2001), Caple and Martin (1994), Brooking (1999) and Kolb (1984).

Methods of Learning	Explicit	Tacit	Authors				
	Formal method	Informal method	Tobin (1998)	Robbins (2001)	Caple and Martin (1994)	Kolb (1984)	Brooking (1999)
Lectures	√		√				√
On-the-job training	√		√		√		√
Watching videotapes, listening to audiotapes, accessing computer-based or multimedia information	√		√				
Reading manuals and reports	√		√				
Asking questions		√	√				
Observation of others performing work		√	√	√		√	
Discussion of work / Interacting with others		√	√				√
Listening to others		√	√				√
Doing the actual work		√	√	√	√	√	√
Action learning (applying content learning to problems and learning from experience)		√	√		√	√	
'War room' exercises (simulating business problem solving)		√	√				
Brainstorming						√	√
Working in groups						√	
Mentoring programme							√

Table 2: Methods of learning

Allee (1997:89) suggests that learning is "the process of integrating information and applying it to our changing needs". Learning is about attaining new information that increases an individual's understanding so that he or she can do things more efficiently. Allee (1997) indicates that most learning cycles fall into four phases: doing; reflecting; conceptualising; and planning (see Figure 3).

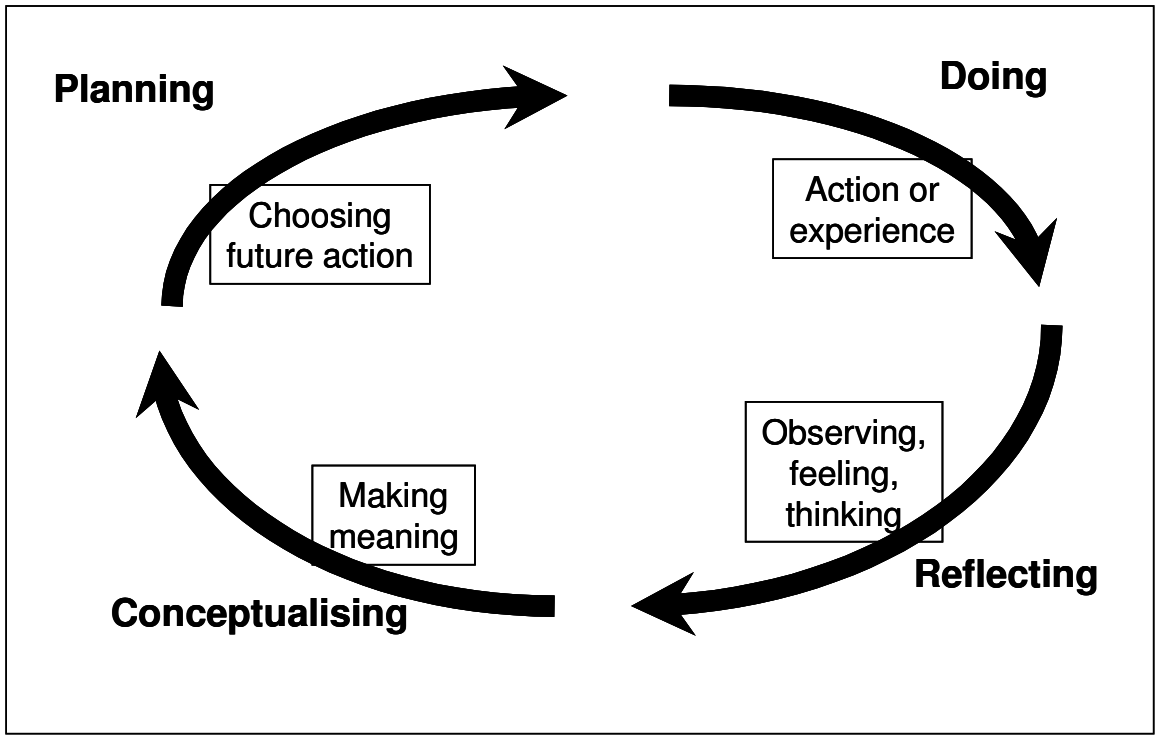

Figure 3: The learning cycle (Allee, 1997:90)

Tobin (1998), similarly to Allee (1997), suggests that an individual learns how to perform a job in four steps. Firstly, he or she finds the appropriate information that matches the learning requirement. The individual then learns the activity that needs to be done by listening, watching, discussing, or doing. He or she then applies the skill learned to the situation at hand and finally an assessment takes place to measure the effectiveness of the outcome. This process is then repeated when handling similar or new situations.

Kolb (1984), Tobin (1998), Kim (1993), Caple and Martin (1994), Honey and Mumford (cited in Caple & Martin, 1994), Piaget (cited in Borodzicz & van Haperen, 2002) and Lewin (cited in Borodzicz & van Haperen, 2002) suggest that individual learning is a four-stage cycle and that learning originates from experience. All these authors describe a learning cycle that is similar to that described by Allee (1997). The authors concerned use the learning cycle to determine how individuals perceive information, process information, learn, solve problems and make decisions. The learning cycle also highlights that individuals shift from being actors to being observers and from being involved to being analytically detached. Table 3 illustrates the learning cycle as envisaged by the authors.

Author	Existing Knowledge / Experience	Learn	Do / Act / Apply / Develop new experience	Assess / Review	Repeat
Tobin (1998)	√	√	√	√	√
Piaget (cited in Borodzicz & van Haperen, 2002)	√		√	√	√
Lewin (cited in Borodzicz & van Haperen, 2002)	√		√	√	√
Honey and Mumford (Caple & Martin, 1994)	√	√	√	√	√
Caple and Martin (1994)		√	√	√	√
Kolb (1984)	√	√	√	√	√
Allee (1997)	√		√	√	√
Kim (1993)	√		√	√	√

Table 3: The learning cycle

Individual learning is important, as the sharing and retention of tacit knowledge involves individuals. Nonaka (1994) confirms Kim's (1993) and Argyris' (1994) understanding of organisational learning as occurring through individual learning. The amount of learning that is transferred to the organisation depends on the individuals themselves in the organisation and how they learn. Individual and organisational learning enables an organisation to compete in the global market (Hartley & Allison, 2002)

Argyris (1995) proposes three major types of learning: single-loop learning, double-loop learning and deutero-learning. Kim (1993), Örtenblad (2004) and Lim and Chan (2004) describe single-loop learning as occurring when an organisation strives to continuously improve the way that it currently does things, double-loop learning as occurring when an organisation continuously questions the ways and actions of doing things, and that deutero-learning occurs when an organisation continuously analyses and becomes aware of how employees learn and improve their work methods. Table 4 summarises single-loop, double-loop and deutero-learning methods.

Argyris (1994, 1995) notes that learning takes place in two ways, when errors are detected and corrections are then made, or when a match is attained between intention (design for action) and consequences (the outcome). In short, learning takes place when an organisation either achieves what it intends or when the organisation does not achieve what it intends (due to a mismatch) and it then realigns itself in order to achieve its intended outcome (a match occurs).

Individuals, rather than organisations, perform actions that produce learning. In this way, individuals act as agents of organisations that can only create conditions that may influence how the individuals frame, act out and resolve problems (Argyris, 1994).

Argyris (1995) suggests two ways in which to correct errors: by means of single-loop learning, which requires changing behaviour between individuals, and double-loop learning, which requires changing the underlying or master programme. Argyris' (1994, 1995) concept of single-loop and double-loop learning is illustrated in Figure 4. The diagram illustrates that single-loop learning occurs when matches are created, or when action is taken to correct mismatches. Double-loop learning takes place when mismatches are corrected by initially examining and changing the governing variables (the values that individuals seek to satisfy) and then taking the relevant action.

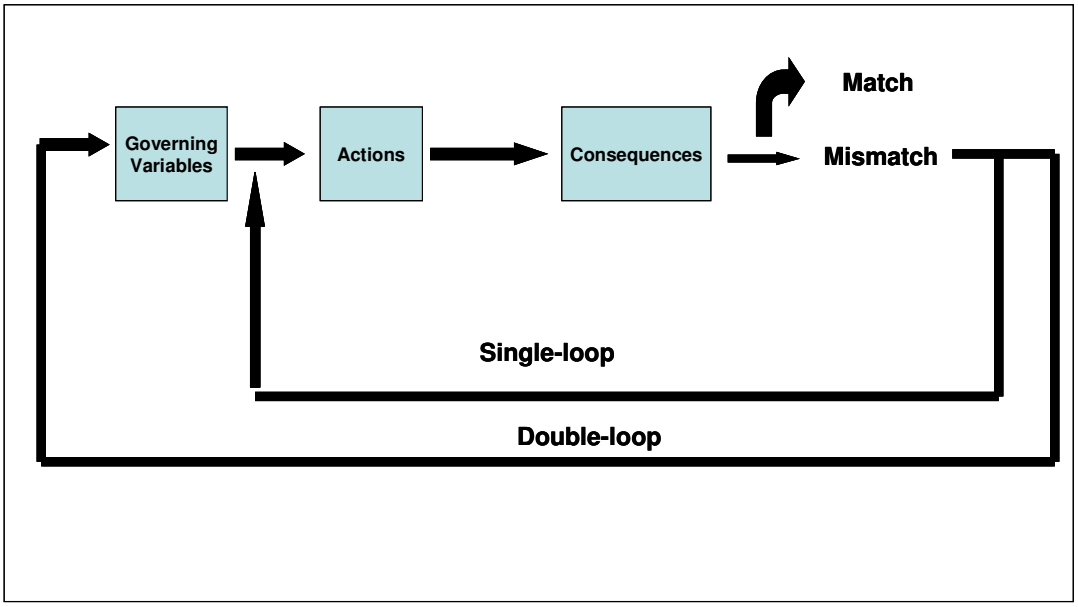

Figure 4: Single-loop and double-loop learning (Argyris, 1994:8)

Lim and Chan (2004:101) acknowledge that single-loop learning is about detecting and correcting performance gap, so that organisations can achieve their objectives. The outcome of single-loop learning is measured against the organisation's norms and expectations. If the outcome matches the expectations of the organisation, then the organisation knows that the actions that it took were successful However, if the outcome does not match the expectations of the organisation, then the organisation must take some action to correct the situation. Argyris (1994) says that single-loop learning is

a reactive learning process appropriate for routine and repetitive work. Lim and Chan (2004) state that other authors have referred to single-loop learning as lower-level learning, non-strategic learning, and adaptive learning or coping.

Argyris (1995) and Lim and Chan (2004) note that double-loop learning is required for complex and non-programmable issues. Double-loop learning involves altering old habits and individual behaviour so that new approaches can be adopted for handling new or different situations. Double-loop learning is an active process. According to Lim & Chan (2004), other authors have referred to double-loop learning as higher-level learning, generative learning, and strategic learning.

Lim & Chan (2004:101) state that deutero-learning is a proactive process, according to which perfection is continuously sought, and that “deutero-learning is about learning how to carry out single-loop and double-loop learning”. Deutero-learning involves members of an organisation learning from their previous experiences by investigating what the organisation has done well and not so well in the past. Based on their findings, the members then produce a new strategy for how to do things better, which they then evaluate and generalise for the rest of the organisation.

Method	Definition	Type of Learning	Suitable For	Authors			
				Argyris (1994, 1995)	**Lim and Chan (2004)**	**Kim (1993)**	**Örtenblad (2004)**
Single-loop	This type of learning involves changing behaviour among individuals. Single-loop learning occurs when matches are created, or when action is taken to correct mismatches.	REACTIVE LEARNING PROCESS	Routine and repetitive work	√	√	√	√
Double-loop	This type of learning is about changing the underlying or master programme. Double-loop learning takes place when mismatches are corrected by initially examining and changing the governing variables (the values that individuals seek to satisfy) and then by taking the relevant action.	ACTIVE LEARNING PROCESS	For complex, non-programmable issues	√	√	√	√
Deutero	Deutero-learning is when members of an organisation learn from previous experiences by firstly investigating what the organisation has done well and not so well, upon which finding the members then produce a new strategy of doing things better, which they then evaluate and generalise for the benefit of the entire organisation.	PROACTIVE PROCESS	Where perfection is continuously striven for	√	√		√

Table 4: Single-loop, double-loop and deutero-learning

2.2.3 The organisational learning volatility matrix model

Organisations are interested in determining the factors that promote learning internally to the organisation, as these methods can help to improve the organisation's competitive advantage in the marketplace. An organisation requires rapid learning methods today, as the business environment is changing rapidly and the survival of an organisation depends on how innovative the organisation is, and on how quickly it can adapt to change. Argyris, Schein and Senge, who are all considered to be experts in the field of organisational learning, share a belief that organisations need to learn quickly if they are intent on sustaining their competitive advantage (Lim & Chan, 2004).

The various forms of learning are important, as each organisation is unique in the challenges that it faces, in the environment in which it finds itself and in the rate of change that impacts on the specific industry.

The amount and type of learning that takes place within a specific organisation determines how flexible it is in adapting to accommodate change and uncertainty present in the marketplace (Hartley & Allison, 2002). Adopting an approach intent on learning facilitates the occurrence of continuous learning, the capacity to learn from experience, and the possibility of allowing one's successes and failures to stimulate innovation.

