IDEA GROUP PUBLISHING

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ITP4911

Stages of Knowledge Management Technology: A Comparison of Law Firms in Norway and Australia

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ABSTRACT

In this paper, information technology support for knowledge management is linked to stages of growth, using a stages of growth model consisting of four stages. This model is used to compare how the law firms in Norway and Australia differ as they move through various stages of growth in their application of knowledge management technology over time. The model is specifically appropriate to law firms where knowledge of professional experts is a core asset, and the careful management of this asset has special importance.

INTRODUCTION

Stages of growth models have been used widely in both organizational research and information technology management research. According to King and Teo (1997), these models describe a wide variety of phenomena - the organizational life cycle, product life cycle, biological growth, etc. These models assume that predictable patterns (conceptualized in terms of stages) exist in the growth of organizations, the sales levels of products, and the growth of living organisms. These stages are (1) sequential in nature, (2) occur as a hierarchical progression that is not easily reversed, and (3) involve a broad range of organizational activities and structures.

Benchmark variables are often used to indicate theoretical characteristics in each stage of growth. A one-dimensional continuum is established for each benchmark variable. The measurement of benchmark variables can be carried out using Guttman scales (Frankfort-Nachmias and Nachmias, 2002; Nunnally and Bernstein 1994). Guttman scaling is a cumulative scaling technique based on ordering theory that suggests a linear relationship between the elements of a domain and the items on a test.

In this paper, a four-stage model for the evolution of information technology support for knowledge management is used to compare how the law firms in Norway and Australia differ as they move through various stages of growth in their application of knowledge management technology over time. The model is specifically appropriate to law firms where knowledge of professional experts is a core asset, and the careful management of this asset has special importance (Barton et al., 2002a, 2002b; Becker et al., 2001; Disterer, 2001; Edwards and Mahling, 1997; Galanter and Palay, 1991; Hunter et al., 2002; Montana, 2000; Mountain, 2001; Susskind, 2000).

THE KNOWLEDGE MANAGEMENT TECHNOLOGY STAGE MODEL

Various multistage models have been proposed for organizational evolution over time. These models differ in the number of stages. For example, Nolan (1979) introduced a model with six stages for IT maturity in organizations, which later was expanded to nine stages. Earl (2000) suggested a stages of growth model for evolving the e-business, consisting of the following six stages: external communication, internal communication, e-commerce, e-business, e-enterprise, and transformation. Each of these models identifies certain characteristics that typify firms in different stages of growth. Among these multistage models, models with four stages seem to have been proposed and tested most frequently (King and Teo, 1997).

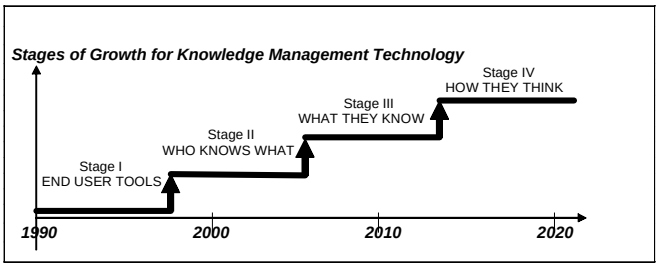
The knowledge management technology (KMT) stage model consists of four stages. The first stage is general IT support for knowledge workers. This includes word processing, spreadsheets, and email. The second stage is information about knowledge sources. An information system stores information about who knows what within the firm and outside the firm. The system does not store what they actually know. A typical example is the company intranet. The third stage is information representing knowledge. The system stores what knowledge workers know in terms of information. A typical example is a database. The fourth and final stage is information processing. An information system uses information to evaluate situations. A typical example here is an expert system.

The contingent approach to firm performance implies that Stage I may be right for one firm, while Stage IV may be right for another firm. Some firms will evolve over time from Stage I to higher stages as indicated in Figure 1. The time axis ranging from 1990 to 2020 in Figure 1 suggests that it takes time for an individual firm and a whole industry to move through all stages. As an example applied later in this paper, the law firm industry is moving slowly in its use of information technology.

