Longitudinal knowledge strategising in a long-term healthcare organisation

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Abstract: Long-term healthcare organisations significantly benefit from Knowledge Management (KM). However, the extant literature has little empirical support for this statement. Using the KM instrument developed by Bontis and Fitz-enz (2002), this paper extends prior studies by evaluating behaviours within a not-for-profit context over several years. As such, it tests a comprehensive causal model that illustrates the inputs and outputs of effective KM. Longitudinal data was collected during three temporal periods which provides unique insight related to the optimal strength of each causal link over time. These results also broaden the initial findings developed by Bontis and Fitz-enz.

Keywords: KM; knowledge management; intellectual capital; long-term healthcare.

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1 Introduction

The fundamental building material of the modern organisation is the creation of knowledge (Lytras et al., 2005; Curado and Bontis, 2007a). But, the idea of taking a knowledge-based view of healthcare organisations is not a novel one. After all, healthcare workers are one the best examples of knowledge workers. However, healthcare organisations are a rare breed in that they are generally not driven by competition or profits. Indeed, they are driven by the pursuit of efficiency and effectiveness. The key challenges in these organisations are:

- How to integrate several disparate and standalone knowledge repositories into a single version for healthcare professionals

- How to effectively manage the human and non-human storehouses of expertise to positively support organisational goals (Andreou and Bontis, 2007).

The importance of KM has been well recognised in many parts of the healthcare sector. The entire February 2001 issue of the journal *Topics in Health Information Management* (Volume 21, issue 3) was devoted to KM. Most of the papers were visions of future issues and possibilities rather than reports of completed projects. The 2002 Knowledge Roundtable in Health was held at Queen's University in Canada. Gallupe (2002) reported successful examples of KM practices in health settings that included critical care pathways, care planning, evidence-based decision making and virtual health networks. The roundtable also identified unresolved challenges such as the need for user participation, information technology investment and organisational structures and cultures that support KM.

In 2003, van Beveren (2003) studied the KM needs of a public healthcare system in Australia. He concluded that specific models and techniques were needed for KM in the public sector in general and the healthcare sector in particular. Van Beveren described a healthcare organisation as a collection of professional specialists who contribute to the delivery of patient care. They are deliberately referred to as a 'collection' since these specialists often work in discrete divisions within the organisation, thus fragmenting the delivery of care. This has a profound effect on the ability to create, disseminate or share knowledge throughout the organisation, and yet the delivery of care has most often been achieved. Over the years, the McMaster World Congress on Intellectual Capital (Bontis, 2002) has also attracted a variety of papers that examined the impact of various KM initiatives on healthcare organisations (see http://worldcongress.mcmaster.ca).

These findings led us to believe that an opportunity existed to apply business KM concepts within a healthcare organisation so that the delivery system could become strategic, proactive and knowledge intensive. Furthermore, we felt it was important to examine these issues longitudinally since the field could benefit from empirical research that could measure the changes of inputs and outputs over time. Therefore, the five main research objectives of this study are to:

- replicate the Bontis and Fitz-enz (2002) KM measurement study

- extend the results from the insurance to the healthcare sector

- generalise the results from the USA to Canada

- test the differences between a for-profit vs. not-for-profit organisation

- broaden the results over time from a sample of cross-sectional companies to a longitudinal examination of one single organisation.

2   Literature review and the study's model

The purpose of this section is to present the key concepts employed in this study that relate to KM including: intellectual capital, leadership, feedback, training, development, employee sentiment, and turnover.

Healthcare organisations in particular need to be effective at collecting and analysing clinical and market data and transforming this data into useful information for decision making (Pavia, 2001). The management and sharing of that information to enhance the useful knowledge of patients, clinicians, staff, managers and board members is pertinent to the future survival of healthcare organisations (van Beveren, 2003). Infusing such knowledge into services and the provision of care will differentiate an organisation and provide sustainable competitive advantage (Curado and Bontis, 2006, 2007b).

Ideally, health care organisations need to strive toward a system that is truly 'patient-centred'; just as corporate organisations need to move toward a customer-centred focus and government organisations need to move towards a citizen-centred focus (Bontis, 2007). The patient-centred approach provides care that is based on continuous healing relationships (Stefl, 2002). Such care is customised based on patient needs and values and serves to build the intellectual capital of the organisation.

The purpose of KM is to build the intellectual capital of a firm (Bontis, 1996; O'Regan et al., 2001, 2005; O'Donnell et al., 2004, 2006; Seleim et al., 2004). As such, the academic field benefits from a wide variety of perspectives such as accounting (Bontis, 2003; Cleary et al., 2007), library science (Lytras et al., 2005), education (Bontis and Girardi, 2000; Bontis et al., 2006, 2007) information systems (Lytras and Pouloudi, 2006; Serenko et al., 2007; Turel et al., 2007), project management (Lytras and Pouloudi, 2003), ethics (Bontis and Mograbi, 2006), collaborative software (McKnight and Bontis, 2002; Bontis et al., 2003; Serenko and Bontis, 2004a; Chauhan and Bontis, 2004; Brett and Bontis, 2004), e-commerce (Bontis and de Castro, 2000; Bontis and Chung, 2000; Bontis, 2004a) and strategic management (Choo and Bontis, 2002).

Recent studies have been placing more emphasis on the analysis of interactions and interdependencies of various intellectual capital components (Bontis, 1998; Bontis et al., 2000, 2002; Bontis, 2004b; Cabrita and Bontis, 2007; Cabrita et al., 2007; Bontis and Serenko, 2007). In a comprehensive meta-analysis of the literature, Serenko and Bontis (2004b) state that the field of intellectual capital has grown dramatically over the last few years with a 50% increase in publications per annum. In fact, they expect there to be 100,000 publications in total by the year 2010. This is quite remarkable for a nascent field with its earliest academic papers dating from the mid-1990s. A Google search on the term 'intellectual capital' yields over one million hits and the term 'Knowledge

Management' yields 45 million hits. Even though the field is considered in its embryonic stages, the concept is still referred to as fuzzy (Marr, 2005). Notwithstanding, there exists some convergence of what intellectual capital encompasses. Generically speaking, the extant literature identifies three sub-components of intellectual capital: human capital, structural capital and relational capital (see Bontis, 1999, 2001a, 2001b for comprehensive reviews of the literature).

Human capital is defined as a set of intangible resources that are embedded in the individuals of the organisation (Bontis et al., 1999). The productivity of human capital depends on a complex combination of factors related to employee talent, motivation, reward, skill, experience, health and even emotional states (Mitchell and Bontis, 2000). In this context, human capital analysis should include an examination of competencies (i.e., skills, experience and know-how) and attitudes (i.e., commitment and values). Consequently, managers should emphasise both the absolute talent of their employees as well as the motivation they have to contribute to the firm's objectives (Kim and Mauborgne, 2005).

While the concept of human capital is well established in the literature, structural capital is less obvious and requires more careful specification. Structural capital is typically defined as encompassing all of the non-human storehouses of knowledge in an organisation (e.g., databases, technology, infrastructure, processes, procedures, etc.). In this context, structural capital and human capital are mutually exclusive yet interdependent. Without the firm's supporting structure, individuals have no ability to do anything with their ideas. Consequently, structural capital should be designed to maximise the potential of human capital given the appropriate culture (Schneider, 2000). In sum, structural capital includes all of the intellectual assets of an organisation that usually stay in the office, even if people leave.

Relational capital represents the knowledge resources embedded in the constellation of external relationships a firm has with any stakeholder (Bontis, 2001a, 2001b). Through external relationships, firms can access critical and complementary resources. Prahalad and Ramaswamy (2000) suggest that the relational capital embedded in customers can become a new source of competence for the organisation, because they rejuvenate a firm's knowledge base preventing it from obsolescence in a turbulent environment. While relational capital can be measured as a function of longevity (Bontis, 1998), marketing prowess (Håkansson and Snehota, 1995), and customer relationship management (Gummesson, 2002), the concept of relational capital emerges primarily from the research related to 'market orientation' (Kohli and Jaworski, 1990; Narver and Slater, 1990). In the context of this study, relational capital refers to the knowledge embedded in relationships with patients and their families.

