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Exploring the Relationships Between Knowledge Management and Information Systems: No Decomissioning

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Abstract

In recent years the discipline of Knowledge Management (KM) has emerged as a supposedly useful approach to leveraging organisational assets in order to obtain a variety of business benefits. However, this is easier said than done. For KM to be effective organisations must reflect on three key issues - infrastructure, culture and technology. While some may chose to emphasise the socio-cultural issues over the technology issues, more recent research (Gallagher & Hazlett, 2000) has pursued a path of normalization in relation to these three key aspects. Regardless of where KM has originated from it is clear that Information Systems (IS) and associated Information Technology (IT) can and will play an important role, if only as an enabler. This paper concentrates on the difficulties associated with implementing and evaluating KM in practice. It explicitly advocates the use of IS/IT and associated models as a response to the problems faced. The results of an exploratory interview study indicate that (a) many firms are relying heavily on IS/IT to support their KM strategies and (b) IS techniques offer a useful response to some of the problems encountered.

Introduction

In recent years the discipline of KM has been proposed as a viable mechanism through which to obtain competitive advantage (Davenport, 1996; De Long & Gantz, 1998; Havens & Knapp, 1999; Miller, 1997; Parlby, 1999a; Seemann, 1996; Wharton, 1998). So-called benefits include increased profits, improved organisational performance, innovation, responsiveness, productivity and competency (De Long & Miller, 1997; Wharton, 1998). KM involves a systematic approach to identifying and capturing information and knowledge about a company (its processes, products, services, markets, customers, and competitors), and sharing this for the greater goal of organisational well-being and performance (Bushko & Raynor, 1998; Romberg, 1998b; Seemann, 1996; Wharton, 1998;).

This paper concentrates on the IS/IT aspect of KM and is based on the premise that regardless of whether or not a firm decides to implement the latest in Intranet technology it should examine IS/IT and be aware of its role and what the IS field can offer. Such awareness provides the basis for a sensible decision in relation to KM. IS researchers have been interested in modeling and evaluation for quite some time and perhaps we should embrace these tools and not be so quick to surrender them. Before progressing it is prudent to note that some writers choose to emphasise the socio-cultural aspects of KM over the technological aspects (or vice versa). This author believes that such distinctions are unhelpful. At one extreme the 'tacitites' would have us believe that knowledge is intangible, context-dependent and ultimately escapes capture and codification. In sharp contrast the 'explicitites' advocate capturing almost everything, storing it in a database and putting it on the corporate Intranet. Arguments between these two groups about the nature of 'knowledge', 'knowledge management' (is it oxymoronic?) and how to go about implementing it in today's so-called knowledge-based economy bounce back and forth. The 'tacitite' approach to KM is based on an awareness of the people issues and represents what 'explicitites' would refer to as a touchy-feely approach to KM. They argue that having all the technology in the world will not help a firm that has not instilled a proper culture of knowledge sharing. Conversely, it could be argued that the efforts of a firm, which is geographically dispersed with a sound KM culture but lacking in technology support will ultimately, flounder. This writer, as do many others, falls somewhere in the middle of the 'Tacitite' - 'Explicitite' spectrum and chooses to accept the importance of culture while advocating IS/IT research, models and approaches as a useful response to the difficulties within KM.

Knowledge Management & Information Systems/Technology

Despite the increased awareness about KM several problems and challenges stubbornly persist. For instance, debate about what constitutes 'knowledge' and how to define it continues (Bushko & Raynor, 1998; De Long & Miller, 1997; Earl, 1994; Nonaka & Takeuchi, 1995). How should one approach KM implementation (De Long & Miller, 1997; Martiny, 1998; Parlby, 1999a; Scheraga, 1998; Seemann, 1996), and how can it be measured and evaluated (Amidon, 1998; Bowen & Scannell, 1999; Crainer, 1999; Fitchett, 1998; Gallagher & Hazlett, 2000; Hiser, 1998; King, 1999). In response to these and other issues this paper proposes a variety of IS techniques as a useful repository of knowledge tools. Why? The answer to this deceptively simple question lies in the similarities and links that exist between KM and IS/IT. The list

below is not intended as an exhaustive review of the dynamics between the two disciplines:

- Knowledge Management invariably relies on IS/IT support, to varying extents;
- KM processes exist to support business processes, so too do IS processes/systems;
- IS processes (particularly during development) are intangible and difficult to grasp and model, so too can knowledge processes (i.e. tacit);
- IS development is in itself a knowledge intensive industry;
- Evaluation (of methods, models, systems development, implementation and use) is an important IS issue and also one that exists within KM;
- IS models have been applied in support of other business initiatives (e.g. BPR), and
- The associated costs of IS and KM development, implementation and evaluation can be significant.

Given all of the above parallels it is proposed that IS techniques can provide a useful basis from which contribute to the implementation and evaluation of KM initiatives. Before discussing this further however, a brief review of the research methodology employed throughout the empirical stage of this project is provided.

Research Methodology

The current qualitative exploratory study is based on 10 semi-structured interviews with professionals from a variety of (public & private) industries who are directly involved in, or professionally interested in, Knowledge Management. The sample is opportunistic in nature, selected on the basis of perceived relevance and access, with no attempt being made to ensure statistical representativeness. Attwell and Rule (1991), along with Babbie (1995), claim that statistical sampling is often abandoned in fieldwork due to practical constraints. Therefore, following Eisenhardt (1989) the researcher decided to select the sample based on the principle that participants would be likely to be significantly and directly interested in and/or involved in the phenomenon under investigation.

Prior to conducting the interviews respondents were provided with an outline detailing the purpose and nature of the study. In addition, since many respondents requested some indication of the types of questions that were going to be asked the researcher, following Faison (1996), provided preliminary copies of the interview schedule in advance. This placed many interviewees at ease and the researcher is convinced that this procedure contributed greatly to the willingness of many to participate, and also did not generate scripted answers. In addition to the interviews the researcher was, in some cases, given (a) access to company documentation, (b) tours of the work environment, and (c) demonstrations of 'knowledge in action' (i.e. software packages and/or procedures employed). All interviews were recorded on audiotape and later transcribed. A qualitative content analysis technique (Calloway, 1995; Miles & Huberman, 1994) was then employed in order to extract key themes as well as similarities and differences between responses.

Discussion

While it is accepted that technology alone will not guarantee success (Martiny, 1998) it does represent a significant enabler for knowledge management activities and processes, particularly in large organisations where the volume of specialised information and knowledge may be excessive. In the words of Kao (in Gurteen, 1998), 'IT is the medium for representing, organising and deploying knowledge'. For example, the growth of web-based technologies such as the internet, or intranets, is considered to be a major factor supporting individual, group, intra- and inter-organisational learning and knowledge transfer (Carayannis, 1998; Gantz, 1998; Romberg, 1998a). Groupware, document management and knowledge mining technologies are other advancements that contribute to the collection and dissemination of information and knowledge across traditional departmental and geographic barriers (Scheraga, 1998). Greenberg (1998: 14) even proposes that it was only with the advent of the intranet that employees had a systematic way of sharing knowledge. Without such technological mechanisms, organisations (particularly those that are quite large and distributed) may never realise the full value of its knowledge (Scheraga, 1998). It is clear then that a symbiotic relationship exists between IS/IT and KM. The enabling role of IS/IT means that the IS function will play a key role in most knowledge management programmes. Although some view KM to be more about sociol-cultural issues than technological, IS/IT must be recognised for its strategic input into the entire process.

