Journal of Information Technology (2000) **15**, 69–78

Predictors of IT support for knowledge management in the professions: an empirical study of law firms in Norway

PETTER GOTTSCHALK

Department of Technology Management, Norwegian School of Management, Box 580, 1302 Sandvika, Norway

Knowledge management is an increasingly important source of competitive advantage for organizations. Knowledge embedded in an organization's business processes and an employee's skills provide a firm with unique capabilities for delivering a product or service to customers. Law firms represent an industry which seems very well suited for knowledge management investigation. Law firms are knowledge intensive and the use of advanced technology may transform these organizations in the future. To examine knowledge management in Norwegian law firms, a study which involved two phases of data collection and analysis was designed. The first phase was a field study of the largest law firm in Norway. The semi-structured interviews conducted in the initial field study documented a strong belief in the potential benefits from knowledge management. The second phase was a survey of Norwegian law firms. Firm culture, firm knowledge and use of information technology were identified as potential predictors of information technology support for knowledge management in law firms in Norway. The extent to which law firms in Norway use information technology to support knowledge management is significantly influenced by the extent firms generally use information technology.

Introduction

A new perspective on knowledge in organizations is being created. Organizations are viewed as bodies of knowledge (Blaauw and Boersma, 1999) and knowledge management is considered an increasingly important source of competitive advantage for organizations (Ginsburg and Kambil, 1999). Knowledge embedded in an organization's business processes and an employee's skills provide a firm with unique capabilities for delivering a product or service to customers. Scholars and observers from disciplines as disparate as sociology, economics and management science agree that a transformation has occurred – knowledge is at centre stage (Davenport *et al.*, 1998).

Law firms represent an industry which seems very well suited for knowledge management investigation (Lamb, 1999). Law firms are knowledge intensive and the use of advanced technology may transform these organizations in the future. As an example, Hale and Dorr LLP is a general practice law firm of 312 attorneys in the USA. Their web site (www.haledorr.com) clearly indicates the firm's commitment to take advantage of advanced technologies to enable the firm to streamline communication and reduce costs for their clients.

Little empirical research on knowledge management has been conducted. Most published research has developed recommendations for successful knowledge management without an empirical basis (e.g. Davenport *et al.*, 1998; Fahey and Prusak, 1998). This study complements existing research by focusing explicitly on knowledge management in the professions. The research adds to the body of empirical knowledge management research (e.g. Alavi and Leidner, 1999).

To examine knowledge management in Norwegian law firms, a study which involved two phases of data collection and analysis was designed. The first phase was an initial field study of the leading law firm in Norway. The second phase was a survey of Norwegian law firms. The two-phased approach was selected to improve practice relevance (Benbasat and Zmud, 1999).

The paper is organized as follows. First, the literature on knowledge management is reviewed. Then, the results from the initial field study are reported. A research model for the second phase of data collection and analysis is developed based on the literature review and the field study. Finally, the research results are presented and discussed.

Literature review

Distinctions are often made between data, information, knowledge and wisdom. Knowledge is information combined with experience, context, interpretation and

ISSN 0268–3962 print/ISSN 1466-4437 online

reflection (Davenport *et al.*, 1998). Knowledge is a renewable, reusable and accumulating asset of value to firms which increases in value with employee experience and organizational life (Ginsburg and Kambil, 1999). According to Fahey and Prusak (1998), knowledge is what a knower knows; there is no knowledge without someone knowing it:

> Knowledge therefore must be viewed as originating 'between the ears' of individuals. Taken literally, the need for a knower raises profound questions as to whether and how knowledge can exist outside the heads of individuals. Although knowledge can be represented in and often embedded in organizational processes, routines, and networks, and sometimes in document repositories, it cannot truly originate outside the heads of individuals. Nor is it ever complete outside of an individual (p. 267).

According to Alavi and Leidner (1999), information becomes knowledge once it is processed in the mind of an individual. This knowledge then becomes information again once it is articulated or communicated to others in the form of text, computer output, spoken or written words or other means. For the organization, it is strategic to focus on proprietary corporate knowledge (Yap and Bjørn-Andersen, 1998). Proprietary knowledge is intrinsic to the core competence/expertise of a firm and is often protected by patents, copyrights and non-disclosure policies.

Knowledge management is introduced to help companies create, share and use knowledge effectively (Davenport *et al.*, 1998). Knowledge support functions have to be established to implement knowledge management in an organization. The Computer Sciences Corporation (1998) suggested the role of chief knowledge officer (CKO), which is not so much to provide knowledge management facilities and services as to enable the organization to innovate. Earl and Scott (1999) found that CKOs have to discover and develop the chief executive officer's (CEO) implicit vision of how knowledge management will make a difference.