Managerial leadership is the fuel of contemporary firms (Boehnke et al., 1997, 2003). Behaviours and actions of leaders have very important consequences for all organisational members in both public and private organisations (Bontis and Nikitopoulos, 2001; Bontis, 2001a, 2001b, 2002; Borins et al., 2007). Systematic academic investigations of leadership have been conducted since 1930, but there are still many phenomena to be uncovered (Bass and Stogdill, 1990). One of the most important characteristics of effective managers and leaders is their ability to generate positive experiences in their followers, motivate them, lead by example, promote, and ensure they retain their positions with the organisation for as long as possible (Ilies et al., 2006). In terms of causal modelling, this establishes a positive direct link between managerial

leadership and the retention of key people and between managerial leadership and value alignment.

Another vital characteristic of strong leaders is their ability to offer timely, relevant and constructive feedback to employees on their performance (House and Aditya, 1997). The importance of feedback from supervisors has been demonstrated in previous studies (Ilgen et al., 1979; Jawahar, 2006; Murphy and Cleveland, 1995). Specifically, it is argued that feedback is vital since it influences a number of outcomes, such as overall organisational attitudes, job performance, increased self-awareness, improved self-confidence, motivation and commitment (Ambrose and Kulik, 1999; Kluger and DeNisi, 1996; London and Smither, 2002). In the present project, feedback is defined as information on one's job performance, recognition, achievements, the identification of goals and objectives and other valuable inputs received by an employee from his or her immediate supervisor. If supervisors are effective leaders, they are likely to offer good feedback to their subordinates; that reveals the managerial leadership – supervisory feedback direct link. At the same time, it is hypothesised that supervisory feedback directly impacts human capital so that those employees who receive positive, applicable, and fair feedback build more human capital. For example, this may be achieved through higher self-efficacy; after receiving positive feedback, employees may believe they have the necessary skills, knowledge and competencies to do their jobs. They may also demonstrate higher problem-solving capabilities and aptitudes to function more productively.

Training and Development (T&D) is a vital attribute of successful contemporary organisations (Goldstein, 1989). Organised and structured T&D activities date back to the 19th century (Grensing-Pophal, 2002). Nowadays, rapid changes in technological, societal and legal aspects of contemporary markets demand the companies constantly invest in the development of their workforce. T&D programs generate benefits for both organisations, such as increased performance and ability to compete (Birdi et al., 1997), and individuals, such as better redeployment chances or feelings of personal growth (Millman and Latham, 2001). Some individuals perceive organisation-sponsored training as an investment in the relationship between the person and the company (Farrell and Rusbult, 1981). Based on this, it is believed that T&D has a positive direct impact on human capital of the organisation.

Employee sentiment is an important antecedent of human capital. It can be defined in terms of three components and their relationships: employee satisfaction, commitment, and motivation. These constructs are products of an overall organisational culture. Job satisfaction is one of the most respected, yet controversial, concepts in the management literature (Judge et al., 2001). It is an attitudinal variable that captures an overall assessment of all aspects of someone's job (Spector, 1997). Despite hundreds of projects that date back to the well-known Hawthorne studies (Roethlisberger and Dickson, 1956), little assimilation regarding the role and impact of job satisfaction has occurred. For instance, it was argued that job satisfaction is positively associated with pay, appraisal feedback and performance (Herzberg, 1957; Judge et al., 2001). It was also found that satisfaction affects organisational citizenship, employee commitment and capabilities (Bontis and Serenko, 2007; Mayo, 2000; Williams et al., 2000; Williams and Wong, 1999). Employee commitment is the extent of one's identification with an organisation (Allen and Meyer, 1990; Jawahar, 2006) that influences key organisational outcomes, such as business performance.

Employee motivation is an important construct in organisational research because it leads to business success. Scholars have developed various concepts, theories and models with the goal to advance our understanding of underlying principles of employee motivation (Ambrose and Kulik, 1999; Kleinbeck et al., 1990; Locke and Latham, 2002). With respect to the present study, it is proposed that employee satisfaction leads to both employee motivation and employee commitment. Employee commitment in turn affects business performance with the knowledge generation construct serving as a partial mediator. Satisfied employees may generate more human capital because of a knowledge-sharing culture; therefore, it is suggested that employee satisfaction also has a positive direct effect on human capital.

Turnover is the rotation of employees around the labour market; among jobs, companies and professions; and between states of employment and unemployment (Abassi and Hollman, 2000). There are two types of turnover: involuntary, when the company terminates one's employment and voluntary, when a person resigns on his or her own will. In this project, voluntary turnover is investigated for the following reasons. First, voluntary turnover is beyond direct control of management; second, voluntary turnover has become a disease of contemporary organisations. For instance, in some industries, annual voluntary turnover rates among knowledge workers are as high as 20% which means that each year organisations lose one-fifth of their knowledge mostly because they do not manage their turnover effectively (Stovel and Bontis, 2002). At the same time, managers have a variety of techniques to deter quits and to make employees stay with an organisation longer. Therefore, senior management should consider the consequences of turnover and take actions in advance and researchers need to further investigate this phenomenon and offer solutions. One of the causes of turnover is knowledge hoarding within the organisation. According to meta-analyses of turnover literature by Griffeth et al. (2000) and Hom and Griffeth (1995), voluntary turnover is associated with the lack of management-subordinate information exchange and the absence work group cohesion; those are situations when employees hoard their knowledge for their personal benefits. Thus, knowledge sharing within a company should be negatively associated with turnover; the more knowledge co-workers tend to share with one another, the more likely people are to stay with this organisation in future. Finally, it is hypothesised that performance itself has a causal feedback loop. Bontis and Fitz-enz (2002) determined that as business performance increased, voluntary turnover decreased. This is because individuals tend to stay with organisations that are doing well and prefer to leave when there is a downturn.

3 Methodology and results

The aforementioned research objectives were operationalised by administering a survey instrument developed by Bontis and Fitz-enz (2002). All items were measured on a 7-point Likert-type scale. This instrument was originally developed for the insurance industry and was therefore adjusted slightly to accommodate the healthcare sector. Ultimately, it was administered three times during the fall of 2001, 2003 and 2005. The healthcare organisation that was the subject of this longitudinal KM study was Country Terrace.

Country Terrace is a not-for-profit long-term health care facility governed by the Ministry of Health and Long-Term Care in Ontario, Canada. It has been in operation for

over 30 years and provides medical, nursing and nutrition services for over 120 residents. There are over 100 qualified, compassionate professionals that work for the organisation.

The executive director of the team was charged with a modernisation initiative in 2001 that included a very important goal to become a knowledge-intensive organisation within three years. Historically, the organisation had been plagued by poor information technology and a culture of hoarding among doctors, nurses and staff at the detriment of high quality patient care. The first step was to diagnose the organisation through a survey which was completed in the fall of 2001. The results identified several areas of improvement that were communicated to all employees through a variety of follow-up seminars and open-ended meetings. There were also several new initiatives developed including an investment in a new electronic filing system, electronic mailing system and the intranet. Individuals were also required to attend several coaching and training seminars throughout the year.

Two years later, in the fall of 2003, a follow-up survey was administered in order to ascertain if the initiatives had made a positive impact. Once again, several new KM projects were undertaken and a final survey was administered in the fall of 2005. On average, there was a response rate of 75% in each of the three survey administrations which is more than adequate for such studies.

