Understanding Employee Knowledge: The Development of an Organizational Memory Scale

Abstract

Purpose *The aim of this study was to develop a psychometrically sound self-report scale of organizational memory. The scale was planned for use in future research to test the relationship between what employees know and their attitudes to passing on their knowledge.*

Design/methodology/approach *Seventy-two organizational memory scale items representing six hypothesised dimensions of organizational memory were developed and tested with 143 participants using exploratory factor analysis. The resulting five-factor model was tested with a further sample of 288 employees using structural equation modelling, and the test-retest reliability was examined.*

Findings *Five factors of the organizational memory scale were identified. These were: socio-political knowledge, job knowledge, external network, history, and industry knowledge. The dimensions correlated with tenure variables often used as proxies for experience. Structural equation modelling confirmed the five-factor model and the scale achieved adequate test-retest reliability.*

Research limitations/implications *The five organizational memory factors are not an exhaustive list. While the scale enables employees to evaluate their own organizational memory, it may not necessarily be an accurate indicator of their knowledge.*

Practical implications *The scale can be used as a knowledge audit instrument for examining attitudes to mentoring and knowledge sharing, as well as for auditing knowledge that may potentially be lost when experienced employees leave organizations.*

Originality/value *The scale is a valid and reliable self-report measure of organizational memory. It is an innovative tool for examining employee attitudes to knowledge sharing initiatives. The scale also recognises the contribution made to organizational memory by those with industry knowledge outside the organization.*

Keywords *Knowledge management, Scale development, Organizational memory, Knowledge sharing, Mentoring.*

Paper type *Research paper*

1. Introduction

There is a potential loss of organizational memory in companies when experienced employees depart and attention has become focused on finding ways to prevent this (Coffey and Hoffman, 2003; DeLong, 2004; Lahaie, 2005; Strack *et al*., 2008). A recent report indicated that employers are, more than ever before, shifting their attention to the potential threat of lost knowledge (MetLife, 2009). Mentoring has been identified as an ideal way of transferring the knowledge and experience of long-tenured employees to less experienced workers (DeLong, 2004). The proposed benefits of this approach include a boost to the engagement and self-esteem of the mentor, the development of the protégé, as well as vital knowledge transfer within the organization (e.g. Davey and Cornwall, 2003). These claims seem to assume that experienced workers will both willingly part with their knowledge and will experience positive outcomes as a consequence. The reality may be quite different.

Workplace cultures have changed since the early publications on mentoring in the 1970s and 1980s that suggested that acting as a mentor was a natural step in the mid to late career (e.g., Kram, 1985; Levinson *et al*., 1978), altering the psychological contract between employee and employer (Harrington and Hall, 2007). Organizations can seldom guarantee life-long employment, and this has altered the psychological contract between employer and employee. This in turn, may reduce the loyalty and commitment felt by experienced employees that might lead them to reciprocate through providing mentoring to others (Dunham and Burt, 2009). There are reports that some experienced workers equate passing on their (prized) knowledge to a loss of competitive niche within their organizations and a threat to their job security (Davenport, 2005; Geisler, 2008).

It is imperative in this context to investigate whether the willingness to share knowledge through mentoring differs according to the knowledge employees think they

possess. For example, sharing knowledge of one's own job might be seem more threatening to passing on social knowledge about the organization and therefore impact on willingness to mentor others. Alternatively knowledge of social networks may be prized by employees who are reluctant to share their contacts with others. Accordingly, research studies that investigate the relationship between employee organizational memory and their willingness to mentor are needed, and along with them, a tool to help participants to evaluate the knowledge resources that they potentially bring to a mentoring relationship. A search of the literature failed to identify a published scale which measured organizational memory, therefore this research was conducted with the aim of developing a psychometrically sound measure of the construct.

2. Scale Development

2.1 Item Generation

Grounding oneself in the conceptual definition of the construct to be measured is crucial in developing an appropriate measurement scale (DeVellis, 2003; Spector, 1992). Organizational memory consists of "stored information from an organization's history that can be brought to bear on present decisions," (Walsh and Ungson, 1991, p.610). Organizational memory enables companies to learn from their past as a means of sustaining competitive advantage (Cross and Baird, 2000; DeLong, 2004; Johnson and Paper, 1998; Neustadt and May, 1986; Stein, 1995). Drawing on this resource is considered useful for problem solving (Cross and Baird, 2000), the development of best practice (Rulke *et al*., 2000), decision-making, and company strategy (Neustadt and May, 1986; Moorman and Miner, 1997). While the outcomes of organizational memory are largely described in terms of organizational effectiveness, organizational memory can occasionally result in suboptimal

outcomes when a tendency to favour what worked in the past excludes potentially more effective solutions (Stein, 1995).