Although expectations are high, many knowledge management projects will probably fail (Davenport *et al.*, 1998). Fahey and Prusak (1998) identified the 11 deadliest sins of knowledge management, which are listed in Table 1.

Recommendations concerning knowledge management are often far too abstract, and too many questions remain unanswered: 'What concrete changes in behavior are required? What policies and programs must be in place? How do you get from here to there?' (Garvin, 1993, p. 79). Nonaka (1994) suggested that companies use metaphors and organizational redundancy to focus thinking, encourage dialogue and make tacit, instinctively understood ideas explicit. This important work has earlier been criticized by Garvin (1993) for being too abstract.

Table 1 The 11 deadliest sins of knowledge management (Fahey and Prusak, 1998)

Error	Description
1	Not developing a working definition of knowledge
2	Emphasizing knowledge stock to the detriment of knowledge flow
3	Viewing knowledge as existing predominantly outside the heads of individuals
4	Not understanding that a fundamental intermediate purpose of managing knowledge is to create shared context
5	Paying little heed to the role and importance of tacit knowledge
6	Disentangling knowledge from its uses
7	Downplaying thinking and reasoning
8	Focusing on the past and the present and not the future
9	Failing to recognize the importance of experimentation
10	Substituting technological contact for human interface
11	Seeking to develop direct measures of knowledge

Leichner *et al.* (1999) suggested the encyclopedia concept as a knowledge medium for structuring and systemizing knowledge. The encyclopedic method is an encompassing management of given knowledge, founded on library and information sciences. This method deals with structuring, categorizing, filtering and organizing authentic knowledge, making it accessible for a given community by the means of an appropriate repository.

Blaauw and Boersma (1999) focused on the control of crucial knowledge in organizations. When taking the decision to invest in knowledge, it is very important for an organization to know what knowledge is relevant to the organization and what knowledge adds value. Crucial knowledge includes, at least, the ever-changing knowledge that is necessary to operate within an industry at an acceptable level. Crucial knowledge is often incorporated within experts in the form of tacit knowledge which manifests itself as problem-solving behaviour. The crucial aspect of knowledge is therefore primarily viewed as the availability of such problem-solving behaviours in the light of the continuity of the organization (Blaauw and Boersma, 1999).

Zack (1999) made distinctions between core, advanced and innovative knowledge. Core knowledge is the minimum scope and level of knowledge required for daily operations, while advanced knowledge enables

a firm to be competitively viable and innovative knowledge is knowledge which enables a firm to lead its industry and competitors.

Many authors seem to be concerned with the distinction between explicit and tacit knowledge (e.g. Fahey and Prusak, 1998; Alavi and Leidner, 1999). However, knowledge may shift dynamically between tacit and explicit over time (Nonaka, 1994).

Organizational theorists have emphasized that information and knowledge acquired by one part of an organization must be communicated speedily to other parts. However, organization members collectively acquire enormous quantities of information on an ongoing basis; if all such information were to be transmitted to all parts of the organization, its members would suffer from information overload (Anand *et al.*, 1998).

There is no single definition of knowledge management, but in general the idea relates to unlocking and leveraging the knowledge of individuals so that this knowledge becomes available as an organizational resource which is not dependent on particular individuals. Much of the literature on knowledge management is driven from an information systems perspective and is based on the belief that knowledge management systems can be used to capture and stockpile workers' knowledge and make it accessible to others via a searchable application (Newell *et al.*, 1999).

Alavi and Leidner (1999) invited a non-random sample of 109 participants in an executive development programme to define the concept of knowledge management. Three perspectives emerged: an infomation-based perspective, a technology-based perspective and a culture-based perspective. All three perspectives were confirmed in a field study of Thommessen Krefting Greve Lund (TKGL). While 'make information more available to all' is an example of the information-based perspective, 'systematic collection and storage of knowledge for reuse by others' is an example of the technology-based perspective and 'development of new competencies' is an example of the culture-based perspective.

The concept of coding and transmitting knowledge in organizations is not new: training and employee development programmes, and organizational policies, routines, procedures, reports and manuals have served this function for many years. What is new and exciting in the knowledge management area is the potential for using modern information technologies (ITs) (e.g. the Internet, intranets, browsers, data warehouses, data filters and software agents) for systematizing, facilitating and expediting firm-wide knowledge management (Alavi and Leidner, 1999).

The use of IT in supporting knowledge management provides organizations with new capabilities (Yap and Bjørn-Andersen, 1998). Software products have started to emerge to support knowledge management. For example, Jasper (Joint Access to Stored Pages with Easy Retrieval) is an information filtering and sharing environment (Chen and Davies, 1999). Another example is Annotate which is a specific knowledge management support system designed to support the knowledge management of document collections in federated organizations which lack common vocabularies and central authority (Ginsburg and Kambil, 1999). However, a strategic fit between knowledge management objectives and choice of IT solution is a challenge to achieve (Yap and Bjørn-Andersen, 1998).