Stages of IT support in knowledge management are useful for identifying the current situation as well as planning for future applications in the firm. Each stage can be labeled as follows:

- Stage I can be labeled *end-user-tools* or *people-to-technology* as information technology provides knowledge workers with tools that improve personal efficiency.
- Stage II can be labeled *who-knows-what* or *people-to-people* as knowledge workers use information technology to find other knowledge workers.
- Stage III can be labeled *what-they-know* or *people-to-docs* as information technology provides knowledge workers with access to information that is typically stored in documents. Examples of documents are contracts and agreements, reports, manuals and handbooks, business forms, letters, memos, articles, drawings, blueprints, photographs, e-mail and voice mail messages, video clips, script and visuals from presentations, policy statements, computer printouts, and transcripts from meetings.
- Stage IV can be labeled *how-they-think* or *people-to-systems* where the system is intended to help solve a knowledge problem.

Figure 1: The Stages of Growth Model for Knowledge Management Technology



Information technology can be applied at four different levels to support knowledge management in an organization, according to the proposed Stages of Growth. At the first level, end user tools are made available to knowledge workers. At the second level, information on who knows what is made available electronically. At the third level, some information representing knowledge is stored and made available electronically. At the fourth level, information systems capable of simulating human thinking are applied in the organization. These four levels are illustrated in Table 1, where they are combined with knowledge management tasks. The entries in the figure only serve as examples of current systems.

One reason for Stage III emerging after Stage II is the personalization strategy versus the codification strategy. The individual barriers are significantly lower with the personalization strategy, because the individual professional maintains the control through the whole knowledge management cycle. According to Disterer (2001), the individual is recognized as an expert and is cared for.

Knowledge management strategies focusing on personalization could be called communication strategies, because the main objective is to foster personal communication between people. Core IT systems with this strategy are yellow pages (directories of experts, who-knows-what systems, people finder database) that show inquirers who they should talk to regarding a given topic or problem. The main disadvantages of personalization strategies are a lack of standards and the high dependence on communication skills and the will of the professionals. Such disadvantages make firms want to advance to Stage III. in Stage III, independence in time among knowledge suppliers and knowledge users is achieved (Disterer, 2002).

BENCHMARK VARIABLES

In Table 2, the four stages of growth for knowledge management technology are described in terms of benchmark variables. Benchmark variables indicate the theoretical characteristics in each stage of growth (King and Teo 1997). For example, firms in Stage I can theoretically be expected to conform to values of benchmark variables listed under Stage I. However, this does not mean that it is impossible for firms in Stage I to have values of benchmark variables applicable to other stages. Rather, it means that the values of benchmark variables indicate the most likely theoretical characteristics applicable in each stage of integration as indicated in Table 2.

Table 1: Examples of IS/IT in different Knowledge Management Stages

STAGES / TASKS	**I END USER TOOLS people-to-technology**	**II WHO KNOWS WHAT people-to-people**	**III WHAT THEY KNOW people-to-docs**	**IV WHAT THEY THINK people-to-systems**
Distribute knowledge	Word Processing Desktop Publishing Web Publishing Electronic Calendars Presentations	Word Processing Desktop Publishing Web Publishing Electronic Calendars Presentations	Word Processing Desktop Publishing Web Publishing Electronic Calendars Presentations	Word Processing Desktop Publishing Web Publishing Electronic Calendars Presentations
Share knowledge		Groupware Intranets Networks E-mail	Groupware Intranets Networks E-mail	Groupware Intranets Networks E-mail
Capture knowledge			Databases Data Warehouses	Databases Data Warehouses
Apply knowledge				Expert systems Neural networks Intelligent agents