3.1   Measurement model

PLS-Graph v.3 was used for structural equation modelling. This analytical software tool is used in a variety of strategic management research settings such as mission statements (Bart et al., 2001; Bart and Bontis, 2003) and performance measurement (Bontis and Mill, 2004; Turel and Serenko, 2006). Before analysing the causal relationships of the model under investigation, a rigorous psychometric evaluation of the constructs and corresponding items was done. First, construct reliability was assessed through Cronbach's Alpha (Cronbach, 1951), and it was observed that all values exceeded the cut-off point of 0.8 for confirmatory research (Nunnally and Bernstein, 1994).

Second, corrected item-to-total correlations for all constructs were measured to further assess inter-item consistency reliability, and all values were above 0.5 for all indicators. Third, a confirmatory factor analysis was done. Only a few items captured <50% of the construct's variance (i.e., item loading was below 0.7) and were removed from further analysis. Table 1 outlines item statistics.

In order to analyse mean differences, a MANOVA test was conducted where year of the survey was selected as a fixed factor. The results indicated that all construct means were different (Wilk's $\lambda = 0.020$, $p < 0.000$, all between-subject effects were different at 0.05 level).

A visual inspection of Table 1 revealed that most item means increased each year, with the largest gap from 2001 to 2003. It is noted that the construct reflecting voluntary turnover decreased in 2003 but dramatically increased in 2005.

Fourth, to test discriminant validity, a matrix of loadings and cross-loadings was constructed. It was observed that each indicator loaded higher on a construct to which it belongs than on other constructs (or other cross-loading items). As such, some degree of confidence in the discriminant validity of the items was assured.

Table 1 Construct statistics, validity and reliability measures

	Construct	Three years combined					Mean 2001	Mean 2003	Mean 2005
		Mean	*Std.*	*Alpha*	*Internal consistency*	*AVE*			
1	Employee satisfaction	4.34	1.15	0.87	0.899	0.642	3.78	4.67	4.70
2	Employee commitment	5.23	1.09	0.87	0.905	0.657	4.82	5.45	5.50
3	Employee T&D	4.93	1.23	0.89	0.919	0.670	4.38	4.79	5.60
4	Employee motivation	4.30	1.37	0.90	0.925	0.711	3.61	4.66	4.75
5	Value alignment	4.16	1.18	0.81	0.872	0.630	3.66	4.38	4.52
6	Retention of key people	4.20	1.29	0.81	0.867	0.572	3.59	4.64	4.51
7	Human capital	4.62	1.04	0.87	0.895	0.551	4.34	4.82	4.77
8	Structural capital	4.32	1.35	0.92	0.942	0.765	3.36	4.72	5.05
9	Relational capital	4.86	1.15	0.93	0.944	0.707	4.22	5.26	5.25
10	Management leadership	4.28	1.76	0.97	0.978	0.813	3.33	4.82	4.90
11	Process execution	4.18	1.31	0.93	0.948	0.784	3.54	4.48	4.64
12	Knowledge generation	4.44	1.21	0.87	0.907	0.662	3.81	4.81	4.82
13	Knowledge sharing	4.12	1.49	0.89	0.921	0.701	3.08	4.72	4.79
14	Knowledge integration	3.71	1.35	0.89	0.920	0.700	2.82	4.15	4.34
15	Business performance	5.27	1.04	0.83	0.884	0.657	5.11	5.60	5.21
16	Feedback	3.93	1.79	0.96	0.969	0.863	3.05	4.43	4.47
17	Turnover	3.37	1.93	0.81	0.862	0.677	3.22	2.97	3.80
	Average for all constructs						*3.75*	*4.67*	*4.80*

Fifth, the measure of convergent validity was assessed by the *t*-tests for the item loadings (Anderson and Gerbing, 1988; Hatcher, 1994). The inspection revealed that all *t*-values were significant at 0.01 level (i.e., all indicators effectively measured the construct they belonged to).

Sixth, internal consistency and Average Variance Extracted (AVE) values were calculated in PLS-Graph v.3 (see Table 1). For all constructs, these values were above the commonly established thresholds of 0.7 and 0.5 respectively.

Seventh, to further assess discriminant validity, a correlation matrix was constructed where each value in the diagonal represents the square root of the AVE as suggested by Fornell and Larcker (1981). For each construct, the square root of AVE was higher than the inter-construct correlations in corresponding rows and columns (see Table 2).

It is noted that some correlation values are only marginally below the square root of AVE. This, however, does not threaten the validity of the model because these constructs represent independent and dependent variables and are expected to be highly correlated. For example, the correlation value between process execution (i.e., independent variable) and knowledge integration (i.e., dependent variable) is 0.808 that is still below the diagonal value of 0.885.

Table 2   Correlation matrix and discriminant validity assessment (2001, 2003 and 2005)

	Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Employee satisfaction	*0.801*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	Employee commitment	0.653	*0.811*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	Employee T&D	0.585	0.492	*0.819*	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	Employee motivation	0.723	0.574	0.628	*0.843*	–	–	–	–	–	–	–	–	–	–	–	–	–
5	Value alignment	0.670	0.571	0.597	0.742	*0.794*	–	–	–	–	–	–	–	–	–	–	–	–
6	Retention of key people	0.710	0.535	0.548	0.745	0.720	*0.756*	–	–	–	–	–	–	–	–	–	–	–
7	Human capital	0.623	0.651	0.546	0.668	0.657	0.660	*0.742*	–	–	–	–	–	–	–	–	–	–
8	Structural capital	0.618	0.534	0.604	0.673	0.640	0.645	0.616	*0.875*	–	–	–	–	–	–	–	–	–
9	Relational capital	0.560	0.590	0.541	0.631	0.593	0.578	0.587	0.718	*0.841*	–	–	–	–	–	–	–	–
10	Management leadership	0.654	0.492	0.570	0.676	0.662	0.758	0.547	0.652	0.566	*0.902*	–	–	–	–	–	–	–
11	Process execution	0.676	0.576	0.574	0.711	0.696	0.713	0.688	0.724	0.722	0.724	*0.885*	–	–	–	–	–	–
12	Knowledge generation	0.615	0.611	0.582	0.643	0.644	0.670	0.698	0.725	0.710	0.666	0.808	*0.814*	–	–	–	–	–
13	Knowledge sharing	0.648	0.508	0.574	0.705	0.696	0.734	0.632	0.720	0.679	0.801	0.798	0.810	*0.837*	–	–	–	–
14	Knowledge integration	0.633	0.517	0.557	0.681	0.692	0.684	0.665	0.742	0.614	0.716	0.769	0.769	0.816	*0.837*	–	–	–
15	Business performance	0.362	0.523	0.394	0.459	0.438	0.499	0.575	0.420	0.566	0.462	0.516	0.540	0.493	0.449	*0.811*	–	–
16	Feedback	0.599	0.433	0.528	0.686	0.665	0.762	0.590	0.605	0.543	0.850	0.684	0.626	0.762	0.712	0.494	*0.929*	–
17	Turnover	–0.212	–0.117	–0.138	–0.148	–0.212	–0.196	–0.127	–0.084	–0.095	–0.191	–0.106	–0.099	–0.096	–0.098	–0.017	–0.170	*0.823*

As stated by Straub et al.,

> "loadings across what are traditionally known as independent and dependent variables are not relevant to the issue of construct validity and such tests may/should be avoided in Principle Component Analysis (PCA)." (Straub et al., 2004, p.25)

Similar observations were also reported in other projects (Dow et al., 2006). Overall, it was concluded that the measurement model met the reliability and validity requirements.

3.2 Structural model

Bootstrapping was done to derive t-statistics for the structural model. Two hundred samples were generated which meets the minimum re-sampling requirement as suggested by Chin (1998, 2001). All in all, four models were estimated:

- the aggregated 2001, 2003 and 2005 data
- 2001 data
- 2003 data
- 2005 data (see Table 3 and Figure 1).

