Knowledge Management:
When will People Enter the Debate

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Abstract

This paper presents an overview of research and literature on Knowledge Management (KM) and argues that to date KM research is limited by its focus primarily on hard information systems. Insufficient attention has been given to the 'people management' aspects of KM and the complex, multi-faceted nature of knowledge and knowledge transformation. The results of a survey of KM practice in a wide sample of UK firms is presented in support of these assertions, highlighting the need to develop a more critical and integrated view of IT/IS and people management and organizational issues related to knowledge creation and knowledge sharing.

Keywords: Knowledge Management, Information Systems

Introduction

Knowledge Management (herein KM) is being lauded as an important new approach to the problems of competitiveness and innovation currently confronting organizations. The theoretical argument for the development of KM rests on a presumed paradigm shift in the business environment in which knowledge is increasing central to organizational performance (Drucker, 1993). This is in a context of wider debates about the restructuring of work and occupations in the 'Information Age', and parallel shifts in dominant modes of knowledge production (for example from single disciplinary 'Mode 1' to transdisciplinary 'Mode 2' knowledge - Gibbons et al, 1994). Whatever the strength of these macro paradigm-shift views, the practical case for KM is convincing many academics and practitioners that to avoid costly problems associated with 'reinventing the wheel', organizations need to find ways of learning across projects distanced by time and space. This depends upon more micro-level processes of capture, assimilation and utilization of knowledge, for example from past to current projects. These micro

processes are believed to be facilitated by the use of information technology (IT) and hence KM as a topic has gained prominence in the IS/IT literature over the last 2-3 years.

This paper begins by outlining the major findings from a recent review of the now burgeoning literature on KM (Scarbough, et al 1999). This reveals that much of the literature on KM is driven by a 'hard' information systems view. This is based on the premise that IT-based tools (for example intranets, groupware) can be used to capture and stockpile workers' knowledge and make it accessible to others via a searchable application so that it can be used in other related projects (Cole-Gomolski, 1997). It is claimed, then, that IT-based tools can facilitate the exploration of knowledge - i.e. the pursuit and identification of new options through processes of knowledge transfomration and creation. They can also facilitate the exploitation of knowledge -i.e. the use and development of things that are already known within the organisation but currently under-exploited, through capture and distribution (Levinthal and March, 1993; Fletcher, 1997). The literature cites several examples of good practice. These include the harnessing of existing documents by using intranet document managers at Hughes Space and Communications (Hibbard and Carrillo, 1998), 'knowledge-on-line' via the company-wide intranet at Booz, Allen and Hamilton, Inc. (Jahnke, 1998), and a cafe-style information service at ICL ('Cafe-Vik') via the global intranet (Lank, 1998). However, many examples are anecdotal rather than premised on systematic research evidence.

Based on the literature review, the paper will argue that much of the positive prescription regarding IT-based tools for KM adopts a limited view of knowledge and knowledge creation. This is supported indirectly by evidence that points to the absence of a direct correlation between IT investment and business performance or KM (Malhorta, 1998; Strassmann, 1998). The reasons for the limits of tools-driven KM initiatives are explored further here. First, they place greater emphasis on exploitation than on exploration and yet exploration is arguably more central to innovative capacity. Second, they place more emphasis on the supply of information than on the demand, application and utilization of information to processes of knowledge creation. These problems arise, from a lack of concern with people in the KM literature oddly reminiscent of earlier problems with BPR - now called by some, 'the fad that forgot people' (Davenport, 1996). This means that the success of such IT-based KM tools in terms of facilitating processes of innovation and developing new projects is likely to be limited. The implementation of IT-tools for KM needs to be coupled with a more detailed consideration of the problems associated with knowledge transformation processes, in particular those concerning knowledge sharing (and hoarding) through social interaction (Nonaka and Takeuchi, 1995). This is supported in this paper by a survey of KM practice in a broad sample of UK firms, predominantly in the manufacturing sector. The analysis demonstrates that the major predictors of problems with respect to organizations having the knowledge needed to develop new projects are concerned with people and reward and appraisal systems, and not just IT-based tools. This paper thus aims to encourage a more critical view of the impact of IT-based tools on knowledge creation and knowledge sharing (e.g. Earl, 1996; Clark and Staunton, 1989; Grant, 1996).

Defining KM in Context

KM could be dismissed as the latest management fad (Abrahamson, 1996). However, the growing emphasis on 'knowledge assets' (rather than labour or capital), 'knowledge work' and 'knowledge workers' as the primary source of productivity in contemporary

society suggest that the interest in KM will endure, even though the label may change (Drucker, 1993). For example, a KPMG research report on KM opens with the words "There is little doubt that we have entered the knowledge economy where what organisations know is becoming more important than the traditional sources of economic power – capital, land, plant and labour – which they command". Moreover, from a survey of 100 leading companies in the UK, only 2% considered that KM was a fad that would soon be forgotten, and 43% of respondents considered their organisation to have a KM initiative in place (KPMG, 1998). Similarly, Ruggles (1998) writes: "To a growing number of companies, knowledge management is more than just a buzzword or a sales pitch, it is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident within and, in many cases, outside of an organisation". KM, then, is worthy of investigation both as a new managerial discourse and as an enduring managerial practice.

There is no single definition of KM, but in general the idea relates to unlocking and leveraging the knowledge of individuals so that this knowledge becomes available as an organisational resource. In this way the organization dependent on knowledge for its competitive advantage, is deemed less susceptible to individuals 'walking out of the door' with this key asset. KM then is about harnessing the intellectual capital of an organisation, recognising that knowledge, not simply information, is the primary asset of an organisation (Marshall, 1997). In this paper we do not wish to privilege one narrow set of definitions because we recognise that both knowledge and KM are best understood as complex multi-layered, and multifaceted concepts (Blackler, 1995). Here, then, the term KM is scoped out broadly as: any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organizations (Quintas et al., 1997, Prusak, 1997).

