

Knowledge Management in Practice: An Exploratory Case Study

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ABSTRACT *Knowledge has been identified as one of the most important resources that contributes to the competitive advantage of an organization. The organizational and social issues associated with the development, implementation and use of information technology have increasingly attracted the attention of knowledge management researchers. The paper is based on an empirical investigation of knowledge sharing processes from an international organization, Buckman Laboratories. Through the socio-technical perspective, the paper traces the interactions between knowledge management practices and the organizational context. On the basis of the research, we propose a perspective of socio-technical theory relevant to knowledge management within organizations. We conclude that management and leadership play a critical role in establishing the multi-level context for the effective assimilation of knowledge management practice.*

Introduction

In recent years, a number of management researchers have outlined the theoretical case for knowledge management.¹ It is claimed that with product life-cycles shortening and technologies becoming increasingly imitable, organizational knowledge emerges as a major source of competitive advantage by virtue of its tacitness, inimitability and immobility.² Despite the plausibility of these arguments, however, relatively few studies have provided empirical insights into how companies develop and manage 'know-how'³ through the interplay between organizational context and information technology.⁴ Indeed, much of the existing literature is concerned with an ontological debate about the nature of knowledge and therefore tends to promote particular approaches as universal panaceas. More specifically, with the development of the field of 'knowledge management' there has been a massive outpouring of articles and books dealing with these issues from a prescriptive standpoint. Their relatively weak empirical base notwithstanding, many of these contributions confidently define organizational knowledge as a kind of economic asset or commodity, or as a purely cognitive phenomenon. Their emphasis is firmly upon the conversion of tacit knowledge into an explicit form through the use of information technology.⁵

These theoretical arguments are difficult to relate to the actual experience of business organizations. This is partly because the very qualities of tacitness which lend such importance to organizational knowledge, make it an elusive item for practitioners. We also know comparatively little about the actual organizational processes through which

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knowledge is valorized in competitive outcomes.⁶ At the same time, the absence of a framework for managing knowledge on a broad and relevant basis becomes an increasingly critical problem for managers.

In an attempt to shed some light on the above-mentioned issues, this paper has two specific objectives: first, it develops an analysis of knowledge management practices from an integrated socio-technical perspective. Second, the study uses a case-study of one pioneering organization—Buckman Laboratories—to examine the dynamics of successful knowledge management practices, and to consider the extent to which such practices can be generalized and adapted by others.⁷ Therefore, the overall effect of this theoretical approach is to bridge a gap between the abstract concepts that we employ to understand knowledge and the practical, context-dependent realities facing business organizations.

This paper consists of four parts. After the introduction, the second section develops a socio-technical perspective on knowledge management, drawing both on the canonical accounts of 'socio-technical systems' but also on more recent studies which allow the elaboration of a synthetic framework of analysis. Thirdly, and drawing on this new socio-technical view, we present an analytically structured case study of Buckman Laboratories which explores the socio-technical dynamics underlying successful approaches to knowledge management. The paper concludes by presenting the managerial and theoretical implications of our analysis, and seeks to draw out some of the key issues which confront firms seeking to manage their knowledge-base.

Broadly speaking, knowledge management, in the sense used here, relates to organizations and encompasses both processes and outcomes. It can be described as the way organizations build, supplement and organize knowledge and routines around their activities and within their cultures, and develop organizational efficiency by improving the use of employee skills. We define knowledge management as the capacity (or processes) within an organization to maintain or improve organizational performance based on experience and knowledge. Knowledge is understood here as multi-layered and multi-faceted, comprising cognition, actions and resources. It is socially constructed and embedded in social networks and communities of practice. The kind of knowledge this research is concerned with can be referred to as organizational knowledge. It is defined as that knowledge which is available to organizational decision-makers and which is relevant to organizational activities.⁸

Towards a Socio-technical Perspective on Knowledge Management

In proposing a socio-technical perspective on knowledge management here, we are responding to a variety of theoretical, empirical and methodological considerations. Four factors in particular seem to warrant such a perspective. First, despite the growing tendency to emphasize the role of information technology in knowledge management, a growing number of studies⁹ are starting to provide powerful arguments for a more holistic view which recognizes the interplay between social and technical factors. Second, there is the point made by Kogut and Zander¹⁰ which refocusses attention on the work process itself; 'it is in the regularities of the structuring of work and the interactions of employees conforming to explicit and tacit recipes that one finds the content of the firm's know-how'. Third, according to Grant,¹¹ compatibility between social and technical subsystems is the key to meeting the needs of customers and hence the competitive position of the firm. It follows that adaptations to new information technologies (such as knowledge sharing systems) inevitably require a redefinition of the relationship between the environmental and technical subsystems through a series of organizational changes.¹²

Finally, not only does a socio-technical perspective reflect these theoretical and empirical factors, it also provides a suitably synthetic analytical space for considering technological and social factors in a symmetrical and even-handed way—avoiding the pre-emptive implications of approaches based on over-theorized epistemological positions.

