

Organizational and behavioral factors that influence knowledge retention

Ellen Caroline Martins and Hester W.J. Meyer



Ellen Caroline Martins is a Director at Organisational Diagnostics cc, Johannesburg, South Africa. Hester W.J. Meyer was an Associate Professor in the Department of Information Science, University of South Africa, Tshwane, South Africa.

Abstract

Purpose – The purpose of this article is to identify and explore the organizational and behavioral factors that influence knowledge retention, specifically in the tacit knowledge sphere.

Design/methodology/approach – A multidisciplinary approach focusing on knowledge management and organizational behavior was followed to develop a theoretical model that identifies the organizational and behavioral factors to be considered when addressing the issues relating to knowledge loss. A quantitative empirical research paradigm using the survey method was adopted to determine the organizational and behavioral factors that impact on knowledge retention. The survey was conducted electronically and on paper in the water supply industry. The exploratory principal component factor analysis technique (PCFA technique) was used to explore the factor structure underlying the variables. The theoretical model was compared with the newly proposed factor model to determine similarities and differences.

Findings – Nine key factors were identified through the factor analysis, of which knowledge behaviors, strategy implementation, leadership and people knowledge loss risks proved to be the most important. In comparing the factor structure of the theoretically derived model and the PCFA-composed factor structure, some factors essentially remained the same with few changes, and a number of new factors emerged.

Research limitations/implications – The literature study reveals that little research has been conducted in the field of knowledge retention with a behavioral focus. However, a vast amount of literature is found on knowledge, knowledge management, knowledge retention with a focus on organizational challenges and solution driven knowledge retention initiatives, and the organizational behavior discipline as such, thus facilitating the application of the relevant concepts to knowledge retention from an organizational and behavioral perspective.

Practical implications – This study encourages practitioners to take cognizance of the fact that organizations are different and that enhancing and impeding organizational factors as well as behavioral factors of knowledge retention are to be considered.

Originality/value – The findings should provide insight into the organizational and behavioral factors that should be considered in implementing a knowledge retention strategy to retain critical tacit knowledge, thus ensuring organizational effectiveness and competitive advantage.

Keywords Knowledge loss, Knowledge retention, Tacit knowledge, Principal component factor analysis, Knowledge behavior, Organizational behaviour, Knowledge management

Paper type Research paper

1. Introduction

Knowledge loss has become a critical factor that could make organizations vulnerable in difficult economic times as well as during thriving economic growth periods when competition is rife. All organizations face the risk of losing knowledge in a world of layoffs, retirements, staff turnover, mergers and acquisitions, which could affect their sustained competitive advantage. In this context it is necessary to understand the consequences of losing knowledge and the significance of retaining knowledge in organizations.

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There has been growing concern in the business and organizational sector that organizational knowledge can be lost through the exit of employees. According to DeLong and Davenport (2003), unprecedented knowledge retention problems are created in many industries through changing workforce demographics such as an aging workforce, more competitive recruiting and faster turnover in younger people. They refer to the problem as “operational and institutional amnesia imperil”. The most significant business and societal trend for the next decades is considered by many to be the rapidly aging workforce (Foster, 2005; Nicholson, 2008), resulting in loss of job-specific and industry-related knowledge through the retirements of a large portion of the current workforce (Juliano, 2004; Gotthart and Haghi, 2009). To this may be added the effects of a world recession leading to downsizing in many organizations and thus knowledge loss. Brown and Galli-Debicella (2009) contend that fewer young workers are entering the skilled trades, and many companies only realize the importance of tacit knowledge in their employees after they have left the company. Since organizations cannot afford to lose expert knowledge, they need to find ways of retaining the knowledge in the minds of people inside the organization before they leave.

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

The literature review revealed that little research has been conducted in the area of organizational knowledge retention with a focus on individual, team and organizational behavior. DeLong (2004) seems to be one of the researchers who focused extensively on the issue of lost knowledge. He proposes that effective knowledge retention efforts require a holistic approach that integrates elements of HR infrastructure and culture, the most appropriate transfer practices depending on the types of knowledge involved, and supporting IT applications. In 2002 the American Productivity and Quality Center (APQC) (2002) conducted a study among 33 companies in the US, consisting of 24 sponsors and nine best practice partner organizations. Although the research utilizes a benchmarking strategy showing the major categories of knowledge retention efforts used by these organizations and the challenges to design and implement knowledge retention initiatives, the focus was not on the behavioral factors that influence knowledge retention, or the type of knowledge that should be retained.

Several studies focus on retention of knowledge and prevention of knowledge loss or attrition in specific environments and specific groups of people in organizations, such as retention of tacit knowledge in small manufacturing enterprises (Wong and Radcliffe, 2000), the effect of loss of knowledge through retirement on the utility workforce (Juliano, 2004), the loss of IT people in the Irish software industry (Acton and Golden, 2003), and knowledge retention in the IT service industry (Bairi *et al.*, 2011). All these studies contained aspects that proved useful to the current research.

A vast number of knowledge retention studies have been conducted in the water supply industry by researchers such as Lieberman *et al.* (2006) on implementing knowledge management (KM) initiatives at the Detroit Water and Sewerage Department and Blankenship *et al.* (2009) on identifying key drivers, critical success factors, barriers, costs and benefits and developing specific strategies to ensure effective retention of knowledge, to name but a few. Bennet and Bennet's (2011) quantitative and qualitative study focuses on an organizational development approach to KM, which includes an assessment

tool to identify organizational readiness to plan and implement a KM strategy and a comprehensive toolkit for establishing or enhancing organizational readiness to support KM initiatives and strategy.

Gaps in the literature were exposed in that not a single study was found that focused specifically on the factors that impact on knowledge retention, from both a knowledge management and organizational behavioral perspective. Few studies on quantitative empirical research have been published in the field of knowledge management (Zack *et al.*, 2009) and the literature study revealed no empirical research on the organizational and behavioral factors that impact on knowledge retention.

Pollard (2005) suggests that knowledge management leaders need to understand and accommodate frontline knowledge behavior instead of trying to change it and find new solutions to improving knowledge worker effectiveness. This suggestion could be applied to understanding knowledge behavior and enhancing or impeding behavioral factors that could have an impact on knowledge retention. Knowledge is gained by different manifestations of behavior such as learning, sharing and transferring the acquired knowledge to human beings (Venzin *et al.*, 1998). Certain enhancing or impeding organizational and behavioral conditions that prevail in organizations may cause this knowledge to either be lost or retained. Focusing on behavior that could enhance knowledge retention and addressing the organizational risks of losing knowledge could help organizations to retain critical, valuable knowledge before it leaves the organization.