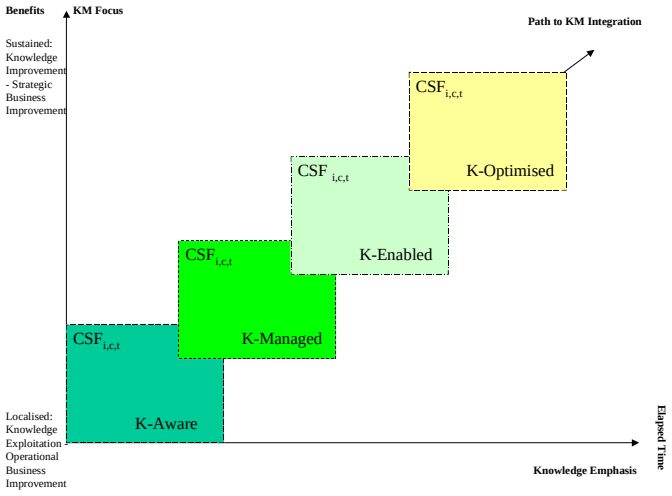
Before addressing the important issue of evaluation the role of IS modeling notations and their potential role within the development of KM activities is explored. For years IS researchers and practitioners have developed ways to cope with the complexity of real-world situations. Notations that concentrate on different perspectives of the problem have been developed, for example, notations for representing data, processes, events and objects are widespread. These have been used, to varying degrees of success, to assist developers of IT systems. This paper proposes that such notations could also be of use in helping us understand, model and develop (not just IT-based) solutions to KM problems and situations. For example, consider Data Flow Diagrams (DFDs) (Hoffer et al, 1999) that are often used to model system processes. If one accepts the premise that knowledge processes, just like IS processes, exist to support the business processes

of a firm then we can apply DFDs to model the knowledge processes, flows, stores and entities within our problem domain. DFDs have, in the past, been successfully applied to other aspects of business, namely Business Process Reengineering (Earl, 1998) and more recently Braiden & Hicks (2000) have explored the application of DFDs to KM. Given the fact that IS development is itself a knowledge-intensive activity (Curtis et al 1988; Davenport, 1996; Keil et al, 1998; Robillard, 1999; Waterson et al, 1997), and previous applications of DFDs to BPR & KM, surely there is scope for a more comprehensive examination of other aspects of IS development that may be of use to those attempting to develop KM initiatives?

Evaluation has been an important issue within IS research for some time. As noted by Smithson & Hirschheim (1998: 160) '...evaluation is endemic to human existence and hence an automatic response to a changing situation.' IS researchers have not only attempted to evaluate the use of particular forms of IS/IT (Robson, 1997; Smithson & Hirschheim, 1999; Fearon & Philip, 1998) but also the manner in which such systems are developed. This last category encompasses not only method evaluation (Gallagher, 1999; Kitchenham & Pickard, 1998; Nuseibeh et al., 1996; Saeki, 1998) but also process evaluation via the SEI's 'Capability Maturity Model' (Fitzgerald & O'Kane, 1999; Paulk et al, 1993). The remainder of this paper will explore a framework for KM evaluation that draws from concepts within the CMM.

In contrast to other research (Meehan, 1998; Meehan & Richardson, 1998) which suggests knowledge management as an alternative to the CMM, this paper has borrowed elements of the CMM to assist in evaluating KM. As currently envisaged, the Knowledge Management Maturity Model (KM^3), like the CMM, can be used as a diagnostic mechanism by organisations to chart their progress in relation to process maturity. In contrast to the CMM's 18 key process activities (KPAs), the KM^3 concentrates on the three related issues of Infrastructure (Ki), Culture (Kc), & Technology (Kt) (Chait, 1999; Davenport, De Long & Beers, 1998; Earl, 1994; Havens & Knapp, 1999; Puccinelli, 1998). The parallels across the models are immediately apparent. They define stages of growth, or maturity, that a firm can be expected to pass through in its attempts to improve its processes and ultimately business performance. The CMM concentrates specifically on *software* development processes, while the KM^3 is concerned with the development and integration of *knowledge* processes with core business processes. Management's approach will differ from one stage to another and it is suggested that different areas of the organisation can be in different stages at any one time thus necessitating a portfolio approach to knowledge management (Birchall & Tovstiga, 1999; Gallagher & Hazlett, 2000).