In order for an organisation to survive in an ever-changing environment, it needs to find ways in which to become agile and flexible – it therefore needs to create a climate that is conducive to learning, experimenting and risk taking (Giesecke & McNeil, 2004). Lim and Chan (2004) note that, in order for an organisation to sustain its competitive advantage, it needs to learn rapidly. Argyris (1994) suggests that an organisation depends on learning if it wants to succeed in a demanding learning-orientated business

environment. An organisation that has the capacity to adapt to change, that is capable of avoiding the mistakes of the past, that learns from its past successes, that is willing to learn from others, that is intent on improving its processes and that continually strives to meet customers needs will succeed, even in a rapidly and violently changing world (Örtenblad, 2004).

An organisation's ability to learn more quickly than does its competition is the only sustainable competitive advantage that such an organisation has (Senge, 1990). Learning is crucial, as the business world becomes more interconnected, complex and dynamic. Kim (1993) claims that organisational learning takes place via individuals and that learning is fundamental to the survival of an organisation. Kim (1993) affirms with Senge (1990), Örtenblad (2004), Giesecke and McNeil (2004), Lim and Chan (2004) and Argyris (1994) that the speed at which individuals and organisations learn is key to determining the sustainability of its competitive advantage over other organisations.

Nonaka (1991) alleges that in today's economy the only certainty is change, and organisations that are able to learn through acquiring and creating knowledge will have a lasting competitive advantage. Superior organisations that are successful will be the ones that create knowledge, and that spread and share the knowledge throughout their organisations. The new knowledge that they create needs to be applied and adapted to new technologies and products in other areas, thus creating a competitive advantage for the organisations as a whole. Learning enables organisations to respond quickly to customer needs, to create new markets, to rapidly develop new products and to dominate new market sectors.

Organisational learning is important for organisations to be able to survive and to be successful. Lim and Chan (2004) developed an organisational learning matrix that shows what type of learning is required for an

organisation that experiences a certain rate of change in the environment in which it operates. Various methods of learning are described in Table 5 and the organisational learning matrix is represented in Figure 5 below. The organisational learning matrix is based on the theories of organisational learning and the rate of change of the business environment in which the organisation operates.

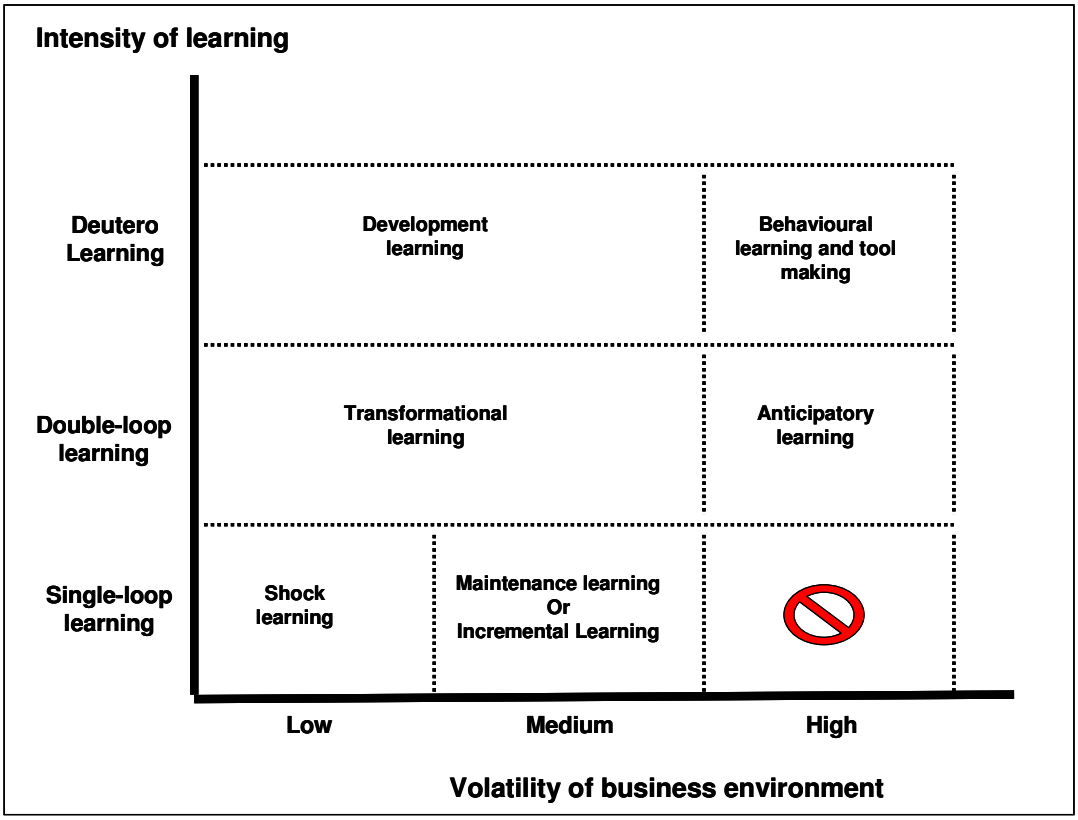

Figure 5: The organisational learning matrix (Lim & Chan, 2004:103)

The organisational learning matrix illustrates that organisations that are involved in single-loop learning in an environment characterised by low volatility are engaged in shock learning. Shock learning results from an organisation being unprepared to face a crisis, so that when a crisis occurs, the organisation has to attempt only to fix the immediate problem, without giving due consideration to its long-term implications. The organisation can afford to fix the problem when the crisis occurs due to the low business

volatility of the environment in which the business operates. Maintenance and incremental learning are required for survival when organisations operate in a medium volatile business environment and engage in single-loop learning. Such organisations learn how to deal with potential problems after each new experience. Organisations will not survive if they engage in single-loop learning while operating in a highly volatile business environment. Such organisations will fail, as the environment changes before they have learned how to cope with the previous crisis (Lim & Chan, 2004).

Single-loop learning is sufficient for handling routine and repetitive tasks. Shock learning, maintenance learning and incremental learning are similarly sufficient for coping with mundane tasks. However, as tasks become more complex, organisations need to be able to engage in double-loop learning. Organisations that use single-loop learning can adopt double-loop learning, such as transformational or anticipatory learning, if they want to achieve greater competitive advantage in the marketplace. Transformational learning is ideal when the organisation operates in a low to medium volatile business environment, while anticipatory learning is required for survival when the rate of change is high, or when constant innovation is required. Double-loop learning assists in providing a competitive advantage, but deutero-learning is required for attaining sustainable competitive advantage. Developmental learning or behavioural learning and tool-making are used when organisations employ deutero-learning. Developmental learning is a strategy for sustaining an organisation's competitive advantage in a low to medium rate of change business environment. Behavioural learning and tool-making is required if an organisation that operates in a highly volatile business environment needs to sustain its competitive advantage (Lim & Chan, 2004).

Learning Type	Description
Maintenance learning	**Maintenance learning** is about finding better ways of doing what the organisation does by constantly challenging the status quo. Maintenance learning is part of single-loop learning, as this learning method does not consider whether something should be done, but rather on finding better ways of doing the same thing (Lim & Chan, 2004).
Shock learning	**Shock learning** enables an organisation to deal with an impending crisis. Shock learning can be constructive when it enables an organisation to learn from past mistakes, so that it does not repeat them in the future. Alternatively, shock learning can be detrimental if an organisation ignores the signals of an upcoming crisis, doing nothing to prevent it. Shock learning is a reactive form of single-loop learning (Lim & Chan, 2004).
Anticipatory learning	**Anticipatory learning** involves making decisions about the future of the organisation and about what actions need to be taken now so that it can achieve the best result in future. This form of double-loop learning considers how certain variables (the governing variables) will affect future situations and what corrective actions the organisation needs to take to achieve the results that it desires (Lim & Chan, 2004).
Transformational learning	**Transformational learning** involves creating new methods of performing actions that are different from the past. Such a form of learning overhauls the way in which the organisation and its employees operate. This form of double-loop learning requires that foresight and a proactive approach are applied to determining possible scenarios (Lim & Chan, 2004).
Developmental learning	In **developmental learning** individuals evaluate new models in order to visualise direction, develop purpose, and set sequential, cumulative objectives for solving the problem at hand. Developmental learning equates to Argyris' (1995) deutero-learning, as the organisation that embarks on this form of learning develops a strategy for dealing with issues that have still to emerge in future (Lim & Chan, 2004).

Learning Type	Description
Behavioural learning and tool-making	**Behavioural learning and tool-making** requires individuals to work together to determine what conditions are required to control the new work process in the future. This form of deutero-learning is a proactive learning method that anticipates and solves problems in order that the organisation may achieve future objectives (Lim & Chan, 2004).
Incremental learning	**Incremental learning** facilitates the application of learning gained from new experiences to new work concepts and tools in the existing situation. This form of single-loop learning helps to ensure that more efficient methods of doing the same work are found without altering the way in which things are done (Lim & Chan, 2004).

Table 5: Learning styles

2.2.4 Classifying the organisational learning matrix in terms of JSE companies

The Johannesburg Stock Exchange Limited (JSE) consists of South African listed organisations that are categorised according to the industries in which they operate. The various industries were investigated and classified according to the volatility of the business environment in which they operate and the type of learning that they require. The classification was then mapped to the type of learning required in the organisational learning volatility matrix model.

The organisational learning matrix is classified according to the learning intensity and the volatility of the business environment. The learning intensity consists of single-loop learning, double-loop learning and deutero-learning. The volatility of the business environment is about the rate of change in the environment, which includes elements such as technology, business, the economy, international factors, national factors, local factors, socio-cultural factors, legal-political factors, the labour supply, and the nature of suppliers,

competitors, customers and clients (Lim & Chan, 2004). The volatility of the business environment is classified as low, medium or high. Single-loop learning is used by organisations that perform routine, repetitive and mundane tasks. Double-loop learning is used by organisations that perform complex tasks and that require more complex methods in order to maintain the organisation's competitive advantage. Deutero-learning is used by organisations that need to come up with creative, new and better ways of doing things so as to secure a sustainable advantage for the future.

The food and drug retail industry, some retail industries, the construction and building industry and the real estate industry operate in a low volatility business environment that requires single-loop learning. Certain organisations, such as Pick 'n Pay Holdings, Shoprite Holdings and Spar in the food and drug retail industries, and Woolworths Holdings in the retail industry are examples of organisations that use shock learning, as they are short-term focused and react to fix problems as crises arise. A crisis develops when competition exists between stores, which adjust their prices accordingly or introduce promotions on specific products in order to outwit similar strategies adopted by their competitors. Organisations that sell niche products also use shock learning. Some retail organisations use franchising, open speciality stores or expand by acquiring other organisations. These types of organisations require to progress to maintenance or incremental learning that operate under medium volatility and use single-loop learning. Edgars Consolidated Stores, the Mr Price Group, Massmart and Woolworths are examples of organisations from the retail industry, and Famous Brand is an example of an organisation from the leisure and hotels industry that use maintenance or incremental learning.

Transformational learning is used by the banking, life assurance, insurance, speciality and other finance, software and computer services, and industrial sector industries. Examples of such organisations are the Standard Bank

Group, RMB Holdings, the ABSA Group, Coronation, Investment Bank, M Cubed, Discovery Health, Old Mutual, Sanlam, Liberty Life, Alexander Forbes, Glenrand MIB, the Bytes Technology Group, Dimension Data, Spescom, Business Connection, Datatec, Barloworld and Imperial Holdings. These organisations all handle complex tasks and offer a variety of services and products to their customers. These organisations need to differentiate themselves from their competition by being innovative and by offering their customers superior products. Anticipatory learning is used by the mining, oil and gas, forestry and paper, software and computer services, and the telecommunication service industries. Examples of these organisations are Anglo American plc, Harmony Gold Mining, Anglo Platinum, Impala Platinum Holdings, Sasol, Sappi, the MTN Group and Telkom. These organisations need to accommodate the high rate of change that occurs in their industry and they need to be innovative in the products or services that they offer customers. These organisations need to anticipate issues, by some method such as scenario planning, before they occur. For example, fluctuations in the dollar-rand exchange rate would have to be anticipated, as they affect the output production of gold mines, the oil price and demand for platinum.

Developmental learning is used by organisations that intend to obtain a sustainable advantage in the industry in which they operate. These organisations operate in an environment that experiences low to medium business environment changes and are involved in developing or manufacturing creative technology products. Frontrange, Idion Technology Holdings, Mustek and Pinnacle are examples of organisations in the information technology industry that use developmental learning. Behavioural learning and tool-making is used by the electronic and electrical equipment industry, as this type of industry requires an organisation to have a vision and demands a high intensity of learning aimed at the constant and rapid innovation that this environment requires. Altron, Altech and Reunert

are examples of such organisations. Figure 6 indicates the organisation learning matrix classification by industry.

Organisations operating in the low, medium and high volatility business environment can attain a higher form of learning in order to secure a sustainable competitive advantage over their competitors. Organisations need not only use one type of learning, but can employ several levels of learning simultaneously as the need arises. No organisation can solely use one type of learning method. An organisation changes and evolves over time, using various combinations of learning methods in tandem.