The end of the 1990s has seen a surge of interest in KM practices focused on the ways in which firms facing highly turbulent environments can mobilise their knowledge base (or knowledge 'assets') in order to ensure continuous innovation in projects. This interest aligns with dominant occupational shifts with the emergence of knowledge-workers and the decline of manual trades (Drucker, 1993) and is accompanied by technological advances and the convergence of computing and communications technology. These changes have been characterised by a variety of terms - the 'Post-Industrial Era', the 'Information Age', the 'Knowledge Society' - which focus on the importance of knowledge as the defining characteristic of this new age. This is not to say that knowledge was ever insignificant in industrial development. Ever since the Industrial Revolution, science and technology have played a crucial role in industrial change. What is distinctive about the current period is a shift in patterns of knowledge production such that knowledge now acts upon itself in an accelerating spiral of innovation and change. Castells summarises the shift as follows: 'What characterises the current technological revolution is not the centrality of knowledge and information but the application of such knowledge and information to knowledge generation and information processing/communication devices, in a cumulative feedback loop between innovation and the uses of innovation.....For the first time in history, the human mind is a direct productive force, not just a decisive element of a production system.' (Castells, 1996: 32). Gibbons et al. (1994) note further that dominant 'modes of knowledge production' are shifting from the conventional (Mode 1) model, where knowledge is produced in ivory-tower, disciplinary-based institutions, to a new (Mode 2) model in which knowledge is transdisciplinary and produced at the point of application.

In organizational terms, this new 'era' is accompanied by flatter structures,

decentralisation, more networked forms of organization, co-ordination through process management and increasing use of information communication technologies. However, as businesses are stretched across time and space and restructured around virtual teams and networks, they lose opportunities for sharing of knowledge and learning induced by physical proximity and specialism. As Prusak (1997) notes: 'If the water cooler was a font of useful knowledge in the traditional firm, what constitutes a virtual one'. Moreover, redesigning around processes and moving towards a trandisciplinary 'Mode 2' model means that opportunities for knowledge exchange among like-minded experts located within disciplinary-based groups may be reduced. All this suggests that although the term may ultimately become another management fad, the impetus for KM is the profound organizational problems posed by new organizational structures and process redesign. Indeed KM could be seen as an antidote to earlier initiatives such as business process reengineering (BPR) that, despite claims to their 'faddishness', left very real consequences and some problems, in their wake (Mumford, 1996). It can be seen then that KM is part of a much wider debate about the shifting demands of the business environment and the sources of competitiveness in advanced economies. This debate has raised a number of questions about the ways in which technologies, organizations *and* people are managed. The review outlined next considers the extent to which these questions have been addressed to date in the literature on KM.

A Review of the KM literature

This section summarises a review of the KM literature conducted by one of the authors together with colleagues (Harry Scarbrough and John Preston - to whom we are indebted). The review covered the 'learning organization' as well as KM because both of these management ideologies are centrally concerned with enhancing organizational performance through improved opportunities for learning and developing knowledge. This contrast was informative in terms of understanding the core themes and discourse of KM and key drivers of this discourse. Details of the review process can be found elsewhere (see Scarbrough et al., 1999; Swan et al., 1999). Suffice to say, that the review covered mainstream journal articles over (almost) a 6-year period (Jan 1993 to August 1998). These articles were located via searchable databases of Social Science and Management Journals (in particular Proquest Direct (PQD) and BIDS ISI). The review was limited, then, by those journals listed (mostly those in English language). That said, PQD alone is quite comprehensive (1562 different journals) and the findings from this review were supported by a broader examination of a wide range of additional sources (e.g. web sites, newspapers, book listings).

The PQD search yielded 334 references to KM over the period 1993 to 1998, whilst a similar search of BIDS which yielded a total of 68 KM references. Further searches carried out using combinations of core terms allowed a classification of numbers of articles by dominant subject areas. Recognising that quantity is not a direct measure of the impact of articles, this search, together with a qualitative analysis of the content of the articles, provided a reasonably thorough coverage of the core themes and issues in the KM literature (Crossan and Guatto, 1996). It also allowed the course of management ideologies (in this case KM and the Learning Organization) and their associated "buzzwords" to be tracked over time. This is shown in Figure 1. This indicates rapid emergence in the discourse of KM, with more references to KM in the first six months of 1998 than cumulatively in the previous 5 years. This contrasts with a rise and fall in

references to the learning organisation - a profile that mirrors the normal distribution observed across a number of other managerial practices (Abrahamson ,1996). Abrahamson notes that these diffusion patterns reflect the prevalence of fashion cycles in the management literature. It is likely, then, that whilst interest in KM is currently soaring, this may also eventually be surpassed by a new label.