Figure 1. The Stages of KM Maturity in the KM^3 Model



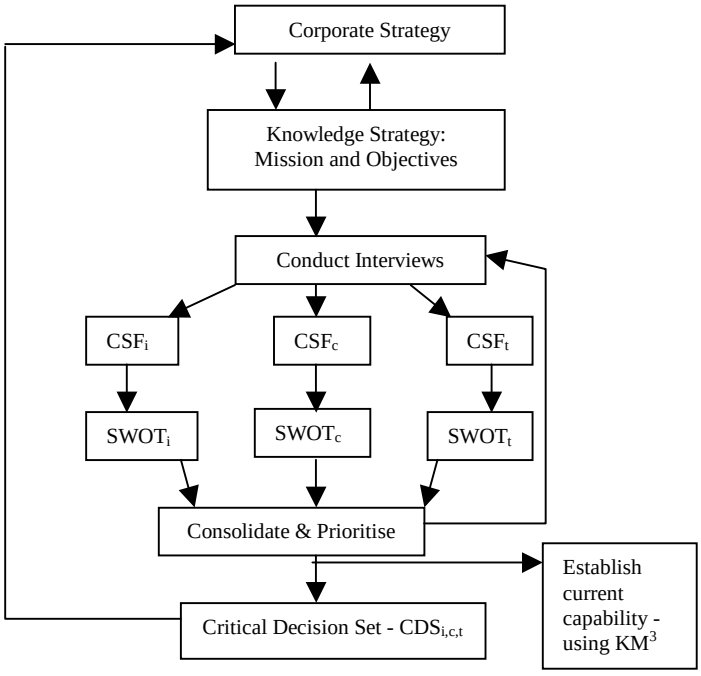
The above figure provides a diagrammatic representation of the stages within knowledge management maturity. It is proposed that a firm's knowledge maturity can be represented by several distinct phases/stages. These range from no awareness of knowledge management to a complete and focused knowledge strategy that is tightly coupled to the business strategy and ultimately results in improved business performance. Each stage of a firm's maturity can be characterised in terms of three components - Ki, Kc, and Kt. In terms of actually evaluating KM a technique akin to Critical Success Factors (CSF) analysis (CSFA) (Rockart, 1979) is proposed. Again, this technique has been widely applied in the IS field (Ang & Teo, 1997; Fitzgerald & O'Kane, 1999; Krcmar & Lucas, 1991; Nandakumar, 1996; Phan et al., 1995;), for many years and is extremely straightforward to apply and ensures management participation at various levels (Robson, 1997). As traditionally defined (Rockart, 1979) CSFs are "...for any business the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation.

In the current context CSFA requires the articulation of the knowledge mission and objectives (in light of the business strategy and expected business improvements) before meaningful interviews can be conducted with various groups of stakeholders. This having been done, a content analysis (Calloway, 1995; Miles & Huberman, 1994) of the interviews is necessary to enable abstraction of the CSFs across the three KM components mentioned above. Further articulation, clarification and ultimately consensus should be facilitated through additional

interviews and feedback sessions. In this way the current KM maturity capability can be established and decisions prioritised (Critical Decision Set - $CDS_{i,c,t}$) (see overleaf).

In proposing the above model the researcher is aware of a number of potential difficulties. Firstly, *any* model is going to be a simplification and this is certainly true of the KM^3. However, if one is to understand this concept we must first abstract and then develop workable solutions. Following the work of others (most notably Chait, 1999; Davenport, De Long & Beers, 1998 Earl, 1994; Havens & Knapp, 1999; Puccinelli, 1998) knowledge management has been abstracted to three key issues - infrastructure, culture and technology. Furthermore, skeptics may consider the application of such a model to be costly, time-consuming and difficult. This same charge has also been levied against the CMM (Fitzgerald & O'Kane, 1999). However, doing nothing in relation to evaluating KM can also be costly, time-consuming and difficult for entirely different reasons. In addition, in contrast to the CMM (with its 18 Key Process Areas) an advantage of the KM^3 is its relative simplicity (with its 3 components).

