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Research Article

Technological Utilization for Knowledge Management

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The aim of this paper is to explore the role and contribution of new information communication technologies in the emerging field of knowledge management (KM). There is much confusion in the literature, and in organizations, as to what role technology has within the field of KM. This quandary has led to the danger that organizations could spend large amounts of time, money and other resources on inappropriate technology in support of their KM efforts. The paper presents the classification of KM technology tools under the headings of collaboration, content management and business intelligence. This paper also seeks to clarify how KM technologies have been applied in organizations in recent years . Overall, the paper presents an overview of current literature and practical technological adoption and application in the KM field. Copyright © 2004 John Wiley & Sons, Ltd.

INTRODUCTION

Knowledge management (KM) seeks to develop a strategy for the capture, use and transfer of knowledge across the organization in order to improve efficiency and increase competitive edge (Demerest, 1997) . It is concerned with embracing a diversity of knowledge sources and cultivating knowledge wherever it resides. Technology can be viewed as both a key contributor to and enabler of the field of KM (Davenport and Prusak, 1998) . This perspective is related to technological-based ability to capture data, information and knowledge that surpasses human capacity in absorbing and analysing these in a focused way (Shenk, 1997). Richards, (1998) further supports this point:

> Our technological capability has outpaced our social capability. This makes us look like social incompetents in charge of increasingly under utilised knowledge.

However, this statement is not a new revelation. In the words of Albert Einstein:

> It has become appallingly obvious that our technology has exceeded our humanity.

As technological developments become more advanced in application and utilization, it is emerging that employees who have access to technologies that detect and manage business opportunities will have the distinct advantage of exploiting market shifts. Martin (1998) emphasizes this point:

> Human expertise is amplified by computers. Software is an encapsulation of knowledge. Knowledge, constantly renewed and enhanced, is the primary source of competitive advantage.

Although the technological arena has received much publicity in recent years, confusion still exists over its implications for KM. One of the

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main reasons for this has been the repackaging of existing software applications under the KM label. While KM technologies may incorporate characteristics of traditional data and information technologies, they extend these capabilities. Knowledge technologies attempt to push users to think beyond their current boundaries, thus facilitating organizational activity, promoting continuous improvement and growth through innovation.

There is also an issue regarding KM technologies and the quandary of how to distinguish between knowledge and information (Malhotra, 1998). Svieby (1997) recognizes that this confusion has caused managers to sink billions of dollars into information technology ventures that have yielded marginal results. This misconception, linked to extensive press coverage suggesting that increased investments in new information technologies will result in improved business performance, has led practitioners to be sceptical (Malhotra, 1998). This scepticism causes managers to question the degree of technological involvement required for successful KM programmes.

This aim of this paper is to explore the contribution that new information communication technologies (ICTs) make to the field of KM. The paper investigates the enhancement of knowledge activities through the application of technological tools. Firstly, a number of tools designed for KM are presented under the headings collaboration, content management and business intelligence. Secondly, the results of empirical research concerned with technical climate and application is presented. The paper concludes with a discussion of key issues uncovered by the research.

INFORMATION COMMUNICATION TECHNOLOGY

Explicit and systematic management of knowledge has emerged as a result of several developments, including that of ICT. Technology within KM can be seen to have evolved through three phases, namely mainframe, personal computer (PC) and networking (Davis, 1984; Abecker *et al.*, 1987; Peppard, 1993; Sprague and Watson, 1996). While the three phases are cumulative and interdependent, the latter has become the dominant model, offering a widely interconnected macro-environment that influences business opportunity and strategy (Ward and Griffiths, 1996; Wiseman, 1986). Contributory factors to this evolutionary process include:

- standardization which gave rise to new customizable, technological mass markets;
- operating systems functional within familiar, easy-to-learn environments through the use of graphical user interfaces (GUIs);
- a shift from bespoke applications to new generic software tools that are customizable by the user;
- significantly reduced IT costs thus allowing individuals and small to medium sized enterprises [SMEs] to participate in the technological revolution;
- networks that provide accessible and empowered channels of communication;
- An overall increase in ICT literacy.

In today's knowledge-intensive organizations the primary objective of ICT is to lead users to the information they need. This includes creating, gathering, storing, accessing and making available the right information that will result in the developments of insight for the organization's users (Davenport and Prusak, 1998). Thus, the pervasive use of information technology in organizations qualifies it as a natural medium for information flow (Borghoff and Pareschi, 1999).