In developing a socio-technical perspective, however, we need to be mindful of both the strengths and weaknesses of this school of thought. The term 'socio-technical' was coined by Trist and Bamforth¹³ to describe a method of viewing organizations which emphasizes the interrelatedness of the functioning of the social and technological subsystems of the organization, and the relation of the organization as a whole to the environment in which it operates. According to Pasmore *et al.*, 'the socio-technical system view contends that organizations are made up of people that produce products or services using some technology' and that each 'affects the operation and appropriateness of the technology as well as the actions of the people who operate it'.¹⁴

Initially, socio-technical principles and practices were developed for, and applied to, routine, linear work systems.¹⁵ In the earlier years of socio-technical systems (STS) thinking (the 1950s and 1960s), the concepts of 'joint optimisation' of technical and social factors and open systems planning were revolutionary and provided a fresh viewpoint for creating new organization designs, distinct from that of industrial engineers or behavioural scientists.¹⁶ In more recent years, however, the STS approach has come under fire for becoming overly prescriptive and for failing to address important empirical trends. Thus, according to Pava,¹⁷ some of the problems stem from an over-reliance on one successful method and a single template (the autonomous work group) for organization design. Equally, broader changes such as the advent of IT and new possibilities of networked organizations and virtual patterns of interaction have posed problems for the conventional socio-technical focus on the point of production.¹⁸

These critiques of STS suggest the need for renewal of the perspective if it is not to become obsolete. Pava, for example, is confident that 'if it can be re-mobilised, the STS approach could play a vital role in an era of far-reaching change'.¹⁹ In outlining a socio-technical perspective on knowledge management, we aim to recognize the limitations of the socio-technical systems approach, while applying its potentially powerful analytical tools to the contemporary issues created by the management of knowledge—notably, the issues of valorizing tacit knowledge through the application of IT.

Analysing Knowledge Management

Our analysis of knowledge management takes as its starting point, a number of features which we see as axiomatic to the socio-technical perspective. This is an holistic approach which highlights the interweaving of social and technical factors in the way people work. It also underlines the complex interactions which take place between the subjective perceptions of employees and the objective characteristics of work processes. Building on existing precepts (such as the open systems approach, the ideal of the 'best match' and principles of redundancy), our development of the socio-technical approach is concerned with the subtle and diffuse structuring of behaviour and perceptions arising from information flows and communication systems.²⁰

This extension of the socio-technical perspective does involve addressing important recent contributions to our understanding of technology. In particular, while socio-technical thinking originated from the 'systems perspective' on organization, more recent analyses have tended to stress the processual and 'emergent' qualities of the interplay between technology and organization.²¹ Similarly, the 'social' aspect of socio-technical needs to be able to embrace the socially constructed aspects of knowledge

within organizations. We identify two important features of organizational knowledge as relevant to our account here. First, there is the need to distinguish between different types of knowledge, and notably between tacit and explicit forms.²² Explicit knowledge is systematic and easily communicated in the form of hard data or codified procedures. It can be articulated in formal language including grammatical statements. This kind of knowledge can thus be transmitted across individuals formally and easily. Tacit knowledge,²³ by way of contrast, is not available as a text and may conveniently be regarded as residing in the heads of those working on a particular transformation process, or to be embodied in a particular organizational context. It involves intangible factors embedded in personal beliefs, experiences, and values.

Secondly, we need to recognize the distributed and context-specific structuring of knowledge within organizations. Argyris and Schon,²⁴ for example, suggest that an organization is a 'cognitive enterprise' and its structure (knowledge structure) is different from organizational culture and climate. According to them, some of the characteristics of knowledge structure are as follows; it is narrower than culture and climate; it deals with goals, cause-and-beliefs; and it possesses distinctive cognitive elements. In addition, knowledge structure is more clearly linked to an organization's strategy for survival. The process of developing the organizational knowledge structure is ongoing and continuous.²⁵ In this context, one group of researchers has discussed the role and importance of organizational memory. For example, Walsh and Ungson²⁶ define organizational memory as 'stored information from an organization's history that can be brought to bear on present decisions'. Some of the advantages of organizational memory are the harnessing of core competence and increased learning.²⁷