According to Juliano (2004), it appears that organizations may need to focus on developing a formal retention strategy to retain critical and highly specialized knowledge.

To prevent detrimental effects on their business success and survival, organizations need to pay serious attention to the issue of knowledge loss and attrition by determining where the risks are and implementing a knowledge retention strategy. To determine the focus of a knowledge retention strategy, it is necessary to understand the organizational and behavioral factors that could enhance or impede knowledge retention.

Against this background, the main objective of the research presented here is to determine empirically through quantitative research the organizational and behavioral factors that could influence knowledge retention. The research was conducted in an organization in the water supply industry, focusing specifically on supervisor, management, specialist and senior levels of operational staff. The research objectives presented in this article are to conceptualize the key concepts of knowledge loss, knowledge retention and tacit knowledge in organizations, briefly present the theoretically derived model of organizational and behavioral factors influencing knowledge retention, describe the empirically derived factors and compare them to the theoretical model. A detailed description of the theoretical foundation of the theoretical model can be found in Martins and Martins (2011). The tacit knowledge loss and retention concepts are discussed below.

2. Conceptualization of tacit knowledge loss and retention

In the context of this research it is important to understand what the terms “tacit knowledge”, “knowledge loss” and “knowledge retention” in organizations refer to. The critical knowledge in organizations that could be lost can be viewed from two perspectives, namely knowledge development as a process and the people in an organization who are the carriers of knowledge. The process of knowledge development involves the manifestation of knowledge on a cognitive level through learning and knowing and on a knowledge construction level through creating, sharing, transferring and applying knowledge. The people in an organization who operate at an individual, group and organizational level are the carriers of knowledge (Martins and Martins, 2011).

Today the carriers of knowledge, such as managers and professionals, work in rapidly evolving scientific and technical fields that bring about tremendous experiential knowledge. Only some of this knowledge is shared and documented (DeLong, 2004). The departure of employees leaves huge gaps in valuable knowledge (Mayo, 2003). These knowledge gaps

are difficult to identify until unexpected quality problems, mistakes, costly disruptions in performance or operations, loss of competitive advantage and even tragic accidents occur (DeLong, 2004). It is estimated that between 50 and 90 percent of the corporate know-how resides in the minds of people (Duhon, 1998; Campos and Sánchez, 2003) and in their experience of actions (the way they do things). Li and Goa (2003) refer to this type of knowledge as “tacit knowing” and describe it as “elusive and subjective ‘awareness’ (author’s quotes) of individual[s] that cannot be articulated in words”. Searle (in Nightingale, 2003) explains that in an individual’s dynamic interaction with the physical and cultural environment, the neurological (cognitive) hardware generates many interrelated unconscious neural images because it regulates the person’s behavior. It could be argued that the manifestation of knowledge through certain behavior during these cognitive and knowledge construction processes could cause tacit knowledge loss or enhance knowledge retention (Martins and Martins, 2011).

Important tacit knowledge in an organization includes, for example, knowledge about the organization, business processes, customers, strategy, products and services (Tobin in Noe *et al.*, 2003). Tacit knowledge is most critical to organizations because it is based on the knowledge and skills that accumulate over time through the experiences of individual employees (King, Fowler and Zeithamel in Noe *et al.*, 2003).

It is not possible to transform all tacit knowledge, but at least some knowledge can be retained. Droege and Hoobler (2003) argue that the greater the value of tacit knowledge in creating new knowledge and processes and maintaining ongoing processes and operations, the greater the loss will be to the organization when employees leave. In organizations, individuals and groups use knowledge to solve problems, make decisions and perform actions. Knowledge is applied in all these situations (Alavi and Tiwana, 2003). Lost knowledge in the context of this research is based on DeLong’s (2004) argument about the effects of lost knowledge and refers to the decreased capacity to solve problems, make decisions and perform effective actions through capabilities repeatedly demonstrated in particular situations in the organization. To maintain capacity and remain competitive, critical knowledge loss should be prevented by retaining it.

“Retaining” knowledge refers to keeping possession of knowledge, not losing, continuing to have, practicing or recognizing knowledge (The Reader’s Digest Association, 1993). The word “retention” can be described as the act or instance of retaining (The Reader’s Digest Association, 1993). If knowledge loss is the problem, then knowledge retention could be regarded as the solution (DeLong, 2004) to combating knowledge loss by keeping possession of, continuing to have, practicing and recognizing knowledge that could be lost to the organization. However, DeLong (2004) acknowledges that the terms “knowledge loss” and “knowledge retention” are not exact opposites because it is not possible for an organization to ever retain all of the knowledge that it could lose.

Knowledge retention is “effectively the act of building organizational memory” (DeLong, 2004). However, in this research organizational memory was not considered as a solution to counter the problem of knowledge loss because it is a theoretical concept that does not describe a way of countering the problem of knowledge loss. Knowledge retention is more action-oriented and grounded, and a practical way of countering knowledge loss (DeLong, 2004).

Knowledge retention in the context of the current research can be defined as maintaining, not losing, knowledge that exists in the minds of people (tacit, not easily documented) and knowing (experiential action manifesting in behavior) that is vital to the organization’s overall functioning.

Since tacit knowledge is not easy to verbalize and document, but manifests in certain behavior of the carriers of knowledge working in organizations through cognitive and knowledge construction processes, it is necessary to determine the enhancing and impeding organizational and behavioral factors that could have an impact on knowledge retention. These factors are discussed in the section below.