The main challenges facing organizational change and development are threefold: first, knowledge discovery; second, corporate collaboration; and third, rapid decision making (Curley, 1998). In addition, recent infrastructure changes have made a significant and positive impact on an organization's ability and desire to manage knowledge. Thus, companies need to comprehend the extent to which knowledge can be shared throughout an organization. A study from the American Productivity and Quality Center (1997) highlights this point. Results from the study indicate that organizations embarking on KM initiatives feel that a suitable IT infrastructure must be established to enable them to successfully accomplish their goals. Martin (1998) shares this viewpoint:

> The cybercorp needs a knowledge infrastructure to capture and create knowledge, store it, improve it, clarify it, disseminate it and put it to use.

At the other end of the spectrum, fear is expressed that IT-oriented initiatives will end up by objectifying and calcifying knowledge into static, inert information with complete disregard to the human element of KM (Svieby, 1997). Liebowitz (1999) contributes to this view by identifying what he considers to be the incorrect linking of KM to the field of information systems (IS), thus neglecting the crucial role of individuals in knowledge activities. The correct stance of IT within the KM arena should be as an integrator of communications

technology, rather than solely as a repository of information; hence the use of the term information communication technology:

> The critical role for IT lies in the ability to support communication, collaboration, and those searching for knowledge and information, not static repositories of best practices. (Manasco, 1996).

Connecting, not number crunching, has become the key factor in determining the knowledge infrastructure. Davenport and Prusak, (1998) support this view:

> Everybody expects technology to be a silver bullet—it isn't. You cannot ignore technology, but we must remember it is only an enabler. The real value is in linking people together, not in the technology itself.

From a KM viewpoint an improved application of IT is thus a compromise between the two polarities. An awareness of the limits of IT and a realization that any IT deployment will be relatively unsuccessful if not accompaied by a global cultural change towards a clear appreciation of the value of knowledge. A balance between these two polarities represents the essence of KM. Quinn *et al.* (1996) envisages the development of ICT as

> allowing many more highly diverse, geographically dispersed, intellectually specialized talents to be brought to bear upon a single project than ever before.

Commenting on this issue, Boisot (1998) argues that improved ICTs will enable the transfer of knowledge that is of a more 'uncoded' (tacit) nature. Thus the common language of ICTs should facilitate increased interactive sharing and problem solving. This issue is an area that KM systems must address.

KNOWLEDGE MANAGEMENT SYSTEMS

To design valuable KM systems a number of factors must be considered. Firstly, users should not have to learn new ways of working with technology. If people need to change the way they work within the KM system, participant motivation will be minimal. Offsey (1997) reinforces this point:

> The promise of technologies aimed at Knowledge Management is that they will help organizations use their knowledge more efficiently without changing the tools they currently use to create and process it.

To ensure the creation of effective KM systems, users must make intelligent decisions about the kind of data and experience that is to be retained and published through the knowledge architecture. The success of a KM system is ultimately judged at the point where people interact with the organizations' information. Secondly, consideration must be given to awareness, accessibility, availability, input and maintenance of information (Offsey, 1997). Technology should deliver relevant up-to-date business information to those who need it from every possible source. The KM technology platform must be ubiquitous enough to permit integration with a variety of devices, such as mobile telephones, laptops, remote access terminals, etc. This will facilitate the increased mobility of knowledge workers. The ability to synthesize and deliver focused information is useless if it cannot be accessed at the point where a decision needs to be made.

Thirdly, the functionality and characteristics of the system must be contemplated taking human–computer interaction (HCI) factors into consideration (Preece *et al.*, 1994). Lawton (1999) emphasizes this point:

> In computer systems the weakest link has always been between the machine and humans because this bridge spans a space that begins with the physical and ends with the cognitive. Advanced software and hardware technologies are converging in machine–human interfaces that vastly extend knowledge transfer capacities.

TECHNOLOGY TOOLS FOR KNOWLEDGE MANAGEMENT

KM technologies are quickly evolving and converging, spurred by requirements of top global organizations, attention by consultants and integrators and efforts by pioneering vendors (Mantelman, 1999). Currently, many technological tools are associated with KM, a point noted by Davenport and Prusak (1998):

> Knowledge Management technology is a broad concept, encompassing much more than Notes and the Web. Firms can apply a wide variety of technologies to the objectives of managing knowledge, some of which have been available for many years.