These features of organizational knowledge suggest that a critical function of the socio-technical account is to understand the organization of social relationships in which knowledge, especially in its tacit form is embedded. As Sanchez and Heene²⁸ observe, tacit knowledge is difficult to exploit organizationally even when it is clearly articulated. This is because to appropriate knowledge from someone else means having a shared code or mental model that enables the other to understand and accept that knowledge.²⁹

These features have important empirical implications in terms of the locus of organizational knowledge. Such knowledge needs to be seen as inscribed in conversations and social interactions within communities rather than as a resource that is disseminated from sender to receiver. This view has been recognized by a number of earlier works: sense-making,³⁰ communities of practice³¹ story-telling³² and communities of knowing.³³

The Structuring of Knowledge Management Systems

This socio-technical account of knowledge can now be applied to the specific features of knowledge management systems. With our view that organizational knowledge is a) socially constructed, b) shaped by the emergent interplay between technological and organizational factors, and c) structured both between tacit and explicit forms, and by the organizational context, we propose that knowledge management activities can usefully be seen as multi-layered systems, with loosely coupled technological, informational and social elements interacting over time to determine practical outcomes. This socio-technical analysis can be broadly summarized in terms of three major layers of interaction, as defined by the forms of knowledge (more or less codified), organizational context (rules and resources) and technologies (more or less determined) involved (see Figure 1: adopted from Pan and Scarbrough³⁴, 1998):

- *Infrastructure*: the hardware/software which enables the physical/communicational contact between network members.

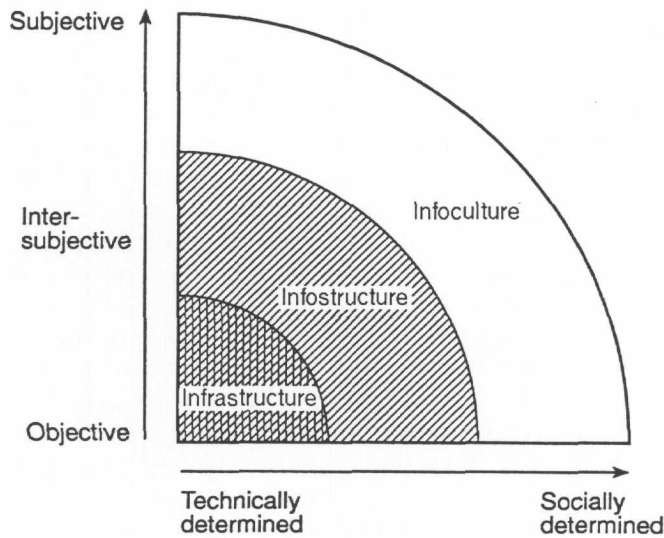


Figure 1. A socio-technical perspective on knowledge management.

- *Infostructure*: the formal rules which govern the exchange between the actors on the network providing a set of cognitive resources (metaphors, common language) whereby people make sense of events on the network.
- *Infoculture*: the stock of background knowledge which actors take for granted and which is embedded in the social relations surrounding work group processes. This cultural knowledge defines constraints on knowledge and information sharing.

(See Bressand and Distler.³⁵)

Of itself the identification of these different levels of knowledge management systems is a useful heuristic. The analysis is not complete, however, without some recognition of the dynamic evolution and complex interaction between these different levels. Knowledge management systems do not develop spontaneously or in a vacuum. They emerge out of the context and history of the organization, and their impact is conditioned by the subjective perceptions of employees whose experience is governed by that history. This draws attention, firstly, to the role of management in developing and linking these constituent elements and, secondly, to the role of key organizational processes and mechanisms in shaping the way they interact with each other.

In order to explore the socio-technical features of knowledge management in more detail and to provide a concrete illustration of its application and value, we now present some empirical findings. We mainly use these findings to demonstrate the analytical power of this concept, rather than to discuss the study in full. Before presenting and discussing findings, the research site and methods are described.

Research Method

A qualitative approach was used to analyse the data.³⁶ The research adopted a retrospective approach. It was based on a single case study, semi-structured interviews, the researcher's own on-site observations of the firm over six-weeks time and extensive

access to secondary data on the firm. The analysis retrospectively traces the change process over 10 years.

The main fieldwork was conducted on-site at Buckman Laboratories' corporate headquarters, with semi-structured interviews carried out with the most knowledgeable managers³⁷ and informants. Informants were encouraged to express themselves in their own terminology and experiences. To provide a managerial perspective as well as an holistic organizational perspective, the researcher formally interviewed 12 top managers (including the Chairman and Chief Executive Officer of the company) and 38 other employees. The range of interviewees covered the different actors and management levels involved in the development and implementation processes.