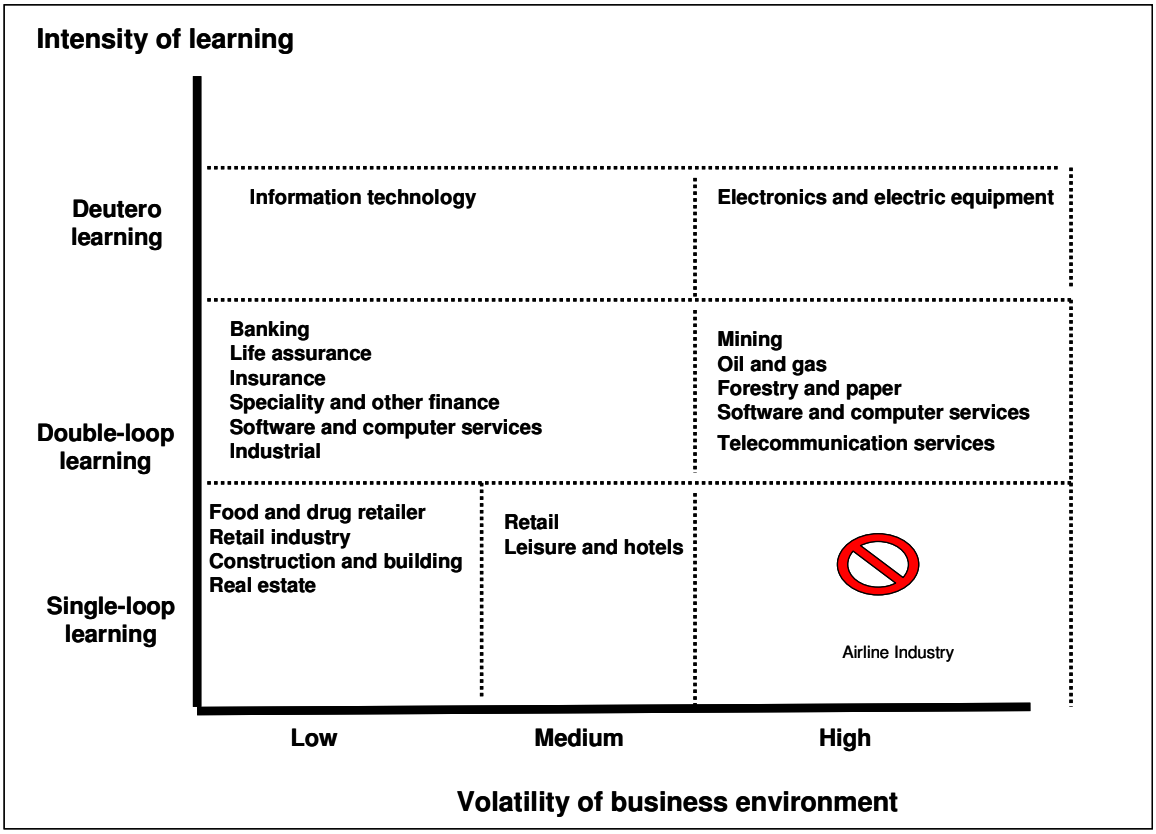

Figure 6: The organisational learning matrix classified in terms of industry

2.3 Methods for Facilitating the Sharing and Retaining of Tacit Knowledge

Knowledge is held by individuals as they apply information to do a job. People share their tacit knowledge by talking, discussing and demonstrating their experience. Tacit knowledge is based on experience, intuition and application; hence, tacit knowledge is difficult to articulate, cannot be in written form and cannot be stored in a database or managed by knowledge management systems (Tobin, 1998).

Employees who have worked for an organisation for a long period of time possess a depth of knowledge which is usually specific to the organisation or the industry in which they operate. Such employees possess expertise that cannot easily be transferred. Bender and Fish (2000) note that when employees leave an organisation, they take their skills with them, and replacing these employees is costly and time consuming. Retaining expert knowledge and insight into how best to perform tasks within the organisation is therefore essential and can be achieved by training staff and ensuring that experts within the organisation regularly pass on their knowledge to the other employees.

Fahey and Prusak (1998) stress that, as an individual's knowledge base grows, the difficulty of transferring their knowledge to other individuals grows. Similarly, Sveiby (1997) points out that expertise is difficult, if not impossible, to transfer to others.

Stover (2004) notes that the reasons why organisations articulate their tacit knowledge as explicit knowledge and then codify this knowledge are:

- so that they do not have to redo the same work repeatedly.
- so that they do not repeatedly have to solve the same problems.
- so that the person who originally possessed the tacit knowledge can be absent when the information is shared.

- so that some of the organisation's intellectual capital is less likely to be lost when employees leave the organisation.
- so that each employee can become more competent and efficient as the information becomes readily available.

Davenport and Prusak (1998:87) state that the impermanent tacit knowledge in people's minds, when made explicit, gains a degree of permanence, allowing an organisation to "share, store, manipulate" and reuse the newfound knowledge in many different ways. In this way, the organisation grows its knowledge base and creates new knowledge.

2.3.1 Methods of sharing tacit knowledge

This section introduces the various ways in which tacit knowledge can be shared with individuals and groups within an organisation. The methods presented will be further investigated to indicate what method have been effectively utilised during the knowledge conversion cycles referred to by Nonaka (1991, 1994) and Nonaka and Takeuchi (1995).

2.3.1.1 Apprenticeship

An apprenticeship is a programme in which an expert teaches and shares skills with a novice. The master transfers and shares its acquired skill to the apprentice, who learns the skill from the master over a prescribed period of time. The apprentice learns by being formally taught, from observation and by participating in learning activities. Both the master and the apprentice share their experiences through their actions (Stenmark, 2001). On-the-job training is similar to the apprenticeship concept (Nonaka & Takeuchi, 1995).

An apprenticeship, according to Leonard and Sensiper (1998), provides the ability to learn through shared observations and by means of the possibility

that it provides for mimicking the behaviour of the expert. When undergoing apprenticeships, individuals are coached by more experienced people who have years of experience.

Sveiby (1997) illustrates that craftsmen have for centuries transferred their skills via master-apprentice relationships. Argyris (1994) suggests that learning effectively takes place by observing people in action and by interpreting the reasons why those acting out the behaviour act in the way that they do. The master shows the apprentice how to perform a task and the apprentice imitates and performs the task as done by the master. The master guides the apprentice and over time the skill is learnt and becomes deeply rooted in the apprentice's mind. The apprentice creates new rules as he or she develops skill in accumulating additional information from other additional sources.

2.3.1.2 Direct interaction

Haldin-Herrgard (2000) indicates direct interaction to be a form of tacit knowledge sharing. Direct interaction involves social interactions and discussions amongst individuals concerned with the same activity.

2.3.1.3 Informal and formal networking

Brooking (1999) states that the fastest and best way to determine what is really going on in an organisation is by means of participating in conversations that usually take place in a cafeteria, pub, bar, smoking area or alongside a coffee machine. Such interactions form part of informal networks. Examples of formal networks are when individuals who share a common interest get together to discuss issues pertaining to the area of interest.

2.3.1.4 Action learning

Action learning, according to Haldin-Herrgard (2000), consists of face-to-face social interactions and practical experience. Action learning involves activities that are practised. Experience is gained by individuals when they interact, communicate and discuss matters of mutual concern with other individuals or groups in the field.

2.3.1.5 Observation

Observing others as they work can help to identify tacit knowledge that individuals may not even be aware they possess. In this way, tacit knowledge that would not otherwise have been shared by more formal means is accessed (Leonard & Sensiper, 1998).

2.3.1.6 Learning by association

Learning by association (Leonard & Sensiper, 1998) is a way of learning or sharing tacit knowledge without being consciously aware of what you are looking at or doing at times. This form of learning is similar to imitation (Hartley & Allison, 2002; Nonaka, 1994), learning by doing (Roberts, 2000; Swap *et al.*, 2001; Nonaka & Takeuchi, 1995; Nonaka & Konno, 1998), on-the-job training (Nonaka, 1994), and apprenticeships (Nonaka, 1994; Leonard & Sensiper, 1998; Stover, 2004; Liao, 2005; Roberts, 2000; Haldin-Herrgard, 2000; Stenmark, 2001).

According to Sveiby (1997), lectures are the least effective method of transferring competence, as five days after a lecture less than a tenth of the

lecture is retained. People retain about twenty percent of what they learn when they combine seeing and hearing. However, learning by doing or on-the-job learning is the most effective learning method in the workplace, as people retain between sixty to seventy percent of what they learn how to do. Competence is effectively transferred when an individual actively participates in a process.

2.3.1.7 Brainstorming

Brainstorming takes place in informal meetings aimed at generating new ideas and forecasting situations. Brainstorming facilitates detailed discussion of difficult problems and the generation of new opportunities and ideas. Ideas arrived at in this way are not analysed or criticised, in order to encourage creative thinking. Participants in such meetings are encouraged to offer up ideas or to build on one another's innovative suggestions. All the ideas put forward at the meeting are gathered and evaluated at a later stage (Pearce & Robinson, 2000).

2.3.1.8 Concept mapping and knowledge mapping

Concept mapping is a tool that assists and enhances the different ways in which an individual thinks and learns when organising and presenting knowledge (Liao, 2005:81). Concept mapping is similar to brainstorming in that it encourages the accumulation of ideas and convergent thinking. The accumulation of ideas results in different interpretations of ideas and allows for the generation of new ideas. Concept mapping involves facts, concepts and generalisations.

Liao (2005) notes that knowledge mapping is achieved through answering questions, which either lead to the linking together of concepts in

unexpected ways or to the creation of new ideas. The teacher evaluates the knowledge constructed by the individual who answers set questions. As a result of his or her evaluation, the teacher can determine the individual's mistakes or divergence from the expected result.

2.3.1.9 Storytelling

A story is a mechanism for storing and passing along tacit knowledge through narration (James & Minnis, 2004). Swap *et al.* (2001) state that stories carry rich contextual detail, which is ideal for conveying tacit knowledge. According to Swap *et al.* (2001) and James and Minnis (2004), stories can inspire and motivate individuals in an organisation. Storytelling can influence behaviour, pilot change, advance knowledge and guide decision making. It can also provide both concept learning and vicarious learning (Vance, 1991). Concept learning helps learners to understand concepts and vicarious learning allows learners to learn from pre-existing models. Learning from models and not from firsthand experience has advantages, as errors can be costly and irredeemable in certain situations.

Storytelling is a powerful tool that management can use to facilitate knowledge sharing, to steer problem solving and decision making, and to produce commitment to change (James & Minnis, 2004). Storytelling can be used as a communicating tool for informing individuals within an organisation of the unique qualities of the organisation, and for establishing and keeping alive corporate traditions.

James and Minnis (2004) state that stories have the power to transform abstractions, such as ideas, attitudes, judgments, or beliefs, into tangible concepts. Stories can also teach approved behaviours and attitudes that are expected in certain situations. Storytelling can easily be understood and meaning can be subtly conveyed in a manner that might otherwise be

difficult to express. A story is powerful, as it can "communicate complex concepts simply and memorably by defining relationships, sequence of events, cause and effect, and a priority among story elements" (James & Minnis 2004:26). Individuals remember a story rather than factual information, as the vibrancy of a story helps individuals better to understand and remember the themes that are conveyed in the story. Swap *et al.* (2001:103) affirm that stories are more memorable, vivid, engaging, entertaining, and easily related to personal experiences than are rules or directives.

2.3.1.10 Mentoring

A mentoring programme is about developing individuals. Mentoring takes place when an individual acts as a mentor to a small group of employees. The individual acting as a mentor offers advice on education or on how individuals can best develop their knowledge for the job so as to advance their competency and proficiency levels. The focus is on the individual and their personal development. The mentor, though acting as a teacher at times, serves mainly as a guide for the individual (Brooking, 1999:96).

Mentors have a wealth of experience, can recognise patterns in situations and know when rules apply to a particular situation. Drawing upon their knowledge base to teach and guide others to a higher level of expertise, mentors enable individuals to attain technical and managerial skills. A mentor provides his or her protégé with:

- guidance and advice about clients, key partners and the politics in practice.
- knowledge of organisational routines and managerial systems.
- access to privileged information.

- information that familiarises the individual with the non-formal aspects of the organisation.
- knowledge on how to navigate the subtleties of the organisation's political system.
- introductions to influential decision-making networks and contacts.
- knowledge about the values, traditions and culture of the organisation (Swap *et al.*, 2001).

2.3.1.11 Coaching

Coaching is a form of mentorship, in which the coach acts as the teacher or supervisor to an individual or group. Lubit (2001) notes that the coach asks the protégé to relate to a particular situation. The coach then gives the protégé advice relating to how his or her protégé intends to handle the situation, methods by which to correct any inaccurate perceptions or ways of handling the situation and assistance with making better decisions regarding the situation.

2.3.1.12 Briefing and debriefing

Briefing and debriefing occur prior to an assignment. During a briefing or debriefing, knowledge is explored by the group. At the end of the assignment, a session is held to discuss the lessons learnt during the assignment. This knowledge then becomes available to the group as a whole (Brooking, 1999).