Table 3 Beta values (significant at 0.05 level are in bold, insignificant values are in italics)

	Construct	*2001*	*2003*	*2005*	*All*	*Bontis and Fitz–enz (2002)*
1	Mgt leadership → value alignment	**0.547**	**0.680**	**0.683**	**0.662**	**0.751**
2	Mgt leadership → feedback	**0.863**	**0.837**	**0.746**	**0.850**	n/a
3	Mgt leadership → structural capital	**0.616**	**0.398**	**0.571**	**0.652**	**0.475**
4	Mgt leadership → retention	**0.700**	**0.562**	**0.560**	**0.654**	**0.506**
5	T&D → human capital	*0.162*	*0.202*	**0.383**	**0.200**	**0.530**
6	Feedback → human capital	**0.334**	*0.210*	**0.323**	**0.283**	n/a
7	Employee satisfaction → human capital	**0.332**	**0.458**	**0.202**	**0.336**	**0.358**
8	Employee satisfaction → employee commitment	**0.654**	**0.678**	**0.549**	**0.653**	**0.734**
9	Employee satisfaction → employee motivation	**0.541**	**0.611**	**0.595**	**0.606**	**0.456**
10	Employee commitment → employee Motivation	*0.138*	*0.149*	*0.237*	**0.179**	**0.429**
11	Employee motivation → knowledge sharing	*0.294*	**0.254**	*0.100*	**0.204**	**0.430**
12	Value alignment → knowledge sharing	*0.173*	*0.157*	*0.208*	**0.146**	**0.285**
13	Structural capital → process execution	**0.754**	**0.596**	**0.600**	**0.724**	**0.543**
14	Process execution → knowledge integration	**0.684**	**0.758**	**0.766**	**0.769**	**0.394**
15	Knowledge integration → knowledge sharing	**0.435**	**0.514**	**0.559**	**0.576**	**0.262**
16	Employee commitment → knowledge generation	**0.540**	**0.585**	**0.624**	**0.611**	**0.491**
17	Human capital → relational capital	*0.109*	**0.344**	**0.430**	**0.233**	**0.326**
18	Structural capital → relational capital	**0.618**	**0.377**	**0.352**	**0.574**	**0.307**
19	Employee commitment → retention	**0.183**	**0.353**	**0.217**	**0.213**	**0.442**
20	Employee commitment → performance	**0.356**	*0.266*	**0.327**	**0.308**	**0.439**
21	Knowledge generation → performance	*0.210*	**0.393**	**0.563**	**0.352**	**0.327**
22	Knowledge sharing → turnover	*–0.116*	*–0.451*	*–0.233*	–0.116	**–0.233**
23	Performance → turnover	*0.166*	*0.183*	*0.145*	0.040	**–0.372**

Figure 1   Structural model, all years (all betas are significant at 0.05 level except where noted)
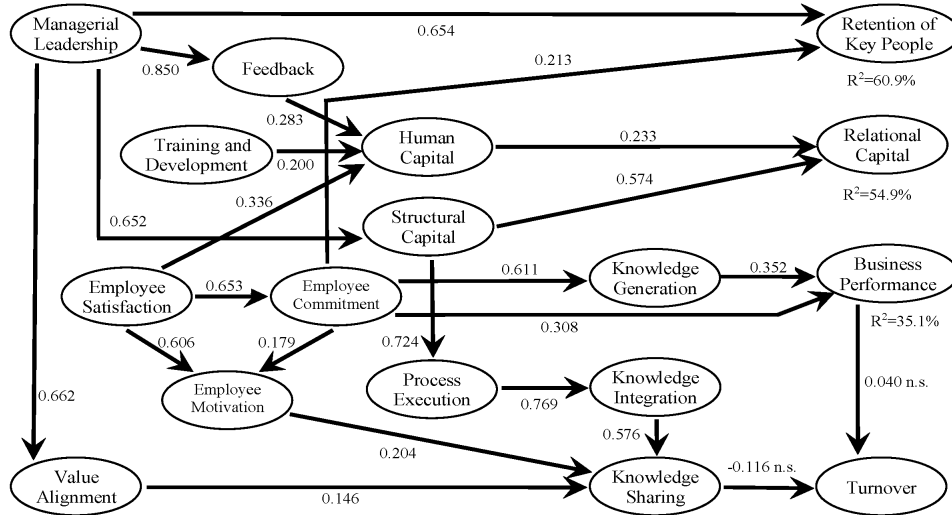
R-squared values were calculated for three outcome dependent variables: retention of key people, relational capital and business performance. These values represent the explanatory power of the overall model which is relatively strong. Table 4 offers the results.

Table 4   *R*-squared values

Construct	2001(%)	2003(%)	2005(%)	All(%)	Bontis and Fitz-enz (2002)
Retention of key people	62.4	60.0	48.9	60.9	68.2%
Relational capital	48.2	41.0	49.7	54.9	–
Business performance	25.2	34.7	65.3	35.1	44.1%

4   Implications and conclusions

During this project, a total of eight major research findings have been discovered that deserve attention.

4.1   Research implication I: differences in construct means in a longitudinal study

As indicated in Table 1, most item means have been increasing over the three-year time period with the largest increase from 2001 to 2003. After the initial 2001 survey, Country Terrace initiated several KM activities that increased employee awareness and appreciation of KM (e.g., seminars, coaching, information technology investments and cross-functional team meetings). One of the major outcomes was changes in perceptions of KM, HR and other measures. Changes in construct averages may serve as an indicator of success for the managers. It is noted that construct averages are meaningful only in a longitudinal study where it is possible to benchmark values over time.

In addition to the longitudinal benchmarking that took place in this study, it should be noticed that Country Terrace also benefited from cross-sectional benchmarking as well. The Bontis and Fitz-enz (2002) instrument has been used in a variety of other industry sectors which provided the organisation with useful relative data. Country Terrace also benefited from direct comparisons with another long-term health care facility that was being tested at the same time.

## 4.2 Research implication II: differences in the model's path coefficients over time

As presented in Table 3, the strengths of the model's structural relationships fluctuated depending on the year the survey took place. It was observed that all betas changed from one year to another. This reveals a relative instability of structural path coefficients in the long-run. One explanation of this phenomenon relates to various moderating variables that affected the nature of these relationships.

A moderator is an external variable that may change the sign or strength of a causal link between an independent and a dependent variable (Carte and Russell, 2003; Sharma et al., 1981). Currently, there is a growing trend to employ moderators in various contexts because they may potentially explain mixed or inconsistent findings of previous projects conducted in different environments (Judge et al., 2001; Serenko et al., 2006; Sun and Zhang, 2006; Turel et al., 2006). Recently, Bontis and Serenko (2007) empirically demonstrated that organisational KM practices actually serve as a moderating variable. Specifically, they proposed a model in which an employee's capabilities depend on his or her T&D as well as job satisfaction. Job satisfaction in turn was affected by T&D, pay satisfaction, supervisor satisfaction and job insecurity. All these relationships were moderated by employee perceptions of organisational human capital management practices.

It is hypothesised that the organisational KM projects initiated by Country Terrace changed the way employees perceived various cause-and-effect relationships tested in the model. For example, it is assumed that an increase in the strength of the employee commitment $\rightarrow$ knowledge generation relationship (beta: 2001 = 0.540; 2003 = 0.585; 2005 = 0.624) resulted from changes in the overall organisational culture; the more committed the employees are, the more likely they are to generate knowledge for the company. By examining the betas over time, one can infer the maximum and minimum points on a curve. Of course, this is only a theoretical determination, but at least, it helps management understand the timing and impact of their initiatives (see Figures 2 and 3 for two examples of interpolation using binomial equations and first integrals).

When longitudinal examinations continue for more than three temporal periods, the accuracy of the interpolations also improves. In the two cases above, two longitudinal causal links were examined. In the first case, the zero slope of the binomial curve infers a minimum point of impact. In the second case, the zero slope infers a maximum point of impact. These two points are then transformed into actual dates by converting the integers into dates between survey administrations. Results like these can be reported back to management so that a determination of optimal lag time for certain organisational initiatives can be presented.