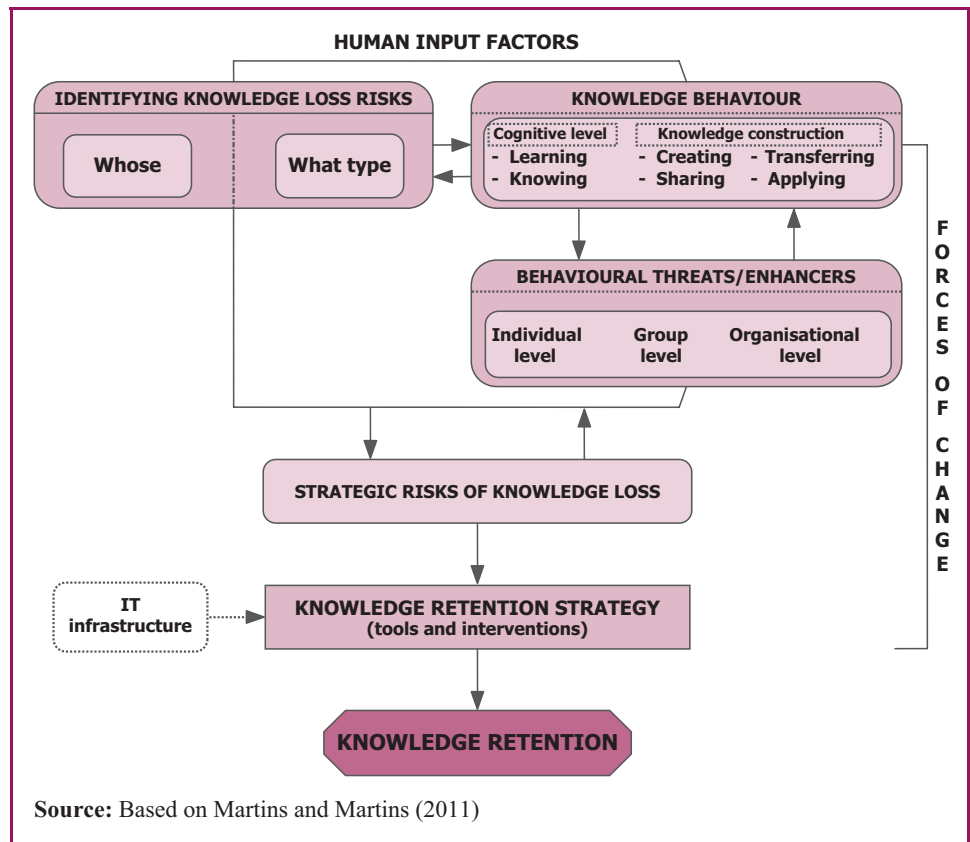
3. Model of theoretical factors that influence tacit knowledge retention

In this section the approach that was followed to develop the theoretical model of the factors that influence tacit knowledge retention and the model itself is explained. A multidisciplinary approach focusing on knowledge management and organizational behavior was followed to determine the organizational and behavioral factors that enhance or impede knowledge retention. From a knowledge management perspective the approach was from a people-reliant perspective at both a strategic and operational level. The organizational behavior perspective focused on the individual, group and organizational levels. An in-depth study in these two fields revealed how knowledge behavior manifests in organizations, the risks of knowledge loss and the organizational and behavioral factors that enhance or impede knowledge retention. Organizational factors that influence knowledge retention would stem from a strategic perspective since organizations started managing knowledge as a strategic capability during the growth spurt of the 1990s (Lesser and Prusak, 2001). Based on the investigation of the behavioral manifestation of tacit knowledge in organizations in the context of knowledge loss and retention, a model was developed that identifies the factors that need to be considered when addressing the issues of knowledge loss. This theoretical model is depicted in Figure 1.

The model offers a representation of the dynamics of knowledge retention by displaying the main organizational and behavioral elements that play a role (Mouton and Marais, 1990). In the discussion section the new factor postulation will be compared with the theoretically derived factors (Figure 1) and the differences or similarities highlighted.

External forces of change such as a world recession, economic shocks, competition and the nature of the workforce (Van Daalen and Odendaal, 2003; Briyball and Barkhuizen, 2009) would impact on knowledge retention in organizations. The human input factors refer to the

Figure 1 Theoretical model: identifying the factors that would enhance or impede



carriers of knowledge and their behavior. Knowledge loss risks in terms of whose and what type of knowledge should be retained, demonstrating knowledge behavior during the knowledge construction processes, and the behavioral threats/enhancers at individual, group and organizational levels all need to be taken into account.

The strategic risks imposed on organizations when losing knowledge pertain to factors such as reduced capacity to innovate, threatened ability to pursue growth, reduced efficiency undermining low-cost strategy and preventing giving competitors an advantage (DeLong, 2004). The strategic risks of knowledge loss and identifying the knowledge loss risks (whose and what type of knowledge) can be regarded as the organizational factors that influence knowledge retention.

The behavior component of the model is depicted in the knowledge behavior processes (learning, knowing, creating, sharing, transferring and applying knowledge) and the behavioral threats or enhancers. All these factors seem to have an impact on one another and could influence the knowledge retention strategy that should be implemented to promote knowledge retention. Taking all these factors into account, it might be possible to determine the extent to which the factors have an impact on possible knowledge loss. Once the inhibiting factors that would prevent knowledge retention have been identified, a knowledge retention strategy could be implemented with the intention of retaining critical tacit knowledge in the organization, thus ensuring organizational effectiveness and competitive advantage. As part of a holistic approach to knowledge retention, the IT infrastructure cannot be totally ignored and certain IT tools might be implemented to assist in retaining tacit knowledge.

The main objective of this study was to empirically examine through quantitative research the validity of the proposed theoretical model. The research, results and findings are discussed below.

4. Research methodology

The purpose of this section is to discuss the empirical research approach that was followed to validate the theoretically derived organizational and behavioral factors that influence knowledge retention. The survey method was deemed to be the most appropriate empirical research method to obtain the research objectives. The survey method provides an overview of a representative sample of a large population (Mouton, 2001). The survey method is a cost-effective method compared with, say, conducting interviews and focus groups, and was agreed to and accepted by the organization in which the survey was to be conducted, in terms of feasible given time, and resource and organizational constraints (Brewerton and Millward, 2001). The quantitative data to be collected in the survey process would enable the researcher to measure the extent to which certain organizational and behavioral factors influence knowledge retention in an organization. Furthermore, quantitative data could be used to conduct multivariate statistics in an attempt to determine the organizational and behavioral factors that influence knowledge retention and compare this to the theoretical model.

The purpose of the survey method in this research was to operationalize the constructs described in the theoretical model by compiling a questionnaire and diagnosing the degree to which knowledge is retained in an organization (Babbie, 1998). The questionnaire attempted to explore employees' attitudes and behaviors in their day-to-day work experience (Church and Waclawski, 1998) regarding knowledge retention. The process followed to design the questionnaire is described below.