Observations of meetings, training classes and individuals at work were also made throughout the study. The field notes from these observations were used to verify or elaborate the interview data. In addition, access to the case company's intranet was gained. The company supplied a laptop, allowing observation of knowledge transfer in real time during the site visit. More than 50 on-line discussions over global knowledge management issues were also carried out with employees from Europe, Asia and Latin America to provide insights into the complex cross-cultural social and technical issues around managing global knowledge. In addition, eight knowledge management related meetings were attended and observed. Five telephone interviews and over 200 electronic mail interviews were conducted to collect and verify data.

The technical details of the knowledge sharing systems were provided mainly through archival data. Documentary evidence permitted cross-checking of much of the interview materials. It was possible to control reliability of the managers' recollections on technical and other details by comparing them with internal documents. Interpretation of empirical events was furthered through discussions with the other members of the research group and several knowledge management researchers and practitioners outside the case company. The use of externally oriented articles provided yet another possibility to triangulate the validity of the interview data. In addition to interviews, observations, archival material and supplemental data collection and member checks were applied. Specifically, archival data was collected in the form of newsletters, handbooks, vignettes, and instructional videos produced by Buckman Laboratories or from information held on Buckman Laboratories' intranet.

In the subsequent analysis, we develop a socio-technical model of knowledge management that highlights the carefully managed interplay between organizational context and knowledge management tools developed at Buckman.

Buckman Laboratories Case Study

In keeping with our aim of developing a socio-technical perspective on knowledge management, the following is an analytically structured case-study which highlights the interaction between the key characteristics (i.e. knowledge, IT, management, change processes, and the layers of infrastructure, infostructure, infoculture) outlined above.

Organizational Background

Buckman Laboratories is a \$300 million chemical company serving industries in 102 different countries selling 1000 different specialty chemicals. It was established in 1945 as a manufacturer of specialist chemicals for aqueous industrial systems. In 1989, Bob Buckman made a personal pledge that knowledge would become the foundation of his

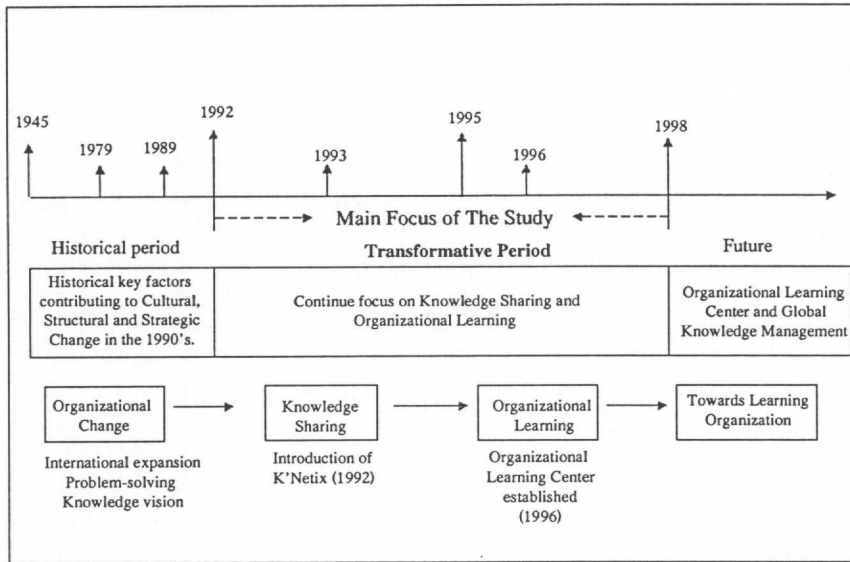


Figure 2. A processual analysis of Buckman Laboratories' global knowledge management activities.

company's competitive edge. Three years later, the implementation of the K'Netix® knowledge network marked the realization of Buckman Laboratories' vision.