2.3.1.13 Workshopping

Workshops take place when individuals meet to share experiences. During these workshops, knowledge disseminates throughout the organisation when individuals share their experiences and the knowledge that they where engaged on particular projects. Information relating to how particular situations were dealt with and how particular problems were solved is discussed (Brooking, 1999).

2.3.1.14 Rotation programmes and redundancy

According to Garvin (1993) and Nonaka (1991), rotation programmes in which employees are trained to perform different types of work serve as a powerful method of retaining expertise within the organisation. They allow individuals to become familiar with various types of work.

Nonaka (1991, 1994) indicates that use of redundancy effectively allows for the sharing of tacit knowledge throughout an organisation. Redundancy is about consciously overlapping company information, business activities and managerial responsibilities amongst individuals.

2.3.1.15 Communities of practice

According to Lubit (2001), a community of practice is a form of informal network, consisting of a group of people who are bound by common interests or common problems and who intend to deepen their knowledge and expertise by interacting with others (Wenger *et al.*, 2002). Communities-of-practice are informal, self-organising networks of people who want to share their expert knowledge with other individuals with related interests

(Hickins, 1999; Allee 1997; Breu & Hemingway, 2002). Communities-of-practice rely on relationship and tacit socialisation, during which situational learning develops and knowledge is readily communicated. Socialising in this way results in knowledge being expressed to other members in the organisation (Allee, 1997). Individuals engage in communities when they desire to share experiences and to solve problems collectively (Breu & Hemingway, 2002).

Leonard and Sensiper (1998) concur with Hickins (1999), Allee (1997) and Breu and Hemingway (2002) that collective learning and informal communication takes place in communities-of-practice. The group that forms the community-of-practice develops implicit ways of working and learning together.

Wenger *et al.* (2002) note that communities-of-practice make knowledge an integral part of their activities and interactions, and that these members serve as a living repository for that knowledge. Communities-of-practice share tacit knowledge by means of "interactions and informal learning processes such as storytelling, conversation, coaching and apprenticeship" (Wenger *et al.*, 2002:9). Rantasa (2004) says that microcommunities can communicate and integrate tacit knowledge amongst themselves and with other areas within the organisation. The tacit knowledge shared within a team is retained through interactions that take place between team members, rather than by way of written documents or manuals.

2.3.1.16 Diversity of backgrounds

Individuals from different backgrounds get together in teams and interact in order to gain knowledge from one another. Coming from different backgrounds means that the contribution of different cultures, organisational experience and disciplinary training is obtained. A diversity of backgrounds

results in a larger subset of ideas being generated, as individuals can view things of which they were previously unaware. Individuals who come from diverse backgrounds tend to frame problems by applying mental schemata and patterns that they understand best. These different mental models foster an environment in which discussions occur over conflicts that arise from the different contributory viewpoints and the different perspectives that are challenged by others. These discussions result in the development of new ideas and products (Leonard & Sensiper, 1998).

2.3.1.17 Additional methods of sharing tacit knowledge

Stover (2004) notes that formal interviews are a useful method of making tacit knowledge explicit and that interaction with other individuals is important if 'knowledge conversation' is to take place. Choo (1998) says that individuals can share tacit knowledge and that teams must work together in a complementary way to create knowledge through collaborative relationships, informal conversations, and formal information transfer. Nonaka *et al.* (2000) state that tacit knowledge is shared, clarified and recreated through interactions with others and Koenig and Srikantaiah (cited in Allard, 2002) state that a positive atmosphere that encourages knowledge sharing is extremely important.

Table 6 summarises the various methods of sharing tacit knowledge held by specific authors to whom we have referred.

Methods for sharing knowledge	Definition	Authors cited
Apprenticeship	A programme in which skills are taught and shared by an expert with a novice	Leonard and Sensiper (1998), Nonaka and Takeuchi (1995), Stenmark (2001), Sveiby (1997)
Direct interactions	Social interactions and discussions amongst individuals	Haldin-Herrgard (2000)
Informal and formal networks	Informal networks are conversations that tend to take place in a pub, bar, smoking area or alongside a coffee machine. Formal networks exist where individuals who share a common interest in a particular field meet to discuss issues relating to the area of interest	Brooking (1999)
Action learning	Face-to-face social interactions combined with practical experience	Haldin-Herrgard (2000)
Observation	Observing others at work	Leonard and Sensiper (1998)
Learning by association	Learning through imitation, often achieved without conscious awareness of doing so	Leonard and Sensiper (1998)
Brainstorming	Detailed discussions aimed at solving difficult problems and at generating new opportunities	Pearce & Robinson (2000)
Concept mapping and knowledge mapping	Concept mapping is a tool that assists and enhances the different ways in which an individual thinks and learns while organising and presenting knowledge. Knowledge mapping results from answering questions, and either leads to concepts being linked together or to new ideas being created	Liao (2005)
Storytelling	The storing and passing on of tacit knowledge by means of narration	James and Minnis (2004), Swap *et al.* (2001), Vance (1991)
Mentoring	Individual guidance of a small group of employees, in which the individual acting as a mentor offers advice on how individuals can best develop their job-related knowledge so as to advance their levels of competency and proficiency	Brooking (1999), Swap *et al.* (2001)
Coaching	In this form of mentorship the coach acts as the teacher or supervisor of an individual or group	Lubit (2001)
Briefing and debriefing	The uncovering of knowledge that is distributed to the group	Brooking (1999)
Workshops	The dissemination of knowledge in an organisation through the sharing of experiences and knowledge by individuals who have participated in particular projects	Brooking (1999)
Rotation programmes and redundancy	Rotation programmes involve the training of employees to perform different types of work. Redundancy involves consciously overlapping company information, business activities and managerial responsibilities amongst individuals in an organisation.	Garvin (1993), Nonaka (1991, 1994)
Communities-of-practice	A community of practice is a form of informal network, consisting of a group of people bound by common interests or common problems, and who share a common intention of deepening their knowledge and expertise by interacting with others. Örtenblad (2004) refers to communities-of-practice as quality circles	Breu and Hemingway (2002), Allee (1997), Hickins (1999), Leonard and Sensiper (1998), Lubit (2001), Rantasa (2004), Wenger *et al.* (2002), Örtenblad (2004)
Diverse backgrounds	Individuals from different backgrounds interact in teams in order to gain knowledge from each other	Leonard and Sensiper (1998)

Table 6: Summary of methods for sharing knowledge

2.3.2 Sharing tacit knowledge in the knowledge conversion cycle

Johannessen *et al.* (undated) note that information technology provides organisations with methods of making explicit knowledge available to everyone in the organisation. Organisations consequently tend to ignore the sharing of more complex tacit knowledge. Nonaka (1991, 1994) and Nonaka and Takeuchi (1995) also emphasise that the "West" considers the easier to share knowledge, namely, explicit knowledge, to be more important than tacit knowledge, which is difficult, if not impossible, to share. Nonaka (1991, 1994), Nonaka and Takeuchi (1995) and Johannessen *et al.* (undated) indicate that tacit knowledge holds value and provides the organisation with a strategic competitive advantage that cannot be provided by explicit knowledge.

In conclusion, knowledge management strategies provide ways in which explicit knowledge can be shared and retained in the form of information and communication technology. However, tacit knowledge cannot easily be captured by means of information technology. Sharing and retaining tacit knowledge provides an organisation with a sustainable competitive advantage. Nonaka (1994) specifies that knowledge is transformed as it passes between tacit and explicit modes. Nonaka (1991) postulates that, as knowledge is socialised, it passes through four different modes of knowledge conversion and that organisational knowledge is created through cycles of socialisation, externalisation, combination and internalisation. Nonaka (1994) and Nonaka and Takeuchi (1995) imply that tacit and explicit knowledge is created and shared amongst individuals and groups by means of the four modes of knowledge conversion.

The current research focuses on tacit knowledge that is shared and retained within an organisation. Therefore, the research focuses on the methods that exist for sharing tacit knowledge throughout the four cycles. These methods

are determined by observing the existing theoretical foundations of the tacit-to-explicit mode of knowledge conversion. In other words, tacit-to-tacit knowledge is transformed by converting tacit knowledge to explicit knowledge, and by then converting the explicit knowledge back to tacit knowledge, so that the tacit knowledge is shared and contained within the organisation.

2.3.2.1 Sharing tacit knowledge during the socialisation phase

Stover (2004), Roberts (2000) and Liao (2005) claim that tacit knowledge is developed interactively. They all note that sharing of tacit-to-tacit knowledge takes place most effectively through face-to-face interactions. Hartley and Allison (2002) state that the sharing of tacit knowledge from an individual or a group with other individuals or groups takes place by means of a process of sharing experiences (social interactions), such as shared mental models and technical skills. The process of observing or imitating individuals in the form of apprenticeship and mentoring, as described by Hartley and Allison (2002), Stover (2004), Nonaka and Takeuchi (1995) and Liao (2005), are examples of sharing technical skills during the socialisation phase. Roberts (2000) notes that tacit knowledge takes considerable time to acquire and is gained by means of participation in apprenticeships, a period of learning by doing, demonstrations or face-to-face interactions. Videoconferencing and virtual project rooms can aid the sharing of tacit knowledge.

Nonaka (1994) notes that during the socialisation phase tacit knowledge is acquired through apprenticeship, mentorship, on-the-job training, and learning through observation, imitation and practice. Nonaka (1999) says that individuals share experiences, feelings, emotions, and mental models during face-to-face interactions. Nonaka and Takeuchi (1995) comment that ‘brainstorming camps’, consisting of a series of informal discussion meetings are used by some organisations to solve difficult problems. This type of

forum allows for creative dialogue to occur, for the sharing of experiences and for the enhancement of mutual trust among all the individuals involved in the brainstorming activity.

According to Leonard and Sensiper (1998), a brainstorming session is an effective way for a group of individuals to gain insight and intuitions from each other. These sessions consist of face-to-face sessions, in which ideas are recorded and participants share their ideas through sketching designs or through visual analogies. Sharing experiences and mental models form part of the socialisation phase. Individuals from diverse backgrounds interact with one another and communicate by way of discussions, resulting in framing the issues to which they apply mental schemata and patterns that they understand best. Observations, learning by association and apprenticeship are other methods used to share tacit knowledge amongst individuals.

Lubit (2001) suggests that coaching and observing experts at work are effective methods of sharing tacit knowledge. Haldin-Herrgard (2000:359) suggests that apprenticeship, direct interaction, networking and action learning, including face-to-face social interaction and practical experiences, are suitable means of sharing tacit-to-tacit knowledge. Rantasa (2004:26) suggests that the sharing of tacit knowledge in an organisation is possible through “apprenticeships, direct interaction, networking, face-to-face social interactions and practical experience”.

James and Minnis (2004) describe how Xerox technicians learned to repair complicated photocopier problems by exchanging stories when they took coffee breaks. They shared this information effectively through engaging in socialising activities, during which they communicated individual experiences. Swap *et al.* (2001:98) note that socialisation of knowledge occurs through the sharing of experiences and through informal forms of teaching, such as mentoring and storytelling. Managers need to encourage

informal learning, as individuals learn “while eating in the cafeteria, chatting in the halls, observing their colleagues’ and supervisors’ behaviour”.

Nonaka (1999) notes that care, love, trust and commitment need to emerge during the socialisation phase.

2.3.2.2 Sharing tacit knowledge during the externalisation phase

Nonaka (1991) and Nonaka and Takeuchi (1995) note that articulating tacit knowledge as explicit concepts occurs in the form of metaphors, analogies, concepts, hypotheses and models. In the article, Stover (2004:168) notes that “the sharing of tacit to explicit knowledge takes place through e-mails, internal workshops, professional conferences, seminars, printed and web-based guides, publications of books and journal articles, and informal conversations”. The conversion of tacit knowledge into explicit concepts and ideas cannot be achieved by using formal language, as certain knowledge cannot be precisely captured.

The conversion of tacit knowledge during this phase is enhanced through dialogue and reflection (Hartley & Allison, 2002). Tacit knowledge is shared by way of metaphors, analogies, storytelling, the telling of anecdotes, and contrasting the situation and context to some form to which others can relate (Hartley & Allison, 2002; Choo, cited in Stenmark, 2001).

Liao (2005) states that knowledge mapping is a viable teaching method for converting tacit knowledge to explicit knowledge within an organisation. Knowledge mapping has proved to be successful in improving the learning results of learners. Both knowledge and concept mapping have promoted peer discussions, as the exchange of ideas and opinions during the learning process fosters understanding, encourages the generation of new ideas, and increases the desire to learn.

Swap *et al.* (2001) find that use of multimedia tends to enhance storytelling, as seeing and hearing the storyteller adds weight and detail to the story. James and Minnis (2004) note that IBM videotaped people who were involved in complex tasks that took years to complete. The videotapes, which included stories of these people's experience, conveyed valuable information regarding best practices in narrative form. The information concerned was stored in the form of videotapes and could be shared in this way with other individuals within the organisation.