4.1 Questionnaire design

The measurement process for quantitative research follows the sequence of first conceptualizing, then operationalizing, followed by measuring, in order to collect data (Neuman, 2000). The theoretically derived model produced the concepts that were operationalized by converting definitions of constructs (the variables) into a questionnaire format and making use of and adapting a few measures that had been validated by other

researchers (Wei *et al.*, 2008). Statements were formulated to operationalize the constructs. The intended (hoped-for) outcome (Fink, 2003) of the survey was to determine the extent to which the organizational and behavioral factors identified in the literature review would enhance or impede knowledge retention in an attempt to combat knowledge loss.

4.1.1 Measures. The paper format of the questionnaire consisting of 88 statements using a Likert scale and nine demographical/biographical questions was finalized and then programmed in an electronic format to be hosted on the internet. The statements that were formulated from the different dimensions and sub-dimensions in the theoretical model were shuffled in the questionnaire to make it easier to read. Statements were grouped under headings as the start of each statement, such as “in our organization, we [...]”; “our team [...]”; “in our team [...]”; “my colleagues [...]”; and “my manager [...]”; as well as some general questions.

The purpose of the survey specified in the questionnaire was to determine whether important knowledge in the organization is retained in order to remain competitive and offer the best service to its customers. To ensure that respondents had absolute clarity on the meaning of terminology used in the questionnaire, the definitions of the terms “knowledge”, “knowledge retention”, “our team”, “my manager” and “our customers” were included in the questionnaire.

The Likert scale contained five categories ranging from “one” for “strongly disagree” to “five” for “strongly agree”. The scale was used to determine the relative intensity of different items (Babbie, 1998). The middle alternative (neutral) was included to provide “for an additional graduation of opinion” (Converse and Presser, 1986). The method used to calculate composite scale scores was averaging and scale response distribution percentages.

4.1.2 Pre-testing the questionnaire for validity. The researcher went through a rigorous process of question/statement formulation in six draft versions to finally construct the questionnaire that was pretested before actually administering the survey (Babbie, 1998; Booyesen, 2003; Welman and Kruger, 2001). The first phase in the pretesting phase that the researcher followed was to ask specialists in the disciplinary fields of this research (organizational behavior and knowledge management), namely two industrial psychologists and two knowledge management and information science specialists, to pretest the questionnaire. This group made recommendations to improve the questionnaire and established that the questionnaire was valid on the face of it.

After adapting the questionnaire, the next phase was to ask experts from the same type of population for which the survey was intended to pretest the questionnaire. This group consisted of two IT specialists, a medical doctor, a mechanical engineer and an HR manager. This group of experts established whether the questionnaire was clear, understandable to them, and easy to complete. In total, the two groups comprised nine people, all of whom work in organizations where knowledge loss could be an issue. After careful consideration of the second pretest group’s comments, the questionnaire was adapted and finalized to be administered in the organization that gave the researcher permission to conduct the survey in exchange for a written report and presentation to the executive committee of the organization.

To ensure content validity, the researchers compiled the items in the measurement tool (questionnaire) drawing from the theoretical study of the factors that could have an impact on knowledge retention in organizations. The team of experts in the disciplinary fields assessed the content validity of the instrument to ensure that the domain was adequately covered.

Factor analysis is often used to determine construct validity in theory development and testing (Brewerton and Millward, 2001; Uys, 2003). Validation of the factor analysis constructs will be discussed in more depth in the results section.

4.2 Sampling and sample size

The human resources director and chief executive officer of a large organization in the water supply industry granted the researcher permission to conduct the knowledge retention survey in the organization.

In the current research, the non-probability sampling method, namely purposive sampling, was chosen to compile the sample (Brewerton and Millward, 2001). Purposive sampling is appropriate when the researcher wishes to select unique cases that can provide special information (Uys and Puttergill, 2003). The sample was selected on the basis of the researcher's knowledge of the population, its elements and the nature of the research objectives, in short the researcher's "judgment and the purpose of the study" (Babbie, 1998).

The purpose of this research was to determine the degree to which the organization retains the knowledge and expertise that accumulates over time through the experience of its individual employees, and which is crucial to the organization's overall functioning and competitive advantage. Some of the questions in the questionnaire were at a strategic level, and it may not have been possible for employees at lower levels in the organization to answer. After a discussion with the organization's project team, it was decided to limit the sample to supervisory level, the middle, senior and top management levels, as well as specialists (IT, researchers, HR, engineers, etc.) and senior levels of operational staff at levels 18 and above of the organization's job grade system. The reasoning here was that they would have a sound understanding of knowledge retention behaviors, influencing factors and the strategic impact that knowledge loss could have on their organization. The size of the population based on these sample specifications was 1,070 in the participating organization.

One of the research objectives was to apply statistical analyses to the data, implying that total sample sizes will significantly influence the accuracy of results reported by statistical tests (Brewerton and Millward, 2001). The researcher invited all members of the population as specified (1,070) to participate in the survey, in the hope of collecting a sufficient number of respondents to make the statistical analyses possible.

4.3 Data collection

In this section the method of survey administration is described. The survey was conducted electronically to be completed by individuals who had access to computers and on paper in facilitated group sessions. It took 20 to 30 minutes on average to complete. Survey completion was anonymous and completely voluntary. Subjects' privacy and anonymity was ensured by having paper surveys returned directly to the researcher via fax or email or collected by the researcher at the organization. The electronic survey was hosted on an external website and did not exist on any of the organization's systems. The data collected over the internet were stored on an external web server. The confidentiality of subjects during the reporting of survey results was ensured by reporting in aggregate form. The data of paper questionnaires were manually captured and merged with the data of the electronic survey in the SurveyTracker software package and then analysed.

4.4 Response rates

The survey was active for four weeks. Response rates were monitored on a daily basis and regular updates on the response rate were sent to the organization's project team (Church and Waclawski, 1998).

According to Church and Waclawski (1998), a response rate of somewhere between 30 and 85 percent can be expected. Of the 1,070 possible observations, 488 responses were received, which is 45.6 percent of the population specified for the research. After cleaning the data, the final number of observations was reduced to 455. This reduced the overall response rate of usable observations to 42.5 percent.