S e a r c h   T e r m s: P r o Q u e s t   'H i t s'
N u m b e r s   (p e r   six-m o n th s) 1 9 9 0 - 1 9 9 8
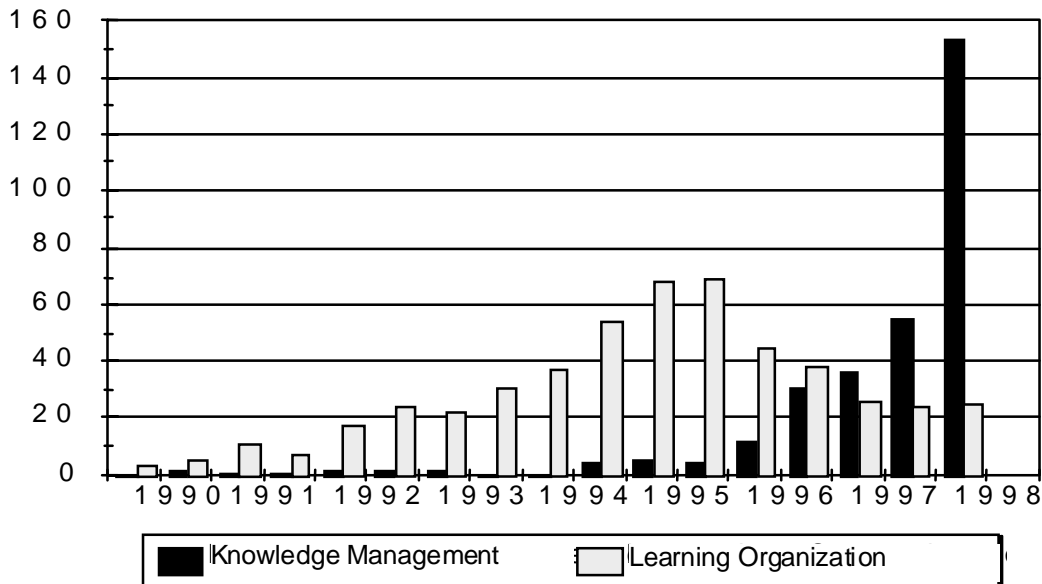

Figure 1: ProQuest references to "KM" and the "LO".

As seen, core themes underpinning the use of labels may be more enduring and more of reflective of core business concerns. It is tempting to conclude here that KM is driven by the same philosophy as the learning organization but has merely replaced it as the latest management buzzword. To explore this further, an analysis was conducted comparing major themes discussed in the literatures on KM and the learning organization. The findings, shown in Table 1, revealed striking differences in the themes addressed by these literatures. This points to the conclusion that KM is a divergence, rather than a development from the literature on the learning organization. The learning organization literature focused on the creation of a learning culture and on the development of trust and commitment engendered through training, organizational development, human resources management and employment contracts and development. In contrast, the KM literature focused much more heavily on IT, IS and intellectual capital. The separation in Table 1 between IS and IT reflects an attempt to distinguish broader information management and strategy (IS) from 'harder' information software and tools (IT). As seen IT articles were the most prevalent of all KM articles. Articles on intellectual capital also focused mainly on development and exploitation of knowledge 'assets' (often via of IT-based tools) with relatively little attention to people management. Overall, this analysis indicated that the shift in emphasis from learning organization to KM has been linked both to a sharp decrease in people management, training and development themes, and to an equally sharp increase in attention to IS/IT. There was also evidence that this trend was lasting, or even strengthening, with nearly 40% and 28% of KM articles in 1998 focusing on IT and IS, respectively (Scarbrough et al, 1999).

Table 1: Comparison of core issues in Learning Organization and KM in PQD articles 1993 to 1998.

No of Hits (%)	'Learning Organization' AND....	No of Hits (%)	'Knowledge Management' AND....
98 (29)	training	58 (26)	information technology
65 (19)	organiz(s)ation(al) development	48 (22)	intellectual capital
42 (13)	HR or HRM or human resource	40 (18)	information system
25 (8)	management development	26 (12)	training
18 (5)	employment	17 (8)	HR or HRM or human resource
16 (5)	people management	8 (3)	career
14 (4)	information technology	7 (3)	people management
11 (3)	career	4 (2)	organiz(s)ation(al) development
10 (3)	information system	4 (2)	rewards OR appraisal
7 (3)	diversity	2 (1)	human resource information systems
7 (3)	rewards OR appraisal	2 (1)	management development
6 (2)	personnel management	5 (2)	all other combinations
5 (2)	intellectual capital		
3 (1)	human resource information systems		
6 (2)	all other combinations		

Note: % subject to rounding errors hence total >100.

This review indicated an emerging gap in the existing literature on KM in terms of its treatment of issues concerning people management. Despite critiques that 'the most dramatic improvements in KM capability in the next ten years will be human and managerial' (Davenport, 1995), many articles continue to focus on developing and implementing KM databases, tools (e.g. decision support tools) and techniques. The review suggests a need for greater integration in KM theory and practice across the IT/IS and people management literatures. The reasons for this emphasis in KM on IT-based tools will be fully examined in the discussion. Next we consider its implications, if any, for actual KM practice within firms. There are two possibilities here: one that the literature is merely a reflection of the centrality of IT-based tools in driving successful KM; second that people management issues do pose real problems for KM but these have been neglected in existing research. The latter would suggest that the KM literature may

be biased towards a technological agenda and away from wider organizational issues, specifically the importance of human and behavioural factors. In short KM, like its predecessor BPR, may be in danger of becoming the next 'fad that forgot people' (Davenport, 1996) - a re-labelling of information management rather than a genuinely innovative attempt to leverage the knowledge of people in the whole organization and to create opportunities for the creation, development and utilization of knowledge.

A Survey of KM Practice

This section presents the findings from a pilot survey of KM practice in UK firms in industry. The focus here is not on whether firms use the label 'KM' - all firms are likely to be engaged to some degree in problems of managing knowledge regardless of whether they use the label (Coombes et al, 1998). Rather, the survey examines the actual practices firms use to encourage the exploitation and exploration of knowledge so that learning may be captured across projects. The research was opportunistic - the authors had a chance to include questions about KM practice when approached to conduct a much larger survey of members of the Institute Operations Management (IOM). Given constraints on sample selection and space in the entire questionnaire, this survey must be considered as a pilot. Nonetheless, given the paucity of systematic research on actual KM practice in a literature dominated by anecdotal examples, the survey was timely and the findings have clear and important implications for KM practice.