The technological tools currently classified as KM applications may be grouped under the headings collaboration, content management and business intelligence (refer to Table 1). As the new

Table 1 Technology tools for knowledge management

Collaborative tools	
Groupware (i.e. Lotus Notes)	Intranet (intra-organization communication)
Meeting support systems (i.e. teleconferencing, dataconferencing, videoconferencing, e-brainstorming)	Extranet (customer/supplier communication)
Knowledge directories (i.e. corporate Yellow Pages)	
Content management	
Internet/WWW (i.e. information provider)	Document management systems (i.e. e-filing)
Agents and filters (i.e. information management)	Office automation systems (i.e. assistance tools, digital image processing)
Electronic publishing systems	
Business intelligence	
Data warehousing (i.e. data mining)	Workflow (i.e. helpdesk)
(Group) decision support systems (i.e. intelligent support systems, executive information systems)	E-commerce (i.e. Internet/WWW, e-tailing)
Knowledge base systems (i.e. artifical intelligence, expert systems)	

technologies encompass many elements, these headings are applied purely as a general presentation guide. Due to the space constraints of this paper each technology is not discussed in detail; further information can be obtained from Moffett *et al*. (2002).

THE MeCTIP MODEL

Application of the key factors uncovered via the exploratory research enabled a prescriptive, conceptual model of KM to be postulated. This model is known as the MeCTIP model.

The MeCTIP model aims to portray the transformation of organizations by prescribing source-level improvements that will contribute to knowledge-based activities. Therefore, the MeCTIP model not only describes current organization standing but also predicts how organizations can optimize business performance through KM implementation. Five factors that influence adoption of KM within organizations were outlined; these five were used to build the MeCTIP model. The name of the model is an acronym of the components of the model, namely,

Me Macro environment
C Culture
T Technology
I Information
P People

The MeCTIP model is shown in Figure 1.

Within the context of the model the following constructs are defined:

- *Macro-environment*. Includes economic, technical and social agents of change. These include globalization, technological development, partnerships and alliances, customer focus knowledge markets and rise of the electronic economy.
- *Organizational climate*. Includes organizational structure, strategy, goals, culture, employee emancipation, change management and business improvement initiatives.
- *Internal technical climate*. Includes technological infrastructure and response to technical change.
- *Technical contributors*. Includes system standardization and compatibility, technical usability, technological tools for KM.
- *Informational contributors*. Includes such concepts as information fatigue, infofamine, infoglut, knowledge silos and power bases and information auditing.
- *Personal contributors*. Includes knowledge roles and skills, motivation and self-reflection, empowerment, learning networks and communities of practice, dialogue, collaboration and innovation.

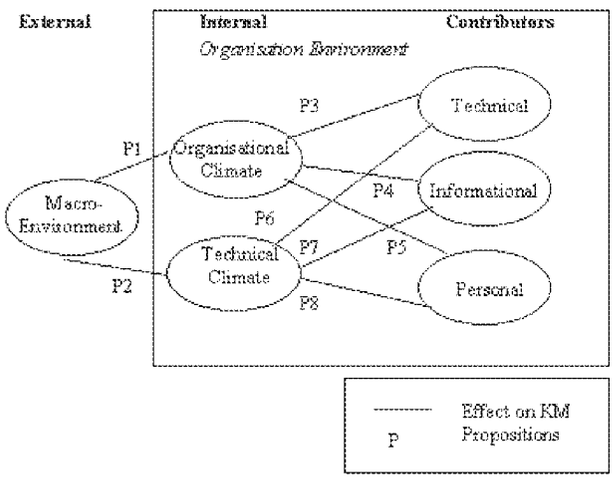

Figure 1 MeCTIP model

The MeCTIP model, as shown in Figure 1, first portrays the relationships between external and internal factors for an organization (P1 and P2); an event occurring in the macro-environment (external to the organization) may impact upon the organizational and technical characteristics of the business. Second, Figure 1 presents relationships internal to the organizational environment. A change in organizational and/or technical events can affect internal characteristics that contribute to KM, namely, people, information and technology (P3–P8). Thus, the MeCTIP model is beneficial to KM research as it clearly outlines key components of the field and the relationships that exist between these elements. The impact of KM activity within a particular area can be determined quickly; for example, a change in the macro-environment (such as the introduction of the Internet) that impinges upon organizational climate may cause a direct effect on technical, informational and personal elements of the organization (P1, P3, P4 and P5).