One of the research objectives was to apply statistical analyses (specifically factor analysis), implying that total sample sizes will significantly influence the accuracy of results reported

by statistical tests (Brewerton and Millward, 2001). The data collected in this survey were measured against the following guidelines:

- There were 88 statements in the questionnaire and 455 observations were received, complying with the general rule that a minimum of at least five times as many observations as there are variables to be analyzed should be obtained (Hair *et al.*, 1995).
- In order to conduct multivariate statistics, the 455 observations received complied with the preferable sample size of 100 or larger needed to factor analyze (Hair *et al.*, 1995).
- As argued by Uys and Puttergill (2003), the size of the sample is proportional to the size of the population. The sample size needed to be representative of a given population of 1,100 is 285 observations (Kregcie and Morgan, 1970). Neuman (2000) estimates a sample ratio of a small population of 1,000 at about 30 percent (i.e. 300 respondents) required for a high degree of accuracy.

Based on these guidelines, the number of observations received was sufficient to ensure a high degree of accuracy, enabling the researcher to conduct the factor analysis to achieve the objectives of the research. The results of the descriptive statistics and exploratory principal component factor analysis are discussed in the next section.

5. Results

The descriptive statistics calculated for the sample are provided to indicate the spread of the sample in the different biographical and organizational categories (Table I).

The data gathered via the knowledge retention questionnaire are summarized by making use of a table/graph to display the results of the theoretically composed dimensions measured in the questionnaire. The extent to which the organization is successful in retaining knowledge was measured. The results presented in Figure 2 were computed for the various dimensions assessed at individual, group and organizational levels in the organization.

The results in Figure 2 indicate that only 39.7 percent agree and strongly agree that conditions are favorable for retaining knowledge in the organization. The highest-ranked dimensions are individual motivation (mean of 3.68 and 66.2 percent agreement), ability to communicate and retain knowledge (mean of 3.56 and 64.5 percent agreement) and values and attitudes regarding willingness to share knowledge and the importance of knowledge retention (mean of 3.44 and 56.7 percent agreement). The knowledge behaviors (i.e. learning, knowing, sharing, transferring and applying knowledge) are enacted in the organization to some extent (mean of 3.33 and 55.3 percent agreement). Strategic impact (mean of 2.49 and 21.6 percent agreement), HR practices (mean of 2.52 and 25.7 percent

Table I Biographical profile of respondents		
	n	%
<i>Gender</i>		
Male	250	56.2
Female	195	43.8
<i>Age</i>		
18 to 31 years old	114	25.3
32 to 44 years old	206	45.8
45 years and older	130	28.9
<i>Job level (grade 18 and above)</i>		
Executive management	5	1.1
Senior management	13	2.9
Middle management	64	14.4
Supervisory	93	21.0
Operational staff	238	53.7
Specialists	30	6.8

Figure 2 Results of theoretically composed dimensions

Groups	Count	Mean	Std. Dev.	Category Percentages				
				0	20	40	60	80
Ind: Motivation	447.0	3.68	1.150	17.1%	16.7%	66.2%		
Ind: Ability	445.0	3.56	1.060	17.1%	18.4%	64.5%		
Ind: Values and Attitudes	445.8	3.44	1.149	20.9%	22.4%	56.7%		
Knowledge Behaviour	445.2	3.33	1.200	25.9%	18.8%	55.3%		
Grp: Conflict	444.5	3.28	1.182	26.9%	20.9%	52.2%		
Ind: Biographical Influence	447.5	3.24	1.135	24.8%	24.9%	50.3%		
Grp: Work Teams	443.3	3.20	1.215	28.5%	23.5%	47.9%		
Grp: Communication	449.0	3.19	1.229	28.6%	22.2%	49.2%		
Ind: Personality and Emotions	445.3	3.15	1.099	29.0%	27.7%	43.3%		
Grp: Structure	444.2	3.15	1.136	29.9%	24.5%	45.5%		
Ind: Individual Learning	445.3	3.10	1.094	36.1%		49.2%		
Grp: Leadership and Trust	444.7	3.07	1.218	31.6%	25.0%	43.4%		
Identifying Types of Knowledge	446.0	2.82	1.215	42.7%	19.4%	38.0%		
Org: Structure	442.5	2.82	1.186	41.3%	26.5%	32.2%		
Grp: Power and Politics	442.0	2.78	1.170	39.4%	30.2%	30.3%		
Preventing Competitor Advantage	442.5	2.69	1.138	42.0%	31.5%	26.6%		
Org: Culture and Values	442.3	2.59	1.194	49.8%	23.4%	26.8%		
Identifying Individuals	437.0	2.52	1.166	50.3%	28.2%	21.5%		
Org: Human Resource Practices	443.4	2.52	1.216	51.7%	22.6%	25.7%		
Strategic Impact	446.5	2.49	1.125	52.5%	25.9%	21.6%		
Overall Averages	443.9	2.96	1.1745	36.7%	23.6%	39.7%		

Count = Number of respondents. This is an accumulated figure. All respondents did not respond to all statements in each dimension.
 Mean = The total of the scores divided by the number of responses.
 Standard deviation = Based on the mean and gives an average distance between all score and the mean – dispersion.

CATEGORY PERCENTAGES/SCALES

Dark Grey (favourable %) = 5 – Strongly agree, 4 – Agree
 Light Grey (neutral %) = 3 – Unsure
 Black (unfavourable %) = 2 – Disagree, 1 – Strongly disagree

agreement), identifying individuals whose knowledge might be lost (mean of 2.52 and 21.5 percent agreement) and organizational culture (mean of 2.59 and 26.8 percent agreement) are the lowest-ranked dimensions.

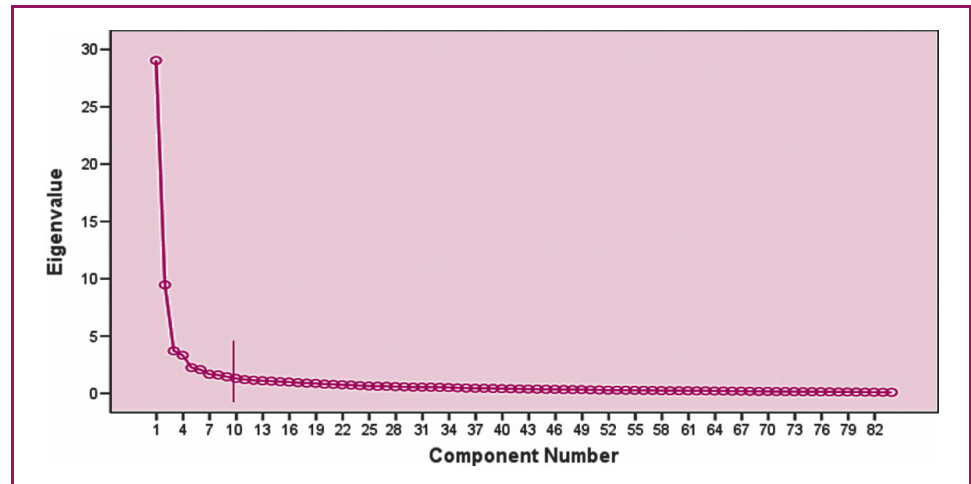
5.1 Exploratory factor analysis

The exploratory factor analysis was conducted with SPSS version 17.0. The first step in the process was to extract the factors based on the data collected from the respondents for each item in the questionnaire. Factor extraction involves determining the number of factors that would best represent the interrelationships between the set of variables (Pallant in Castro, 2008). The initial unrotated factor matrix was computed to assist in obtaining a preliminary indication of the number of factors to be extracted (Hair *et al.*, 1995).