The knowledge-sharing capabilities of IT have been identified as having the capacity to change business processes and, possibly, fundamentally redefining the scope of a business:

> Information is a resource and its sensing, collection, organization, communication, and use are critical to the knowledge-based organization. Information can be a source of power, justify ideologically based decisions, as well as symbolize adherence to norms. Information is embodied in specific roles and relationships and distortion occurs in the form of power struggles and coalition bargaining. Knowledge, the combination of learning and information, applied to a context, has a dynamic quality and is defined by individuals in shared and coordinated interaction. The strength and characteristics of individual and group ties impact knowledge transmission. Knowledge-sharing capability can determine an organization's processes or structural form. The capability of an organization to share and leverage knowledge as a whole facilitates its proclivity to change (Kettinger and Grover, 1995, p. 18).

An intranet may be classified as a knowledge management application since it is capable of distributing knowledge. According to Newell *et al.* (1999), intranets are often implemented with knowledge management as the primary focus, that is intranet systems are seen as a tool for more efficient sharing and creation of knowledge within organizations. Lamb (1999) studied intranets in international law firms in the USA. She found that only 20% of the law firms had intranets in 1998, but that this percentage was growing rapidly.

Law firms have started to present themselves on the Internet. One of the early ones in the USA was Hale and Dorr LLP which is found at www.haledorr.com. On one of their web pages, they argue that the use of advanced technologies enables the firm to take advantage of the most appropriate tools for improving efficiency, increasing effectiveness, streamlining communication and reducing costs for their

clients. They claim that 'knowledge is power'. A law firm is a collection of fiefdoms – each lawyer has his or her own clients and keeps the information about them private. However, this makes it difficult for management in a US law firm such as Primrose, Mendelson, and Hansen, a 250-person law partnership on Manhattan's West Side, to find out who is a client of the firm and who is working on a deal with whom (Laudon and Laudon, 1998, p. 412). Knowledge management support systems in law firms are concerned with capturing and codifying knowledge, creating knowledge, distributing knowledge and sharing knowledge (Edwards and Mahling, 1997).

Edwards and Mahling (1997) categorized the types of information involved in the practice of law as administrative data, declarative knowledge, procedural knowledge and analytical knowledge. Administrative data includes all of the nuts and bolts information about firm operations, such as hourly billing rates for lawyers, client names and matters, staff payroll data and client invoice data. Declarative knowledge is knowledge of the law, the legal principles contained in statutes, court opinions and other sources of primary legal authority. Law students spend most of their law school careers acquiring this kind of knowledge. Procedural knowledge is knowledge of the mechanics of complying with the law's requirements in a particular situation: what documents are necessary to transfer an asset from company A to company B or what forms must be filed where to create a new corporation. Analytical knowledge is the conclusions reached about the course of action a particular client should follow in a particular situation. Analytical knowledge results from analysing declarative knowledge (i.e. substantive law principles) as it applies to a particular fact setting.

However, there are significant hurdles to be overcome in order to embed successful knowledge management in the law firm context, all of which may be categorized according to firm culture: individuality, time, success and lack of incentives (Terrett, 1998). Individuality is encouraged in most law firms; lawyers are not noted for their team-based approaches to legal work or for their willingness to share their expertise. Time is money in a law firm; any time spent sharing knowledge and experience is time not spent billing. Success can be the enemy of innovation; many larger law firms have done very well without any recourse to knowledge management or even particularly innovative use of IT. Lack of incentives obscures the existence of a knowledge market-place (Terrett, 1998).

Firm culture is not only a law firm problem. In a survey of 431 US and European organizations, culture was found to be the biggest impediment to knowledge transfer (Ruggles, 1998). The second impediment was top management's failure to signal importance and third a was lack of shared understanding of the strategy of the business model. According to Ruggles (1998), the knowledge management efforts under way in the responding organizations focused on creating intranets and data warehouses, implementing decision-support tools and mapping sources of internal expertise.

The initial field study

TKGL dates back to 1856. The firm has offices in Oslo, Bergen, London and Brussels and provides services relating to Norwegian and European Union law in all aspects of business and commerce. They advise a wide variety of Norwegian and international clients. The law firm consists of the following groups: corporate and finance law, intellectual property and media law, real estate and energy law, European Union and competition law, tax law, litigation and shipping and offshore law. TKGL is a member of the Scandinavian Law Alliance together with Vinge KB, Sweden and Kromann & Münter, Denmark and also a member of Lex Mundi, an international network of leading law firms in more than 130 jurisdictions worldwide. TKGL has 145 employees, out of which 90 are attorneys, as listed in Table 2.