The content of organizational memory covers several domains. An unpublished study by Conlan (2001) identified four dimensions of organizational memory, namely, "organizational decision-making," "organizational history and events," "norms and expectations," and "power and politics". A scale of organizational socialization developed by Chao *et al*. (1994), while not specifically addressing organizational memory, also identified organizational knowledge domains relevant to the construct. The socialization dimensions were knowledge of (organizational) history, language, politics, people, organizational goals and values, and job proficiency. Both scales provided initial ideas for item generation for the organizational memory scale. In addition, a review of the organizational memory literature yielded six broad content themes that also formed the basis for the generation of scale items and these are described below.

2.1.1 Job knowledge

Job knowledge refers to knowledge that enables effective job performance (e.g. DeLong, 2004; Gratton and Ghoshal, 2003; Leonard and Swap, 2005; Zhang, *et al*., 2006). Scale items to capture job knowledge included several items taken and/or adapted from the performance proficiency subscale of the "organizational socialization scale" (Chao *et al*., 1994).

2.1.2 Social knowledge

According to Cross *et al*. (2003) high performing employees are characterised by their ability to create, maintain and utilise personal networks. The importance of social capital is acknowledged by many authors (e.g. Cannon-Bowers and Salas, 2001; DeLong, 2004; Gratton, and Ghoshal, 2003; Kidd and Terramoto, 1995; Leonard and Swap, 2005; Nahapiet

and Ghoshal, 1998). Accordingly, items relating to social networks and social knowledge of the organization were generated.

2.1.3 Political knowledge

Political knowledge of an organization is vital to successfully navigate organizational life and for gaining access to necessary resources. It involves an understanding of management and decision-making styles (e.g. Kransdorff and Williams, 2000). Items were generated to reflect knowledge of resource allocation, organizational decision-making, and knowledge of the prime actors in organizational events.

2.1.4 Cultural knowledge

Cultural knowledge including that of shared beliefs, values and norms, is also an integral part of organizational memory (Kransdorff and Williams, 2000; DeLong, 2004; Moorman and Miner, 1997; Zhang *et al*., 2006). Schein (2004) refers to culture as "patterns of shared assumptions learned by a group" (p.17). Items were generated that tapped into an understanding of organizational norms, values, and priorities.

2.1.5 History

According to Day (1994) "Organizations without practical mechanisms to remember what has worked, and why, will have to repeat their failures and rediscover their success formulas over and over again" (p. 44). Thus items that reflected knowledge of past successes and failures, and the lessons learned from them, were generated.

2.1.6 Industry knowledge

Zhang *et al*. (2006) used the term “market-oriented organizational memory”, to recognise the importance of aspects of the organization’s environment, including knowledge of competitors and stakeholders. Similarly, Kransdorff and Williams (2000) referred to the knowledge of the organization’s market. To include this emphasis in the organizational memory scale, items were generated about knowledge of competitors, past events, and networks external to the organization.

> Hypothesis 1: The scale items resulting from the EFA will represent six broad dimensions of organizational memory content proposed in the literature: Job knowledge, social knowledge, political knowledge, cultural knowledge, history, and industry knowledge.

2.2 Construct validity

Correlation coefficients offer much of the construct validity evidence in early scale development (Kane, 2006). In this study, it was predicted there would be positive relationships between the organizational memory factors identified in the exploratory factor analysis and job and organization tenure which are often used as proxy variables for knowledge and experience (Chao, *et al*., 1994; Leonard and Swap, 2005). As noted by Walsh and Ungson (1991), time spent in a company promotes an understanding of the organization’s cultural attributes, its practices and procedures, and underlying values; in essence it provides the opportunity for the acquisition of organizational memory.

In addition, it was expected that organizational memory factors would relate differentially to various tenure variables. For example it was expected that job knowledge would show a stronger correlation with job tenure than organizational tenure. Similarly, it

was expected that industry knowledge, more than any other organizational memory dimension, would have a strong correlation with the number of jobs held in the industry.

Hypothesis 2: The Organizational Memory Scale factors will differentially correlate with proxy variables for experience including number of jobs in the industry, job tenure and organizational tenure.

2.3 Study design

The study consisted of two parts. An exploratory factor analysis (EFA) was carried out in Part I with the aim of reducing the number of items ensuring that those which remained were concentrated onto meaningful factors representing organizational memory dimensions. While it was expected that the organizational memory dimensions outlined above would be identified through the process of factor analysis there was also potential for other meaningful factors to be identified involving combinations of items and so an exploratory rather than confirmatory approach was taken at this stage.