The first specification of the principal component factor analysis (PCFA) produced a reasonably acceptable factor model. A total of 11 factors were produced. However, two of the factors consisted of only one item each. It was decided to eliminate these two factors. The reliability test (the Cronbach alpha) was conducted and the Cronbach alphas of the nine remaining factors varied between 0.960 and 0.787. The factor loadings were investigated, and re-specification of the factor model was computed by returning to the extraction stage, extracting factors and reinterpreting (Hair *et al.*, 1995). Items that had low scores (lower than 0.400) in the first factor analysis were removed before the second factor analysis was conducted. The second factor analysis included items with a loading above 0.400. The results of the second factor analysis are discussed below.

5.1.1 Number of factors to be extracted. Three different criteria were used to determine the number of factors to be extracted in the second factor analysis, namely the scree test, the latent root criterion (eigenvalues) and the percentage of eigenvalues. Cattell's scree test produced the following results (Figure 3).

Figure 3 Scree plot of the overall scale of the knowledge retention questionnaire



Inspection of the scree test revealed that there is a change in direction after the fourth factor and the point at which the line seems to straighten could possibly be after the ninth factor. It was decided to retain nine factors.

The analysis of the latent root criterion (eigenvalues) and percentage of eigenvalues (or variance criteria) produced the following results (Table II):

Although 14 components appeared to have an eigenvalue greater than 1.00 which is considered significant, the extraction sum of squared values and the rotation sum of squared values indicated that nine factors accounted for 64.61 percent of the total variance, based on the cumulative percentage of eigenvalues. This percentage is above the criterion stated by Hair *et al.* (1995, p. 378) that a solution in the social sciences should account for 60 percent (or even less) of the variance. The nine-factor structure appears to provide a satisfactory solution.

The next step was to conduct factor rotation to determine the most interpretable factors, producing factor loadings that indicate the correlation of each variable with each factor. The VARIMAX rotational method, which seems to be the approach that provides a clearer separation of factors, was used.

Table II Total variance explained

Component	Total	Initial eigenvalues		Extraction sums of squared loadings			Rotation sums of squared loadings		
		Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	29.031	34.561	34.561	29.031	34.561	34.561	11.864	14.124	14.124
2	9.436	11.233	45.794	9.436	11.233	45.794	9.738	11.593	25.718
3	3.671	4.371	50.165	3.671	4.371	50.165	8.487	10.104	35.821
4	3.284	3.910	54.074	3.284	3.910	54.074	7.014	8.350	44.171
5	2.206	2.626	56.700	2.206	2.626	56.700	5.371	6.395	50.566
6	2.034	2.421	59.121	2.034	2.421	59.121	3.378	4.021	54.586
7	1.631	1.942	61.063	1.631	1.942	61.063	2.966	3.531	58.117
8	1.567	1.866	62.928	1.567	1.866	62.928	2.921	3.478	61.594
9	1.410	1.678	64.607	1.410	1.678	64.607	2.530	3.012	64.607
10	1.265	1.506	66.113						
11	1.165	1.387	67.500						
12	1.107	1.318	68.818						
13	1.059	1.261	70.078						
14	1.037	1.234	71.312						
15	.983	1.170	72.482						

In total, nine items were removed from the knowledge retention questionnaire (four items after the first factor analysis and five after the second factor analysis). It was decided to retain the items that loaded on two factors with the factor where the highest factor loading was evident. Coincidentally, the items fitted conceptually well in these factors. Only three variables were found to have communalities below 0.50. However, the variables were included in the factors because they all had factor loadings above 0.400 and were deemed to make a contribution to the research in the sense that they would contribute to knowledge retention. After removing items with scores lower than 0.400 or that did not fit into the factor structure, 79 items in total remained.

The total communality obtained by adding the individual sums of squares for each of the factors is 51.062, which represents the total amount of variance extracted by the factor solution (Hair *et al.*, 1995). This indicates that the factor solution accounts for at least one-half of the variance of all the variables.

5.1.2 Conceptual naming of factors. The interpretation of the refined second factor analysis produced the following factors (Table III).

5.1.3 Reliability analysis. The Cronbach alpha was used to determine the internal reliability of items in each factor. The test was conducted on the second factor analysis to validate the factor structure. These results are indicated in Table IV and include all statements with a factor loading above 0.400.

The overall Cronbach alpha coefficient obtained for the knowledge retention questionnaire was 0.975803 for the total 79 items. Since the total value was above 0.7, the instrument (scale) can be deemed to be reliable (De Vaus, 1986; Pallant in Castro, 2008). The reliability coefficient of the factors appears to vary between 0.959965 and 0.751401. Four of the reliability coefficients are above 0.9 and three above 0.8, which can be regarded as acceptable internal consistency reliability (Sekaran, 1992). This means that the correlation between the items in each factor is strong. The closer the reliability coefficient is to 1.0, the

<i>Factor</i>	<i>Name</i>
Factor 1	Knowledge behavior
Factor 2	Strategy implementation
Factor 3	Leadership
Factor 4	People knowledge loss risks
Factor 5	Knowledge attitudes and emotions
Factor 6	Power play
Factor 7	Knowledge growth and development
Factor 8	Performance management
Factor 9	Organizational support and encouragement

<i>Factor</i>	<i>Cronbach alpha</i>	<i>Cronbach alpha based on standardized items</i>	<i>No. of items</i>
Factor 1 Knowledge behavior	0.959965	0.959958	19
Factor 2 Strategy implementation and values	0.940314	0.939676	15
Factor 3 Leadership	0.958008	0.958159	11
Factor 4 People knowledge loss risks	0.938447	0.938646	10
Factor 5 Knowledge attitudes and emotions	0.897459	0.898581	6
Factor 6 Power play	0.847315	0.847416	7
Factor 9 Organizational support and encouragement	0.811864	0.815229	3
Factor 7 Knowledge growth and development	0.748458	0.761046	4
Factor 8 Performance management	0.751401	0.744182	4
Overall reliability of questionnaire of 79 items	0.975803	0.975578	79

better the correlation (Hair *et al.*, 1995). Two of the reliability coefficients are below 0.8 but above 0.7, namely performance management and knowledge growth and development, which can be regarded as acceptable.