Sohn (2003) notes that, when a large number of Boeing Rocketdyne's workforce was about to retire, resulting in substantial loss of tacit knowledge, the firm used video-capturing and mentoring programmes to convert the tacit knowledge into explicit knowledge. The highly skilled employees who were due to leave the firm were interviewed on video, thus capturing the tacit knowledge held by the employees concerned. This process enabled their tacit knowledge to be shared with all the employees of the organisation. Boeing Rocketdyne continues to maintain one-on-one and group mentoring programmes as a mechanism for sharing individually possessed tacit knowledge.

2.3.2.3 Sharing tacit knowledge during the combination phase

Stover (2004:170) notes that knowledge is converted from explicit-to-explicit by firstly acquiring the newly discovered knowledge, then refining the knowledge from all the gathered information and finally adapting the refined knowledge, so that this knowledge can be shared by means of a technological delivery platform. Knowledge is acquired by way of e-mails, public announcements, private conversations, personal observations and published material. The knowledge is refined by determining what is valuable and by extracting the most important content, which is based on

personal experience, conversations with colleagues, recommendations by peers and literature reviews. The adaptation of the refined knowledge to the technological system requires appropriate cross-referencing of information and accurate search engine use.

Hartley and Allison (2002) affirm that the combination phase requires the systemisation of concepts into knowledge management systems, involving the reconfiguration of existing information, information analysis, and the combining and recategorising of information. Hartley and Allison (2002) and Stover (2004) note that databases and expert systems are examples of combining explicit knowledge.

Roberts (2000) finds that codified knowledge is shared by way of blueprints or patents. Nonaka (1994) and Nonaka (1999:84) note that explicit knowledge is shared by way of meetings, telephonic conversations and use of existing information systems, such as on-line networks, groupware, documentation, and databanks.

2.3.2.4 Sharing tacit knowledge during the internalisation phase

Explicit knowledge is internalised back into tacit knowledge by communicating and marketing the accessibility of the system and knowledge to everyone through regular e-mails, announcements, meetings and training sessions (Stover, 2004). Hartley and Allison (2002) and Nonaka (1994) note that internalising the explicit knowledge as tacit knowledge can be achieved through practice and when individuals actually do the required work. Nonaka and Takeuchi (1995:69) say that “knowledge needs to be verbalized or diagrammed into documents, manuals, or oral stories and … documentation, reading, listening to others helps internalise individual’s experience”, and Nonaka and Konno (1998) note that learning by doing, training and exercise aid the internalisation of tacit knowledge. Nonaka (1999) adds that written

manuals or simulation programmes are additional methods that can be used for internalising knowledge.

Swap *et al.* (2001) argue that individuals learn by doing during the internalisation phase. Similarly to the way in which the socialisation phase operates, knowledge is developed through informal teaching, such as mentoring and storytelling.

Bender and Fish (2000) find that information in the form of data is transferred by means of various types of information technology, such as e-mail, groupware, the Internet, intranet and videoconferencing. Bender and Fish (2000) state that employees can teach or train others by passing on their knowledge in lectures, meetings, presentations, and on-the-job-training, by demonstrating how to do things and by providing advice on how to approach certain tasks.

Table 7 summarises the various methods of sharing tacit knowledge that occur in the knowledge conversion cycle according to the authors who have described these methods.

Knowledge Conversion Framework	Methods utilised	Authors cited
Socialisation	Apprenticeship / On-the-job training	Haldin-Herrgard (2000), Hartley and Allison (2002), Leonard and Sensiper (1998), Liao (2005), Nonaka (1994), Nonaka and Takeuchi (1995), Rantasa (2004), Roberts (2000), Stenmark (2001), Stover (2004)
	Action learning • Face-to-face interactions • Practical Experience • Practice	Haldin-Herrgard (2000), Rantasa (2004), Liao (2005), Roberts (2000), Stover (2004), Nonaka (1994)
	Brainstorming	Nonaka (1994), Nonaka and Takeuchi (1995), Leonard & Sensiper (1998)
	Coaching	Lubit (2001)
	Demonstration	Roberts (2000)
	Direct interaction	Haldin-Herrgard (2000), Rantasa (2004)
	Imitation / Learning by doing	Hartley and Allison (2002), Nonaka (1994), Roberts (2000)
	Learning informally by • chatting • eating together • observing	Swap *et al.* (2001)
	Learning by association	Leonard and Sensiper (1998)
	Mental models (mental schemata and patterns)	Leonard and Sensiper (1998)
	Mentoring	Hartley and Allison (2002), Nonaka (1994), Nonaka and Takeuchi (1995), Stover (2004), Swap *et al.* (2001)
	Networking	Haldin-Herrgard (2000), Rantasa (2004)
	Observing	Hartley and Allison (2002), Leonard and Sensiper (1998), Lubit (2001), Nonaka (1994), Nonaka and Takeuchi (1995), Stover (2004), James and Minnis (2004), Swap *et al.* (2001)
	Storytelling	James and Minnis (2004), Swap *et al.* (2001)
	Videoconferencing and using virtual project rooms	Roberts (2000)
Externalisation	Analogies	Hartley and Allison (2002), Nonaka (1991), Nonaka and Takeuchi (1995), Stenmark (2001)
	Books	Stover (2004)
	Brainstorming	Nonaka (1994)
	Concept mapping	Liao (2005)
	Contrasting situations and contexts	Hartley and Allison (2002), Stenmark (2001)
	Dialogue	Hartley and Allison (2002), Stenmark (2001)
	E-mail	Stover (2004)
	Informal conversation	Stover (2004)
	Internal workshops	Stover (2004)
	Journal articles	Stover (2004)
	Knowledge mapping	Liao (2005)
	Mental models (mental schemata and patterns)	Leonard and Sensiper (1998)
	Mentoring	Sohn (2003)
	Metaphors	Hartley and Allison (2002), Nonaka (1991), Nonaka and Takeuchi (1995), Stenmark (2001)
	Models and concepts	Nonaka (1991, 1994), Nonaka and Takeuchi (1995)
	Multimedia	Swap *et al.* (2001)
	Professional conferences	Stover (2004), Örtenblad (2004)
	Printed web-based guides	Stover (2004)
	Seminars	Stover (2004)

Knowledge Conversion Framework	Methods utilised	Authors cited
	Storytelling	Hartley and Allison (2002), Stenmark (2001)
	Telling anecdotes	Hartley and Allison (2002), Stenmark (2001)
	Videotaped narratives	James and Minnis (2004), Sohn (2003)
Combination	Blueprints	Roberts (2000)
	Databases	Hartley and Allison (2002), Stover (2004)
	Expert systems	Hartley and Allison (2002), Stover (2004)
	Information systems • E-mail • Groupware • Documentation • Databanks	Nonaka (1994, 1999)
	Knowledge management systems	Hartley and Allison (2002)
	Patents	Roberts (2000)
Internalisation	Announcements	Stover (2004)
	Demonstrations	Bender and Fish (2000)
	E-mail	Stover (2004)
	Learning by doing	Nonaka & Konno (1998), Swap *et al.* (2001)
	Lectures	Bender and Fish (2000)
	Meetings	Bender and Fish (2000), Stover (2004)
	Mentoring	Swap *et al.* (2001)
	Multimedia	Swap *et al.* (2001)
	Presentation	Bender and Fish (2000)
	Practice and doing / On-the-job-training	Hartley and Allison (2002), Nonaka (1994), Bender and Fish (2000)
	Simulation programs	Nonaka (1999)
	Storytelling	Nonaka and Takeuchi (1995), Swap *et al.* (2001)
	Training sessions	Nonaka and Konno (1998), Stover (2004)
	Verbalising or using diagrams of information • Documentation • Manuals • Reading Listening to others	Nonaka and Takeuchi (1995)
	Written manuals	Nonaka (1999)

Table 7: Summary of methods for sharing tacit knowledge in the knowledge conversion cycle

2.3.3 Dilemmas regarding the sharing of tacit knowledge

Davenport and Prusak (1998) say that the sharing of tacit knowledge is an interactive and social activity. The different cultures in the organisation, the lack of trust, the belief that knowledge provides power and the offering of financial rewards to individuals who possess knowledge can hinder the flow of knowledge in an organisation.

Rantasa (2004) states that “tacit knowledge is inherently elusive, and in order to capture, store, and disseminate it, it is argued that it first has to be made explicit.” This process is difficult and fails for the reasons illustrated in this section. von Krogh (1998:136) also cites the following factors that can effect the sharing of tacit knowledge between individuals:

- untrustworthy behaviour
- constant competition
- imbalances in giving and receiving information
- not cooperating and helping others, such as adopting a “that’s not my job” attitude

2.3.3.1 Difficulties in communicating and measuring tacit knowledge

Tacit knowledge often exists in the individual mind and forms part of intuitive personal experience. Tacit knowledge is hard to observe and measure. Stover (2004) notes that tacit knowledge present in the individual mind is often hard to formalise and communicate to other people. Haldin-Herrgard (2000) notes that individuals may find it difficult to document or express tacit knowledge that they possess and that seems obvious or natural to them.

Cabrera and Cabrera (2002) find that individuals do not share their knowledge and experience at times due to the fact that they might not recognise the benefits of sharing their knowledge and experience with their co-workers.

2.3.3.2 Awareness of tacit knowledge

Haldin-Herrgard (2000) notes that individuals find it difficult to document or express tacit knowledge they possess, as it is held in a non-verbal form and seems obvious or natural to them. Stenmark (2001), Haldin-Herrgard (2000)

and Rantasa (2004) note that individuals are not conscious of the knowledge they possess, as their tacit knowledge forms part of their behaviour or way of thinking.

2.3.3.3 Personal issues relating to tacit knowledge

Stenmark (2001) and Rantasa (2004) note that individuals may not want to share their tacit knowledge with others, as they fear that they will then lose their valuable competitive advantage. According to Stover (2004), individuals may think that their knowledge is not worth noting, or they may think that their knowledge could endanger their position, as they might know too much or too little. Experts may not be willing to share their knowledge with others and language barriers may exist that hinder the communication and sharing of knowledge with others in an organisation (Stover, 2004).

Cabrera and Cabrera (2002) state that some employees are only willing to share their experience and knowledge with others in return for a reward or personal benefit. Employees also tend to be reluctant to share their knowledge with others when they perceive that the organisation's top management will not allow them to apply new ideas to the work that they do.

2.3.3.4 Time issues relating to tacit knowledge

Individuals are reluctant to share their experiences and tacit knowledge with others when they are either too busy performing a job or when they do not have enough time to share their experiences due to their everyday duties (Cabrera & Cabrera, 2002).

An individual may develop a better method of doing work, and this method could be valuable, beneficial and reduce costs when applied more generally

throughout the organisation. However, the individual concerned may not invest the time to share his or her ideas or experiences with others, as the time spent to share the tacit knowledge with others could be better invested by that individual on more personally rewarding activities (Cabrera & Cabrera, 2002).

Rantasa (2004) and Haldin-Herrgard (2000) say that expertise takes a long time to learn and that individuals may be reluctant to invest the time that it takes to share their tacit knowledge. Leonard and Sensiper (1998) note that individuals need time and dedication to share their tacit knowledge. Individuals do not tend to share tacit knowledge when organisations do not reward or give individuals recognition for knowledge sharing.

2.3.3.5 Political and cultural issues relating to tacit knowledge

Knowledge represents power and opportunities for individuals who possess it when the sharing of knowledge does not form part of the organisational culture. Stover (2004) explains that it is for this reason that some individuals are reluctant to share their knowledge with everyone and why only their closest associates will have access to their knowledge. In the case of separate departments within an organisation working as separate entities, each department will tend to store and share its own knowledge. In this way, knowledge is segmented within departments and repetition or ignorance of some knowledge occurs in the organisation. Individuals may also keep knowledge to themselves and act in ways that serve their own interests or the interests of their department, rather than those of the organisation as a whole.

Cabrera and Cabrera (2002) state that individuals tend not to reveal any information in an organisation with a competitive work environment, as the individually held knowledge or experience provides those concerned with a

competitive edge over other individuals who lack the same knowledge or experience. Sharing knowledge or experience might, in such an environment, result in the individual concerned losing his or her unique expertise. Accordingly, individuals will then tend to hoard, rather than to share, their tacit knowledge. Roberts (2000) notes that issues of control and power influence whether or not tacit knowledge is shared with others.

Organisations are not conducive to knowledge sharing when their culture does not promote failures or making mistakes as forms of experience for employees. Such organisations discourage individuals from expressing their ideas or making suggestions, in case they fail or appear foolish to others. Such organisations hinder creative thinking (Leonard & Sensiper, 1998).

Stover (2004) finds that organisations that are informal and competitive in the way in which they share knowledge across departments fail to encourage the partial or complete sharing of tacit knowledge in the organisation.

2.3.3.6 Tacit knowledge as personal power

Leonard and Sensiper (1998) find that individuals will tend to hoard their tacit knowledge when the organisation rewards expertise of people, and does not reward individuals assisting or mentoring others. In such organisations, knowledge is regarded as an important source of power that an individual possesses. Rantasa (2004) states that knowledge provides a basis of power and respect, and individuals are hesitant to share knowledge in case doing so reduces their power.