The aim of Part 2 of the study was to test the stability of the factor structure of the organizational memory scale identified in Part 1, with a new sample. This step of confirmatory factor analysis (CFA) is important for future users to have confidence that the new scale will reliably result in the factors already identified.

Hypothesis 3: Factor analysis will confirm the factor structure of the Organizational Memory Scale identified in the exploratory factor analysis.

Correlations between the organizational memory subscales and job and organizational tenure were again examined to evaluate construct validity. The CFA study also gave the opportunity to examine the test-retest reliability of the organizational memory scale with

participants invited to complete a second questionnaire several weeks after the first. Stability of responses to the scale over a brief time interval is desirable for reliability.

Hypothesis 4: The confirmed organizational memory factors will differentially correlate with proxy variables of experience including job tenure, organizational tenure and industry tenure.

Hypothesis 5: The organizational memory factors will achieve adequate test-retest reliability.

Part 1

3. Method

3.1 Sampling

A number of businesses were approached for volunteers to participate in the EFA study resulting in 59 participants from the utility industry (*n*=59, 41.3%), 38 individuals (16.6%) from an organization in the banking and finance sector, and the remaining 46 participants (32.2%) from five small businesses in the professional services sector.

A sample of 143 participants was used in the analysis after the exclusion of 11 cases with incomplete data sets, and employees with less than 3 months organizational tenure. Short tenure participants were excluded to avoid floor effects which could potentially skew the distributions (e.g., Aron and Aron, 1999). Response rate information is not available for all of the organizations, however when recorded it was close to 100%.

3.2 Participants

There were 60 (42%) male and 83 (58%) female participants. The mean participant age was 43.26 years, (*SD*= 11.97). The overall mean job tenure was 7.11 years (*SD*=8.05), and overall mean organizational tenure was 10.51 years, (*SD*=10.25). Participants had held a mean 1.23 (*SD*= 1.56) jobs in their industry. Ninety-eight individuals (68.5%) identified themselves as team members, 24 (18.8%) as middle manager/team leaders, 17 (11.9%) as senior manager/team leaders, and 4 (2.8%) as the chief executive officer of the company.

3.3 Materials

The questionnaire consisted of several demographic questions and the 72 organizational memory scale items (see Appendix A). Instructions included at the start of the questionnaire provided participants with a common frame of reference to avoid ambiguity and reduce error (Spector, 1992). These instructions defined organizational memory in the following way:

> When an individual enters an organization to work, over time, they acquire knowledge about how things are done in that particular organization – how things operate, the procedures, the lines of communication (formal and informal), acceptable behaviour and practices, and organizational traditions, as well as the specific skills and knowledge related to their job. Organizational memory refers to this organizational knowledge gained over time.

The cover page of the questionnaire also defined a number of other terms which appeared in the scale items: *Co-workers* were defined as those the participants interact with in order to meet their job goals and objectives; *colleagues* were described as "other individuals who work in the organization"; *managers* were described as "individuals the participant is directly responsible to for their work including supervisors and/or team leaders"; *associates* were described as others the participant interacted with "in order to meet job goals and objectives who are not members of your organization, and who are not clients or shareholders"; s*takeholders* were described as "others like clients or shareholders" that the participant may relate to in the course of their work. Demographic details were sought regarding age, sex, tenure in job, organization, and industry, and the number of jobs the participant had held in the industry. A seven-point response scale was adopted for the organizational memory scale, anchored with the following statements: 1= *strongly disagree* and 7= *strongly agree.*

3.4 Procedure

All participants gave informed consent and were assured of anonymity and confidentiality. No incentive was given for participation. Participants were asked to fill in the paper and pencil questionnaire, and to return the questionnaire directly to the researchers in the freepost envelope provided.

4. Results

4.1 Exploratory factor analysis

The exploratory factor analysis (principle-components analysis) employed an oblique rotation (direct oblimin), as the organizational memory factors were expected to correlate with one another. Minimum factor loadings were set at .40 (Nunally, 1978). The result of the

exploratory factor analysis was a five-factor scale rather than the six dimensions proposed in Hypothesis 1. The 21 items in the scale accounted for a cumulative 64.93% of variance in the data. Three items loaded on each factor, a minimum advised by Spector (1992).

4.2 Factor Interpretation

The five factors can be seen along with their item factor loadings in Table 1. The alpha for the total 21 items of the scale was .89. The factors were named according to their content as socio-political knowledge (7 items, α=.87), job knowledge (4 items, α=.81), external network (3 items, α=.75), history (5 items, α=.79), and industry knowledge (3 items, α=.75). The job knowledge factor included three items from Chao et al.'s (1994) socialization scale with the addition of a new item recognising organization-specific job knowledge.