It can be concluded that the internal consistency (reliability) of the overall knowledge retention questionnaire and the factors are consistent in what they are intended to measure. If multiple measurements are taken, the reliability measures will all be highly consistent in their values (Hair *et al.*, 1995).

6. Discussion

The new factor postulation produced by the factor analysis was compared to the theoretical model to determine the empirically derived organizational and behavioral factors that could enhance or impede knowledge retention. The theoretical model consisted of the following four main factors: identifying knowledge loss risks (in terms of whose and what type of knowledge is at risk), knowledge behavior, behavioral threats versus enhancers (at individual, group and organizational level) and strategic risks of knowledge loss. The statistical procedure (described above) produced nine factors. Using the new factor postulation as the point of departure, the comparisons with and differences to the theoretically derived factors are discussed below.

6.1 Main findings

In the discussion below each new factor is compared with the theoretically derived factors, the differences or similarities are highlighted and some earlier research and researchers are connected to the outcomes.

The new factor 1, knowledge behavior, remained basically the same as in the theoretical factor, knowledge behavior, focusing on learning, creating, sharing, knowing, transferring and applying knowledge. A new perspective was added to this factor, which focused on behavior that could indirectly be regarded as knowledge behavior in the sense that it would enhance the knowledge behavior and therefore knowledge retention. These elements refer to identifying the type of knowledge that needs to be retained, the effectiveness of communication between different age groups (DeLong, 2004), diverse team members' acceptance of team goals (an indication of what type of knowledge should be retained) and constructive solving of conflict (because conflict may hamper knowledge behavior such as sharing and learning). Determining the type of knowledge that needs to be retained in today's business environment is supported by Bertels and Savage (1998), Blanckenship *et al.* (2009), Ivancevich *et al.* (2005), Seidman and McCauley (2005), Tobin (in Noe *et al.*, 2003) to name but a few.

The new factor 2, strategy implementation, remained basically the same as the theoretical factor, strategic risks of knowledge loss. Strategy implementation focuses on the extent to which maintaining organizational growth and developing new products and services, regardless of knowledge loss, is achieved, determining areas of competitive advantage because of specialized knowledge and preventing giving competitors advantage by protecting own knowledge during outside negotiations. An interesting new focus emerged in this factor, namely the values of openness, respect, innovativeness and trust that could contribute to strategy implementation, and, ultimately, knowledge retention. Developing trust is generally accepted as a value to support knowledge retention and regarded by Bennet and Bennet (2011) as a critical success factor to enhance knowledge retention.

Another contributing factor that was grouped with the strategy implementation dimension appears to be an effective mentoring (coaching, apprenticeship) process that helps build knowledge retention. This corresponds to DeLong's (2004) perspective that knowledge loss caused by turnover and retirements could reduce the availability of potential mentors which, in turn, could hamper a strategy of growth.

The new factor 4, people knowledge loss risks, encompasses the theoretical factor, identifying whose knowledge is at risk of loss (i.e. highly experienced, best performers,

leaders, industry-specific professionals and employees approaching retirement), with an added focus on retaining knowledgeable people, an effective career development process that helps build knowledge and competencies (supported by DeLong, 2004), and being sensitive to the protection of expert knowledge (supported by Allee, 2003; Mauer *et al.*, 2003).

The remaining factors all refer to the behavioral threats/enhancers at individual, group and organizational levels. However, the individual, group and organizational levels disappeared in the new postulation. The new factor 3, leadership, remained basically the same as the leadership and trust factor at group level in the theoretical model, and now also includes the value of individuals trusting their managers, and managers encouraging employees to take responsibility for their own training and development. The new leadership factor still focuses on managers behaving in a trustworthy manner and being emotionally intelligent in terms of interpreting employees' emotions correctly. Knowledge retention could be enhanced by managers encouraging the flow of knowledge, promoting cooperation, facilitating knowledge exchange and retention, and creating an awareness of organizational challenges. Leadership (leading) by example is highlighted by Bennet and Bennet (2011) as a critical success factor in successfully implementing a knowledge management strategy. Handzic's (2011) research also pointed to leadership as the single most important enabler of KM. Liebowitz (2011) too argues that without strong leadership and a knowledge retention program, an organization will be vulnerable to potential knowledge loss, which could lead to sub-optimization.

The new factor 5, knowledge attitudes and emotions, appears to be at individual level, when comparing it with the theoretical factors. It encompasses aspects of the original personality and emotions regarding cooperation and commitment to prevent knowledge loss, the original ability to communicate knowledge, the original individual learning element regarding colleagues taking responsibility for their own development and the original values and attitudes regarding willingness to share and use expertise. Maierhofer and Finsterle (2003-2004) conducted research on employees' willingness to share knowledge in organizations and found that personal values (belief in the importance of knowledge sharing) emerged as the strongest link to knowledge sharing with co-workers, managers and staff from other units (compared to individual benefits and interpersonal trust). All the new items appear to relate to individuals' perceptions of their colleagues since all items start with the words "My colleagues [...]". It can be concluded that perceptions of colleagues that manifest in attitudes and emotions regarding knowledge loss, on the one hand, and willingness to share, ability to communicate knowledge and taking responsibility for own development, on the other, could affect the degree to which knowledge is retained.

The new factor 6, power play, appears to combine mainly elements at group level, namely group cohesiveness from group structure, resolving differences from conflict, and making use of external expertise and experts freely sharing their knowledge from power and politics in the original model. Power and politics as an influencing factor of knowledge retention is supported by authors such as Haldin-Herrgard (2000), Mahee (2006), Small (2006), and Syed-Ikhsan and Rowland (2004). The trust element at individual level (trusting colleagues) and the team member trust element (team members trust one another) are combined in this factor. The team member trust element formed part of organizational culture as a value at organizational level, but from the team member perspective could have formed part of the group level in the theoretical model. It can be concluded that if trusting relationships, conflict resolution, making use of and sharing expertise freely are negative, power and politics could come into play, preventing knowledge retention.