2.3.3.7 Distance, status and trust issues relating to tacit knowledge

Distance between individuals in an organisation problematises the sharing of tacit knowledge, as trust is difficult to develop in the absence of ongoing face-to-face interaction (Rantasa, 2004; Leonard & Sensiper, 1998). Leonard and Sensiper (1998) say that trust is necessary for open communication to occur and for relationships to develop. Organisations marked by distrust between individuals do not share tacit knowledge freely (Leonard & Sensiper, 1998). Roberts (2000) notes that when trust involving mutually held beliefs and relationships is broken, individuals are less likely to share tacit knowledge.

The sharing of tacit knowledge in status-riddled organisations is unlikely, as the individuals concerned will try to seek their own glory by hoarding their knowledge (Leonard & Sensiper, 1998).

2.3.4 Requirements for sharing tacit knowledge

Cabrera and Cabrera (2002) note that in order for an organisation to maintain its competitive advantage and to grow as an organisation, it needs to share its experiences and knowledge with all the employees in the organisation. An organisation needs a culture that values creativity, continuous improvement and the sharing of ideas. The employees should feel motivated to explore new opportunities, work procedures, products and ideas. Organisational structures and systems should be flexible enough to allow employees the autonomy to apply new ideas to their work and to try out new ways of working. An organisation also needs mechanisms that facilitate the sharing of new ideas between individuals.

Cabrera and Cabrera (2002) note several ways in which an organisation can promote the sharing of tacit knowledge within the organisation. An

organisation needs to find a way in which to make it easier for individuals to share their knowledge within the organisation. An organisation also needs to make sure that the sharing of knowledge or experiences is valued, especially in relation to other activities, and that the appropriate recognition, in the form of fitting incentives and rewards, is awarded to those who share their tacit knowledge. Rewards do not have to be monetary. Social recognition is powerful, as long as the incentives are public, exceptional, credible, and culturally meaningful. An organisation needs to instil a culture in terms of which employees are assured that time is allotted to sharing activities, which will be duly rewarded. It also needs to make employees aware that the knowledge-sharing process is promoted as representing what the organisation stands for. Publicly identifying those who have contributed to shared learning in monthly newsletters can serve to inform other members of the organisation about who has made valuable contributions to the organisation.

Cabrera and Cabrera (2002) also note that an organisation needs to redefine the concept of performance, so that individuals willingly offer up knowledge that, in the past, gave them the competitive advantage over their fellow employees. Accordingly, what constitutes performance should include an individual's overall effect on the organisation's results, as well as his or her contribution to the organisation's performance. An organisation also needs to provide an employee with feedback regarding how other employees see his or her contribution.

Groups within an organisation have been shown to be more willing to share knowledge when groups share a common identity. A feeling of group identity leads to individuals perceiving that they are part of a larger whole and that they share a common identity with other members in the group (Cabrera & Cabrera, 2002). Communication, in the form of group discussions, increases an individual's feeling of belongingness, identity and commitment to the

group as a whole. Communities, such as communities-of-practice, may enhance feelings of group identity and belongingness.

Constructive and helpful relations encourage open communications between individuals and help to eliminate distrust, fear and dissatisfaction amongst individuals (von Krogh, 1998). Good relations instil confidence in members, who then feel free to try out alternate ways of working. von Krogh (1998) proposes that a perception of care enhances and speeds up the sharing of tacit knowledge. Care, according to von Krogh (1998), consists of five dimensions of behaviour: mutual trust; active empathy; access to help; lenience in judgement; and courage.

The sharing of tacit knowledge requires:

- the building of a trusting relationship. Feelings of trust allow individuals to communicate openly and to help one another. Consistent behaviour needs to be established in order to enhance trust.
- the possession of empathy. Individuals need to make a concerted effort to understand the personal circumstances, interests and skill levels of others. Individuals need to try proactively to understand one another.
- the provision of help with assisting and teaching the novice how to perform work-related activities. Such help needs to be readily available when individuals request it.
- the accommodation of individual failings. An organisation should behave leniently towards individuals who make mistakes or errors when they try to work differently to how they have worked in the past. Mistakes, to a certain degree, need to be considered as a path for personal growth.
- allowing individuals to experiment and take on new challenges (von Krogh, 1998).

Organisations need to ensure that their employees care enough about their workplace to want to share their tacit knowledge voluntarily. Caring employees who possess more knowledge than do their colleagues will naturally be inclined to help and teach those with less experience. In such a caring environment, individuals will be encouraged to learn from one another, to optimise their task performance and to find new ways of working that they otherwise would not have been able to achieve on their own. An organisation that achieves a high rate of care amongst its employees and departments will be likely to decrease the organisation's dependency on single individuals (von Krogh, 1998).

In order to cultivate a caring environment, von Krogh (1998) suggests that management in organisations should:

- have an incentive system that focuses on how individuals help others, focusing on the dimensions that foster care and sound working relationships. Rewards must be consistent and based on the contributions that the individual makes to nurturing a caring organisational environment. Team-based incentives can also reward the overall performance of all team members. Individual participation needs to be taken into account when rewarding team-based incentives. Performance appraisals must be conducted to determine the amount of help provided by the individual, the accessibility to help granted by that individual, individual commitment to the building of trust and the relationship that exists between the individual and other members of the group.
- have a mentoring programme in place. The mentoring programme should allow individuals to grow to their full potential by developing expertise under the guidance of their mentor. The mentor should also be motivated to share his or her tacit knowledge with the protégé concerned.

- instil an environment that values qualities of trust, openness, and courage. The organisational culture should allow knowledge to flow freely to all employees and levels of the organisation.
- provide both off-the-job and on-the-job training.
- have set project debriefings and other forms of learning-oriented discussions. Doing so requires that individuals involved in a project share their prior experiences, so that people benefit from others' experiences. At the start of the project, goals should be effectively communicated and at the end of the project the individuals in the team should be able to share their experiences and outcomes.
- hold social events for stimulating sound relationships and trust between employees. Social events can either be informal or formal.

Leonard and Sensiper (1998) agree with von Krogh (1998) and Cabrera and Cabrera (2002) that managers need to set up systems that encourage, enable and reward individuals or teams that share their tacit knowledge. Leonard and Sensiper (1998) note that time needs to be devoted to maintaining personal contacts, and that mentoring, coaching and assisting others is required, and must be rewarded, by an organisation. Organisations can facilitate the sharing of experiences by setting up communities-of-practice and apprenticeship programmes and encouraging trips to customer sites.

Leonard and Sensiper (1998:121) say that "the more that tacit knowledge about operations is diffused and shared, the harder is the imitation", which, in turn, gives an organisation the competitive advantage. They also state that "even if some individuals leave the organisation, a shared 'net of expectations' created through organisational routines and accepted standards remain" where such diffusion and sharing of tacit knowledge takes place (Leonard & Sensiper, 1998:122).

2.3.5 Methods of retaining tacit knowledge

Organisations need to find mechanisms for retaining and utilising tacit knowledge. Tacit knowledge found in an organisation is unique and harder to copy than explicit knowledge. Tacit knowledge present in an organisation is what differentiates the organisation from other organisations of the sort, and provides the organisation with a sustainable competitive advantage. Tacit knowledge, otherwise known as know-how, is cognitive knowledge. This type of knowledge needs to be captured and stored by the organisation that possesses it. Organisations need to utilise the tacit knowledge in order to increase their agility and adaptability to change.

"Access to organisational knowledge has become more critical to achieving and sustaining competitive advantage than the knowledge that individual members possess. Professionals can no longer know everything they need to do their jobs well. They have to be able to get to critical information – fast – whenever and wherever they need it. In the future, organisations that are able to provide their members with rapid access to the full repository of organisational knowledge are the organisations that are most likely to succeed" (Hiebeler, cited in Tobin, 1998).

Kim (1993) suggests that an organisation's knowledge is found in shared mental models (the input of entire individual minds that construct procedures, routines and frameworks for the operation of the organisation) and physical records (the static memory of the organisation). Organisational memory, as noted by Kim (1993), is everything that is contained and retrievable within an organisation. Shared mental models need to be continuously updated, as they stay with the organisation when individuals leave. The organisation's value is the shared mental model and not its static memory as, when people leave, the organisation's knowledge of how it operates is held in the shared mental model and not in the individual mind.

According to Kim (1993), operational learning at the procedural level consists of routines and frameworks form the conceptual learning that is applied to existing issues. Kim (1993:45) notes that individual frameworks become embedded in the organisation's framework, which leads to the organisation embodying individual thinking. Individual routines become the organisation's standard operating procedure, its culture, deep-rooted assumptions, artifacts and rules of behaviour.

Örtenblad (2001, 2004) suggests that organisational learning consists of different levels of learning. An organisation needs to store knowledge for use by the individuals in the organisation. Individuals learn and store the knowledge that they have learned in the organisational memory so that the knowledge is available for all the employees in the organisation. The organisational memory consists of routines, standard operating procedures, shared mental models, documents and manuals. Individual knowledge needs to be made organisational, otherwise the knowledge could be lost through personnel turnover. The knowledge possessed by individuals needs to be shared with other employees in order to create new routines and rules or to refine pre-existing ones.

Lubit (2001) and Rantasa (2004) state that the tacit knowledge of an organisation resides in its routines. Lubit (2001) and Liao (2005) refer to organisational routines as a way of retaining tacit knowledge within an organisation. Kim (1993) notes that organisational routines, such as standard operating procedures, form an important part of an organisation's memory and an essential repository of its past learning. Liao (2005) argues that tacit knowledge is retained in organisational routines, processes and practices. Lubit (2001) suggests that routines become standard operating procedures in an organisation, and that roles are developed and enforced in an organisation. Knowledge that individuals develop is embedded in the

routines of organisations. In time individuals leave, but the routines, unless otherwise amended or replaced, remain with the organisation. These routines are retained in the organisation long after the individual who implemented the routine has left the organisation.

von Krogh (1998) and Lubit (2001) share similar views on the role played by knowledge retention in an organisation. von Krogh (1998) notes that individuals contribute collectively to an organisation. Employees share a common understanding of how everything fits together and works in an organisation. Organisational routines and accepted standards are understood and shared by all employees in the organisation. This knowledge is considered to be stored in the organisation, so that, when individuals leave, the knowledge is retained in the organisation.

Leonard and Sensiper (1998:112) state that "expertise is captured and codified in software, hardware, and processes." Roberts (2000) suggests that organisations are repositories of knowledge. Organisations transfer knowledge by means of managerial activities and the established organisational routines of their other employees.

Tuggle and Goldfinger (2004) suggest that tacit knowledge is embedded in organisational processes. Process maps enable the mapping out of organisational processes and the extraction of knowledge. According to Tuggle and Goldfinger (2004), an organisational process involves the following five components:

- the people or objects involved in performing a task
- the resources used and the characteristics required for each task
- the decisions used to describe a particular task
- the relationship between individual tasks
- the links from one task to another task

A process map describes the work that is being done, who is doing the work, when the work is to be done, and what information is flowing to and from each task involved in the process (Tuggle & Goldfinger, 2004).

Tobin (1998) notes that knowledge networks provide employees in an organisation with a mechanism for organising, storing and accessing the organisation's knowledge. Tacit knowledge and skills can be stored by knowledge networks, which offer pointers and access to learning resources that databases are unable to represent.

A knowledge network, according to Tobin (1998), consists of four main components. The first component should be a *repository of the organisation's knowledge*. The repository should include information that employees need to do their jobs, and information that should help them accomplish their learning and their business goals more efficiently.

The second component is a *directory of knowledge, skills, and experiences*. Knowledge, skills and experience are tacit and cannot be captured in a repository. Instead of relying on a knowledge repository, individuals depend on a directory of knowledge, skills and experience that is held by individuals and groups within the organisation. This directory tracks specific job-related competencies of individuals. The directory stores best practices from the various departments in the organisation, as well as global best practices originating in both internal and external sources. The aim of a directory of knowledge, skills and experience is to keep track of the organisation's human assets and to provide pertinent details, such as the educational level, experience and competency level of each new employee.

The directory of knowledge provides the organisation with a method for determining what human resource skills the organisation has and for deciding who can be assigned to a project, as well as for establishing any

skills gap that exists in the organisation. The directory of knowledge provides the employee with ways in which to up-skill in a certain area and with ways of developing skills that the organisation requires. The directory of knowledge also provides the organisation with details of information that might otherwise have lain dormant or that were unknown to others. The directory provides details of individual employee's capabilities, as well as the capabilities of the organisation as a whole. The directory of knowledge provides the organisation with a mechanism for expanding the organisation's knowledge and with a solution set the organisation can use to provide solutions to customers. The directory of knowledge also enables employees to create "communities of interest" (Tobin, 1998:105). Such communities of interest consist of individuals who are scattered throughout the organisation, yet who share a common interest. These individuals work on different projects or in different departments and communicate informally to expand both individual and organisational knowledge.

The third component consists of the *directory of learning resources*. The directory of learning resources consists of a learning resource database and a library of learning materials that provides sources and methods for learning needs. A learning resource database consists of the organisation's training catalogue and schedule of formal training programs, self-paced learning materials, listings of external learning opportunities, and a complete listing of the organisation's library, as well as of links to other libraries. The fourth component consists of *learning and management tools* that enable employees to communicate with one another, and a forum for asking questions and receiving answers. Employees can communicate with one another by way of group-specific and open discussion forums. Employees can post problems on electronic bulletin boards, which can be answered by other employees.