Table 1. Organizational Memory Scale and item factor loadings.

	1	**2**	**3**	**4**	**5**
(1) Socio-political knowledge					
1. I know who represents the model of acceptable behaviour in this organization.	**.78**	.05	-.10	-.13	.13
2. I know the personal characteristics that make a person a good fit here.	**.77**	.02	.09	-.02	-.04
3. I know whose support you need in the organization to make an idea work.	**.75**	-.11	.20	.06	-.07
4. I have a good idea of who knows what in this organization.	**.74**	.12	.00	-.08	.02
5. I know how to advance an idea in this organization.	**.72**	-.06	.01	.07	.14
6. I know who has been responsible for the major decisions made in this organization.	**.72**	.01	.-.16	.22	-.02
7. I know what organizational decisions will mean for different departments.	**.53**	.17	.14	.15	.08
(2) Job knowledge					
1. I have learned how to operate in my job in an effective manner.	-.08	**.87**	-.16	-.05	.13
2. I have mastered the required tasks of my job.	-.05	**.83**	.13	.10	-.13

3.	I know the aspects of my job that are particular to this organization.	.03	**.71**	.19	-.03	.08
4.	I understand what the duties of my job entail.	.29	**.69**	-.06	.03	-.07
(3)	**External network**					
1.	I know which associates to go to for good work related advice.	.07	.10	**.82**	.06	-.27
2.	I know which associates to go to for accurate industry news.	-.02	.02	**.74**	-.15	.28
3.	I have a network of associates for the mutual sharing or work-related information.	.05	-.02	**.72**	.16	.13
(4)	**Industry knowledge**					
1.	I know how other organizations in this industry operate.	-.06	-.07	.00	**.92**	.03
2.	I know how similar organizations in the industry are performing.	.01	.03	-.00	**.80**	.12
3.	I know what has been the major success of this organization.	.24	.09	.00	**.68**	-.01
(5)	**History**					
1.	I know which mistakes have really hurt this organization.	-.01	-.05	.01	.02	**.85**
2.	I know what the organization regrets most about its past.	.07	.08	-.01	.07	**.72**
3.	I know the major turning points in this organization's past.	.08	.13	.20	.15	**.54**
4.	I know who was considered responsible for major errors in this organization.	.21	-.09	.21	.12	**.51**
Eigenvalues		6.91	2.30	1.66	1.44	1.32
Percentage of variance explained		32.91	10.97	7.92	6.84	6.29

4.3 Descriptive Statistics

The items within each of the five organizational memory subscales were summed to create subscale scores, and these scores in turn were divided by the number of items in the subscale to calculate a mean scale score. Subscale means, standard deviations, and the correlations between the variables are shown in Table 2. Correlations among the organizational memory factors surpassed the suggested minimum correlation of .15 that justified the use of an oblique rotation for the EFA (DeVellis, 2003).

The correlations between the organizational memory scale subscales and the tenure variables shown in Table 2 support the construct validity of the scale (Hypothesis 2). All organizational memory subscales correlated significantly with job tenure, while all *but* job knowledge correlated with organizational tenure. Industry knowledge was the only organizational memory factor to correlate with the number of industry jobs held by participants.

Table 5. Test-retest sample descriptive statistics and correlation matrix

	M	***SD***	**α**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Socio-political knowledge (1)	5.01	1.04	.86	1.00											
2. Job knowledge (1)	5.92	0.98	.89	.47**	1.00										
3. External network (1)	5.12	1.33	.83	.59**	.40**	1.00									
4. History (1)	3.46	1.38	.77	.44**	.31**	.42**	1.00								
5. Industry knowledge (1)	4.10	1.29	.77	.35**	.24*	.27**	.53**	1.00							
6. Organizational memory (1)	4.77	0.86	.89	.84**	.64**	.74**	.75**	.62**	1.00						
7. Socio-political knowledge (2)	5.09	0.93	.89	**.82****	.48**	.56**	.41**	.34**	.76**	1.00					
8. Job knowledge (2)	5.76	1.02	.91	.44**	**.83****	.44**	.35**	.20*	.62**	.59**	1.00				
9. External network (2)	5.12	1.15	.76	.41**	.49**	**.61****	.36**	.21*	.56**	.53**	.60**	1.00			
10. History (2)	3.60	1.35	.82	.41**	.26**	.41**	**.86****	.43**	.66**	.45**	.28**	.39**	1.00		
11. Industry knowledge (2)	4.15	1.20	.74	.32**	.29**	.47**	.48**	**.70****	.59**	.44**	.33**	.48**	.56**	1.00	
12. Organizational memory (2)	4.80	0.84	.92	.68**	.60**	.66**	.66**	.48**	**.86****	.84**	.72**	.75**	.73**	.71**	1.00

Note. (1) Time One (2) Time Two. Test-retest correlations are in bold.
* $p < 0.05$ level; ** $p < 0.01$ level, (two-tailed).