Questions on KM practice were developed by referring to earlier research on knowledge communication and KM practice. In particular, Scarbrough (1995) describes three dominant modes of knowledge communication: professionalism, whereby knowledge is communicated via the professional expertise, skills and training of individuals; objectification, whereby knowledge is transferred through codified and explicit information, tools and practices; and sedimentation, whereby knowledge is communicated via rules, routines and practices embedded, for example, in organization structures and practices of work. Others have highlighted distinctions between relatively formal (e.g.written or recorded information) and informal (e.g. word-of mouth, personal contacts) channels for knowledge communication (MacDonald and Williams, 1992). These authors, in keeping with other writers on innovation, note that whilst formal channels may be useful for the sharing of knowledge which can be articulated in explicit forms, informal channels are just as important, if not more so, for processes of innovation. This is because much innovation-relevant knowledge in organizations is tacit (e.g. Polyani, 1966; Spender, 1996; Tsoukas, 1996). This is seen as critical for innovation processes but is, by definition, difficult to articulate and codify therefore much more difficult to share through formalised channels such as IT-based KM systems.

The questions on the survey attempted to address these various modes of knowledge communication and ways of capturing learning across projects (i.e. formal and informal, professional, codified and sedimented). A problem was in translating these theoretical and often rather abstract claims about knowledge and KM into questions that could relate to the practice and experience of managers. The survey chose to focus, then, at the level of projects, specifically addressing KM activities related to learning from one project to another. Previous research on KM practice in research and development firms was helpful here (Coombes et al. 1998). This had identified more specific KM practices such as archiving of data or benchmarking across projects and these were adapted into questions considered to be relevant for this sample.

Methodology

The questions addressed project-based KM activities relating to different modes of knowledge communication and informal and formal KM practices. Specifically questions were asked about: **(1)** the use of recorded information from past projects, the benchmarking of recorded information across projects, being encouraged to archive or record of learning or knowledge that comes out of projects, the use of various IT-based tools and communication media for knowledge sharing (including email, internet/intranet, groupware/lotus notes, and hardcopy), and the difficulty of use of such systems for capturing learning across projects. These questions related to codified or objectified knowledge communication modes. **(2)** The involvement of people in projects based on records of relevant expertise; the reluctance or otherwise of people to share knowledge, and difficulties arising from changes in people across projects (these reflect the professionalism knowledge communication mode). **(3)** The reward systems used to reinforce knowledge sharing, the decision structures (from centralised through to networked), type of manufacturing process where relevant (from unit through to large batch/repetitive), and available time for capturing learning across projects. These may indicate, albeit indirectly, knowledge communication modes which are organizationally sedimented. **(4)** The extent to which learning across projects occurred through either formal or informal (personal contacts) channels and the use of informal contacts for involving people in projects. **(5)** The extent to which lack of knowledge and information was seen as a critical constraint on developing projects. This question was treated as the critical dependent variable in the analysis below. Finally, a question was included that asked whether the concept of 'Knowledge Management' was recognised as an important issue in respondents firms. This would give further indication as to the extent to which the KM discourse was being used in practice.

The questionnaire was mailed as part of a larger survey to the population of around 4000 members of the IOM. This resulted in 617 responses where the KM practices questions had been completed. Whilst this is a fairly low response rate, it was considered adequate considering the very detailed nature of the questionnaire and it provided a comparatively large survey sample. That said, the characteristics of the sample should be noted when evaluating the findings. The majority of respondents were male (94%) and worked in manufacturing industry (67%) across a wide range of sectors (e.g. automotive, pharmaceutical, engineering, computing, electronics, consumer goods) in areas related to operations management. The remainder worked in consultancy (12%), software supply (8%), education (4%), service (4%) and a scattering of other sectors (5%). 89% of respondents had access to email at their place of work and 72% had access to the Internet at work. A significant number (43%) worked in senior management or director positions, with most of the remainder in middle (26%) or junior management (8%) or technical specialist (13%) positions. 75% classed their companies as multinational and 58% were owned by a larger corporation. 30% worked in companies with greater than 1000 employees, 33% in companies with between 300-1000. Although a significant minority (13%) worked in small firms (less than 50), the majority of these were consultancies. In terms of the decision-making structure of firms, these were classed as centralised, decentralised or networked (28%, 42% and 25%, respectively). Whilst this profile is typical of members of professional associations (Swan and Newell, 1995), it may not be representative of manufacturing firms more broadly, given the relatively high number of senior managers in large firms represented in this sample.