Figure 2. The Process of KM Evaluation



Interview Findings

The following discussion focuses on the interviews in an effort to demonstrate how IS techniques and IT are being employed in order to guide and support knowledge management in practice. Based on the ten exploratory interviews, it appears that the vast majority of the firms examined are doing something in the name of 'Knowledge Management'. While many of the respondents appeared to be critical of their respective organisation, they did feel that KM initiatives, current and future, represented a significant opportunity to improve their current business performance. Issues such as improved customer relationships, continuity of service, increased internal co-ordination, faster cycle times and increased productivity were all mentioned.

Not surprisingly, technology was cited by all participants as a key enabler for KM. Several firms considered themselves to be competent in the use of technology and in some cases the impetus for KM has arisen from the existing IT strategy and more specifically left to the IT department to drive the whole process forward. In the case of another company (a software firm) the Managing Director commented that it was through the adoption of certain types of technology that they were able to instill a culture of knowledge sharing. Concerns about quality, loss of key personnel, extensive growth and a desire to learn from past mistakes are other major drivers for knowledge management. In terms of what types of IT systems/platforms are being employed, three general categories have emerged: Internet-based systems, LotusNotes systems and 'Microsoft-based' systems. Integration and enhancement of the existing technology was cited by at least two respondents as an issue.

In terms of gauging the use of IS notations within KM at least two firms had attempted to apply them. In a technique similar to that advocated by Braiden & Hicks (2000) one respondent from a manufacturing firm had applied DFDs in an effort to understand the knowledge processes and stores within his firm. Another respondent from an IT education/training organisation had attempted to map his department's knowledge activities using object-oriented notations. This respondent had applied elements of UML (Booch et al, 1998) in order to articulate the knowledge objects, their relationships and uses within that particular organisation. This indicates that IS development techniques and models can be of use when trying to understand KM situations.

One of the major problems that many of the respondents cited relates to the difficulty of trying to evaluate the progress and success of KM. Other respondents were keenly aware of the need to evaluate but were uncertain as to what techniques currently existed, what was actually evaluated, and indeed how this could be improved upon in the future. Within most organisations evaluation did occur for each client project, both from the client's perspective and the product or service provider's, but only in a non-specific qualitative and subjective manner. Furthermore, there was little or no evidence to suggest that individuals were being evaluated or appraised on their knowledge capability, output and use of associated technology.

The above commentary serves to reinforce that evaluation is indeed a serious practical problem associated with implementing KM. Furthermore, many respondents welcomed the suggestion of the KM^3 as a potential response to this problem. Having explained the model and taken respondents through the associated CSF analysis, applying it to their situation, many felt that its focus on the related aspects of infrastructure, culture and technology was helpful. Indeed, two respondents from the software industry seemed to favour the KM^3 over the CMM. Of the latter the respondents commented that it was too unwieldy while considering the former to be simple to apply yet comprehensive in its outlook. Future research will continue to refine the KM^3 and explore ways in which IS research can contribute to the field of Knowledge Management.

Conclusions

This paper has demonstrated that IS development and evaluation techniques can be of use when applied to knowledge management. The lesson from this to KM researchers and practitioners is that they should avoid condemning IS/IT advocates whenever they suggest such approaches. We must be careful to avoid a situation whereby we throw the baby out with the bath water! IS researchers working within the sphere of knowledge management should not be too quick to surrender the techniques that have withstood the test of time. Ongoing work involves exploring the IS domain for ways in which to model, develop and evaluate KM initiatives.

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