RESEARCH METHODOLOGY

To test the validity of theory of the MeCTIP model, a tool for measuring the relationships between the various KM components was devised. This paper-based tool, entitled 'Benchmarking knowledge management', took the form of a postal questionnaire. This study undertook a traditional, cross-sectional approach to survey implementation. To gain an understanding of how empirical research had previously been applied within the KM field, an extensive literature review was conducted, along with secondary exploratory research. This process highlighted the limited theoretical support for research of this kind within the KM arena, thus outlining the difficulty of justifying any broad research findings. Another factor to be considered is the fact that each industrial sector must operate within its own unique environment. Thus, cross-sectional results on a broad-scale KM study would not be valid, under scrutiny, as generalizable to all industrial sectors. To overcome this limitation the survey population was reduced to a more controlled group. The survey was therefore focused on three industrial sectors, namely, engineering, retailing and technology.

The 'Benchmarking knowledge management' questionnaire consisted of 34 questions subdivided into 11 sections, as outlined in Table 2.

A comment section was also included to offer respondents the opportunity to express views on the questionnaire in general or on a specific area that they felt had not been adequately addressed.

Table 2 Analysis of questionnaire

Sections	Heading	No. of questions
A	General information	2
B	Using information effectively	1
C	ICT	5
D	How we work in this company	1 (3 sub-sections)
E	Organization strategy	6
F	Organization structure	1
G	Decision making	2
H	Changing work practices	1
I	Training and development	5
J	Appraisal systems	4
K	Background information	6

To select sample candidates a number of trade directories were referred to. These included *The Times Top 1000 British Companies*, *Major and Minor Companies in the UK*, *Kompass: A Directory of UK Companies*, *The Top 100 Northern Ireland Business Directory* and *Who's Who in Business 2000*. Organizations within the chosen three industrial sectors were selected at random from these sources. Contact details of suitable organizations, such as industrial sector, name of organization, address, postcode, telephone number, activity of organization and key personnel, were entered into a database held on Microsoft Access version 7.0.

From the total list of entries six batch files were devised in alphabetical order. This process facilitated administering the survey. First, organizations in each batch were contacted by telephone to confirm contact details and to introduce the survey. This technique has successfully been applied by a number of researchers. One example is that of Jobber *et al.* (1985), who raised response rates from 27 to 43% by the use of a prior telephone call to a sample of quality control managers. The survey was then sent via the postal service; each package was marked for the attention of the Managing Director to be distributed as appropriate. A covering letter on university letterhead, a pre-paid envelope and a questionnaire were mailed to 1004 organizations selected from the sample framework.

If questionnaires were not completed and returned by the specified deadline, follow-up action was taken. This included telephone contact and a second mailing to non-respondents. The second mailing included a revised cover letter, a copy of the original letter, a pre-paid envelope and a copy of the questionnaire. Through the use of a special coding system on the questionnaire, all non-respondents could be identified. This avoided unnecessary mailing to those who had already responded.

Table 3 Survey response rates

Batch no.	Alphabetical letters	Number of organization	Number of responses	Number completed	Number uncompleted
1	A–B	152	28	16	12
2	C–E	200	33	19	14
3	F–I	181	21	15	6
4	J–N	179	25	15	10
5	O–R	109	8	7	1
6	S–Z	183	29	16	13
	TOTAL	1004	144	88	56
Percentage of total responses		14.34	*Percentage of usable responses*		8.76

In an attempt to further increase the response rate, the small incentive of a copy of the research findings was promised to the candidates on receipt of their completed questionnaire. From this report each organization is able to benchmark their original answers against industrial peers. In addition each respondent was entered into a raffle for a free Electronic Commerce short course courtesy of the University of Ulster. The offer of a small token gift has been known to increase survey response rates.

PILOT STUDY

To pre-test the mail questionnaire, a pilot study was undertaken. First, the questionnaire was subjected to critical review by five academics from within the fields of Marketing, Business and Management and Informatics. Following the necessary revisions, the survey was piloted with eight organizations; a total of 21 practitioners took part in the review process. The organizations selected were representative of the population being subjected to the survey. To gain an accurate and valid critique of the questionnaire, organizational members at senior management, middle management and administration levels were selected as part of the pilot group. This gave an insight into issues of concern for organizational, group and individual levels. Only minor changes were required to the questionnaire after this stage.

SURVEY RESPONSE

The usable response rate for the KM survey, after completion of the follow-up mailings, was 9% of the population. This figure is reflective of the immaturity of the KM field. Sixty-one per cent of respondents voluntarily identified themselves by requesting survey results. This figure reflects that respondents have a high level of interest in the subject area. Table 3 illustrates a breakdown of survey responses.