To understand how Buckman Laboratories creates, stores and accesses its stock of knowledge more closely: the type of knowledge that is shared and transferred at Buckman Laboratories encompasses customer knowledge, competitive intelligence, process knowledge and product knowledge. These can all be conveniently categorized under factual and behavioural corporate knowledge. Factual corporate knowledge consists of technological and market know-how. It is an accumulation of structured information and is transferable in formalized processes.³⁸ Behavioural corporate knowledge, which lies beyond simple transferability from one organization to another, includes mind structures co-ordinating the social interaction of individuals and organizations. Also crucial at Buckman Laboratories is its proprietary knowledge which is protected by patents and trade secrecy, is codified and can be subject to licensing and commercialization, while tacit knowledge is implicit in the professional and institutional culture of the firm.³⁹

Although this paper focuses on the period of development between 1992–1995, the evolution of Buckman Laboratories' knowledge management development can be seen in terms of two major stages (Figure 2): historical 1945–1991) and transformative (1992–1998) periods. The knowledge sharing initiatives were planned and emerged over time to respond to internal and external changes. The findings below can be grouped into four areas. The first describes the infoculture which identifies the change activities Buckman Laboratories undertakes to facilitate a knowledge sharing environment. The second looks at the knowledge infrastructure which includes knowledge architecture and organizational knowledge memory. The third describes an infostructure which includes the structure and processes used in the sharing of knowledge within the case company. The fourth section describes the issues and concerns of the knowledge sharing activities at Buckman. We then discuss some of the key managerial and theoretical implications of this paper.

Empirical Analysis of the Transformative Period (1992–1998)

Our data suggest that different elements of Buckman Laboratories' knowledge management system have interacted over time. There is the obvious role of the infrastructure, for instance, in the shape of the 'K'Netix' network connecting knowledge suppliers and knowledge users on a world-wide basis. There is also the evident importance of the infostructure, with the implicit norms and protocols attached to both requesting and supplying knowledge and information on this specialist topic. Finally, we note the diffuse but hugely influential impact of the infoculture. The core values and attitudes of Buckman employees are reflected in their willingness to exchange knowledge simply to solve company problems, without the usual political baggage and ulterior motives. In the following section, the analysis will concentrate mainly on the key processes and mechanisms that were found to be important to knowledge management.

Analysis of Infrastructure

Knowledge Architecture

A major requirement for effective knowledge management is a knowledge architecture, which needs to be designed and specified according to hierarchical levels and with a given conceptual framework for knowledge. Major knowledge architecture elements consist of humans, organizational entities, documents, books, other knowledge repositories and operating entities.

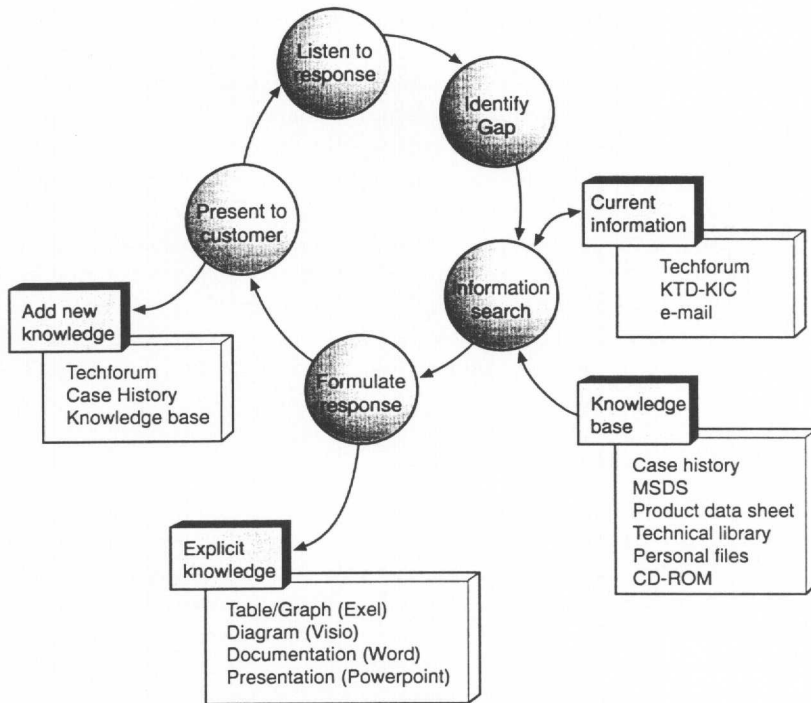
The process of building a global knowledge sharing architecture began after the integration of information systems, telecommunications departments and the Technical Information Centre. As a result, a Knowledge Management Transfer Department (KTD) was set up in March 1992. The main responsibility of the department is to monitor and support the sharing of both explicit and tacit knowledge within the organization.

By the end of 1992, Buckman Laboratories had invested \$8 million to lay the groundwork for its new knowledge transfer system. The knowledge-creating and sharing systems known as K'Netix are divided into two basic categories: seven organizational forums and various codified databases. All 1300 of the organization's associates world-wide have CompuServe identifications and passwords (though only about 1000 have their own lap-tops or personal computers), and they use the network for both intra- and inter-company communication.