Table 2: Typology of Evolutionary Stages

No.	Benchmark Variable	Stage I END USER TOOLS people-to-technology	Stage II WHO KNOWS WHAT people-to-people	Stage III WHAT THEY THINK people-to-docs	Stage IV HOW THEY THINK people-to-systems	Inspired by
1	***Trigger of IT for KM***	Individual lawyer's needs for tools	Organization's needs for information	Automate lawyers' information work	Automate lawyers' knowledge work	*King and Teo 1997*
2	***Top management's participation***	Rarely	Sometimes	Frequently	Almost always	*King and Teo 1997*
3	***User management's participation***	Rarely	Sometimes	Frequently	Almost always	*King and Teo 1997*
4	***Principal contribution***	Efficiency of lawyer	Effectiveness of lawyer	Effectiveness of firm	Competitiveness of firm	*Gottschalk 2002*
5	***Technology assessment***	Rarely	Sometimes	Frequently	Almost always	*King and Teo 1997*
6	***Main purpose***	Administrative work	Access to information	Sharing information	Automating work	*Gottschalk 2002*
7	***Contribution of IT function***	Supplier of PCs	Technical infrastructure	Resource of information	Supplier of systems	*King and Teo 1997*
8	***Role of IT manager***	Technology expert	Functional administrator	Resource manager	Knowledge management expert	*King and Teo 1997*
9	***Performance of IT function***	Operational efficiency	Business implementation	Knowledge implementation	Long-term impact	*King and Teo 1997*
10	***IT manager's participation***	Rarely	Sometimes	Frequently	Almost always	*King and Teo 1997*

There are a total of ten benchmark variables in Table 2. Six benchmark variables (1-6) are concerned with IT in KM; the remaining four benchmark variables (7-10) are concerned with IT management.

Benchmark variables in Table 2 indicate theoretical characteristics that commonly occur together. Sabherwal and Chan (2001) label this a configuration, which is defined as any multidimensional constellation of conceptually distinct characteristics that commonly occur together. Configurations take a step beyond the traditional contingency theoretic view by using a holistic rather than a reductionistic stance. They offer richer insights by focusing on parsimonious and relatively homogeneous groups rather than diverse concepts.

SURVEY OF LAW FIRMS

For survey of law firms in Norway largest law firms were selected by identifying all law firms that had at least five lawyers in the firm. This procedure resulted in a total of 102 law firms. It was possible to obtain email addresses for managing directors / chief executive officers in 95 of these law firms by contacting the firms. Most law firms in Norway are small. Because knowledge management technology for sharing information is dependent on a minimum number of lawyers to make sense, only law firms with a minimum of five lawyers were selected for this survey.

Questionnaires were prepared and sent to the chief executive officer (CEO) in each firm, with two follow-ups about one week and two weeks after the date of the initial mailings. Five firms declined participation citing that the questionnaire was too long. Useable responses were returned by 19 firms, providing a response rate of 20%.

For the survey in Australia questionnaires were mailed to a total of 500 firms of which 47 firms responded, representing a response rate of 9%.

COMPARISON OF NORWEGIAN AND AUSTRALIAN LAW FIRMS

Having collected survey data in both Norway and Australia, we are now able to make comparisons between the two countries. From previous studies we know that Australia and Norway both have similarities and differences in business in terms of information technology applications.

Table 3 lists characteristics of respondents in Australia and Norway. Participating law firms in Australia were larger than participating firms in Norway. The partner ration is larger in Norway than in Australia. The IT budget in Australia has a larger fraction of the firm's income budget. Most Norwegian law firms are in Stage III, while most Australian law firms are in Stage I.

As a consequence of many Australian law firms found in Stage I, many Australian law firms (56.8%) report no path of evolution as listed

Table 3: Characteristics of Respondents in Norway and Australia

Characteristics	Norway	Australia
About respondents		
Years in the firm	6 years	11 years
Persons in the firm	65 persons	124 persons
Lawyers in the firm	43 persons	57 persons
Partners in the firm	14 persons	15 persons
Fraction lawyers	66%	46%
Fraction partners	33%	26%
Income budget	10 mill. US $	4 mill. US $
IT budget	0.2 mill. US $	0.1 mill. US $
IT personnel	1.1 persons	2.9 persons
Income per person	0.2 mill. US $	0.03 mill. US $
Fraction IT budget	2.3%	3.3%
Fraction IT personnel	1.7%	2.3%
About stages of growth		
Stage I: People-to-technology	16%	55%
Stage II: People-to-people	21%	13%
Stage III: People-to-docs	58%	21%
Stage IV: People-to-systems	5%	11%