Figure 2   Longitudinal causal model with interpolation of minimum point (see online version for colours)
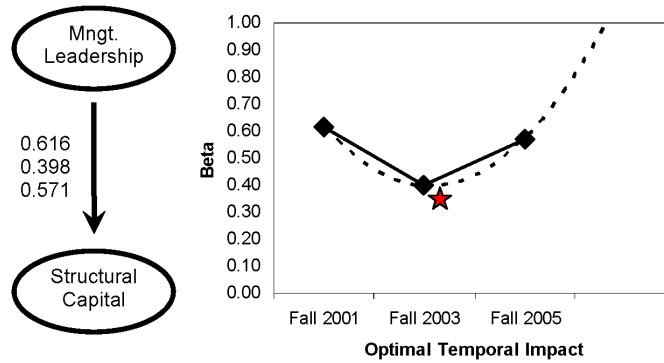
$y = 0.1955x^2 - 0.8045x + 1.225.$
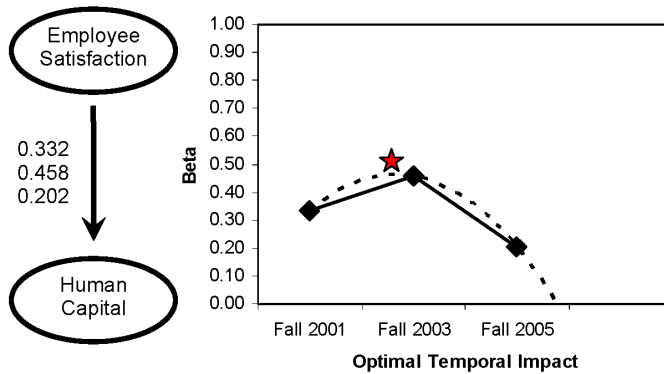
First integral, slope $\rightarrow$ 0(MIN).

$0 = 2 \times 0.1955x - 0.8045.$

$0 = 0.391x - 0.8045.$

$X = 2.058.$

Date = December 21, 2003.

Figure 3   Longitudinal causal model with interpolation of maximum point (see online version for colours)

$y = -0.191x^2 + 0.699x - 0.176.$

First integral, slope $\rightarrow$ 0(MAX).

$0 = -2 \times 0.191x + 0.699.$

$0 = -0.382x + 0.699.$

$X = 1.829.$

Date = September 27, 2003.

4.3   Research implication III: differences in a single year and aggregate years

During the study, it was observed that there were differences between the models for a single year (i.e., only for 2001, only for 2003 and only 2005) and the model where the three-year data were aggregated (see Table 3). As such, both the strength of

the relationship and significance levels were different for most links. For example, the employee commitment → employee motivation link was in the proposed direction (i.e., positive) yet insignificant for single-year models, but it became significant when the three-year data were combined together with the beta of 0.179 ($p < 0.05$). Two explanations are offered. First, combining three yearly datasets together increased the sample size of the aggregated dataset that allowed PLS generating a sufficient number of re-samples to achieve statistical significance. Second, item variance in the combined model might dramatically differ from those in single-year models. This might cause changes in the measurement models that, in turn, affected the structural model. A visual inspection of item loadings for the constructs confirmed this proposition. Even though all item loadings were within the commonly accepted thresholds for all constructs for all models, some changes in item weights and loadings were observed among the models. Therefore, in a longitudinal study, aggregating individual datasets may not necessarily reflect a model's behaviour in each particular time period.

4.4 Research implication IV: findings compared to those by Bontis and Fitz-enz (2002)

There are several explanations as to why the beta values were different in this study as compared to Bontis and Fitz-enz (2002). First, this study's context is significantly different given that the industries (healthcare vs. insurance) are structurally different. Therefore, the mode of enterprise (not-for-profit vs. for-profit) plays an important role in the behaviours of employees. Furthermore, the insurance study consisted of surveying employees in the insurance sector who were predominantly men. In the case of Country Terrace, the respondents were predominantly women.

4.5 Research implication V: managerial leadership is the key antecedent

Managerial leadership is the parsimonious antecedent construct in KM. It positively affects the retention of key employees (0.654), value alignment (0.662), structural capital (0.652), and perception of supervisor feedback (0.852). The exogenous constructs that influence endogenous ones with coefficients of 0.6 and above are considered very important in management research and should be treated with extra care.

4.6 Research implication VI: employee sentiment affects important factors

In this study's model, employee sentiment in an organisation was operationalised in form of three independent factors: employee satisfaction, employee commitment and employee motivation. Consistent with prior research, it was confirmed that employee satisfaction had a positive direct effect on both employee commitment (0.653) and employee satisfaction (0.606). At the same time, employee commitment had an impact on employee motivation in the aggregated model only, and the link was moderate-low (0.179). This contradicts the finding by Bontis and Fitz-enz (2002). This may result from differences in the types of organisations investigated in each project. In the present study, a significantly larger pool of contractual vs. permanent employees were surveyed which may explain the difference.

Employee commitment is directly linked to people retention (0.233). It is reasonable to conclude that as the level of employee commitment increases, individuals are more likely to stay with this organisation in the long-run. Employee commitment is also linked to business performance with knowledge generation serving as a partial relationship mediator. As such, an overall employee commitment impact on business performance is $0.523 = (0.308 + 0.611 \times 0.352)$.

It should also be noted that employee sentiment is a 'critical node'. In other words, it has the most important tactical position in the causal model itself. To determine a critical node, one must identify the construct with the most consequences. In this case, employee satisfaction has three causal relationships coming out of it which makes it a critically influential antecedent for the outcome variables.

4.7   Research implication VII: ambiguous role of turnover

Recall that no relationship between business performance and turnover for all models was found. Only in one year (2003), there was a strong negative knowledge sharing → turnover link (–0.451). This contradicts the results by Bontis and Fitz-enz who showed that both relationships were negative and significant. Two explanations for this disparity are offered. First, the nature of the organisations was different because they belonged to the health-care and financial sectors that are different in most aspects. Second, respondents were also different. In the present project, they were all employees of a single organisation whereas in the study by Bontis and Fitz-enz, they were senior executives across 25 organisations. It may be assumed that the subjects from each study perceived turnover differently and made voluntary job termination decisions based on dissimilar factors. For example, senior executives are more likely to leave if they are not satisfied with some aspects of their jobs, for example, when they believe their colleagues hoard their knowledge. At the date Bontis and Fitz-enz's study was conducted, the job market offered tremendous job opportunities for senior executives of financial companies. This explains the negative knowledge sharing → turnover link in Bontis and Fitz-enz's project. At the same time, some middle and frontline employees of a health-care company located in a relatively small town may prefer to keep their jobs regardless of their perception of intra-organisational knowledge sharing. The absence of business performance → turnover relationship in the present investigation may be attributed to differences in financial performance measures of both organisations. As such, financial sector companies tend to be more aggressive and profit-driven whereas those are not the primary objectives of health-care providers. Therefore, as performance of a profit-focused business increases, people tend to keep their jobs. This explains the negative 0.373 performance → turnover link in Bontis and Fitz-enz's project. In contrast, business performance is not a major factor affecting voluntary turnover for health-care providing organisations; there may be various intrinsic factors, for example, moral obligations and self-expression that make employees stay. In addition, senior managers' pay tends to be directly linked to the company performance; therefore, they receive higher monetary rewards and retain their jobs when business performance improves. This does not hold true with respect to middle and lower-level employees. Therefore, it is concluded that the relationship between knowledge sharing and turnover and business performance and turnover depends on

- the sector in which the company operates so that a negative relationship is likely to exist for profit-oriented companies rather than for goodwill-focused ones

- employee level so that a negative relationship is likely to exist for senior executives rather than for middle and lower-level employees.