Organizational Knowledge Repository (Memory)

A major building-block in implementing knowledge management is the organizational memory. Organizational memory is defined as the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organizational effectiveness.⁴⁰ K'Netix is an interconnected system of knowledge bases used as a world-wide resource by Buckman Laboratories associates. It is the network through which Buckman associates share knowledge electronically and then pass it on to the customer. Combining Buckman knowledge with electronic forums, bulletin boards, virtual conference rooms, libraries and e-mail, K'Netix gives associates unlimited access to expertise, experience and resources in around 102 countries.

As suggested by Wiig,⁴¹ these knowledge bases come in many forms, ranging from relatively loosely organized expertise possessed by knowledge workers to highly organized and strictly represented knowledge bases that support knowledge-based system applications. K'Netix is a customer-focused, dynamic, structured yet flexible, multi-dimensional



Source: Buckman Laboratories Internal Document, 1996

Figure 3. The knowledge-sharing flow at Buckman Laboratories.

system. It has evolved continuously and is represented by an interconnected collection of databases (repositories of all the pertinent information pertaining to Buckman customers and their manufacturing processes, electronic forums with their attendant libraries, virtual conference rooms, e-mail and bulletin boards) that support the rapid exchange of knowledge between associates who are separated by both time and space.

Analysis of Infostructure

Knowledge Sharing Processes

Access to knowledge is governed by formal and informal rules on use and access. Thus K'Netix is not a static repository (Figure 3). According to a forum specialist of the Knowledge Resource Centre:

A feedback loop was set up so that, after listening to customers, any queries relating to a particular area that cannot be answered by the technical-sales person/field-based associates are posted on the forum. Usually the request for help is picked up and answered by anyone who has expertise in the related subject area. If the request is unattended for a few hours, two scenarios emerge. First, the forum specialist will pick up the request, identify the potential experts and try to get their attention in order to answer the question. Second, formally, there is also a team of experts with related industrial experience who volunteer to be listed as section leaders who help answer any requests and prepare weekly summaries.

After an information search, responses are then formulated and presented to customers

for problem solving. The request will be kept on the forum as long as there is an active discussion of it, and will only be taken down for knowledge-processing when it is considered 'dead'. As a result of the discussion of the request, it would usually generate new knowledge and, with the help of the forum specialists and section leaders, the new knowledge will then go through some processing activities. For example, the knowledge generated is usually overlapping and sometimes inaccurate. Forum specialists and section leaders will thus need to organize, validate and verify the knowledge before it is uploaded, stored into the knowledge base, and is ready for distribution and use/re-use if a similar query is requested in the future. These processes enable the tacit knowledge of experienced people to be shared within the organization on a world-wide basis. More importantly, they allow front-line employees to continue serving customers while a specialized group devotes time to 'capturing their knowledge in a re-usable form'.

Global Access

There are four different region-focus forums available at Buckman: TechForum, Euroforum (for European associates who prefer using European languages), LatinoForum (used mainly by Latin American associates) and AAAForum (for Asia, Australia and African associates). The regional forums, accessible only to company associates, are each divided into sections based on Buckman's lines of business, such as water treatment and leather. Codified databases come from a number of sources: valuable knowledge generated from discussions on the forums (industry experts within individual sections advise forum specialists on which exchanges or 'threads' are worth saving), uploaded external secondary material and any materials that are helpful to associates are also included (for example, competitive intelligence).

An obvious component of a competent global knowledge management organization is its ability to function effectively as a global organization. One of the unique features of Buckman Laboratories' knowledge management is the early recognition and vision of global expertise. As a US sales manager pointed out:

With the information technology intervention, the key is to be aware of the effects of culture on the work and learning habits of employees from different cultures, and to build training programmes, interrelationships and structures that enable all employees to participate fully in the knowledge sharing processes.

Analysis of Infoculture

Knowledge Enterprising Culture

At Buckman Laboratories, one very significant aspect of its culture consists of its knowledge-enterprising characteristics that promote knowledge sharing. Part of the unique culture puts the world's most knowledgeable experts at all levels of Buckman's organization in touch with each other, thus, encouraging group problem-solving and the sharing of new ideas and knowledge.