The growth figures in Table 2 represent the change in revenue from 1997 to 1998. TKGL had an acceptable growth of 16% and is the leading law firm in Norway. However, auditing and consulting firms have started expanding into the law business and firms like KPMG Law and Arthur Andersen had growth rates

Table 2 Law firms in Norway (Dagens Nœringsliv, 1999)

Law Firm	Attorneys	Growth
Thommessen Krefting Greve Lund	90	+16
Wikborg, Rein & Co.	81	+10
Schjødt	79	+29
Price Waterhouse Coopers	78	–
Wiersholm, Mellbye & Bech	74	+11
BAHR	74	–
Selmer	50	+29
KPMG Law	40	+51
Hjort	36	+12–20
Kluge	36	+17
Arthur Andersen	35	+57
Deloitte & Touche	33	+35
Stabell	32	+8
Simonsen Musæus	28	+32
Vislie, Ødegaard & Kolrud	25	–2
Haavind & Haga	25	+12

of 51 and 57% respectively. This is quite a challenge for long-established law firms in Norway.

A structured interview was conducted in October 1998 with 14 employees at TKGL: eight attorneys and six staff persons. They were asked questions at the organizational level and at the individual level. They filled in a questionnaire during the interview. Their average responses to the organizational level questions are listed in Table 3.

Table 3 shows that TKGL has a strong belief in the potential power of IT: IT will become a competitive tool (5.2) and IT can improve effectiveness (5.4). They have also recognized the importance of knowledge management (5.4). However, there is little recognition or acceptance of the possible changes in the working environment, exemplified through paper-free offices (2.4) and no traditional offices at all (1.4).

The respondents were asked to write down their own definitions of knowledge management to clarify their expectations. The examples below indicate that the concept of knowledge management was well understood in TKGL.

(1) Combine experience and data/information in an effective business process.
(2) Make information more available to all.
(3) Systematic collection and storage of knowledge for reuse by others.
(4) Make knowledge accessible.
(5) Organize the knowledge we already have.
(6) Collect and present information from various sources.
(7) Managing and structuring information/data so that data/information become available.
(8) How to manage our knowledge resource.
(9) Development of new competencies.
(10) Shared memory of the organization.
(11) Utilization of the tools we have.

Table 3 Questionnaire responses to organizational level questions

To what extent	Score
Is IT today a competitive tool for TKGL?	3.8
Will IT in the future become a competitive tool for TKGL?	5.2
Is TKGL ahead in its use of IT?	3.9
Is TKGL ahead in its use of IT compared with other Norwegian law firms?	4.7
Does TKGL have an age problem concerning users of IT?	4.4
Should the IT function in TKGL be strengthened?	4.6
Can use of IT improve TKGL's competitive position?	5.1
Can use of IT improve TKGL's effectiveness?	5.4
Can use of IT improve TKGL's profitability?	4.7
Does use of IT represent a security risk in TKGL?	3.5
Is knowledge management important in TKGL?	5.4
Will information in TKGL become a shared resource with increased IT use?	5.0
Are offices in TKGL becoming paper-free in the future?	2.4
Is TKGL becoming an office-free law firm in the future?	1.4

The Likert scale went from 1 (very little extent) to 6 (very great extent).

The respondents were asked to rank knowledge management together with 23 other information systems management issues. They ranked knowledge management in fourth place. This is high compared with a national survey at the same time which ranked knowledge management in eleventh place (Gottschalk *et al.*, 1998). TKGL management decided to recruit a chief information officer (CIO) who should be a knowledge manager or CKO (Computer Sciences Corporation, 1998; Earl and Scott, 1999).

Each interview lasted for 2 hours. Many statements were made. One of the lawyers interviewed in TKGL later stated in one of Norway's leading newspapers that

> Professional pride is concerned with an understanding of important quality aspects when doing your job and having an interest in providing this quality. This is important for all professionals. Lawyers have promised to promote justice, prevent injustice and avoid unnecessary conflicts. In addition, lawyers will often work as advisors, and then quality and integrity are important elements (*Aftenposten*, 1999, p. 36).

In conclusion, the initial field study confirmed a strong belief in knowledge management in law firms and a strong belief in IT as an enabler of knowledge management. More specifically, analyses of the interviews identified three concepts of importance for the extent of IT-enabled knowledge management: law firm culture, importance of knowledge to the firm and the extent of IT use in the firm.

