

**The Knowledge Strategy
Within a Business Context**

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Abstract

The recognition of knowledge as the key to competitive advantage is raising many issues for corporate organisations and their managers. Each are accustomed to assembling tangible physical, financial and human resources, and competing on price, quality and customer service.

The competitive dynamics of current markets are imposing upon management a demand for on-going strategizing and to follow-up on changing market structures and competitor behaviour. Knowledge management within this business environment is emerging as a strategic challenge but in practice is rarely considered in a strategic context.

A number of companies have introduced the role of a chief knowledge officer, virtual universities, best practice replication and a large number of technology-based initiatives e.g. Intranets. Managers and consultants generally do not treat knowledge management as a strategic endeavour. Furthermore, contributions from an academic point of view are scarce in the field of the strategic issues of knowledge management. In fact it is only in the last few years researchers have introduced the concept of a knowledge strategy and placed it in the context of a firm's business strategy.

The author states that for knowledge to make a difference within such a competitive environment, it must be grounded within the company's strategic context. To achieve this there must be an association between the knowledge assets, resources, the core capabilities and the business strategy the firm pursues.

The resource and knowledge based view of the firm will be used within this paper, to create a strategic framework for defining the knowledge within firms. The author will then from a literary perspective examine the association of these knowledge assets, resources and six organisational capabilities (creation, destruction, integration, absorption, replication and protection) to the intellectual resources of the business strategy.

An empirical survey of international best practice in knowledge management within thirty-seven leading international corporations will then be used to present specific examples. Based on these case studies a series of knowledge strategies will be defined. Ranging from firms who illustrate no association between the knowledge and organisational capabilities and the business strategy. To companies that pursue the strategy that knowledge management is a core competency and critical to the health of the business as a whole.

In this case the knowledge, resources and capabilities are tightly aligned and integrated with the company's global business framework and strategies. This has been described as the 'second level' in a knowledge strategy, connecting the knowledge and the strategic focus, a virtual team at BP Amoco plc. is said to be already working at this level.

This paper states there is a profound lack of understanding for many firms of how to exploit a knowledge strategy into a source of sustained competitive advantage. In order to gain such understanding it is necessary to firstly focus on how organisations can mobilize existing knowledge and resources within new capabilities, and how to create viable and flexible patterns of action between them and the business strategy of the firm.

Introduction

Knowledge management is emerging as a strategic challenge but in practice although firms have already introduced a large number of initiatives, managers and consultants do not treat knowledge management within a strategic context.

Consulting firms such as Ernest & Young and KPMG are offering learning models and knowledge solutions. Managers have begun to focus on their firms becoming learning organisations, implementing knowledge management tools, and measuring intellectual capital (Vera, 2001). They are allocating large budgets to human development and information technology (DeGeus, 1988:6).

Contributions from an academic point of view are also scarce in the field of the strategic issues of knowledge management. Academics are presenting the resource-based view of the firm (Barney, 1986, 1991; Penrose, 1959; Prahalad & Hamel, 1990; Wernerfelt, 1984) and the knowledge-based view of the firm (Conner, 1991; Conner & Prahalad, 1996; Ghoshal & Moran, 1996; Grant, 1996b, 1996a; Kogut & Zander, 1992; Spender, 1996a). Barney (1991) defines knowledge, as a resource that is valuable, rare, inimitable, and unsubstitutable and the ultimate source of sustainable competitive advantage (Vera, 2001:3).

The recognition of knowledge as the key to competitive advantage is raising many issues for the corporate world. Managers are accustomed to assembling tangible physical, financial and human resources, and competing on price, quality and customer service (Blumentritt & Johnston, 1999). Companies such as Cisco Systems, Ford Motors, British Telecom and Rolls-Royce are being advised that to remain competitive they must efficiently and effectively create, locate, capture and share their organisation's knowledge and expertise and have the ability to bring that knowledge to bear on their problems and opportunities.

This research initially asked the question, what types of organisational capabilities, structures and strategies are firms developing to manage knowledge? An in-depth URL search was conducted looking at large corporate organisations in the United Kingdom, USA, and Australia. The search focused on two aspects: the organisational and technological structures within the organisations, in relation to knowledge management.

The information collected from this in-depth search was published in the report *International Best Practice - Case Studies of Knowledge Management*, June 2001, published by Standards Australia, co-authored with Professor Thomas Clarke, University of Technology, Sydney, Australia. The value of this publication lies in its ability to point towards the fact that knowledge management within each firm is multidimensional, complex and dynamic and that there is a large range of knowledge management initiatives found across industry sectors:

- ❑ Ford Motors, implemented knowledge sharing practices that effectively drove down its vehicle concept-to-production time from 36 months to 24 months. The flow-on value of this has been estimated at \$US1.25 billion.
- ❑ Chase Manhattan, one of the US's largest banks, achieved a 15 per cent incremental increase in annual revenue from developing and implementing systems that manage client relationships more effectively.
- ❑ Boeing were previously forced to retrofit parts from separate suppliers to make sure they fitted together, a burdensome task considering commercial 747s, 767s and 777s each contain about four million parts. Boeing and part suppliers now have full visibility via the Web into parts specifications, production schedules and maintenance histories for every plane.
- ❑ The Dow Chemical Company, realised that its patent database, with more than 29,000 patents, represented under-used intellectual capital, the firm saved more than \$1 million in patent maintenance fees alone by hiring a new director of intellectual asset management.