4.8 Research implication VIII: KM is a critical organisational initiative

Three primary KM constructs were utilised in the study's model: knowledge generation, knowledge integration and knowledge sharing. It is argued that it is important to combine general HR procedures with KM activities. As such, employee satisfaction directly affects employee commitment (0.653), which in turn influences both performance (0.308) and knowledge generation (0.611). Process execution (the ability to complete tasks in an efficient and timely manner) has a direct impact on knowledge generation (0.769) that further affects knowledge sharing (0.576).

In other words, people are ready to generate knowledge and perform better if they are committed to the company. Successful process execution allows employees to integrate knowledge that leads to intra-organisational knowledge sharing. To be successful and boost performance, KM initiatives should be combined with regular HR and operational policies.

Finally, three endogenous constructs, such as retention of key people, relational capital and business performance exhibited significant R-squared values. To be meaningful in terms of managerial decision making, a dependent construct should have an R-squared value of 20% and above. In the present project, even though R-squared varied over the three time periods under investigation, they were all substantive. The highest R-squared was observed for the retention of key people construct (48.9–62.4%), followed by relational capital (41.0–49.7%) and business performance (25.2–65.3%).

This study demonstrates that it is possible to develop and utilise causal models describing impacts of various organisational policies on major outcome variables. Specifically, it was proved that a longitudinal study may reveal the effect of internal procedures on various KM constructs. Longitudinal investigations are a relatively new form of inquiry in business administration research. This project presents one of the first documented attempts to conduct a longitudinal study in the KM field. The potential benefit of developing causal models and testing them longitudinally is unarguable. We hope that future scholars will continue this line of research and develop more useful recommendations to guide executive management decisions.

References

Abassi, S.M. and Hollman, K.W. (2000) 'Turnover: the real bottom line', *Public Personnel Management*, Vol. 2, No. 3, pp.333–342.

Allen, N.J. and Meyer, J.P. (1990) 'The measurement and antecedents of affective, continuance and normative commitment to the organization', *Journal of Occupational Psychology*, Vol. 63, No. 1, pp.1–18.

Ambrose, M.L. and Kulik, C.T. (1999) 'Old friends, new faces: motivation research in the 1990s', *Journal of Management*, Vol. 25, No. 3, pp.231–292.

Anderson, J.C. and Gerbing, D.W. (1988) 'Structural equation modeling in practice: a review and recommended two-step approach', *Psychological Bulletin*, Vol. 103, No. 3, pp.411–423.

Andreou, A. and Bontis, N. (2007) 'A model for resource allocation using operational knowledge assets', *The Learning Organization: An International Journal*, in press, forthcoming.

Bart, C. and Bontis, N. (2003) 'Distinguishing between the board and management company mission: implications for corporate governance', *Journal of Intellectual Capital*, Vol. 4, No. 3, pp.361–381.

Bart, C., Bontis, N. and Taggar, S. (2001) 'A model of mission statements and firm performance', *Management Decision*, Vol. 39, No. 1, 1pp.9–35.

Bass, B.M. and Stogdill, R.M. (1990) *Bass and Stogdill's Handbook of Leadership: Theory, Research, and Managerial Applications*, Free Press, New York.

Birdi, K., Allan, C. and Warr, P. (1997) 'Correlates and perceived outcomes of four types of employee development activity', *Journal of Applied Psychology*, Vol. 82, No. 6, pp.845–857.

Boehnke, K., DiStefano, A., DiStefano, J. and Bontis, N. (1997) 'Leadership for exceptional performance', *Ivey Business Journal (Formerly Business Quarterly)*, Vol. 61, Summer, pp.56–63.

Boehnke, K., Bontis, N., DiStefano, J. and DiStefano, A. (2003) 'Transformational leadership: an examination of cross-cultural differences and similarities', *Leadership and Organization Development Journal*, Vol. 24, No. 1, pp.5–15.

Bontis, N. (1996) 'There's a price on your head: managing intellectual capital strategically', *Ivey Business Journal (Formerly Business Quarterly)*, Summer, Vol. 60, pp.40–47.

Bontis, N. (1998) 'Intellectual capital: an exploratory study that develops measures and models', *Management Decision*, Vol. 36, No. 2, pp.63–76.

Bontis, N. (1999) 'Managing organizational knowledge by diagnosing intellectual capital: framing and advancing the state of the field', *International Journal of Technology Management*, Vol. 18, Nos. 5–8, pp.433–462.

Bontis, N. (2001a) 'Assessing knowledge assets: a review of the models used to measure intellectual capital', *International Journal of Management Reviews*, Vol. 3, No. 1, pp.41–60.

Bontis, N. (2001b) 'CKO wanted – evangelical skills necessary: a review of the chief knowledge officer position', *Knowledge and Process Management*, Vol. 8, No. 1, pp.29–38.

Bontis, N. (2002) 'The rising star of the chief knowledge officer', *Ivey Business Journal (Formerly Business Quarterly)*, Vol. 66, No. 4, pp.20–25.

Bontis, N. (2002) *World Congress of Intellectual Capital Readings*, Elsevier Butterworth Heinemann KMCI Press, Boston.

Bontis, N. (2003) 'Intellectual capital disclosure in Canadian corporations', *Journal of Human Resource Costing and Accounting*, Vol. 7, Nos. 1–2, pp.9–20.

Bontis, N. (2004a) *Ebusiness Essentials*, Information Age Publishing, Greenwich, CT.

Bontis, N. (2004b) 'National intellectual capital index: a United Nations initiative for the Arab region', *Journal of Intellectual Capital*, Vol. 5, No. 1, pp.13–39.

Bontis, N. and Chung, H. (2000) 'The evolution of software pricing: a framework for box licenses to application service provider models', *Journal of Internet Research*, Vol. 10, No. 3, pp.246–255.

Bontis, N. and de Castro, A. (2000) 'First world congress on electronic commerce: review and commentary', *Journal of Internet Research*, Vol. 10, No. 5, pp.365–373.

Bontis, N. and Fitz-enz, J. (2002) 'Intellectual capital ROI: a causal map of human capital antecedents and consequents', *Journal of Intellectual Capital*, Vol. 3, No. 3, pp.223–247.

Bontis, N. and Girardi, J. (2000) 'Teaching knowledge management and intellectual capital lessons: an empirical examination of the TANGO simulation', *International Journal of Technology Management*, Vol. 20, Nos. 5–8, pp.545–555.

Bontis, N. and Mill, J. (2004) 'Dot-bomb post-mortem: web-based metrics and internet stock prices', *Quarterly Journal of Electronic Commerce*, Vol. 4, No. 1, pp.1–25.

Bontis, N. and Mograbi, A. (2006) 'The ethical leadership of business school deans', *International Journal of Business Governance and Ethics*, Vol. 2, Nos. 3–4, pp.217–236.

Bontis, N. and Nikitopoulos, D. (2001) 'Thought leadership on intellectual capital', *Journal of Intellectual Capital*, Vol. 2, No. 3, pp.183–191.

Bontis, N. and Serenko, A. (2007) 'The moderating role of human capital management practices on employee capabilities', *Journal of Knowledge Management*, Vol. 11, No. 3, pp.31–51.

Bontis, N., Crossan, M. and Hulland, J. (2002) 'Managing an organizational learning system by aligning stocks and flows', *Journal of Management Studies*, Vol. 39, No. 4, pp.437–469.

Bontis, N., Dragonetti, N., Jacobsen, K. and Roos, G. (1999) 'The knowledge toolbox: a review of the tools available to measure and manage intangible resources', *European Management Journal*, Vol. 17, No. 4, pp.391–402.