Research model

Based on the literature reviewed and the initial field study, a research model was developed. The research model is illustrated in Figure 1. The dependent construct in the research model is the use of IT in supporting knowledge management which consists of five major categories of knowledge-focused activities: generating knowledge, accessing knowledge, transferring knowledge, sharing knowledge and codifying knowledge (Ruggles, 1998). There are three independent constructs in the model. First, firm culture consists of individuality, time, success and incentives

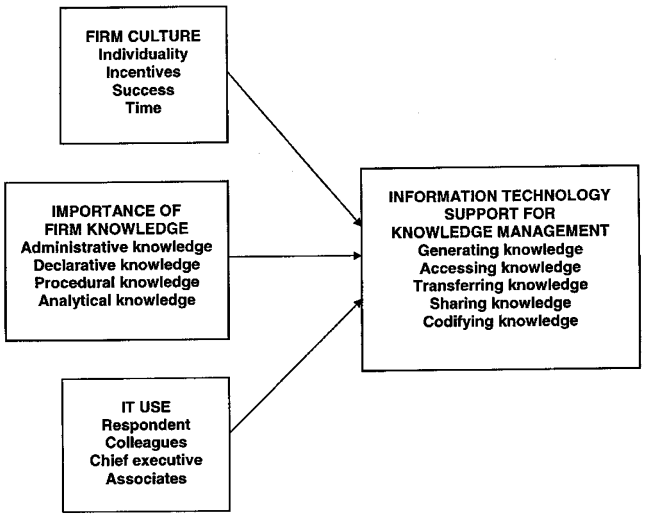

Figure 1 The research model

(Terrett, 1998). Second, firm knowledge consists of administrative knowledge, declarative knowledge, procedural knowledge and analytical knowledge (Edwards and Mahling, 1997). Third, IT use by the respondent, colleagues, president and associates can be identified (Yap and Bjørn-Andersen, 1998).

Three research hypotheses can be developed based on the research model. First, a firm culture where lawyers are stimulated to cooperate with each other, where knowledge transfer between lawyers is rewarded, where success is dependent on knowledge sharing and where time is allocated to knowledge sharing will lead to a greater extent of IT use in generating, accessing, transfering, sharing and codifying knowledge (Terrett, 1998).

> H_1: The greater the extent of knowledge sharing culture in a law firm, the greater the extent of IT use in supporting knowledge management.

Second, the importance of firm knowledge influences the extent of IT use in knowledge management. It is suggested that a law firm with critical administrative, declarative, procedural and analytical knowledge will use IT to a larger extent to generate, access, transfer, share and codify knowledge (Terrett, 1998).

> H_2: The greater the importance of knowledge to a law firm, the greater the extent of IT use in supporting knowledge management.

It is assumed that the respondent will be the IT-responsible partner in the law firm. The dimensions of IT use include the respondent's use, colleagues' use, the chief executive's use and associates' use. If these users use IT to a large extent, it is suggested that the extent of IT use for knowledge management will be greater (Lamb, 1999).

> H_3: The greater the extent of IT use in a law firm, the greater the extent of IT use in supporting knowledge management.

Research methodology

The objective of this study was to examine the use of IT in supporting knowledge management in law firms. The sample was comprised of 256 law firms in Norway. The desired informants in this research were lawyers with special interest or responsibility for IT. Many law firms have a senior lawyer called the 'IT-responsible partner' (IT-ansvarlig partner) who seems to be an ideal person for this kind of research. Out of 256 mailed surveys 73 were returned, providing a response rate of 28%. The titles of the respondents showed some variation as listed in Table 4.

Information was collected on the number of years the respondent had been in their current position and the number of lawyers in the firm, as listed in Table 5.

The respondents were asked to give their own definitions of knowledge management. These responses were categorized according to the three perspectives suggested by Alavi and Leidner (1999). In terms of the information-based perspective, the lawyers reported thinking of knowledge management being about the characteristics of information, such as readily accessible information, real-time information and actionable information. In terms of the technology-based perspective, the lawyers associated knowledge management with various other systems (including data warehousing, enterprise-wide systems, executive information systems, expert systems and the intranet), as well as various tools (e.g. search engines, multimedia and decision-making tools). From the view of the culture-based perspective of knowledge management, the lawyers associated knowledge management with learning (primarily from an organizational perspective), communication and intellectual property cultivation. The percentages of each perspective are listed in Table 6.

Research results

Four multiple-item scales were used to measure the constructs (Frankfort-Nachmias and Nachmias, 1996), one for the dependent variable and three for the independent variables, as listed in Table 7. They all have acceptable reliability.

The hypothesis testing was carried out using multiple regression. Table 8 lists the results of the multiple regression analysis between the three independent variables and the dependent variable.

The full multiple regression between the three independent variables explained 34.7 % of the variation in use of IT in supporting knowledge management, that is the adjusted R^2 is 0.347. The F-value of 13.217 is

Table 4 Titles of the respondents

Title	*n*
Lawyer	65
Manager	8
Total	73

Table 5 Characteristics of respondents and organizations

Characteristic	Mean	SD
Years in current position	10	6
Number of lawyers in the firm	12	20

Table 6 Definitions of knowledge management

Definition	Percentage
Culture-based perspective	30
Information-based perspective	19
Technology-based perspective	10
No response	41
Total	100

significant at $p < 0.01$, indicating that the null hypothesis is rejected and that there is a significant relationship between the set of predictors – firm culture, firm knowledge and IT use – and the extent of IT use in supporting knowledge management. The only significant predictor is IT, which implies that IT is used to a greater extent in supporting knowledge management in law firms in Norway when IT generally is used to a larger extent.