Such effective utilisation of the firm's knowledge is the very basis of competitive advantage but for many firms, poor management and a lack of global and company-wide strategic direction is fatally slowing the success of many of the initiatives. Organisations are in general, concentrating on purely technical solutions to knowledge management (Zack, 1999a.). There is little focus on developing a strategic framework between the knowledge initiatives and operational or structural efforts, which are designed to help companies capitalise on their knowledge assets. Companies have also tended to ignore the organisational and cultural changes needed to promote knowledge transmission and circulation.

This paper argues that the firm's perspective on knowledge management should be dynamic and company wide. For the knowledge initiatives to make a difference within a competitive environment, they must be grounded within the company's strategic context (Crossan, Lane, & White, 1999; Earl & Scott, 1999; Zack, Smith, & Slusher, 1999). To achieve this there must be an association between the firm's knowledge, the core capabilities, and the business strategy pursued (Vera, 2001). This paper offers a literary interpretation of this association and will explore the emergence of the knowledge strategy within a business context.

The paper begins by defining knowledge as tacit or explicit. That it cannot be directly observed or measured and in conjunction with resources, knowledge gives the firm its capabilities and this implies the capacity to act (Kaplan, Schenkel, von Krogh, & Weber, 2001:17).

The paper considers Kaplan's six capabilities each exemplifying the firm's need for the strategic management of knowledge. The paper examines three of these capabilities: creation, transfer and protection, stating that to exercise these capabilities firms need to adopt a strategic direction in which knowledge and resources will be a key influence on the strategy employed.

The literary review will explore the development of the knowledge strategy, from the resource and knowledge based view of the firm. Strategic approaches will be presented based on the firm's tacit or explicit knowledge. The work will review emerging literary perspectives on the knowledge strategy and define five emerging strategies based on a survey of thirty-seven large corporate organisations.

The Resource and Knowledge Based Views

During recent years, the resource-based view of the firm (Conner, 1991; Conner & Prahalad, 1996; Penrose, 1959; Peteraf, 1993; Rumelt, 1984; Wernerfelt, 1984) has emerged as a popular reference framework for studies in strategy and management. It emphasizes the importance of firm specific resources in the generation of economic profit. The resource-based theory complements the contractual (Grossman & Hart, 1986; Hart & Moore, 1990; Williamson, 1985) views of the firm by suggesting that the firm is not merely a nexus of contracts (Fransman, 1994) but also a knowledge-bearing entity, a repository of knowledge and capabilities.

Capabilities are stored in, e.g., organisational routines and structures, in employees, and in the control and information systems of the firm (Autio, Yli-Renko, & Sapienza, 1997). The refinement and extension of such resource-based arguments, has enabled researchers to form the largest subset of the growing literature on strategic theories of the firm, the knowledge based theories (Conner, 1991; Conner & Prahalad, 1996; Grant, 1996a; Kogut & Kulatilaka, 1994; Liebeskind, 1996).

These theories assume that firms operate in dynamic environments, where markets and technology are changing fast and in unpredictable ways. They also assume a highly competitive setting, with firms functioning within ecologies of learning (Levitt & March, 1988) interacting and adapting to the environment (Oliverira & Santos, 2000).

Knowledge theories invariably start from the premise that knowledge is the most important strategic asset that a firm possesses (Phelan & Lewin, 2000). Grant (1996:112)

goes so far as to say that "...all human productivity is knowledge dependent, and all machines are simply embodiments of knowledge". The development of the theories requires a rich understanding of what is the knowledge within the firm (Oliverira & Santos, 2000).

Knowledge

Scholars seem to agree that there are two types of knowledge, with a strong distinction being made between explicit and tacit. Explicit knowledge is extremely easy to transfer and contracts protecting this type of knowledge are difficult to enforce (Liebeskind, 1996; Phelan & Lewin, 2000). Tacit knowledge cannot be easily codified and can only be learned through observation and practice (Grant, 1996a; Kogut & Zander, 1992). Michael Polanyi (1962) first expounded the notion of 'tacit knowledge', based on the simple observation, 'We know more than we can tell'. Polanyi argued that a large part of human knowledge is occupied by knowledge that cannot be articulated - 'tacit knowledge'.