Bontis, N., Fearon, M. and Hishon, M. (2003) 'The e-flow audit: an evaluation of e-mail flow within and outside a high-tech firm', *Journal of Knowledge Management*, Vol. 7, No. 1, pp.6–19.

Bontis, N. (2007) 'Citizen relationship management in Canadian cities: starting to dial 311', in Borins, S. (Ed.): *Digital State at the Leading Edge*, University of Toronto Press, Toronto, pp.137–154.

Bontis, N., Hardie, T. and Serenko, A. (2007) 'Self-efficacy and KM course weighting selection: can students optimize their grades?', *International Journal of Teaching and Case Studies*, Vol. 1, Nos. 3–4, pp.189–199.

Bontis, N., Keow, W. and Richardson, S. (2000) 'Intellectual capital and the nature of business in Malaysia', *Journal of Intellectual Capital*, Vol. 1, No. 1, pp.85–100.

Bontis, N., Serenko, A. and Biktimirov, E. (2006) 'MBA knowledge management course: is there an impact after graduation?', *International Journal of Knowledge and Learning*, Vol. 2, Nos. 3–4, pp.216–237.

Borins, S., Kernaghan, K., Bontis, N., Brown, D., Thompson, F. and Perri, 6. (2007) *Digital State at the Leading Edge: Lessons from Canada*, University of Toronto Press, Toronto.

Brett, D. and Bontis, N. (2004) 'Selling expertise to the highest bidder', *KM Review*, Vol. 7, No. 3, pp.28–31.

Cabrita, M. and Bontis, N. (2007) 'Intellectual capital and business performance in the Portuguese banking industry', *International Journal of Technology Management*, in press, forthcoming.

Cabrita, M., Landeiro de Vaz, J. and Bontis, N. (2007) 'Modelling the creation of value from intellectual capital: a Portuguese banking perspective', *International Journal of Knowledge and Learning*, Vol. 3, No. 2, in press, forthcoming.

Carte, T.A. and Russell, C.J. (2003) 'In pursuit of moderators: nine common errors and their solutions', *MIS Quarterly*, Vol. 27, No. 3, pp.479–501.

Chauhan, N. and Bontis, N. (2004) 'Organizational learning via groupware: a path to discovery or disaster?', *International Journal of Technology Management*, Vol. 27, Nos.6–7, pp.591–610.

Chin, W.W. (1998) 'The partial least squares approach for structural equation modeling', in Marcoulides, G. (Ed.): *Modern Methods for Business Research*, Lawrence Erlbaum Associates, Mahwah, NJ.

Chin, W.W. (2001) *PLS-Graph User's Guide*, Version 3.0, Soft Modeling Inc., Houston, TX.

Choo, C.W. and Bontis, N. (2002) *The Strategic Management of Intellectual Capital and Organizational Knowledge*, Oxford University Press, New York.

Cleary, P., O'Regan, P., O'Donnell, D., Kennedy, T. and Bontis, N. (2007) 'Positioning management accounting in the intellectual capital agenda', *International Journal of Accounting, Auditing and Performance Evaluation*, in press, forthcoming.

Cronbach, L.J. (1951) 'Coefficient alpha and the internal structure of tests', *Psychometrika*, Vol. 16, No. 3, pp.297–334.

Curado, C. and Bontis, N. (2006) 'The knowledge based-view of the firm and its theoretical precursor', *International Journal of Learning and Intellectual Capital*, Vol. 3, No. 4, pp.367–381.

Curado, C. and Bontis, N. (2007a) 'Parallels in knowledge cycles', *Computers in Human Behavior*, in press, forthcoming.

Curado, C. and Bontis, N. (2007b) 'Managing intellectual capital: the MIC matrix', *International Journal of Knowledge and Learning*, Vol. 3, No. 3, in press, forthcoming.

Dow, K., Serenko, A., Turel, O. and Wong, J. (2006) 'Antecedents and consequences of user satisfaction with e-mail systems', *International Journal of e-Collaboration*, Vol. 2, No. 2, pp.46–64.

Farrell, D. and Rusbult, C.E. (1981) 'Exchange variables as predictors of job satisfaction, job commitment, and turnover: the impact of rewards, costs, alternatives and investments', *Organizational Behavior and Human Performance*, Vol. 27, No. 1, pp.78–95.

Fornell, C. and Larcker, D.F. (1981) 'Evaluating structural equation models with unobservable variables and measurement error', *Journal of Marketing Research*, Vol. 18, No. 1, pp.39–50.

Gallupe, B. (2002) 'Health care and knowledge management: building bridges to better patient care', in McKeen, J. (Ed.): *Knowledge Roundtable*, Queen's Centre for Knowledge-Based Enterprises, London, pp.1–17.

Goldstein, I.L. (1989) *Training and Development in organizations*, Jossey-Bass Publishers, San Francisco, CA.

Grensing-Pophal, L. (2002) *Motivating Today's Employees*, Self-Counsel Press, Canada, North Vancouver, BC.

Griffeth, R.W., Hom, P.W. and Gaertner, S. (2000) 'A meta-analysis of antecedents and correlates of employee turnover: update, moderator tests and research implications for the next millennium', *Journal of Management*, Vol. 26, No. 3, pp.463–488.

Gummesson, E. (2002) 'Relationship marketing in the new economy', *Journal of Relationship Marketing*, Vol. 1, No. 1, pp.37–58.

Håkansson, H. and Snehota, I. (1995) *Developing Relationships in Business Networks*, Routledge, London.

Hatcher, L. (1994) *A Step-by-Step Approach to Using the SAS System for Factor Analysis and Structural Equation Modeling*, SAS Publishing, Cary, NC.

Herzberg, F. (1957) *Job Attitudes: Review of Research and Opinion*, Psychological Service of Pittsburgh, Pittsburgh, PA.

Hom, P. and Griffeth, R. (1995) *Employee Turnover*, South-Western Pub., Cincinnati, OH.

House, R.J. and Aditya, R.N. (1997) 'The social scientific study of leadership: Quo Vadis?', *Journal of Management*, Vol. 23, No. 3, pp.409–473.

Ilgen, D.R., Fisher, C.D. and Taylor, M.S. (1979) 'Consequences of individual feedback on behavior in organizations', *Journal of Applied Psychology*, Vol. 64, No. 4, pp.349–371.

Ilies, R., Judge, T. and Wagner, D. (2006) 'Making sense of motivational leadership: the trail from transformational leaders to motivated followers', *Journal of Leadership and Organizational Studies*, Vol. 13, No. 1, pp.1–22.

Jawahar, I.M. (2006) 'An investigation of potential consequences of satisfaction with appraisal feedback', *Journal of Leadership and Organizational Studies*, Vol. 13, No. 2, pp.14–28.

Judge, T.A., Bono, J.E., Thoresen, C.J. and Patton, G.K. (2001) 'The job satisfaction – job performance relationship: a qualitative and quantitative review', *Psychological Bulletin*, Vol. 127, No. 3, pp.376–407.

Kim, W.C. and Mauborgne, R. (2005) *Blue Ocean Strategy*, Harvard Business School Press, Boston.

Kleinbeck, U., Quast, H-H., Thierry, H. and Hacker, H. (1990) *Work Motivation*, Lawrence Erlbaum Associates, Hillsdale, NJ.

Kluger, A.N. and DeNisi, A. (1996) 'The effects of feedback interventions on performance: a historical review, a meta-analysis and a preliminary feedback Intervention Theory', *Psychological Bulletin*, Vol. 119, No. 2, pp.254–284.

Kohli, A. and Jaworski, B.J. (1990) 'Market orientation: the construct, research proposition, and managerial implications', *Journal of Marketing*, Vol. 54, April, pp.1–18.

Locke, E.A. and Latham, G.P. (2002) 'Building a particularly useful theory of goal setting and task motivation', *American Psychologist*, Vol. 57, No. 9, pp.705–717.