Part 2

5. Method

5.1 Confirmatory models

While EFA methods can be used in a confirmatory manner, CFA is often equated to the use of structural equation modelling (SEM) (DeVellis, 2003; Spector, 1992). Part 2 proposed two models of organizational memory. The first (Model 1) consisted of five correlated factors of organizational memory and best represented the model that resulted from the EFA in Study 1. The second model (Model 2) consisted of five first order factors of organizational memory and an over-arching second-order factor, organizational memory, to test the utility of the overall scale as well as use of the separate subscales in future studies.

5.2 Sampling

The CFA sample was made up of 288 participants. This included participants from seven companies in total, representing the utility industry (19.72%), the banking and finance sector (15.97%), the professional services sector (6.59%), manufacturing (61.11%), and engineering/transport (7.64%). Invitations to participate were estimated to have circulated among 1085 people in total, with the resulting 288 participants representing a response rate of 26.54%.

5.3 Participants

5.3.1 CFA sample

For the CFA sample, of those who completed the demographic questions, there were 187 (65.4%) male and 99 (34.6%) females, with a mean age of 41.75 years (*SD*=11.17). Participants had been in their current job for a mean 5.03 years (*SD*= 5.50), their organization

for a mean 9.53 years (*SD* =8.78), and their industry for a mean of 15.88 years (*SD*=11.55). There were 192 (67.1%) individuals who identified themselves as team members, 77 (26.9%) as team leaders/middle managers, 16 (5.6%) as team leaders/senior managers, and 1 (.3%) as chief executive officer.

5.3.2 Retest sample

Of the 134 participants given the opportunity to participate in the test-retest reliability analysis, 83 individuals (61.94%) completed the retest. Of these, 21 were from the utility industry (25.30%), 23 from the banking and finance sector (27.71%), 16 from professional services (19.28%), 13 from manufacturing (15.66%), and 10 from the engineering/transport (12.05%) industry. There were 49 (59 %) males and 34 (41%) females. The mean age of the test-retest group was 43.59 years (SD=13.76). Participants had been in their current job for a mean 6.20 years (SD= 7.29), their organization for a mean 10.28 years (SD =10.88), and industry for a mean of 17.65 years (SD= 14.37). There were 68 (81.9%) individuals who identified themselves as team members, 12 (14.5 %) as team leaders/middle managers, and 3 (3.6%) as team leaders/senior managers.

5.4 Materials

Paper and pencil versions of the questionnaire including the 21-item organizational memory scale and demographic questions were used. The instructions and response scale were the same as those used in Part 1. To preserve anonymity in the test-retest reliability study, a personal code was requested of participants at the end of the first questionnaire to enable the researchers to match it to the appropriate retest questionnaire.

5.5 Procedure

All participants were assured of confidentiality and anonymity and gave their informed consent. No incentive was given for participation. There was a mean interval of 4.02 (SD= 0.72) weeks between the test and retest phases.

6. Results

6.1 Goodness of Fit

The confirmatory factor analysis (CFA) employed version 6.0 of AMOS (Arbuckle, 2005). Achieving model fit confirms the factor structure of the scale. Model fit was determined using several "goodness of fit" statistics.

Two models were tested (see Figure 1). Model 1 consisted of five first-order correlated factors while Model 2 consisted of the five first-order factors with one second-order factor of organizational memory. Table 3 shows the goodness fit statistics for each model. The x^2 values for both models were significant (a nonsignificant result is indicative of fit) however both models achieved reasonable CFI and RMSEA values, these statistics often used in addition to the chi-square statistic which can be vulnerable to sample size. A CFI statistic over .90 is indicative of fit (Bentler, 1992), while a RMSEA statistic of less than .80 is considered desirable for fit (Brown and Cudeck, 1993). Model 1 shows slightly better fit than model 2. Overall there was support for Hypothesis 3 with confirmation of the factor structure of the scale identified in the EFA.

Table 3. Confirmatory factor analysis

	x^2	(*df*)	*P*	CFI	RMSEA	Lo	Hi	PCLOSE
Model 1	388.866	179	.000	.922	.064	.055	.073	.005
Model 2	434.496	184	.000	.907	.069	.061	.077	.000

Note. CFI=comparative fit index; RMSEA= root mean square error of approximation; Lo/Hi= lower and upper limits for a 90% confidence interval around RMSEA; PCLOSE= closeness of fit for RMSEA.