To control for organizational size statistically, multiple regression was applied when the number of lawyers in the firm was included. The adjusted R^2 decreased to 0.334 and the number of lawyers was not significant. Hence, no spurious relationships caused by this control variable were found.

Discussion

Three research hypotheses were developed based on the research model. First, a firm culture where lawyers are stimulated to cooperate with each other, where knowledge transfer between lawyers is rewarded, where success is dependent on knowledge sharing and where time is allocated to knowledge sharing, will lead to a greater extent of IT use in generating, accessing, transfering, sharing and codifying knowledge (Terrett, 1998).

> H_1: The greater the extent of cooperative culture in a law firm, the greater the extent of IT use in supporting knowledge management.

This hypothesis was not supported, which may be considered a surprising result. In contrast, Ruggles (1998) found that the current biggest impediment to knowledge transfer was culture. Practising lawyers argue that they just do not have time for knowledge sharing. However, one explanation for the lack of support for this hypothesis might be the direct link suggested between the knowledge sharing culture and IT use for knowledge management. An alternative formulation would be a path from culture to knowledge sharing and then to IT use. This would lead to two hypotheses instead of one. Another explanation for the lack of support for the hypothesis might be firm size, although no spurious relationship was found.

Table 7 Items for measurement of the dependent and independent constructs

Construct	Measurement of construct	α
IT support for knowledge management (Ruggles, 1998)	IT use for knowledge generation	0.92
	IT use for knowledge access	
	IT use for knowledge transfer	
	IT use for knowledge sharing	
	IT use for knowledge coding	
Firm culture (Terrett, 1998)	Cooperation stimulation	0.87
	Knowledge-sharing incentives	
	Knowledge-sharing success	
	Knowledge-sharing time	
Importance of firm knowledge (Edwards and Mahling, 1997)	Importance of administrative knowledge	0.73
	Importance of declarative knowledge	
	Importance of procedural knowledge	
	Importance of analytical knowledge	
IT use (Yap and Bjørn-Andersen, 1998)	IT use by respondent	0.88
	IT use by colleagues	
	IT use by chief executive	
	IT use by associates	

Table 8 Multiple regression between use of IT and predictors

Predictors	Beta	*t*-test
Firm culture	0.154	0.189
Firm knowledge	–0.018	–0.177
IT use	0.561	5.557**

The statistical significances of the *t*-values are $p < 0.01$ (double asterisk) and $p < 0.05$ (single asterisk).

Second, the importance of firm knowledge influences the extent of IT use in knowledge management. It is suggested that a law firm with critical administrative, declarative, procedural and analytical knowledge will use IT to a larger extent to generate, access, transfer, share and codify knowledge (Terrett, 1998).

> H_2: The greater the importance of knowledge to a law firm, the greater the extent of IT use in supporting knowledge management.

This hypothesis was not supported, which may be considered a surprising result. However, one explanation for the lack of support for this hypothesis might be the direct link suggested between the importance of knowledge and IT use in knowledge management. An alternative formulation would be a path from knowledge importance to knowledge management and then to IT use in knowledge management. This would lead to two hypotheses instead of one. Another explanation for the lack of support for this hypothesis might be the self-evaluation which took place in this survey, i.e. the respondents may have been biased towards the same importance of knowledge in different law firms.

It was assumed that the respondent would be the IT-responsible partner in the law firm. The dimensions of IT use include the respondent's use, colleagues' use, the chief executive's use and associates' use. If these users use IT to a large extent, it is suggested that the extent of IT use for knowledge management will be greater (Lamb, 1999).

> H_3: The greater the extent of IT use in a law firm, the greater the extent of IT use in supporting knowledge management.

This hypothesis was supported. There are lessons to be learned from this research result. IT-supported knowledge management will only take place if IT is generally used in the firm. A technical infrastructure has to be in place, including networks, PCs, databases and software. An application architecture has to be in place, linking the various software applications. An information architecture has to be in place, enabling the flow of information between various systems.

It may seem that support for the third hypothesis is obvious since IT use in supporting knowledge management can be a component of IT use. However, it is argued in this research that IT support for knowledge management and IT use may be treated as different constructs since IT support for knowledge management is a new application area for IT. In other words, firms which have extensive use of IT do not necessarily apply IT to knowledge management. To test this assumed construct validity, factor analysis was performed with the nine items (see Table 8). All five IT support items loaded significantly on one factor together with IT use items for the respondent and colleagues. The remaining IT use items for the president and associates did not load significantly on the factor. Hence, this test did not reject the discriminant validity for the two constructs.