London, M. and Smither, J.W. (2002) 'Feedback orientation, feedback culture and the longitudinal performance management process', *Human Resource Management Review*, Vol. 12, No. 1, pp.81–100.

Lytras, M.D. and Pouloudi, A. (2003) 'Project management as a knowledge management primer: the learning infrastructure in knowledge-intensive organizations: projects as knowledge transformations and beyond', *The Learning Organization*, Vol. 10, No. 4, pp.237–250.

Lytras, M.D. and Pouloudi, A. (2006) 'Towards the development of a novel taxonomy of knowledge management systems from a learning perspective: an integrated approach to learning and knowledge infrastructures', *Journal of Knowledge Management*, Vol. 10, No. 6, pp.64–80.

Lytras, M.D., Sicilia, M., Davies, J. and Kashyap, V. (2005) 'Digital libraries in the knowledge era: knowledge management and semantic web technologies', *Library Management*, Vol. 26, Nos. 4–5, pp.170–175.

Marr, B. (2005) 'Management consulting practice on intellectual capital', *Journal of Intellectual Capital*, Vol. 6, No. 4, pp.469–473.

Mayo, A. (2000) 'The role of employee development in the growth of intellectual capital', *Personnel Review*, Vol. 29, No. 4, pp.521–533.

McKnight, B. and Bontis, N. (2002) 'E-Improvisation: collaborative groupware technology expands the reach and effectiveness of organizational improvisation', *Knowledge and Process Management*, Vol. 9, No. 4, pp.219–227.

Millman, Z. and Latham, G. (2001) 'Increasing reemployment through training in verbal self-guidance', in Erez, M., Kleinbeck, U. and Thierry, H. (Eds.): *Word Motivation in the Context of a Globalizing Economy*, Lawrence Erlbaum Associates, Mahwah, NJ.

Mitchell, M. and Bontis, N. (2000) 'Aligning human capital with business strategy: foreign bank and luxury retail', in Bonner, D. (Ed.): *Leading Knowledge Management and Learning*, American Society for Training and Development (ASTD), Alexandria, VA, pp.73–86.

Murphy, K.R. and Cleveland, J.N. (1995) *Understanding Performance Appraisal: Social, Organizational and Goal-Based Perspectives*, Sage Publications, Thousand Oaks, CA.

Narver, J. and Slater, S.F. (1990) 'The effect of market orientation on business profitability', *Journal of Marketing*, Vol. 54, October, pp.20–35.

Nunnally, J.C. and Bernstein, I.H. (1994) *Psychometric Theory*, McGraw Hill, New York.

O'Donnell, D., Tracey, M., Henriksen, L.B., Bontis, N., Cleary, P., Kennedy, T. and O'Regan, P. (2006) 'On the 'essential condition' of intellectual capital-labour', *Journal of Intellectual Capital*, Vol. 7, No.1, pp.111–128.

O'Donnell, D., Bontis, N., O'Regan, P., Kennedy, T., Cleary, P. and Hannigan, A. (2004) 'CFOs in eBusiness: eArchitects or foot-soldiers?', *Knowledge and Process Management*, Vol. 11, No. 2, pp.105–116.

O'Regan, P., O'Donnel, D., Kennedy, T., Bontis, N. and Cleary, P. (2001) 'Perceptions of intellectual capital: Irish evidence', *Journal of Human Resource Costing and Accounting*, Vol. 6, No. 2, pp.29–38.

O'Regan, P., O'Donnell, D., Kennedy, T., Bontis, N. and Cleary, P. (2005) 'Board composition, non-executive directors and governance cultures in Irish ICT firms: a CFO perspective', *Corporate Governance: International Journal of Business in Society*, Vol. 5, No. 4, pp.56–63.

Pavia, L. (2001) 'The era of knowledge in health care', *Health Care Strategic Management*, Vol. 19, No. 2, pp.12, 13.

Prahalad, C.K. and Ramaswamy, V. (2000) 'Co-opting customer competence', *Harvard Business Review*, Vol. 78, No. 1, pp.79–87.

Roethlisberger, F.J. and Dickson, W.J. (1956) *Management and the Worker: An Account of a Research Program Conducted by the Western Electric Company*, Hawthorne Works, Harvard University Press, Cambridge, Mass, Chicago.

Schneider, B. (2000) 'The psychology of organizations', in Ashkanasy, N.M., Wilderom, C. and Peterson, M.F. (Eds.): *Handbook of Organizational Culture and Climate*, Sage, Thousand Oaks, CA, pp.xvii–xxi.

Seleim, A., Ashour, A. and Bontis, N. (2004) 'Intellectual capital in Egyptian software firms', *The Learning Organization: An International Journal*, Vol. 11, Nos. 4–5, pp.332–346.

Serenko, A. and Bontis, N. (2004a) 'A model of user adoption of mobile portals', *Quarterly Journal of Electronic Commerce*, Vol. 4, No. 1, pp.69–98.

Serenko, A. and Bontis, N. (2004b) 'Meta-review of knowledge management and intellectual capital literature: citation impact and research productivity rankings', *Knowledge and Process Management*, Vol. 11, No. 3, pp.185–198.

Serenko, A., Bontis, N. and Detlor, B. (2007) 'End-user adoption of animated interface agents in everyday work applications', *Behaviour and Information Technology*, Vol. 26, No. 2, pp.119–132.

Serenko, A., Turel, O. and Yol, S. (2006) 'Moderating roles of user demographics in the American customer satisfaction model within the context of mobile services', *Journal of Information Technology Management*, Vol. 17, No. 4, pp.20–32.

Sharma, S., Durand, R.M. and Gur-Arie, O. (1981) 'Identification and analysis of moderator variables', *Journal of Marketing Research*, Vol. 18, No. 3, pp.291–300.

Spector, P.E. (1997) *Job Satisfaction: Application, Assessment, Causes and Consequences*, Sage Publications, Thousand Oaks, CA.

Stefl, M.E. (2002) 'Introduction: the drivers of change', *Frontiers of Health Services Management*, Vol. 18, No. 2, pp.3–7.

Stovel, M. and Bontis, N. (2002) 'Voluntary turnover: knowledge management friend or foe', *Journal of Intellectual Capital*, Vol. 3, No. 3, pp.303–322.

Straub, D., Boudreau, M-C. and Gefen, D. (2004) 'Validation guidelines for IS positivist research', *Communications of the Association for Information Systems*, Vol. 13, Article 24, pp.1–80.

Sun, H. and Zhang, P. (2006) 'The role of moderating factors in user technology acceptance', *International Journal of Human-Computer Studies*, Vol. 64, No. 2, pp.53–78.

Turel, O. and Serenko, A. (2006) 'Satisfaction with mobile services in Canada: an empirical investigation', *Telecommunications Policy*, Vol. 30, Nos. 5–6, pp.314–331.

Turel, O., Serenko, A. and Bontis, N. (2007) 'User acceptance of wireless short messaging services: deconstructing perceived value', *Information & Management*, Vol. 44, No. 1, pp.63–73.

Turel, O., Serenko, A., Detlor, B., Collan, M., Nam, I. and Puhakainen, J. (2006) 'Investigating the determinants of satisfaction and usage of Mobile IT services in four countries', *Journal of Global Information Technology Management*, Vol. 9, No. 4, pp.6–27.

van Beveren, J. (2003) 'Does health care for knowledge management?', *Journal of Knowledge Management*, Vol. 7, pp.90–95.

Williams, S. and Wong, T. (1999) 'Mood and organizational citizenship behavior: the effects of positive affect on employee organizational citizenship behavior intentions', *The Journal of Psychology*, Vol. 133, No. 6, pp.656–668.

Williams, S., Pitre, R. and Zainuba, M. (2000) 'Does mood influence organizational citizenship behaviour intentions? An experimental manipulation of affective state', *Research and Practice in Human Resource Management*, Vol. 8, No. 2, pp.49–59.