Table 4: Paths of Evolution

Paths of Evolution	Norway	Australia
I End-user-tools to **II** who-knows-what to **III** what-they-know	50.0%	8.1%
I End-user-tools to **III** what-they-know	12.5%	13.5%
II Who-knows-what **III** what-they-know	12.5%	-
I End-user-tools to **III** what-they-know to **II** who-knows-what	12.5%	2.7%
III what-they-know to **II** who-knows-what to **I** end-user-tools	12.5%	-
I End-user-tools	-	56.8%
Other paths in line with the stages of growth model	-	16.2%
Other paths not in line with the stages of growth model	-	2.7%
Total	100.0%	100.0%

Table 5: Typology of Evolutionary Stages

No.	Benchmark Variable	Stage I END USER TOOLS people-to-technology	Stage II WHO KNOWS WHAT people-to-people	Stage III WHAT THEY THINK people-to-docs	Stage IV HOW THEY THINK people-to-systems	Inspired by
1	***Trigger of IT for KM***	Individual lawyer's needs for tools	Organization's needs for information **Australia Norway**	Automate lawyers' information work	Automate lawyers' knowledge work	*King and Teo 1997*
2	***Top management's participation***	Rarely	Sometimes	Frequently **Australia Norway**	Almost always	*King and Teo 1997*
3	***User management's participation***	Rarely	Sometimes	Frequently **Australia Norway**	Almost always	*King and Teo 1997*
4	***Principal contribution***	Efficiency of lawyer	Effectiveness of lawyer **Australia**	Effectiveness of firm **Norway**	Competitiveness of firm	*Gottschalk 2002*
5	***Technology assessment***	Rarely	Sometimes **Norway**	Frequently **Australia**	Almost always	*King and Teo 1997*
6	***Main purpose***	Administrative work	Access to information **Australia Norway**	Sharing information	Automating work	*Gottschalk 2002*
7	***Contribution of IT function***	Supplier of PCs	Technical infrastructure **Australia Norway**	Resource of information	Supplier of systems	*King and Teo 1997*
8	***Role of IT manager***	Technology expert	Functional administrator **Australia Norway**	Resource manager	Knowledge management expert	*King and Teo 1997*
9	***Performance of IT function***	Operational efficiency	Business implementation **Australia**	Knowledge implementation **Norway**	Long-term impact	*King and Teo 1997*
10	***IT manager's participation***	Rarely	Sometimes	Frequently **Australia Norway**	Almost always	*King and Teo 1997*

in Table 4. Overall, 75% of Norwegian law firms seem to follow the stages of growth model, while 95% of Australian law firms seem to follow this model when assuming that all firms at Stage I will eventually progress to later stages.

Analyzing the benchmark variables the results from Norway had a low coefficient of reproducibility (CR). Hence, benchmark variables in Table 5 are used to illustrate average responses in the two countries.

Average responses to questions concerned with the extent of IT use at each stage of growth are listed in Tables 6 to 9. Table 6 lists the extent of IT use in terms of people-to-technology, Table 7 in terms of people-to-people, Table 8 people-to-docs, and Table 9 people-to-systems. Average responses are for all 19 responding law firms.

Electronic mail is most extensively used within the people-to-technology stage I in both Australia and Norway. Internal standards database is most extensively used within the people-to-people stage II in Norway, while the firm's intranet is the most extensively used in Australia. Database with client cases is most extensively used within the people-to-docs stage III in Norway, while document system is the most extensively used in Australia. Expert systems are most extensively used within the people-to-systems stage IV in both Australia and Norway.

In terms of statistical differences, there are two significant differences in the tables. First, internal databases are significantly more used in Norwegian law firms compared to Australian firms. Second, document systems are significantly more used in Australian law firms compared to Norwegian firms.