It may be argued that the sample of law firms contains many small firms. Although the statistical control for organizational size did not provide new insights, a separate analysis of only large law firms was conducted. Of the 73 law firms, only ten law firms had more than 25 lawyers. The adjusted R^2 increased to 0.750, indicating that the research model explains more variation in IT support for knowledge management. However, only the third hypothesis was supported, as for the total sample.

Law firm size is of considerable interest to practitioners. Lawyers in large law firms say that there must be differences between small and large law firms. The responses are categorized into small law firms, medium law firms and large law firms in Table 9. There seems to be only marginal differences. The only pattern easily recognized is the growing use of IT in supporting knowledge management which grows with law firm size.

During the survey in April 1999 and after mailing of the survey report in June 1999, many law firms contacted the author. They expressed both interest in the research and concern about certain concepts in the research. One such concept was the categorization of knowledge into administrative, declarative, procedural and analytical knowledge which was based on work by Edwards and Mahling (1997) in the USA. Many respondents found this categorization hard to follow. Some translated declarative knowledge into knowledge about current laws. Some were unable to make a distinction between declarative and analytical knowledge. Both declarative and analytical knowledge have components of both legal binding circumstances and interpretations. The procedural lawyer establishes working knowledge of the facts, whereupon the lawyer searches for relevant laws which fit the facts. However, the business lawyer first develops agreements and documents between the parties which are signed. Later, the business lawyer may be called upon to solve disagreements by interpreting the original agreements and documents.

Table 9 Responses for different law firm sizes

Construct	36 small law firms	27 medium law firms	Ten large law firms
IT support for knowledge management (Ruggles, 1998)	3.3	3.7	4.1
Firm culture (Terrett, 1998)	5.0	5.0	5.3
Importance of firm knowledge (Edwards and Mahling, 1997)	4.5	4.2	4.7
Information technology use (Lamb, 1999)	4.5	4.3	4.9

Small law firms have less than five lawyers, while large law firms have more than 25 lawyers.

In this situation, an inseparable mixture of declarative and analytical knowledge is applied. Generally, one lawyer commented, are the research results are influenced by many lawyers' unclear perceptions of the constructs and terms used in the research.

Some lawyers commented on the lack of support for two hypotheses and support for one hypothesis. One lawyer made the comment that the first hypothesis about firm culture was not supported because the lawyers' daily routines and the time and costs involved in training and administration of a knowledge support system are influencing factors. The second hypothesis was not supported because no cases are alike; knowledge from one case can only serve as general knowledge for another case. The third hypothesis was supported because general IT use is a form of knowledge management. This hypothesis was also supported because firms with low IT use have no practical ability for implementing knowledge management using advanced technologies.

The extent to which law firms in Norway use IT to support knowledge management is significantly influenced by the extent firms generally use IT. Specifically, as listed in Table 8, the greater the extent of IT use by the respondent, colleagues, the chief executive and associates, the greater the extent of IT use in supporting knowledge management in law firms.

Conclusions

The initial field study documented a strong belief in the potential benefits from knowledge management as suggested in the research literature. The current use of IT in law firms does not seem to be extensive, but combined with a knowledge management perspective, law firms have substantial expectations.

The extent to which law firms in Norway use IT to support knowledge management is significantly influenced by the extent firms generally use IT. Only those law firms which already use IT will use IT to support knowledge management in their firms. Law firms which have a limited use of IT will continue to keep away from the technology.

Future research may concentrate on the dynamic processes which are going on within and outside law firms: between lawyers and clients, between lawyers and other parties' lawyers, between lawyers and other parties, between lawyers and judges, between lawyers and assistants and between lawyers in the same law firm.

Practitioners have discussed whether IT-supported knowledge management will revolutionize law firms: 'Business as usual or the end of life as we know it?' (Whitfield-Jones, 1999, p. 3). It will not, 'business will continue much as usual' (Whitfield-Jones, 1999, p. 10).

Law firm size was not found to be a significant influence on IT-supported knowledge management. However, practitioners continue to question the validity of results based on law firms ranging from one to 95 lawyers. Future research should look into this more carefully, including the fees charged by large versus small law firms.

References

Aftenposten (1999) Advokat Siri Teigum (Lawyer Siri Teigum). *Aftenposten*, 25 April, 36.

Alavi, M. and Leidner, D.E. (1999) Knowledge management systems: issues, challenges, benefits. *Communications of the AIS*, **1**(7), 2–41.

Anand, V., Manz, C.C. and Glick, W.H. (1998) An organizational memory approach to information management. *Academy of Management Review*, **23**(4), 796–809.

Benbasat, I. and Zmud, R.W. (1999) Empirical research in information systems: the practice of relevance. *MIS Quarterly*, **23**(1), 3–16.