Take in Figure 1

6.2 Descriptive Statistics

Means, mean scale scores, standard deviations, coefficient alphas (where appropriate), and correlations between the study variables are shown in Table 4. Coefficient alphas for the organizational memory subscales ranged from .77 to .89, again indicating acceptable to excellent internal consistency estimates (DeVellis, 2003).

As with Part 1, and proposed in Hypothesis 4, correlations were expected between the organizational memory subscales and the tenure variables. All of the organizational memory factors correlated with organizational tenure, while only job knowledge and history correlated with job tenure. Industry knowledge along with job knowledge and history correlated with industry tenure.

Table 4. Part 2 CFA Descriptive statistics and correlations.

	M	*SD*	α	1	2	3	4	5	6	7	8	9	10
1. Age	41.75	11.17		1.00									
2. Organizational tenure	9.53	8.78		.53***	1.00								
3. Job tenure	5.03	5.50		.39***	.59***	1.00							
4. Industry tenure	15.88	11.55		.73***	.66***	.42***	1.00						
5. Socio-political knowledge	4.83	1.08	.87	.12*	.26***	.08	.13*	1.00					
6. Job knowledge	5.77	0.94	.87	.20**	.19**	.14*	.15*	.44***	1.00				
7. External network	5.00	1.29	.81	.13*	.21**	.11	.10	.58***	.38***	1.00			
8. History	3.62	1.21	.77	.32***	.41***	.25***	.31***	.44***	.25***	.39***	1.00		
9. Industry knowledge	3.89	1.29	.78	.27***	.21***	.06	.25***	.41***	.21***	.33***	.57***	1.00	
10. Total organizational memory	4.67	0.85	.91	.26***	.35***	.17**	.25***	.86***	.60***	.73***	.73***	.66***	1.00

* $p < 0.05$ level; **$p < 0.01$ level, *** $p < 0.001$ level, (two-tailed).

6.3 Test-Retest Reliability

The test-retest reliability coefficients for each organizational memory subscale and the combined scale are shown in Table 5, along with the scale means and standard deviations, and the coefficient alphas. Four of the organizational memory subscales, and the overall scale, achieved good test-retest reliability above .80, with the coefficients for industry knowledge (r=.70) and external network (r= .61) showing acceptable test-retest reliability and providing support for Hypothesis 5.

Table 5. Test-retest sample descriptive statistics and correlation matrix

	M	***SD***	**α**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Socio-political knowledge (1)	5.01	1.04	.86	1.00											
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11. Industry knowledge (2)	4.15	1.20	.74	.32**	.29**	.47**	.48**	**.70****	.59**	.44**	.33**	.48**	.56**	1.00	
12. Organizational memory (2)	4.80	0.84	.92	.68**	.60**	.66**	.66**	.48**	**.86****	.84**	.72**	.75**	.73**	.71**	1.00

Note. (1) Time One (2) Time Two. Test-retest correlations are in bold.
* $p < 0.05$ level; ** $p < 0.01$ level, (two-tailed).

7. Discussion

There was support for all of the study hypotheses, with the results having several implications for our understanding of organizational memory and its measurement. These are discussed below.

7.1 Measurement implications

Five meaningful factors of organizational memory resulted from the EFA in Part 1 of the study. The five identified factors represent organizational memory content suggested in the literature including: social (e.g. Cannon-Bowers and Salas, 2001; DeLong, 2004; Gratton, and Ghoshal, 2003; Kidd and Terramoto, 1995; Leonard and Swap, 2005; Nahapiet and Ghoshal, 1998) and political knowledge (Chao *et al.*, 1994; Conlan, 2001; Kransdorff and Williams, 2000); industry knowledge and networks (Kransdorff and Williams, 2000; Zhang *et al*., 2006); job knowledge (e.g. Chao *et al*., 1994; DeLong, 2004; Gratton and Ghoshal, 2003; Leonard and Swap, 2005; Zhang, *et al*., 2006); and knowledge of the history of the organization (Day, 1994; Walsh and Ungson, 1991).

Some of the factors differed in composition from the categories specified in the item generation phase. In some instances the categories proposed earlier were too broad (e.g., industry knowledge) and resulted in sub-categories after factor analysis (i.e. the external network and industry knowledge subscales). Other categories merged, such as the social-political knowledge factor. The organizational memory subscales in Part 1 achieved acceptable internal consistency estimates.