The survey instruments included questions on knowledge-sharing perceptions and reward attitudes in both countries. These questions were derived from research conducted by Hunter et al. (2002). Table 10 shows results for knowledge-sharing perceptions. The questions were posed somewhat differently than earlier questions, as respondents were asked whether they disagreed or agreed with each statement. The scale went from 1 (strongly disagree) to 5 (strongly agree). This means that a 3 means neither disagree nor agree. The first question in Table 10 indicates that respondents did somewhat agree that lawyers are encouraged to share with others what they have learned from their recent assignments. Similar results are obtained for the other questions on knowledge-sharing perceptions that respondents only marginally agreed with the statements. The second question was a turned question, indicating a marginal disagreement with the statement, especially in Australia.

Table 11 lists responses concerning reward attitudes. Results indicate that individual evaluation is more common that teamwork evaluation when salary increases take place, especially in Australia. There are three statistically significant differences in Table 11. First, lawyer salary increases in the firm are significantly more based on ability and how well he/she does his/her job in Australia. The same is the case

Table 6: The extent of use of end-user-tools (1 little extent, 6 great extent)

People-to-technology	*Norway*	*Australia*
Text processing (e.g., Word)	5.4	4.8
Presentations (e.g., PowerPoint)	2.6	2.7
Electronic mail (e.g., Notes mail)	5.6	5.6
External legal databases (e.g., Lovdata)	5.2	4.7
End user tools for lawyers	4.5	3.8

Table 7: The extent of use of who-knows-what systems (1 little extent, 6 great extent)

People-to-people	*Norway*	*Australia*
Groupware for cooperation (e.g., GroupWise, Lotus Notes)	2.7	2.8
The firm's intranet	3.8	3.8
The firm's own web pages on the Internet	3.6	2.8
Internal standards database	4.1	2.9
Systems providing information about lawyer's knowledge	3.7	2.9

Table 8: The extent of use of what-they-know systems (1 little extent, 6 great extent)

People-to-docs	Norway	Australia
Groupware for knowledge (e.g., GroupWise, Lotus Notes)	2.7	2.9
Database with client cases	3.7	3.0
Database with best practices	3.1	2.4
Document system (e.g., DocsOpen)	3.5	4.6
Systems providing information based on lawyers' knowledge	2.8	3.2

Table 9: The extent of use of how-they-think systems (1 little extent, 6 great extent)

People-to-systems	Norway	Australia
Expert system (e.g., Knowledger)	1.6	1.7
Neural network system	1.4	1.3
Intelligent agent (e.g., Autonomy)	1.2	1.4
Case-based reasoning system	1.2	1.5
Systems solving knowledge problems for lawyers	2.0	1.5

Table 10: Average response to statements about knowledge-sharing perceptions (1 strongly disagree, 5 strongly agree)

Knowledge-sharing perceptions	Norway	Australia
Lawyers are encouraged to share with others what they have learned from their recent assignments	3.8	4.1
Senior staff are too busy to reflect on their experiences and share them	3.2	3.8
The firm has a well-organized system for sharing knowledge (e.g. about clients, managing projects, new approaches) within departments or practice areas	3.4	3.2
The firm has a well-organized system for sharing knowledge (e.g. about clients, managing projects, new approaches) across departments or practice areas	3.3	2.8
There is an expectation that lawyers or their teams will have to take a regular turn to provide a reflection on learning experiences	3.5	2.8
Sharing knowledge systematically is part of the firm's culture	3.2	3.1

Figure 2: Average response to systems use at each stage (1 little extent, 6 great extent)