Blaauw, G. and Boersma, S.K.T. (1999) The control of crucial knowledge. In *Managing Information Technology Resources in the Next Millennium*, Khasrowpour, M. (ed.), (Idea Group Publishing, Hershey) pp. 1098–108.

Chen, C. and Davies, J. (1999) Integrating spatial, semantic, and social structures for knowledge management, in *Proceedings of the 32nd Hawaii International Conference on System Sciences*, Maui, Hawaii, 5–8 January, pp. 1–10.

Cliffe, S. (1998) Knowledge management: the well-connected business. *Harvard Business Review*, **76**(4), 17–21.

Computer Sciences Corporation (1998) *Explicit Management of the Knowledge Asset* (Computer Sciences Corporation, London).

Dagens Nœringsliv (1999) Kraftig vekst for revisoradvokater (Strong growth for auditing attorneys). *Dagens Nœringsliv*, 27 January, 6.

Davenport, T.H., Long, D.W.D. and Beers, M.C. (1998) Successful knowledge management projects. *Sloan Management Review*, Winter, 43–57.

Earl, M.J. and Scott, I.A. (1999) What is a chief knowledge officer? *Sloan Management Review*, Winter, 29–38.

Edwards, D.L. and Mahling, D.E. (1997) Toward knowledge management systems in the legal domain, in *Proceedings of Group 97*, 158–66.

Fahey, L. and Prusak, L. (1998) The eleven deadliest sins of knowledge management. *California Management Review*, **40**(3), 265–76.

Garvin, D.A. (1993) Building a learning organization. *Harvard Business Review*, July–August, 78–91.

Ginsburg, M. and Kambil, A. (1999) Annotate: a web-based knowledge management support system for document collections, in *Proceedings of the 32nd Hawaii International Conference on System Sciences*, Maui, Hawaii, 5–8 January, pp. 1–10.

Gottschalk, P., Christensen, B.H. and Watson, R.T. (1998) Key issues in information systems management surveys: methodological issues and choices in a Norwegian context. *Scandinavian Journal of Information Systems*, **9**(2), 57–66.

Kettinger, W.J. and Grover, V. (1995) Special section: toward a theory of business process change management. *Journal of Management Information Systems*, **12**(1), 9–30.

Lamb, R. (1999) Using intranets: preliminary results from a socio-technical field study, in *Proceedings of the 32nd Hawaii International Conference on System Sciences*, Maui, Hawaii, 5–8 January, pp. 1–10.

Laudon, K.C. and Laudon, J.P. (1998) *Management Information Systems – New Approaches to Organization & Technology*, (Prentice Hall).

Leichner, U., Schmid, B., Schmid-Isler, S. and Stanoevska-Slabeva, K. (1999) Structuring and systemizing knowledge on the Internet – realizing the encyclopedia concept as a knowledge medium. In *Managing Information Technology Resources in the Next Millennium*, Khosrowpour, M. (ed.), (Idea Group Publishing, Hershey) pp. 402–10.

Newell, S., Swan, J., Galliers, R. and Scarbrough, H. (1999) The intranet as a knowledge management tool? Creating new electronic fences. In *Managing Information Technology Resources in the Next Millennium*, Khosrowpour, M. (ed.), (Idea Group Publishing, Hershey) pp. 612–19.

Nonaka, I. (1994) A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, **5** (1), 14–37.

Oekonomisk Rapport (1999) Fremtidens jobbtitler (Future job titles). *Oekonomisk Rapport*, **26**(5), 44–6.

Ruggles, R. (1998) The state of the notion: knowledge management in practice. *California Management Review*, **40**(3), 80–89.

Terrett, A. (1998) Knowledge management and the law firm. *Journal of Knowledge Management*, **2**(1), 67–76.

Whitfield-Jones, C. (1999) Business as usual or the end of life as we know it? *Managing Partner* May.

Yap, A.Y. and Bjørn-Andersen, N. (1998) Energizing the nexus of corporate knowledge: a portal towards the virtual organization, in *Proceedings of the International Conference on Information Systems*, Helsinki, 11–13 December, pp. 273–86.

Zack, M.H. (1999) Developing a knowledge strategy. *California Management Review*, **41**(3), 125–45.

Biographical notes

Petter Gottschalk is an associate professor in information management at the Norwegian School of Management. He earned his MBA in Germany, his MSc in the USA and his DBA in the UK. He has been IT director of ABB, managing director of ABB Datacables and managing director of the Norwegian Computing Center. His research has been published in *Information & Management*, *European Journal of Information Systems*, *Scandinavian Journal of Information Systems*, *Long Range Planning*, *Journal of Global Information Technology Management* and *Journal of Knowledge Management*.

Address for correspondence: Petter Gottschalk, Norwegian School of Management, PO Box 580, 1302 Sandvika, Norway.