Analysis

Figure 2 shows the extent to which the KM concept was recognised as important in members firms. This confirms that the discourse of KM has diffused quite widely at least among the firms represented, with around half the sample recognising this as quite important, important or very important. Figure 3 shows the extent that lack of knowledge and information was seen by the majority as a constraint on developing projects with only 14% suggesting this was 'rarely or 'never' a constraint. Thus, even though KM may not recognised as a concept, the problems associated with KM pervade.
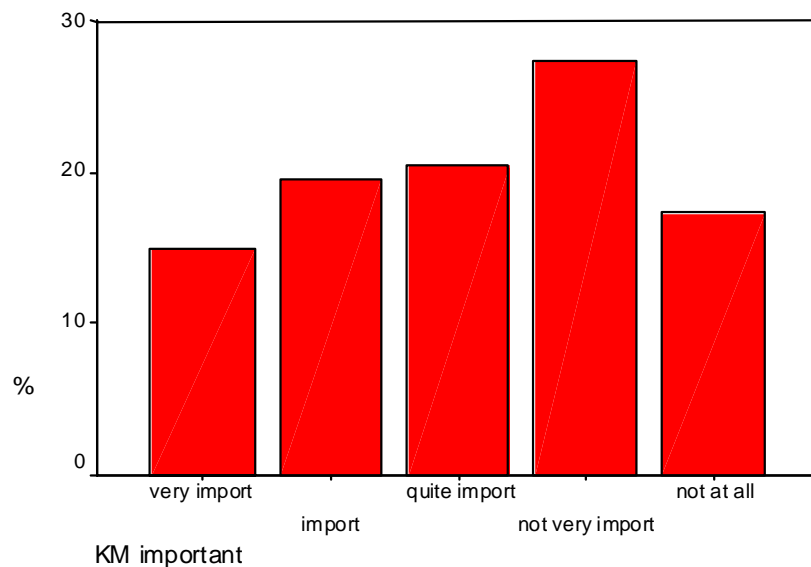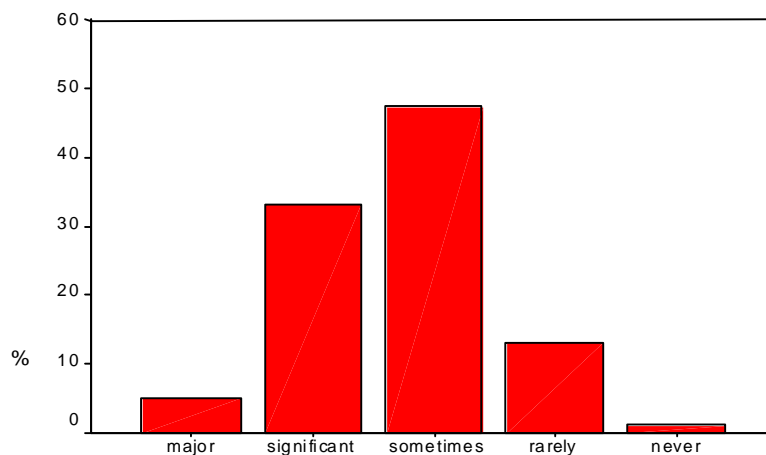
Figure 2: Extent to which KM seen as important

Figure 3: Extent to which lack of knowledge a seen as a constraint

The majority of firms (95%) relied on some form of recorded hardcopy information for sharing knowledge across the firm. However, IT-based tools were also used quite widely for this purpose with 83% using email, 61% using Intranet and 42% using some form of groupware (including lotus notes). In terms of the problems in capturing learning across projects however, difficulty in using these systems appeared to play a relatively minor role (only 17% reported this as a problem) as compared to lack of time (70% reported problems with this); people being reluctant to share information

(31%); and people changing across projects (24%). This suggests that, at least for these firms, problems in KM were critically concerned with people management issues as well as IT use.

Table 2 summarises the response frequencies to the remaining questions about KM practice. This suggests that in general learning from past projects is often recorded or archived (77.4% do this at least 'sometimes') or benchmarked (78.6% do this at least 'sometimes'). Further, this recorded information does tend to be used in developing new projects (91.4% do this at least 'sometimes'). Further learning across projects occurs via both formal (e.g. recorded information, email, lotus notes) and informal (e.g. personal contacts) channels, although significantly more often via informal than formal channels (t=12.19, p<0.001, 2-tailed). People tend to be selected for projects equally often on the basis of informal personal contact as on the basis formal records of their expertise. However, in many cases knowledge sharing is not really rewarded by the company's reward and appraisal systems. Over half (58.5%) of respondents indicated that knowledge sharing was rewarded either 'not at all' or 'not very much'. The responses to questions shown in Table 2 were also correlated with the critical variable: 'to what extent is lack of knowledge and information a constraint on developing projects'. Where the correlation was significant (p<0.01, 2-tailed), this is indicated in Table with an asterix ** and correlation coefficients are shown in brackets (all relationships were in expected directions - i.e. the more the practices were used, the less problem there was with lack of knowledge sharing.

Table 2: Response Frequencies and Relationship to Critical Variable of KM Practices

Question	1	2	3	4	5
Use recorded info from past projects? (r=.04)	9.8	2.6	9.0	.5	.1
Benchmark info from past projects? (r=.04)	5.0	9.2	4.4	7.0	.3
Encouraged to archive/record learning from projects?**(r=.17)	8.9	0.4	8.1	4.4	.2
Involve people based on recorded relevant expertise? (r=.03)	9.5	6.9	3.1	.3	.1
Reward/appraisal encourages knowledge sharing?**(r=.21)	.9	9.4	5.1	1.5	7.0
Learning across projects occurs via formal channels?** (r=.13)	6.8	7.5	9.3	0.2	.2
Learning across projects occurs via informal channels?**(r=.19)	9.8	4.0	5.1	0.6	.5
Involve people in projects based on informal contact? (r=.07)	8.8	7.2	5.3	.5	.2

Numbers shown are percentage responding on scales of 1- highest score (always/ a great deal) to 5-lowest score (never/ not at all) with scale labels appropriate to question.

To test these relationships further, stepwise regression analysis was conducted to assess which, if any, of the KM practices addressed in the survey were the best independent predictors of the critical variable, lack of knowledge sharing. The questions in Table 2 were entered as independent variables, together with the questions (noted above) concerning the use of KM tools, the difficulties in capturing learning, company structure and manufacturing type. Finally, company size and job position of the respondent were also entered into the analysis because these might act as mediators of relationships among

KM practices and lack of knowledge sharing. For example, company size has been found to predict innovation (or lack of innovation) in previous research (Mohr, 1976) and job position in a company may shape respondents' perceptions of KM practices and outcomes. This analysis revealed only two significant predictors of lack of knowledge sharing: first, people being reluctant to share (multiple R=.26, F=24.18, p<.001); and, second, the extent to which knowledge sharing was rewarded by the companies reward and appraisal systems (increasing multiple R to 0.32; F=18.25, p<.001). Notably, the use of various IT-based communication tools and the various kinds of formal or codified modes of knowledge communication did not independently predict lack of knowledge sharing. Of course, this could be explained statistically in terms of 'ceiling effects' (i.e. there was little problem in these firms with any of these codified forms of knowledge and so little variance in the responses). However, given the frequency data and the range of firms covered by the survey, this seemed extremely unlikely.