A knowledge-enterprising culture is one of the most important conditions leading to the success of a knowledge management project. It is perhaps the most difficult part to build from scratch, but its development helped Buckman Laboratories to become one of the pioneer organizations in knowledge management. Despite the apparently successful implementation of this cultural change, it is important to remember that culture is not simply the conscious design of management, but reflects the evolution of the organization

over a period. On the other hand, top management were clearly proactive in changing culture within the organization. According to Bob Buckman:

What happens in Buckman is 90% cultural change. After the K'Netix system was put in place, a new organizational culture change seemed essential. The culture that Buckman created began with a process of 're-learning'.

Under a new paradigm of organizational culture, Buckman believed strongly that employees who shared their knowledge would be the most influential and would be sought by others within the company.

At the heart of knowledge-sharing activities in Buckman is a climate of continuity and trust. A top manager explained,

This is the most difficult aspect of knowledge-sharing to achieve. If you can't do it, you can't succeed. We grew up learning to hoard knowledge to achieve power. Buckman created a culture of trust encouraging active knowledge sharing across time and space among all of the company's employees across the world.

In his view, 'the most valuable employee is one who becomes a source of knowledge and actively shares that knowledge with other people'. The knowledge-enterprising culture at Buckman encourages everyone to become knowledge entrepreneurs. The facilitative climate has encouraged associates to take risks, innovate and get out of the habit of asking for instructions. Knowledge entrepreneurship is rewarded, and inquiry and innovations are promoted.

Knowledge Entrepreneurship and the Role of Top Management

A shared, challenging, knowledge entrepreneurship vision is critical to the success of knowledge management. A shared vision provides the focus and energy for knowledge sharing. It encourages and energizes people to uncover the organization's picture of the future, and should provide meanings and value for everyone.

These factors underline the importance of management in creating and co-ordinating the different elements of the knowledge management system. However, Buckman Laboratories' experience also suggests that management on its own may not always be sufficient to provide the necessary vision and energy to stimulate and sustain effective knowledge management practice. Leadership, in other words, and mobilizing the perceptions and attitudes of employees may be equally instrumental. From the study, it was evident that top management at Buckman served as role models for learning and knowledge sharing. Facilitating changes in the area of knowledge management requires proactive entrepreneurial support from the top. 'Leaders have contributed to the creation of a corporate knowledge culture and a managerial mindset that promotes co-operation and the formation of communities of practice throughout the organization', explained an informant.

Bob Buckman is a pioneering figure in the knowledge management field for his vision and continuous efforts in promoting knowledge sharing inside and outside his organization. After his training in chemical engineering and business studies, he joined the company which his father, Stanley, had founded. He has long been fascinated by organizational dynamics, and the challenges which computers could bring. Bob Buckman states that when he took over from his father, 'I knew I didn't want to do it his way'. His dad epitomized the classic pyramid-style of leadership which oversaw every decision, sales order, cheque and memo. Bob's determination to be different showed him the path to the future. He decided to give his associates access to company information and knowledge networks that would take the organization into the future.

Top management at Buckman Laboratories take knowledge leadership seriously, insisting that 'the climate we create as leaders has a major impact on our ability to share knowledge across time and space', observed an informant. Bob Buckman recognized trust as one of the company's core values. 'For knowledge-sharing to become a reality, you have to create a climate of trust in your organization. You cannot empower someone that you do not trust and who does not trust you.' A code of ethics that values the individual is solidly at the core of the learning mindset. In addition, Buckman constantly reinforces the points that provide knowledge for customer service. The aim is to deploy knowledge at the point of sale for the benefit of the customer. 'We need to invest in knowledge sharing like any other investment that will redefine an organization'. Indeed, many associates at Buckman Laboratories credit him with the foresight to have managers 'thinking ahead five to ten years rather than 60 days'.

It is important to consider the political dimension of leadership, including the application of rewards and sanctions to overcome resistance. Both culture and leadership should not be seen in a wholly uncritical way, though they have obviously had successful implications at Buckman Laboratories. This last comment draws attention to perhaps the most important leadership role played by Buckman in the knowledge management arena—his ability to 'manage the managers' and thus enrol them as enthusiastic practitioners of knowledge management.

Communities of Practice

Another interesting phenomenon found at Buckman is the formation of 'communities of practice'.⁴² At Buckman Laboratories, communities of practice were evolved informally involving the use of virtual communities to share information and to build on the knowledge of others in order to solve their customers' problems while gathering knowledge for widespread corporate use. According to a scientist from the Research and Development department (R&D),

These are small sub-groups of people who have mutual respect, share some common values and generally get the important work done. They are not necessarily a team, a task force or any other authorised group. Their bonding is social as well as technical, and is built around informed participation.

Further, sharing knowledge outside the community is extremely hard to enforce. Many managers have great difficulty in trying to understand and build any meaningful system around this process.