A concern to all researchers is the matter of explaining non-respondents. From Table 3 one can extract that the total number of non-respondents was 860. This represented 86% of the total population. Written replies were received from 42 non-respondents stating that it was company policy not to complete surveys. Fourteen organizations no longer existed when contacted by telephone follow-up. Others, contacted by follow-up action, offered vague promises to complete the questionnaires but failed to do by the final submission deadline.

DATA ANALYSIS

To provide statistical support for research propositions and questions, data gathered for the research was analysed using a number of statistical techniques processed through SPSS version 9. Standard procedures for data entry and data cleaning were applied.

General descriptive statistics were selected as the appropriate analytical tool for a number of the questions. This approach involved the use of frequency tabulations and cross-tabulations. The remaining areas of analysis required a more sophisticated approach, thus multivariate techniques were used. One multivariate technique that was utilized was factor analysis. Factor analysis is a statistical technique used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables (Norusis, 1988). Its primary objective is data

reduction and summarization with a minimum loss of information (Kim and Mueller, 1978; Hair *et al.*, 1987). This technique was applied to several questions where data, derived from the use of Likert scales, was suited to data reduction.

As the purpose of this paper is to investigate the utilization of technology in relation to KM applications, the remainder of this section will focus purely on data results relating to this topic.

The 'Benchmarking Knowledge Management' survey tool contained five questions devoted to ICT utilization. In the first instance this led to a total of 56 constructs. As this number is too large to analyse statistically, factor analysis was undertaken. This task involved a two-step process. First, constructs were analysed under the heading 'technical climate'; here the organization environment was explored in relation to technological adoption and maintainability. Second, the constructs were investigated under the heading 'technical application'; in this instance application and utilization was the main focus.

TECHNICAL CLIMATE

Before factor analysis could be applied, all constructs had to be tested for reliability and validity. To ensure that the constructs were reliable and internally consistent item to total correlation and Cronbach alpha statistical tests were performed. To check for validity and appropriateness both the Kaiser–Meyer–Olkin Measure of Sampling Adequacy and Barlett's Test of Sphericity were utilized. On completion of these tests a total of 22 constructs were suitable for factor analysis in this area.

To understand the significance of these 22 constructs in relation to technical climate it was necessary to undertake further statistical analysis in the form of factor extraction and factor loading. Factor extraction was used to determine grouping of the factors. Using principal component analysis, factors were extracted using the Eigenvalue technique. This showed that a total of nine factors could be extracted from the constructs (refer to Table 4).

Table 4 Factor loadings: technical climate

Variables	Factor loading
Factor 1: Business improvement	
IT and applications developed with clear vision of business needs	0.765
IT and applications designed for specific organizational problems	0.727
Technology designed to held employees work more efficiently	0.715
Technology designed to aid better decision making	0.555
Factor 2: Application	
All employees trained to use technologies	0.896
SW applications designed to share information across whole organization	0.439
Factor 3: Collaboration	
Technology is a means of enhancing collaboration	0.724
Technology used to minimize geographical/time barriers	0.486
SW applications designed to recognize/retain important information	0.776
Factor 4: Reward	
Employees rewarded for contributing to information systems	0.921
Employees rewarded for contributing to maintenance of systems	0.919
Factor 5: Contact	
ICT permits organization members to connect directly with customers	0.799
ICT permits organization members to connect directly with suppliers	0.890
Factor 6: Communication	
Orgn regularly updates/replaces HW/SW	0.701
Priority is given to technologies that serve as information bridges	0.691
ICT permits employees to talk directly to one another	0.632
Factor 7: On-line training	
SW applications designed to share info only with those who need it	0.530
Technology systems designed to be easily mastered with on-line training	0.747
Users feel on-line training is sufficient for effective application use	0.821
Factor 8: User orientation	
User-friendly systems are organization priority	0.699
Users of technology systems decide on their content	0.828
Factor 9: Management	
Senior management leads by example in using technology	0.815

The total variance derived from these nine factors is 75.677. Factor loadings were then applied to the constructs to confirm significance between the factors. As can be determined from Table 4; 91% of the factor loadings are rated highly significant (above 0.7 rating). The final step in this process was to award factor descriptions, thus capturing the underlying nature of the factors and aiding interpretation of the significance of technical climate.

The nine factors appear to have solid interpretations, and, therefore we have effectively reduced the original number of factors (22 in total) to a more manageable number. Owing to the significant factor loadings, the nine factors are relatively easy to interpret.