Allee (1997) describes a group or network of individuals who share common interests as forming a knowledge network that consists of professionals who share their experiences and technical knowledge with one another.

Organisations use knowledge maps to guide individuals to knowledge resources inside the organisation (Allee, 1997). Knowledge maps show where the tacit knowledge is located in the organisation and which individual has that knowledge. A 'lessons learned' database and a best practice resource guide that provides information on groups, networks, documents, conferences and forums in the organisation are two examples of how organisational knowledge can be mapped.

Davenport and Prusak (1998) note that knowledge maps are guides that help to locate important organisational information by pointing those needing information in the direction of the right people and documents. Davenport and Prusak (1998) and Choo (1998) suggest that a browseable application that uses controlled vocabulary, a structure that can cross-reference efficiently and a powerful search engine that can search keywords in the database repository are essential for referencing knowledge in an organisation.

3 CONCLUSION

3.1 Summary

The current research highlights what style of learning an organisation can adopt to be most effective in the industry in which they operate and suggests various methods that organisations can use for sharing and retaining knowledge within the knowledge conversion cycle.

The research shows that knowledge has two dimensions: explicit and tacit. Explicit knowledge can be easily expressed and communicated between individuals in systematic ways. Tacit knowledge, on the other hand, consists of individual experiences, personal skills, subjective insights, hunches, gut feelings and intuition, all of which are difficult to communicate. Bender and Fish (2000) have noted that there are many ways of efficiently and effectively sharing and retaining explicit knowledge by means of information technology systems or knowledge management systems. However, the tacit knowledge that is present in the mental make-up of individuals is not as easily shared as is explicit knowledge. Hence, we need to determine how organisations can find ways of sharing and retaining valuable tacit knowledge.

The current research describes tacit knowledge as a valuable strategic resource possessed by different organisations. The research shows various ways in which an organisation can explicate and amplify the knowledge of all in the organisation. Knowledge lies initially with the individual and needs to become part of the organisational memory for two reasons. Firstly, knowledge needs to remain with the organisation when employees leave the organisation and, secondly, knowledge needs to be accessible for each and every person in the organisation.

The research shows how Nonaka's SECI knowledge conversion model describes the conversion of knowledge from tacit to explicit and from explicit to tacit, so that the knowledge base of an organisation grows by amplifying and spreading knowledge throughout the organisation. In order to grow the knowledge, tacit knowledge needs to be made visible by sharing it with other individuals (socialisation), who in turn share it with other individuals, groups (externalisation) and the organisation (internalisation). The knowledge conversion framework needs to be applied to organisations that operate in different industries, that experience different levels of volatility in the business environment, and that learn at a different pace and in different ways.

The research proposes that organisations learn in the following three ways. Single-loop learning occurs when an organisation strives continuously to improve the way in which it currently does things; double-loop learning occurs when an organisation continuously questions the ways in which work is done; and deutero-learning occurs when an organisation continuously analyses and develops awareness of how it learns in order to be able to improve work methods. The way in which organisations learn depends on the industry and the volatility of the business environment in which the organisation and industry operate. The organisation learning matrix that is proposed by Lim and Chan (2004) highlights the type of learning that is most appropriate for an organisation when the volatility of the business environment and the intensity of learning are taken into account.

The research indicates that organisations involved in single-loop learning and which operate in an environment of low volatility are engaged in shock learning. An organisation is engaged in maintenance or incremental learning when it operates in a medium volatile business environment that fosters single-loop learning. Transformational and anticipatory learning are methods that an organisation can use for double-loop learning. Developmental and behavioural learning and tool-making are types of deutero-learning methods. The learning method that an organisation chooses depends on where the organisation wants to be and on the rate of change that occurs in its particular business environment. An organisation needs to adopt a learning method that is effective and efficient for it to secure a competitive advantage over its competition. An organisation needs to continually reassess the learning type that it has adopted and to consider moving up and to the right of the organisation learning matrix.

The research highlights the methods that can be used for sharing knowledge in the knowledge conversion cycle. Apprenticeship programmes; on-the-job training; face-to-face interactions; practical experience; practice; brainstorming; coaching; demonstrations; direct interaction; learning by doing; learning by association; the use of mental models; mentoring; formal and informal networking; observation;

storytelling; the use of virtual project rooms; and videoconferencing are all methods that the study identifies as ways in which knowledge can be shared during the socialisation stage of the knowledge conversion framework. Analogies; books; brainstorming; concept mapping; contrasting situations and contexts; dialogue; e-mail; informal conversations; internal workshops; journal articles; knowledge mapping; mental models; mentoring; the use of metaphors, models and concepts; multimedia; professional conferencing; printed web-based guide use; seminars; storytelling; telling anecdotes; and videotapes of stories are all methods that can be used for sharing knowledge during the externalisation stage of the knowledge conversion framework. Blueprints; databases; expert systems; information systems; patent use; and knowledge systems are all methods that can be used for sharing knowledge during the combination stage of the knowledge conversion framework. Announcements; demonstrations; e-mail; learning by doing; lectures; meetings; mentoring; multimedia; presentations; on-the-job training; practice; simulation programmes; storytelling; training sessions; documentation; reading; listening to others; and written manuals are all methods that can be used for sharing knowledge during the internalisation stage of the knowledge conversion framework.

The research notes that managers experience the following difficulties: competition between individuals in the workplace, the untrustworthy behaviour of employees, imbalances in giving and receiving information, and the unwillingness of individuals to help others in cases where personal gain is unlikely or to part with their knowledge. Managers need to overcome these difficulties in order to make sure that individuals within their organisation share their knowledge with their fellow employees.

The research illustrates that mutual trust, empathy, access to help, leniency in judgement and courage are all qualities essential for the maximal sharing of tacit knowledge. Managers need to establish an environment that values trust, openness and courage. They also need to employ incentive systems that focus

on how individuals help one another and to have a rewards system in place that is based on individual and team contributions.

The research recommends a framework that combines different methods for sharing and retaining knowledge within the knowledge conversion cycle and the style of learning that an organisation can adopt to be effective in that particular business environment.

3.2 Recommendations

A revised framework for sharing and retaining tacit knowledge, based on the literature and models that have been summarised in this report, is suggested in Figure 7 below.

The underlying framework is based on the organisational learning matrix mooted by Lim and Chan (2004) and on Nonaka and Takeuchi's (1995) SECI model for knowledge conversion. The revised framework illustrated in Figure 7 combines the methods for sharing and retaining knowledge within the knowledge conversion cycle.

The framework for sharing and retaining tacit knowledge within organisations consists of three dimensions. The two dimensions of intensity of learning and volatility of the business environment are derived from the organisational learning matrix for identifying the learning style that an organisation needs to adopt. The third dimension of the framework, referred to as the knowledge conversion type, is derived from the knowledge conversion framework. The first dimension of the intensity of learning consists of single-loop learning, double-loop learning and deutero-learning. The second dimension of the volatility of business environment consists of low, medium and high volatility. The third dimension of the knowledge conversion type consists of converting tacit knowledge to tacit knowledge (socialisation); converting tacit knowledge to explicit knowledge (externalisation);

converting explicit knowledge to explicit knowledge (combination); and converting explicit knowledge to tacit knowledge (internalisation).

The framework expands on the organisational learning matrix by illustrating different methods for sharing and retaining knowledge that can occur in each of the four phases in the knowledge conversion framework. This accommodates the learning style that is most appropriate for an organisation that experiences the specified volatility of its particular business environment.

The framework is described in terms of the methods for sharing and retaining tacit knowledge within the organisation, which are shown in Table 8 below. Table 8 illustrates the methods that an organisation can use, taking into account the three dimensions: the intensity of learning; the volatility of the business environment; and the knowledge conversion type. The methods that are chosen depend on the industry in which the organisation operates and on where the organisation aims to operate in future.

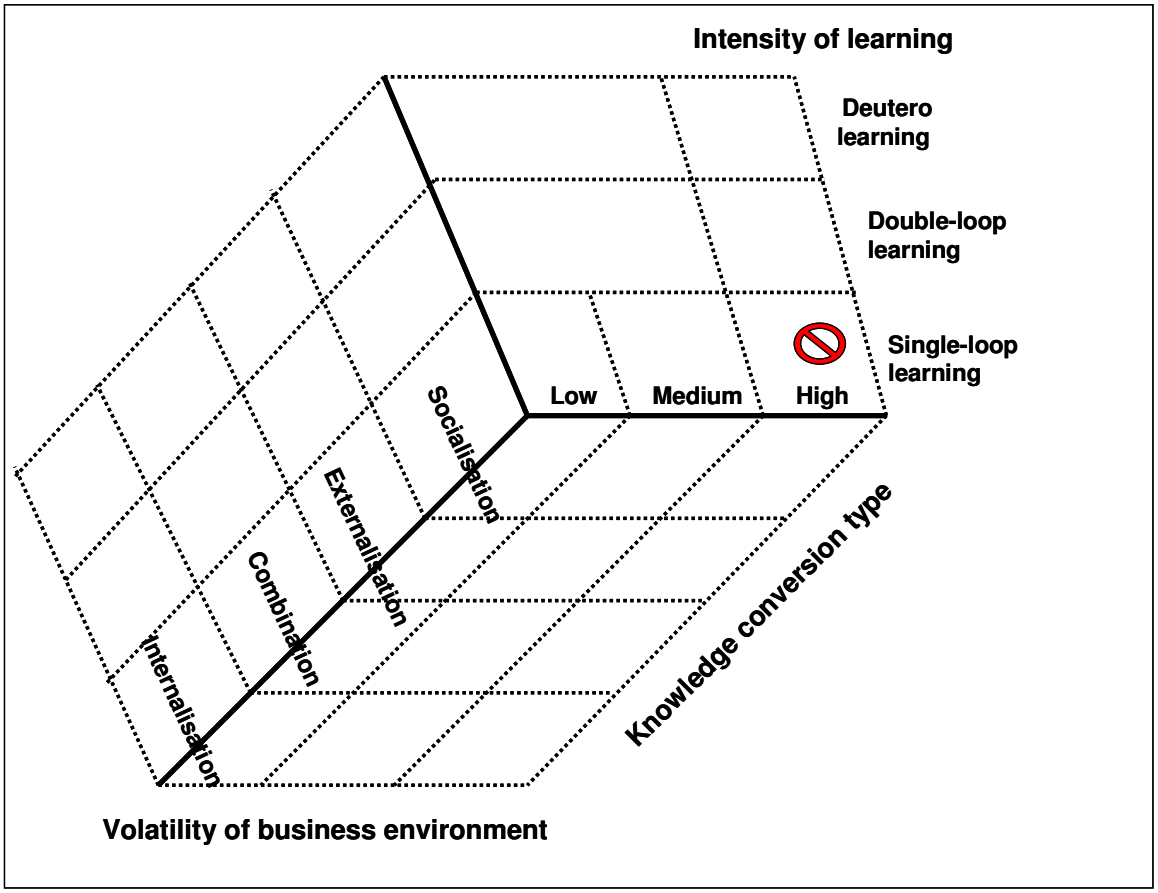

Figure 7: The framework for sharing and retaining tacit knowledge

An organisation is continually undergoing changes and the methods that it decides to adopt to secure learning need to constantly be monitored and reviewed. The business environment changes; the industry transforms; individual needs change; and newer or more efficient methods are developed for sharing and retaining tacit knowledge. Due to the reasons noted above, an organisation needs constantly to modify and adapt its current learning style. Hence, an organisation over time needs to move up the intensity of learning axis and to the right of the volatility of business environment axis, as shown in Figure 8.

The reason why an organisation needs to adopt a deutero learning style by moving up and to the right is that deutero learning is a proactive process in which perfection is continuously strived for and provides a comparative advantage. Single-loop learning is a reactive learning process that is suitable for routine and

repetitive-type work, and double-loop learning is an active learning process that provides a competitive advantage but not a sustainable competitive advantage that deutero learning can provide.