Knowledge Management Strategy

As the above account has underlined, knowledge management is a multi-level set of technologies, norms and practices. For such qualitatively different factors to evolve in a consistent, mutually reinforcing way, the guiding role of management is crucial. In this context, arguably one of the most important items for the effective sharing of knowledge is a clear and conscious knowledge strategy. Buckman Laboratories, since the 1980s, have consciously decided to compete in terms of knowledge, and hence made it a priority to strategically use process, integrated with, and running parallel with work. Anticipation of knowledge-creation and knowledge-sharing are built into the mindset of the company and all its people. According to a study conducted by APQC,⁴³ the knowledge management strategy at Buckman Laboratories can be classified into two parts:

- The ability to access, develop, and deliver in the shortest amount of time a quality

solution, derived from the broadest possible knowledge base, will increase customer satisfaction and confidence in a supplier.

- Associates must be empowered with knowledge so they can satisfy the needs of customers faster and better than the competition.

Strategic efforts are being made at Buckman Laboratories to ensure that every employee knows that an important part of working for the company is to learn as much as possible, contribute knowledge to the system, and participate in the dissemination of knowledge to the benefit of Buckman customers world-wide. All customers receive the benefit of rapid and accurate data transfer as well as the added value provided by the experience-enhanced knowledge of all Buckman employees.

When Buckman Laboratories started their journey towards knowledge management in the 1980s, the electronic communication technology was not available to realize their needs. Today, the challenge is not one of technology. The case study illustrates that much of the value added by the technical changes associated with knowledge management results not from the technology itself but from the new arrangements and roles of the organization, management and the people who can make the best use of technology. It is clearly indicated that knowledge management must be embedded in the processes in which people work. This case demonstrates that knowledge management is a process which facilitates knowledge creation and sharing through corporate intranets and communities of practice. The company's approach is to incorporate knowledge management practices into its culture to ensure that it achieves its mission to compete on knowledge.

Conclusions

This research presents a model of knowledge management and illustrates it with a case study of one organization. It suggests that this organization represents a particular form of knowledge management—one that utilizes various mechanisms for leveraging knowledge towards business advantage. This study presents an initial attempt at understanding this phenomenon from a socio-technical perspective, though it falls short of claiming that such a system can be readily replicated in other organizations.⁴⁴

In this research, we argue that the socio-technical view offers a particularly important approach to examining and exploring the development, processes, and mechanisms of knowledge management within a knowledge-intensive firm. We drew on findings from an empirical study in order to apply the concept to illustrate the multi-faceted, multi-layered and socially constructed phenomenon of knowledge management. The conceptual framework developed here has important implications for both practice and research.

Managerial Implications

A socio-technical view of knowledge management has implications for overall management practices. This study suggests that however successfully an organization transforms its environment for knowledge management in the short term, a more daunting task for organizations is that of facilitating a truly knowledge entrepreneurial culture in the long run. Specifically, the task for the organization is to continuously create and maintain a knowledge-enterprising culture and community whereby associates feel comfortable with knowledge and are motivated, rewarded and entrepreneurial. Equally challenging, is the task of developing a knowledge-focused reward system that can effectively replace the traditional, commission-based reward mechanisms.

Finally, the effectiveness and value of knowledge management depends on the active participation of each employee. An equal emphasis on technology, structures, and cultural factors might help to provide the answers to this challenge and help management to identify the facilitating and inhibiting factors which influence the success of knowledge management.

Theoretical Implications

This study has investigated the effects of implementing a knowledge management system within a particular organization. This study leads towards the conclusion that such systems involve more than technology but rather a culture in which new roles and constructs are created. It changes the communication patterns between individuals and teams, and also alters the design of the organization by fostering new processes and structures. Learning and competence development need to be encouraged, and a knowledge sharing system instituted to foster the integration of knowledge towards business objectives. This study also provides an important new perspective on the interplay between knowledge management and the organizational context, suggesting that much of the existing literature in this field is based on dubious functionalist and rationalist assumptions.⁴⁵

This study describes in theoretical terms how one organization is developing its systemic capability to effectively and efficiently share tacit knowledge from on-going practice and to create explicit organizational knowledge for future events. In so doing, it provides a vocabulary that both practitioners and academics can use to identify like constructs in other organizations, so that future empirical work in the area can be comparable and cumulative. While no single organization has a knowledge management system similar to that of Buckman Laboratories in its entirety, many organizations set up mechanisms and management processes to achieve portions of it. Much work remains to be done, but this study lays some groundwork for research on the characteristics and effects of knowledge management.

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