Discussion

This paper has argued that KM been driven by an emphasis on IT-based tools which has precluded attention to critical issues of managing people such as commitment, rewards, trust and informal social relationships. This is supported by a review of the KM literature. This found that the most distinctive feature of the recently emergent KM literature is the emphasis on tools and systems and the scant attention paid to issues of people management (Scarbrough et al, 1999). Yet the survey found that these issues - specifically the willingness of people to share knowledge and the ways in which their companies reward knowledge sharing - are crucially related to constraints on project development through lack of knowledge. This implies that these people management issues need closer attention if the introduction of KM tools are to be effective (of course recognising usual cautions about inferring cause-effect from cross-sectional data). The introduction of formal IT-based tools for KM may have important implications for the management of people and social relationships, including their willingness to share knowledge. These implications warrant much closer research attention if KM is not to suffer the same fate as BPR as another fad that forgot people. The reasons for the emphasis on IT-based tools and its implications need then, to be understood if KM is to develop both as a managerial practice and discourse.

Why the emphasis on tools-based KM?

It is clear from the literature review that interest in KM has achieved lift-off as a new wave management fashion. Significantly, by far the majority of articles appear in IS/IT journals. Much of this literature is practice, rather than theory driven, with many articles appearing in practitioner-oriented computer science journals and magazines. The emphasis on IT-based tools in KM can be understood then, in terms of the need to diffuse KM concepts to the widest possible number of practitioners. This places heavy demands of codification and commodification of KM concepts. To become more widely accessible, portable and marketable, ideas on KM practice need to be abstracted from their local contexts. At the same time, there need to be incentives for intermediaries (e.g. consultants of suppliers of KM tools) and firms to engage in the diffusion and adoption of these ideas. 'Black-boxing' KM as a technological 'fix' for what are often complex, intangible and intractable problems of managing knowledge, addresses both these needs

(Scarbrough, 1995).

      Commodification of new ideas through 'blackboxing' strategies is an important element of the diffusion innovations or fashions (Abrahamson, 1996). It is probably not coincidental that the surge of interest in KM has mirrored the widespread diffusion of another managerial fad - Business Process Reengineering (BPR). The reasoning goes like this: BPR's emphasis on de-layering and process-based organizations has eliminated important forms of organizational knowledge embodied in middle management groups and embedded within functional or professional disciplines. Eventually the value of what has been lost has been recognised and a new fashion cycle, this time centred on KM, has been initiated. This may have prompted some embarrassment and retractions on the part of promoters of the original fashion, but also opens up new markets for their expertise. Thus, many of the same groups (and some of the same individuals) who promoted BPR - IT/IS specialists, consultants, management gurus (e.g. Davenport and Prusak, 1997) - have also driven the debates and discourses of KM. In evidence, KM now features as a core component of the services and internal organization of major consultancies (for example, KPMG, CSC Consulting Group, IBM, Ernst and Young, McKinsey) and consultancies feature frequently as case examples in the literature (e.g. Hildebrand, 1994). However, labels aside, it is widely argued that KM is more than just a fad and the problems it seeks to address will endure. Thus: 'To a growing number of companies, KM is more than just a buzzword or a sales pitch, it is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident within and, in many cases, outside of an organization'. (Ruddles, 1998). This is supported here in as much as managers recognised the difficulties of managing knowledge in projects even though they did not necessarily use the label KM.

      It is also clear that behind the KM discourse there lies a 'resource-based' view of the firm in which intellectual capital assumes greater importance that financial capital (Roos and Van Grogh, 1996). The emphasis is on identifying and capturing the 'knowledge assets' of the firm so that they can be both fully exploited and fully protected. For example, Dow Chemical's introduced its patents database, built from 30 years of patent records, specifically to exploit its 'intellectual assets' (Mullin, 1996). The language of knowledge as a resource, as an asset, as a 'thing' to be exploited pervades the KM literature. However, this treats knowledge as an entity (like financial or physical assets) to be shifted from place to place and under-emphasises the fluid, dynamic and inherently social processes of knowledge transformation and creation. The logical quest has been for tools that leverage knowledge and put it to use. Indeed the practice of KM is frequently reduced to the implementation of new IT systems for knowledge sharing: 'the idea behind KM is to stockpile workers' knowledge and make it accessible to others via a searchable application" (Cole-Gomolski, 1997). KM is equated to mining for data. Indeed, mining, digging, and drilling metaphors are frequently used (Leonard Barton, 1995). For example, in describing KM in a customer care project Finerty notes that: 'a range of data mining techniques can be applied to assist in tapping into the knowledge the organization already has...They include: modelling or neural networks, cluster analysis and rule induction' (Finerty, 1997). People do feature but only in as much as they are fundamental to the intellectual resource. The dominant discourse of KM (i.e. to capture, codify, and exploit the knowledge of employees by developing better tools and methods and an ability to use those methods) is not fundamentally about managing and developing people. It is also demonstrably different to that of the learning organization which does emphasise people, where to harness the learning capability of the firm and individuals necessitates the management of values and culture, people development, empowerment, commitment,

leadership and so forth.