Part 2 of the study sought to confirm the factor structure of the organizational memory scale established by the EFA in Part1. There were also encouraging results in terms of test-retest reliability with most subscales reaching acceptable levels. The internal consistency

estimates of the subscales were also at an acceptable or good level. The result of the study is a psychometrically sound self-report scale encompassing a number of organizational knowledge domains that have relevance for investigation into knowledge-sharing behaviour.

All of the organizational memory factors correlated with organizational tenure in Part 2, with the history factor showing the strongest correlation with this tenure variable. Differentiation in the strength of correlations between the organizational memory and tenure variables were generally as expected. Job knowledge correlated with job tenure but not organizational tenure in Part 1, although correlated with all tenure variables in Part 2. Industry knowledge was the sole organizational memory correlate with the number of jobs held by the participant in the industry in Part 1. Industry knowledge also demonstrated a stronger correlation with industry tenure than organizational tenure in Part 2. These findings provide further support for the validity of the scale.

7.2. Implications for organizational memory theory

There are several implications for the organizational memory literature from these findings that relate to content. The combination of social and political items on one factor suggests that social knowledge is strongly political within organizations and perhaps the more organizational experience one has the less utility there is in separating these elements.

The scale also suggests that valuable organizational memory is not solely sourced from those with long-tenure *within* the organization. Those who have recently entered the organization but who have substantial tenure in that organization's industry, also have knowledge that is significant. This knowledge may offer unique insights that contribute to competitive edge, a desirable outcome of organizational memory (e.g., Cross and Baird, 2000; DeLong, 2004; Johnson and Paper, 1998; Neustadt and May, 1986; Stein, 1995).

The scale (through the inclusion of the socio-political and external network dimensions) also acknowledges the social aspects of organizational memory. The scale (through the inclusion of the socio-political and external network) also underlines the social aspects of organizational memory. According to Cross and Parker (2004), organizational performance, learning, and innovation, rely heavily on well-organised social networks. Rulke et al. (2000) maintain that both internal and external networks are likely sources of highly tacit knowledge (e.g., Nonaka & Takeuchi, 1995). DeLong (2004) proposes that mentoring is a significant method of tacit knowledge transmission. The inclusion of social knowledge and networks in the scale are particularly pertinent to the planned studies into the relationship between organizational memory and attitudes to mentoring.

7.3 Practical Implications

The development of a valid and reliable measure of organizational memory has implications for a number of knowledge sharing initiatives within organizations. The scale can be used as a way of gauging the relationship between what people think they know about the organization and their attitudes to sharing their knowledge. This can help address questions like “How amenable are experienced employees *really* to passing on their valued knowledge to others?” and “Are specific domains of organizational knowledge more or less associated with the willingness to share knowledge?” These questions are particularly relevant when assumptions are made that experienced workers will as a matter of course share their knowledge.

The scale also provides an audit instrument that could be used, for example, in exit interviews. It could identify potential knowledge loss from all departing employees and also identify individuals entering retirement with specific knowledge who could be targeted to

return in a reduced role as mentors, trainers, or consultants in their retirement should they wish to (e.g., DeLong, 2004).

7.4 Limitations and further development

The organizational memory scale was designed to enable employees to estimate their organizational memory and may not reflect employees' *actual* organizational memory. As Spector (1994) suggests, criticism in the research literature is largely directed at self-report methods as objective indicators rather than as valid indicators of employees' own feelings and evaluations. Future research could compare organizational memory scale scores with more objective measures including manager and/or co-worker ratings of the participant's organizational knowledge.

The organizational memory categories proposed for the study, and the resulting subscales do not represent an exhaustive list of the domains that make up organizational memory. A further subscale measuring managerial organizational memory (e.g., Zhang *et al.*, 2006) may be a useful addition. There is also potential to develop some of the already identified scales even further. There may be particular utility in developing a separate scale of job knowledge and expertise for example, with the aim of providing further differentiation between individuals of varying expertise.

7.5 Conclusions

The aim of the research was to develop a psychometrically-sound self-report measure of organizational memory. The newly developed organizational memory scale adequately represents organizational memory content proposed in the literature, demonstrates consistent factor structure, good internal consistency and test- retest reliability, and accordingly, meets psychometric standards for use. Both Parts of the study supported the predicted relationships

between the organizational memory subscales and the tenure variables that are often used as "proxy" variables for job, organizational, and industry, experience. These findings indicate the potential of the scale in future research to gauge connections between what people think they know and their attitudes to sharing their knowledge, critical to an organization's capacity to learn from experience.

Learning organizations depend on being able to harness the knowledge and experience of employees. Investigation of the relationship between organizational memory and attitudes to mentoring are thus needed. The newly developed organizational memory scale shows promise for this research.