The nine factors relate to the contribution of technology for business improvement and competitive advantage. Focus is placed on technology for efficiency, collaboration and effective decision making. For successful utilization of technology systems, care must be taken to ensure the system is properly maintained. To encourage this, rewards are offered to employees who facilitate content management. To ensure that employees are capable of operating technological systems, emphasis is placed on technology training and applications are designed to be user-focused.

Emphasis is also placed on technological systems as communication devices. Employees are encouraged to use technology, not only to collaborate with one another, but also to contact customers and suppliers. This focus can contribute to the development of Web-based and knowledge-based technologies. Taking this train of thought a step further factor analysis was then applied to investigate technological application.

Table 5 Factor loadings: technical application

Variables	Factor loading
Factor 1: Knowledge roles	
Chief information officer	0.935
Chief learning officer	0.905
Knowledge author	0.938
Knowledge broker	0.951
Information publisher	0.912
Factor 2: Support tools	
Internet	0.742
Intranet	0.740
Extranet	0.513
Document management systems	0.394
Electronic publishing systems	0.506
Office automation systems	0.544
Meeting support systems	0.624
Help-desks	0.665
Groupware/workflow systems	0.593
Agents/filters/navigation tools	0.500
Information retrieval engines	0.531
Factor 3: Intelligent tools	
Data warehousing	0.642
Data-mining tools	0.645
Knowledge directories	0.726
Knowledge-based systems	0.798
Intelligent support systems	0.593
Factor 4: Technology training	
Internal	0.865
In-house	0.919
External	0.870
Factor 5: Collaborative tools	
Chief knowledge officer	0.680
Community of practice coordinator	0.696
Web Master	0.591
Factor 6: Electronic markets	
Electronic commerce	0.750

TECHNICAL APPLICATION

To determine factors related to technical application, the same factor analysis process as outlined above was undertaken. The results of this analysis are presented in Table 5. First, reliability checks and tests of appropriateness were conducted. From these a total of 28 items were deemed reliable, internally consistent and significantly favourable for factor analysis application.

The principal component analysis using the Eigenvalue technique was applied once again to extract suitable factors. A total of six factors were obtained, showing a variance of 68.768, thus representing almost 69% of the total factor variance. Factor loadings allocated to factor constructs outline that 96% of the factor are rated highly significant to the investigation of technical application. Again factor descriptions have been included to aid the discussion process.

Factor analysis on the technical application variables has successfully reduced the number of variables from 28 to 6. This made the task of interpretation easy due to the high factor loadings of each variable.

Factors 1 and 5 are concerned with the various roles an organization must have in place to create a knowledge-oriented environment. The majority of these roles have a technical focus. Factors 2 and 3 highlight various tools for KM. These have been classified under the headings 'Support tools' and 'Intelligent tools'.

Factor 4 is concerned with the need for training to ensure full technological utilization. This need

has also been expressed in the previous section when considering technical climate. This case depicts the need for training to be conducted with a three-level focus in mind: internal, in-house and external.

The final factor (factor 6) is concerned with the use of technology in electronic markets. This factor reflects the growth of electronic commerce as a new retail environment. Electronic commerce has developed in recent years due to the emergence of Web-based technologies.

CONCLUSION

Information communication technologies are focused on three specific areas, namely, collaboration, content management and business intelligence. KM offers guidelines for organizations that wish to incorporate these technologies for organization success and competitive innovation. This paper has shown that for successful technological adoption and application within an organization a number of factors must be present. First, KM systems should be well-maintained, user-focused systems dedicated to communication and information flow within the organization. A variety of technological tools should be used for knowledge work; these tools support function classifications as outlined in the literature. Second, dedicated roles must be established to promote technological use within the organization. Employees at all levels should be encouraged to use KM systems for efficient and effective decision making. Reward and recognition must be awarded for their efforts. Third, training must be provided to encourage full utilization of the tools installed. This training should be undertaken at internal, in-house and external levels. Fourth, emphasis should be placed on Web-based systems. This research has shown that use of the Internet is still a relatively new concept in organizations and one that is not yet being used to its full potential. While many organizations are content to use the World Wide Web (WWW) for information gathering, most are apprehensive to employing the Internet as an electronic commerce device. Although technology alone will not lead to a KM culture (Davenport and Prusak, 1998) a well-designed, standardized, fully implemented technical infrastructure for KM can improve information-processing capabilities, knowledge discovery, project collaboration and rapid decision making within organizations. This in turn will lead to the adoption of business improvement practices and sustainable competitive advantage.

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