It does not seem too speculative, given the numerous KM articles in the IT/IS literature, to suggest that this community provides an important professional sponsor for the diffusion of KM. Again, this has implications for the shaping of KM concepts. For example, the emphasis on codification in KM probably reflects the dominance of the IT/IS lens on KM. It also has advantages – by focusing on specific tool-based projects, the practical implications and outcomes are relatively easy to see, at least in terms of systems improvement. The emphasis on codification of knowledge through tools has also meant that the responsibility for KM has conveniently fallen to those IS/IT experts who are well equipped to develop IT strategy and to offer education and training in the application of the tools. The Chief Knowledge Officer (CKO) role is often filled by a person (or group) with an IT background. Companies that have adopted this position include Hoffman LaRoche, GE Lighting, Xerox PARC and (not insignificantly) several consultancies including Ernst and Young, IBM, Gemini, and McKinsey. Maglitta, (1995), cites examples of KM projects in General Motors, Fidelity Inc., Hewlitt Packard Co., and a number of other leading firms. In each case: 'IS plays a key leadership or support role. IS's systemic thinking, technology know-how, and experience of working with many departments can be the perfect background for KM' (Maglitta, 1995). It makes good sense for IT/IS professionals to colonize KM as this may serve to increase their involvement in core strategic issues within their own organizations and enhance the status of this community. The IS colonization of KM is perhaps another explanation of the marginalization of people management concerns. That is not to say that these are not seen as important but rather the discourse and practices surrounding KM serve a different set of priorities. Equally, Human Resource (HR) management specialists (who have been central to discourse on the learning organization) have not really taken on board the issues or ownership of KM (Johnson, 1998). This is despite KM's emphasis on intellectual capital and its obvious relevance to HR.

The review presented here suggests that KM has not yet drawn from lessons learnt from past failures to acknowledge human and behavioural issues found, for example in BPR. Nor has it taken many hints from the large pre-existing literature the learning organization – indeed these two literatures barely intersect. The review suggests a need for closer integration among the IT/IS and HR professionals, and associated research and literatures in order to develop KM theory and practice.

The implications of tools-based approaches to KM

As we have noted, the solutions to KM practice are increasingly being offered in the form of ever-more sophisticated ITs (for example, Intranets, data warehouses) for knowledge 'capture', 'storage' and 'sharing'. These solutions promise a way of redressing the balance of power between autonomous knowledge workers and the knowledge base of the firm – by codifying individuals' tacit knowledge intangible knowledge assets can no longer 'walk out of the door'. However, they also represent a potentially damaging approach to KM: first, because they overemphasise the exploitation of existing knowledge and de-emphasise exploration; second because they offer a limited understanding of tacit knowledge; and third because they de-emphasise social relationships and networks in shaping processes of knowledge creation and transformation.

Taking these issues in turn, in terms of the 'exploitation' of knowledge, the idea is that by using KM systems the reinvention syndrome can be avoided . This is where

people engage in work/projects 'from scratch' because they are unaware that what they are trying to do has already been done elsewhere (or at least something similar has been done). So instead of learning from past experiences, individuals or project teams 'reinvent the wheel'. KM is based on the premise that the learning from a particular task should be codified, stored and made available to others at different times and in different places. The focus, then, is on externalisation (making tacit knowledge explicit so it can be distributed) and combination (combining different kinds of explicit knowledge – Nonaka and Takeuchi, 1995). However, as Nonaka notes processes of knowledge transformation are more complex and fluid than this. Further, the codification and objectification of knowledge from past experience into formal systems (even if possible) may generate its own psychopathy in terms of innovation and learning. This is because those fluid, organic, informal and locally situated practices that are seen as essential in more creative processes of innovation may become rigidified by the system (Scarbrough, 1996). Further, the direction of new projects may be dictated by information from past projects stored in systems (which, after all, are there to be used). The paradox, then, is that whilst KM tools may increase the effectiveness with which existing knowledge is exploited, they may simultaneously reduce opportunities for knowledge exploration and lower the knowledge creating potential of the organization.

The limits of tools-based approaches to KM are also seen in their treatment of tacit knowledge. Polanyi (1966) was among the first to distinguish between the tacit and explicit knowledge. Explicit knowledge is that knowledge that can be easily expressed in formal, systematic language. The problem is that this does not occur automatically or easily (Gardner, 1998). Either the knowledge is very difficult to codify or else it is codified but not in a way that is useful or easily accessible. The objective of tools-based approaches to KM, then, is store explicit knowledge in a form that can be easily accessed by others for whom it might be useful. However, this approach to KM is limited because, arguably it is the tacit knowledge which will typically be of more value (Grant, 1996; Hall, 1993). Tacit knowledge is rooted in social action (Nonaka, 1994). This type of knowledge cannot be easily articulated or transferred because it is context specific (skills like language, for example, are highly tacit). Tools-based approaches to KM make sophisticated attempts to codify tacit knowledge but this ignores the fact that some tacit knowledge is probably impossible to codify. For example, intuitions and hunches, which are a form of tacit knowledge (Nonaka, 1998), are not readily codified, since by definition they occur 'immediately and without reasoning' and cannot be expressed. Of course, some tacit knowledge could be codified, as Tsoukas (1996) points out – "tacit knowledge can indeed be linguistically expressed if we focus our attention on it". However, even if codified, tacit knowledge is knowledge that cannot be understood or used without the 'knowing subject' (Popper, 1972), "the realisation of its (tacit knowledge) potential requires the close involvement and co-operation of the knowing subject" (Lam, 1998). Tacit knowledge is more easily transferred, then, through processes of socialisation (Nonaka and Takeuchi, 1995). That is it can be transferred only by example or observation through social interaction and demands practical experience in the relevant context. Thus effort needs to be given to people management issues that focus on social networking, knowledge sharing and problems of hoarding or protecting knowledge.