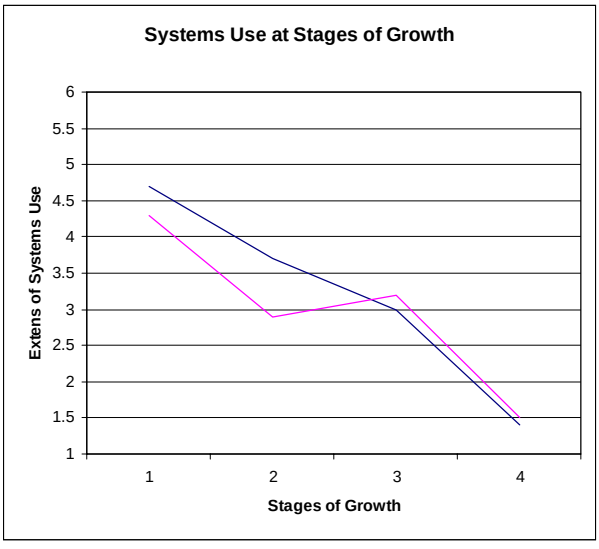


Table 11: Average response to statements about reward attitudes *(1 strongly disagree, 5 strongly agree)*

Reward attitudes	Norway	Australia
Lawyer salary increases in the firm are based on ability and how well he/she does his/her work	4.2	4.8
Promotion of a lawyer in the firm is based on ability and how well he/she does his/her work	4.2	5.0
Lawyers are fairly rewarded for the amount of effort they put in	3.7	5.0
The interest of the work lawyers do compensates for long hours and a stressful workload	3.4	3.3
The team as a whole is rewarded for good work	3.2	3.4
Teamwork in this firm is fully recognized and rewarded	3.2	3.6

Table 12: Average response to systems use at each stage (1 little extent, 6 great extent)

Multiple item scale	Norway Score	Australia Score	Norway Alpha	Australia Alpha
End-user-tool systems	4.7	4.3	.69	.79
Who-knows-what systems	3.7	2.9	-	-
What-they-know systems	3.0	3.2	.77	.80
How-they-think systems	1.4	1.5	.89	.85

Table 13: Average response to human resources issues (1 little extent, 6 great extent)

Multiple item scale	Norway Score	Australia Score	Norway Alpha	Australia Alpha
Knowledge-sharing perceptions	3.3	3.0	.70	.87
Reward attitudes	3.8	4.2	.71	.73
Support for personal development	3.2	-	.71	-
Performance appraisal	3.3	-	.77	-

for promotion. Third, Australian lawyers are more fairly rewarded for the amount of work they put in.

Stages of growth were measured in terms of tools and systems in the first part of the questionnaire. Each stage was measured through a multiple item scale consisting of five items. Reliability for each scale is listed in Table 12. The second scale on who-knows-what systems had an unacceptable reliability even when items were deleted, causing the summary item to be used in Table 12.

Scores in Table 12 are illustrated in Figure 2. The visual picture supports stages of growth in terms of less systems use at higher stages.

Knowledge-sharing perceptions, reward attitudes, support for personal development and performance appraisal were measured through four multiple item scales. Reliability for each scale is listed in Table 13. In the Australian survey, only the two first scales were included in the questionnaire. While Norwegian law firms report stronger knowledge-sharing perceptions in their firms compared to Australian firms, Australian law firms report stronger reward attitudes compared to Norwegian firms.

CONCLUSION

A Stages of Growth model is used to compare how the law firms in Norway and Australia differ as they move through various stages of growth in their application of knowledge management technology over time. This is specifically appropriate to law firms where knowledge of professional experts is a core asset, and careful management of this asset has special importance.

Stages of growth were measured in terms of tools and systems. Each stage was measured through a multiple item scale consisting of five items with results showing reliability. The second scale on who-knows-what systems had an unacceptable reliability.

Knowledge-sharing perceptions, reward attitudes, support for personal development and performance appraisal were measured through four multiple item scales. In the Australian survey, only the two first scales were included in the questionnaire. While Norwegian law firms report stronger knowledge-sharing perceptions in their firms compared to Australian firms, Australian law firms report stronger reward attitudes compared to Norwegian firms.

The size of the sample has to increase in future research by making it more attractive to respond to the survey. Law firms seem very relevant as an industry for future research, but their participation has to be stimulated more successfully than in this research.

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