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Appendix A

General Conceptual Categories and Initial Organizational Memory Scale Items

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Job knowledge

1. I have not yet learned the basics of my job. * (R)
2. I quickly get to the core of the matter when it comes to making decisions in my work tasks.
3. I have learned how to operate in my job in an efficient manner.*
4. I have mastered the required tasks of my job.*
5. I know the aspects of my job that are particular to this organization.
6. I have not yet developed the appropriate skills necessary to perform my job.* (R)
7. My performance in my work tasks often feels awkward.
8. I have little experience to draw upon when solving problems in my work tasks.(R)
9. I understand what the duties of my job entail.*
10. I know where 'corners can be cut' without affecting the quality of my work.
11. I can think of exception(s) to the rule I am applying when solving problems in my work.
12. Accomplishing my work tasks seems like second nature to me.

Social knowledge

1. When I encounter a problem in my work, I need to ask co-workers who to go to for help.(R)
2. I know 'who' supports 'who' when it comes to my co-workers.

3. I have a good understanding of the work strengths of my co-workers.
4. I have a good idea of “who knows what” in this organization.
5. I know which of my co-workers have expertise you can rely on.
6. I am not aware of informal collaboration(s) among my colleagues.(R)
7. I know which co-workers to go to for a second opinion in my work tasks.
8. I am not aware of how the ‘grapevine’ works in this organization. (R)
9. I have difficulty understanding the jargon used in this organization. (R)
10. I know which co-workers are likely to share their knowledge when asked to do so.
11. I do not know how up-to-date my co-workers are in their work-related knowledge. (R)
12. I know who belongs to which clique in the organization.

Political knowledge

1. I do not know whom you should consult in order to get a request heard here. (R)
2. I do not know of ways to get an idea heard here apart from formal procedures.(R)
3. I know who has the real power in this organization.
4. I can describe the sort of person who will rapidly advance in this organization.
5. I know examples of effective leadership in this organization.
6. I know how to advance an idea in this organization.
7. I do not know how budgets are constructed in this organization.(R)
8. I can identify different styles of leadership at work in this organization.
9. I do not know what this organization considers its main priority. (R)
10. I know whom you cannot afford to offend in this organization.
11. I know whose support you need in the organization to make an idea work.
12. I know the organization’s priorities when it comes to resource allocation.

Cultural knowledge

1. I do not understand why certain behaviours are considered inappropriate here.(R)
2. I know which behaviours upset the management of this organization.
3. I am not sure which behaviours you can get away with in this organization.(R)
4. I know how to avoid reprimand in this organization.
5. I do not know of organizational rules that can be broken without penalty. (R)
6. I am not aware of any 'unwritten rules' in this organization.(R)
7. I know how this organization differs to others in what behaviours are acceptable.
8. I know who represents the model of acceptable behaviour in this organization.
9. I do not know when co-workers have over-stepped the boundaries of acceptable behaviour. (R)
10. I do not know which practices will be punished by this organization. (R)
11. I know the personal characteristics that make a person a good 'fit' here.
12. I know how to avoid the disapproval of management here.

History

1. I have little knowledge of how different managers have responded to crises. (R)
2. I know the major turning points in this organization's past.
3. I know who was considered responsible for major errors in this organization.
4. I know the origins of most organizational traditions.
5. I know which mistakes have really hurt this organization.
6. I know which achievements will be celebrated in this organization.
7. I am not aware of any mistakes the organization has made. (R)
8. I know who has been responsible for the major decisions made in this organization.
9. I know what the organization regrets most about its past.
10. I have little experience of how decisions are made in this organization. (R)
11. I know what organizational decisions will mean for different departments.

12. I cannot predict how colleagues are likely to respond to organizational decisions.(R)

Industry knowledge

1. I know how similar organizations in this industry are performing.
2. I know what represents this organization's major threat in this industry.
3. I know how well this organization has performed compared with others.
4. I know how other organizations in this industry operate.
5. I have a network of associates for the mutual sharing of work-related information.
6. I know which associates to go to for accurate industry news.
7. I have few associates that I can go to for work related feedback. (R)
8. I know which associates to go to for good work-related advice.
9. I know which stakeholders give valuable work-related feedback.
10. I know which stakeholders' opinions matter most to the organization.
11. I know the reputation this organization has in the industry.
12. I know what has been considered the major success of this organization.

Note. (R) Item was reverse scored.

*Items taken or adapted from Chao, G. T., O'Leary-Kelly, A. M., Wolf, S., Klein, H.J. & Gardner, P.D. (1994). Organizational socialization: Its content and consequences. *Journal of Applied Psychology*, *79*(5), 730-743.