The new factor 7, knowledge growth and development, covers elements at the individual level of the theoretical model ranging from ability (working with colleagues to improve one's ability to retain knowledge), motivation (gaining satisfaction from sharing knowledge while working with colleagues (Devos and Willem, 2006; Osterloh and Frey in Von Krogh, 2003)) to individual learning (actively engaging in learning opportunities to further develop oneself (Bryson *et al.*, 2006)). It may be concluded that intrinsic motivation, actively engaging in

learning opportunities and working with colleagues could contribute to knowledge growth and development, as a contributing factor to knowledge retention.

The new factor 8, performance management, covers elements at organizational level which form part of HR practices, namely performance evaluation taking knowledge sharing into account and recognizing individuals' expertise, and training and development processes taking heed of the needs of different age generations. Satisfaction to continue doing a job without further development from the individual learning factor of the theoretical model fits into this new factor because it could be regarded as part of performance management. Learning, training and development are regarded as critical success factors by researchers such as Bennet and Bennet (2011), Blanckenship *et al.* (2009), and Visscher *et al.* (2006).

The new factor 9, organizational support and encouragement, is a combination of an organizational culture item (encouragement to suggest ideas for new opportunities) and two items of the structure and design factor at organizational level (support for cooperation between different departments and interaction between those who share a concern/passion for a topic). Lack of support from top management, such as creating a social system to support knowledge behavior, is perceived to be one of the greatest factors impeding knowledge behavior (Noe *et al.*, 2003). This offers support for the new organizational support and encouragement factor that was postulated.

An interesting finding regarding the organizational support and encouragement factor was that the item dealing with financial rewards as motivation to share knowledge with colleagues was grouped with this factor, but was ultimately removed owing to a negative factor loading. It would appear that, although some researchers (Cabrera in Minbaeva and Michailova, 2004; Du Plessis, 2006) theorized that extrinsic rewards would enhance knowledge-sharing behavior, the negative loading proves that this is not the case. This confirms Bock *et al.*'s (2005) finding that extrinsic rewards can in fact hinder rather than motivate people to share their knowledge.

In comparing the two sets of factor structures it appears that some factors in the new empirical factor postulation basically remained the same with a few changes, and a number of new factors emerged shedding a different light on the theory.

6.2 Limitations of the study and future research directions

The literature study revealed that hardly any research has been conducted in the field of knowledge retention with a clear understanding of the influence of behavioral factors. However, a vast amount of literature was found on knowledge, knowledge management, solution driven knowledge retention and organizational behavior, thus facilitating the application of the relevant concepts to knowledge behavior and knowledge retention.

The limitations of the empirical study relate to the questionnaire, data collection and sample. A new questionnaire had to be constructed because no empirical research on the influencing factors of knowledge retention from a behavioral perspective was found in the literature. Areas that were not sufficiently measured were forming relationships and networking with other internal expert groups, the impact of diversity on knowledge retention and whether or not decision making plays a role in tacit knowledge retention. These aspects might point to possibilities for further exploration in the knowledge retention sphere.

Although five responses per statement of the original questionnaire were collected and regarded as sufficient for multivariate analyses, the more acceptable range would be ten respondents for each variable (Uys and Puttergill, 2003). A further limitation of the empirical study is that the research was conducted in only one South African organization and thus limits generalization to other organizations. A calibration data sample could be used in future studies and then confirmed using an independent validation sample (Garson, 2009, p. 2).

6.3 Implications for managers

Practitioners need to take cognizance of the fact that organizations are different. The enhancing and impeding organizational and behavioral factors need to be determined in an organization before attempting to put a knowledge retention strategy in place, in order to

clarify where the focus of the strategy should be. Furthermore, practitioners should realize that tacit knowledge (i.e. the knowledge in the minds of people that is difficult to put into words) is not easy to retain, but there are strategies that could enhance any attempts to retain this type of knowledge. Another vital consideration is the fact that tacit knowledge retention is but one type of knowledge that should be retained – hence the need for a knowledge retention strategy to include other types of knowledge such as explicit knowledge retention.

7. Conclusions

The purpose of the exploratory factor analysis was to determine statistically the enhancing or impeding organizational factors that influence knowledge retention and validate the theoretical model. It can be concluded that some factors such as people knowledge loss risks, knowledge behaviors, leadership and strategy implementation in the new factor postulation remained largely the same as in the theoretical model, with a few new perspectives (as discussed above). Behavioral factors at individual, group and organizational level were grouped differently in the new factor postulation, with a strong emphasis on knowledge attitudes and emotions, knowledge growth and development, power play and performance management. A surprising factor that was postulated in the principal component factor analysis was organizational support and encouragement, which did not exist as such in the theoretical model, and added a new perspective to the factors influencing knowledge retention.

Although the current findings are encouraging, it should be kept in mind that the study (under discussion) has been conducted in only one South African organization. Further research needs to be conducted in other organizations to produce more generalizable results. To gain a better understanding of the empirically postulated factors that shed light on the enhancing or impeding organizational and behavioral factors influencing knowledge retention, it is proposed that a structural equation model (SEM) be developed to produce an empirically tested knowledge retention model.

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Further reading

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About the authors

Ellen Caroline Martins is a Director at Organizational Diagnostics. She specializes in the field of organizational diagnosis and development. She has extensive practical experience in numerous organizational diagnostics projects, which include cultural, climate, employee engagement, employee satisfaction, 360-degree behavioral assessments and qualitative research methods such as interviews and focus groups. Her Master's degree (cum laude) focused on the impact of organizational culture on creativity and innovation. Her research field interest is a combination of knowledge retention and organizational behavior. Ellen Caroline Martins is the corresponding author and can be contacted at: orgdia@iafrica.com

Hester W.J. Meyer – recently retired – was an Associate Professor in the Department of Information Science, University of South Africa (Unisa). She has extensive practical experience in public and related libraries and more than 20 years' teaching and research experience at Unisa. Her research interest focuses primarily on information behavior of groups of information users in diverse contexts, with special reference to transfer of information across cultural boundaries for development of traditional communities.

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