In considering tacit knowledge, a more fundamental question is *why* this knowledge has not been codified in the past. There appear to be a number of explanations for this, but each provides a fundamental challenge to the likely success of a tools-based approach to KM. Some valuable tacit knowledge in a firm may not lend itself to capture

because it is: difficult to explain; ambiguous or uncertain; seen to be unimportant; highly changeable; contextually specific; politically sensitive; or seen as too valuable to the people concerned for them to want to share it. Therefore, forcing tacit knowledge into codified forms may result in knowledge which is: useless (if it is too difficult to explain); difficult to verify (if it is ambiguous or uncertain); trivial (if it is too unimportant); redundant (if it is continuously changing); irrelevant (if it is too context dependent); politically naïve or disruptive (if it is too politically sensitive); inaccurate (if it is too valuable to the people concerned). Tools-based approaches to KM typically underemphasise the multifaceted characteristics of knowledge and complex processes of knowledge transformation. Moreover, even where knowledge could be codified, as discussed there are a variety of good reasons why some knowledge remains tacit. The risk is that the knowledge captured by tools will only be that which is easily codified, rather than that which is genuinely helpful and important.

   An understanding of KM and the impact of IT-tools could, perhaps, be informed by the wider literature on organizational knowledge creation (e.g. Nonaka, 1994; Blackler, 1995). This literature highlights the social embeddedness of knowledge - the importance of relationships, of shared understandings and of attitudes and behaviour to knowledge formation and sharing within organizations. Knowledge is seen as continuously 're-created' and 're-constituted' through an interactive process of social networking: "unlike information, knowledge is embedded in people, and knowledge creation occurs in the process of social interaction" (Svieby, 1997). Accepting the view of knowledge as socially constructed through processes of interaction, means that issues of managing power and social relationships need to come to the forefront. KM tools such as intranets, for example, could enable knowledge sharing but, depending on the prevailing social and organisational context, could equally be used to protect the expert power base of particular social groups and restrict knowledge sharing. As Cohen (1998 notes): "An intranet is a powerful tool that, when used correctly can enhance communication and collaboration, streamline procedures, and provide just-in-time information to a globally dispersed workforce. Misused, however, an Intranet can intensify mistrust, increase misinformation, and exacerbate turf wars". In their theory of what it takes to become a knowledge creating company, Nonaka and Takeuchi (1995) note the central importance of generating commitment to knowledge sharing. Even if perfect systems existed, people would need to be willing to make them work (i.e. to contribute their knowledge to the systems and to use the knowledge from them). The survey findings above support the view that people are often reluctant to share knowledge (Bank, 1996). Others agree that 'the obstacles to KM are collaboration problems that stem from old habits of hoarding knowledge' (Hibbard and Carrillo, 1998).

   A core assumption in much of the literature on KM is that technology enables effective KM. The problem is that this perspective essentially views knowledge as a static stock and underplays processes of knowledge creation and transformation (Nonaka, 1998). The social exchange and political aspects of the ways that IT-based KM tools are devised and used are sometimes ignored (Liff, 1997). Moreover, this privileges an information processing view of knowledge as cognitive abilities (inputs) which can be identified and processed using technology (e.g. which codifies and distributes) to produce certain outputs (Nonaka, 1994). In contrast, understanding knowledge as embedded in, and constructed from, social relationships highlights a need to unpack the 'blackbox' of human interactions in KM (Silverman, 1970).

Conclusions

By identifying the somewhat narrow focus of IT tools-based approaches to KM this paper hopes, not to dismiss these, but to stimulate alternative theorising about the use and impact of these tools within organisations. IT-based KM tools clearly have a crucial role in the new 'knowledge era'. In particular, they may facilitate the more efficient exploitation of knowledge and reduce the amount of reinvention that occurs. However, even here it must be recognised that not all knowledge which is 'known' within an organisation is readily codified and transferred; nor that all knowledge which is supplied is readily found and applied. Seeing knowledge as socially constructed, negotiated and interpreted leads to the possibility that technology may disable as well as an enable KM.

Our analysis of the literature and the diffusion process for KM suggests that the approach applied to BPR as the 'fad that forgot people' is in danger of applying equally to KM. Recently critics (including IS specialists) have argued that there has been far too much reliance on the idea that KM has to do with IT systems and have suggested that 'successful KM requires a skillful blend of people, business processes and IT' (Dash, 1998). This recognises that KM is related to individual cognitive skills and also to organizational and institutional characteristics such as employment systems, career development patterns, organization design (Hedlund, 1994) and sector-specific labour markets and communities of practice (Lam, 1998; Spender, 1989). However, few KM articles discuss, in anything other than very broad terms, specific people management practices (such as selection, recruitment, career development, performance appraisal, reward systems, training and development). Yet the survey outlined here suggests that these are the bedrock of KM. There is clearly a need for closer integration in the KM literature and research across professional domains. As clearly demonstrated with earlier initiatives such as BPR, unless issues of commitment, trust, culture and leadership are addressed employees will not be willing to engage in these initiatives. People management practices and organizational processes needed to facilitate KM, and the effective use of KM tools, may depart significantly from those currently in place. This is an area that warrants closer attention in the literature (Keegan, 1998). The findings presented in this paper imply, then, a pivotal, not peripheral, role for people management and organizational issues in KM. As Hibbard and Carrillo (1996) note: 'Getting people to share their knowledge requires not only new processes but also a new covenant between employer and employees'. Perhaps researchers interested in KM could prevent more 'reinvention of the wheel' by learning from the failures and successes of earlier management ideologies such as BPR and the learning organization.

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