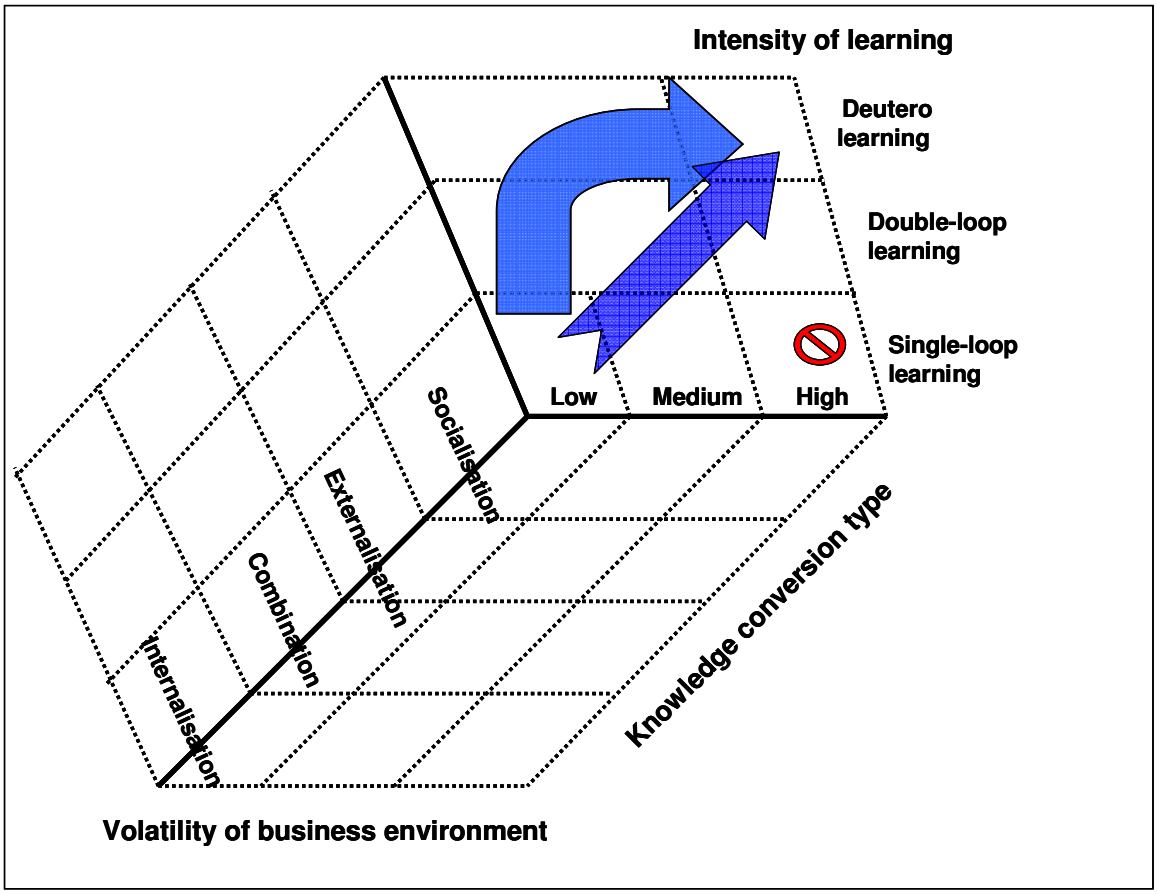

Figure 8: Organisational movement along the framework

The research study is exploratory in nature and the author has thus proposed the following guide as to how this framework could be made operational in an organisation:

1. Management needs to identify the industry in which an organisation operates, in order to be able to determine the type of learning that will be most effective and efficient for the organisation.
2. Management then needs to identify the level of volatility that exists in the immediate business environment.

3. Management should then consider where it wants to be in future, which will determine which learning style it will adopt.
4. Management needs to consider the above three points in order to be able to position the organisation appropriately on the framework for sharing and retaining tacit knowledge (see Figure 7).
5. Management should then identify the methods, reflected in Table 8, that it will utilise for each phase of the knowledge conversion framework. The methods used will depend on the goals that management wants to achieve within the specified time frames.
6. Management is responsible for determining the appropriate method for utilising the four different knowledge conversion phases and for guiding and promoting the use of the various methods by the individuals concerned. Managers need to cultivate an organisational culture that facilitates mentoring and coaching programmes, and that rewards the sharing and retention of tacit knowledge. Management needs to ensure that performance appraisals are regularly undertaken and that these appraisals effectively measure individual input as regards the sharing of tacit knowledge with other individuals and groups within the organisation.
7. Individuals need to have the autonomy and freedom to interact with others, to learn and to share tacit knowledge in the various ways listed for each phase in which they are involved.
8. Team incentives need to be established in order to guide progress through the knowledge conversion cycle.
9. Management needs to receive feedback, to constantly assess and to realign whichever process works best in terms of the framework for sharing and retaining tacit knowledge within the organisation.
10. Management needs to set up systems, structures and processes to retain tacit knowledge within the organisation. Organisational routines and frameworks need to be in place, so that decisions can readily be made from information that is widely available. Standard operating procedures and accepted standards are examples of organisational routines and frameworks within

which employees work. Processes are embedded in organisations and process maps need to be used, so that all concerned are aware of the processes that an organisation follows.

11. Management needs to set up knowledge networks, as described in Section 2.3.5, in order to retain valuable organisational information. The components that need to be captured are:
    - a repository of the organisation's knowledge;
    - a directory of knowledge, skills and experiences;
    - a directory of learning resources; and
    - appropriate learning and management tools.

Learning Type	Socialisation	Externalisation	Combination	Internalisation
Shock learning (single-loop, low volatility)	On-the-job training; action learning; demonstration; imitation; learning by association; observation	Dialogue; e-mail; informal conversation	Information systems (e-mail, documentation)	Announcements; demonstrations; e-mail; written manuals
Maintenance learning or incremental learning (single-loop, medium volatility)	Action learning; brainstorming; demonstrations; direct interactions; informal learning; observation	Analogies; contrasting situations and contexts; dialogue; e-mail; informal conversations; internal workshops	Information systems (e-mail, groupware, documentation), databases	Announcements; demonstrations; e-mail; presentations; learn by doing; written manuals
Single-loop, high volatility	**SET FOR FAILURE**			
Transformational learning (double-loop, low to medium volatility)	Apprenticeships; brainstorming; demonstrations; imitation; learning by doing; networking; videoconferencing; and virtual project rooms	Analogies; books; contrasting situations and contexts; dialogue; e-mail; informal conversations; internal workshops; journal articles; models and concepts; multimedia; professional conferences; printed web-based guides; videotapes	Blueprints; information systems (e-mail, groupware, documentation, databanks); databases; knowledge management systems	Announcements; demonstrations; e-mail; learn by doing; lectures; meetings; multimedia; presentations; on-the-job training; training sessions; written manuals
Anticipatory learning (double-loop, high volatility)	Brainstorming; coaching; mentoring; mental models; networking; storytelling; videoconferencing; and virtual project rooms	Analogies; brainstorming; contrasting situations and contexts; dialogue; e-mail; Informal conversations; concept mapping; journal articles; knowledge mapping; mental models; mentoring; metaphors, models and concepts; multimedia; professional conferences; printed web-based guides; storytelling; videotapes	Blueprints; information systems (e-mail, groupware, documentation, databanks); databases; knowledge management systems	Announcements; demonstrations; e-mail; learn by doing; lectures; meetings; mentoring; multimedia; presentations; storytelling; training sessions; verbalising or using diagrams of information; written manuals
Developmental learning (deutero-learning, low to medium volatility)	Apprenticeships; action learning; brainstorming; coaching; demonstrations; learning by doing; mental models; mentoring; networking; observations; storytelling; videoconferencing; and virtual project rooms	Analogies; books; brainstorming; concept mapping; contrasting situations and contexts; dialogue; e-mail; informal conversations; journal articles; knowledge mapping; mental models; mentoring; metaphors, models and concepts; multimedia; professional conferences; printed web-based guides; seminars; storytelling; telling anecdotes; videotapes	Blueprints; information systems (e-mail, groupware, documentation, databanks); databases; expert systems; knowledge management systems; patents	Announcements; demonstrations; e-mail; learn by doing; lectures; meetings; mentoring; multimedia; presentations; on-the-job training; storytelling; simulation programmes; training sessions; verbalising or using diagrams of information; written manuals
Behavioural learning and tool-making (deutero-learning, high volatility)	Apprenticeships; action learning; brainstorming; coaching; demonstrations; learning by doing; mental models; mentoring; networking; observations; storytelling; videoconferencing; and virtual project rooms	Analogies; books; brainstorming; concept mapping; contrasting situations and contexts; dialogue; e-mail; Informal conversations; journal articles; knowledge mapping; mental models; mentoring; metaphors, models and concepts; multimedia; professional conferences; printed web-based guides; seminars; storytelling; telling anecdotes; and videotapes	Blueprints; information systems (e-mail, groupware, documentation, databanks); databases; expert systems; knowledge management systems; patents	Announcements; demonstrations; e-mail; learn by doing; lectures; meetings; mentoring; multimedia; presentations; on-the-job training; storytelling; simulation programs; training sessions; verbalising or using diagrams of information; written manuals

Table 8: Framework for determining methods for sharing and retaining tacit knowledge within organisations

3.3 Implications for Management of the Sharing and Retaining of Tacit Knowledge

Organisations need to reach a deeper understanding of the methods that can be used for effectively sharing and retaining tacit knowledge. They should ensure that the management team understands the learning style that is required for the organisation to thrive in the industry in which it operates and utilises the most appropriate methods of knowledge conversion for the organisation. Doing so will ultimately result in the organisation maintaining and sustaining its competitive advantage.

The sharing and retaining of tacit knowledge within an organisation will allow management to manage the available resources more effectively by preventing unnecessary repetition of the same work, and by eliminating repeatedly having to solve the same problems. The sharing of tacit knowledge provides managers with a form of contingency plan or secure way of preventing loss of the organisation's intellectual capital when employees leave the organisation, as, in the meantime, other employees will have gained at least some of that valuable knowledge. The sharing of tacit knowledge provides the manager with a larger resource pool, as the person who originally possessed the tacit knowledge does not need to be present for the sharing of that particular information to take place. In this way, the information becomes more readily available for everyone concerned. Accordingly, the competency and efficiency of each individual employee is maximised, allowing them to operate at their full potential.

The research provides management with a framework for determining the type of learning that is required to successfully compete in the industry in which the organisation operates and also provides management with methods for sharing tacit knowledge in the knowledge conversion cycle by means of the most appropriate learning style. In this way, management can:

- capture and retain tacit knowledge that was either previously uncaptured or that was difficult to capture before.
- retain valuable knowledge within the organisation, even when people leave the organisation. Intellectual property of this kind is costly, hard to transfer and time-consuming to replace.
- deliver better and faster results, due to employees sharing their tacit knowledge and making time to help and assist other, less knowledgeable employees.
- skill individuals in a relatively short space of time.
- access a wider variety of people with skills, as more people can do the same work due to the knowledge that is shared and made available to all the employees in the organisation.

Managers need to be aware of issues with which they must cope, including:

- differences in cultures;
- the lack of trust between employees;
- individual effort exerted by employees;
- rewarding of individual expertise; and
- the reluctance of individuals to sharing knowledge that gives them power over others who lack this knowledge.

The research highlights the fact that individuals are sometimes ignorant of the knowledge that they possess and that knowledge that is intuitive to an individual may be difficult to communicate to others. Managers need to find ways in which to share intuitive knowledge through observation or on-the-job training. Sharing of tacit knowledge prevents both the segmentation of knowledge within departments and the needless repetition of work. A manager needs to make individuals aware of the benefits of sharing tacit knowledge and also needs to instil a culture that values the sharing of knowledge within the organisation, as well as making sufficient time for and rewarding such sharing. Making time for sharing tacit knowledge is important, as an individual may be able to develop a better way of

doing work, which could be valuable to the organisation, as well as save on costs when more employees apply the new work method within the organisation.

The research provides managers with insight as to what the organisation can do to promote the sharing and retention of knowledge. Managers need to make sure that appropriate recognition is given to individuals who willingly share their tacit knowledge. A recognition system in the form of incentives, rewards and social recognition needs to be set up. Managers need to establish structures in their organisation that aid the sharing of knowledge amongst individuals. Current performance appraisals need to be modified to include individual contributions to the team, the group and the organisation. Managers also need to ensure that communication is increased so that individuals come to associate themselves with a particular group and community.

Managers need to instil a sense of mutual trust, active empathy, awareness of the availability of help, lenience in judgement and courage throughout the organisation by:

- adopting an incentive system which focuses on how individuals help others.
- providing rewards that are based on the contributions that individuals provide to both the group and the organisation.
- providing team-based incentives that are based on the overall performance of all team members.
- conducting performance appraisals to determine the amount of help provided by individuals, how accessible individuals make themselves available for help, the individual commitment to the building of trust and the relationship between individuals and other members of their group.
- having a mentoring programme in place. The mentoring programme provides growth for the individuals by enabling them to acquire expert guidance from their mentor. Management needs to motivate mentors to share their tacit knowledge with their protégés.

- instilling an environment that values trust, openness, and courage. The organisation requires a culture that allows knowledge to flow freely among all individuals and at all organisational levels.
- providing both off-the-job and on-the-job training.
- holding project debriefings and other forms of learning-oriented conversations. Such debriefings and conversations require that individuals involved in specific projects share their prior experiences so that individual learning is enhanced by accessing the experience of others. At the start of each project, goals should be effectively communicated and at the end of each project the individuals in the team should share their experiences and outcomes.
- holding social events that promote sound relationships and the development of trust among team members.

3.4 Suggestions for Further Research into the Sharing and Retaining of Tacit Knowledge

This exploratory study identified some of the methods that organisations in particular types of industry use to share and retain tacit knowledge within the knowledge conversion framework. Possibilities for further research based on the findings of this study include the following:

- conducting empirical research on the topic
- conducting empirical research into the similarities in, and differences between, how different companies within a targeted industry share and retain tacit knowledge
- conducting empirical research into the similarities in, and differences between, how tacit knowledge is shared and retained within an organisation across various industries listed on the JSE
- testing the implication and consequences of the theme proposed in the previous point within the various industries listed on the JSE

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