The perspective adopted in this paper builds upon the premise that knowledge (tacit or explicit) in practice can range from highly tacit to fully articulable knowledge (Winter, 1987) and it is rooted in organisational coordination mechanisms and routines (Lam, 1998). This paper explores this concept further by examining the dynamic perspective of knowledge presented by Kaplan, Schenkel, von Krogh, & Weber (2001:17):

"That knowledge is information whose certainty is given by a specific context (Arrow, 1962b, 1962a), which creates space for a justified true belief (Nonaka, 1994; Von Krogh, Ichijo, & Nonaka, 2000) and gives a firm the capacity to act (Stehr 1992) "

Lam (1998) made the observation that tacit knowledge could not be directly measured by normal quantitative indicators - if it could it would not be tacit. Kaplan, Schenkel, von Krogh, & Weber (2001) and Stehr (1992) also define knowledge as not being directly observable or measurable. Therefore it becomes a construct whose existence and

properties can only be inferred through the firm's core capabilities that are manifested in observable action. Nonaka (1994) states that "tacit knowledge is deeply rooted in action, commitment and involvement in a specific context" therefore tacit knowledge resides in individuals but must be integrated to become useful, facilitating such coordination are the organisation's rules and routines.

By defining capabilities as the capacity to act, Kaplan, Schenkel, von Krogh, & Weber (2001) deduce that:

"Knowledge, in conjunction with resources, gives the firm its capabilities, and that the existence of capabilities is the prerequisite for potential action of any kind. Conversely, the observation of action by the firm demonstrates the existence of capabilities, and the existence of capabilities inherently identifies the presence of knowledge, even if knowledge itself cannot be directly observed".

Organisational Capabilities

Teece, Pisano, & Shuen (1994) define firms as generators of dynamic capabilities. The term emphasises the key role of strategic management in appropriately building, integrating and reconfiguring internal and external organisational skills and resources (Teece, Pisano, & Shuen, 1997) to match emerging environmental opportunities.

Dynamic capabilities are rooted in high performance routines operating inside the firm, embedded in processes and conditioned by organisational history. Such organisational routines are activities required when firm specific knowledge and resources are assembled in integrated clusters to enable distinctive activities to be performed (Teece, Pisano, & Shuen, 1997).

The firm's *core capabilities* can be defined as clusters of knowledge sets and routines that can be translated into distinctive activities. They are valuable, rare, and idiosyncratic and hard-to-imitate and they define the firm's fundamental business (Teece, Pisano, &

Shuen, 1997). They are a subset of knowledge, their key characteristic being that they lack the systematic codification that allows scientific discourse and is commonly considered to be a prerequisite for generalisations and rigour (Ramazzotti & Rangone, 2000).

Such core capabilities refer to the integration and joint operation of routines (Metcalfe & James, 2000), to identity, norms and values, learning, or vocabulary, that come into existence when individuals possess tacit knowledge (e.g. (Collis, 1996; Grant, 1996b; Leonard-Barton, 1992; Molin, 2001; Spender, 1996b; Teece, Pisano, & Shuen, 1997). Firms are primarily knowledge repositories, where evolution can be analysed in terms of creating, transferring and integrating within a dynamic or static environment (Huttunen, Kylaheiko, & Virolainen, 2001).

Organisations serve both as sources of new combinations and they provide a stable hierarchy of path-dependent routines and capabilities that are continuously replicated (Huttunen, Kylaheiko, & Virolainen, 2001:4). Replication mechanisms bring stability and continuity, whereas routines serve as organisational memory. The creation of knowledge will always be conceptualised in the framework of old established routines, which can be dynamic or static. Static routines replicate organisational and technological capabilities and dynamic routines enable the firm to learn by creating, transferring and integrating knowledge (Huttunen, Kylaheiko, & Virolainen, 2001).

Kaplan, Schenkel, von Krogh, & Weber (2001) define the knowledge-based firm as a locus for six critical capabilities: *creation, destruction, integration, absorption, replication and protection*. Stating that the;

"The six capabilities are not completely independent of each other: they appear to possess a dyadic organization structure. Specifically, creation is associated with destruction; integration is intimately tied to absorption; and replication is linked to protection. This also points to the existence of a meta-capability for the firm to enable and constrain the individual capabilities".

They go on to say "this meta-capability constitutes the essence of strategic management". This paper will be review three: the creation, replication and protection of knowledge (Von Krogh & Roos, 1996). For the purposes of this research the replication capability will be defined as the transfer capability.

Creation Capability

The creation capability is the capacity to combine knowledge with knowledge and knowledge with resources to produce output (Kaplan, Schenkel, von Krogh, & Weber, 2001), it includes developing new ideas, the recognition of new patterns, the synthesis of separate disciplines and the development of new products and processes (Cormican & O'Sullivan, 2000). It encompasses both creating new knowledge and acquiring existing knowledge from somewhere else. According to Nonaka & Takeuchi (1995) organisational knowledge creation is a never ending, iterative process. They add that this process is not confined within the organisation, but it also takes place between organisations.

Transfer Capability

The capacity of transferring knowledge is designed to enable the flow of knowledge among and between individuals, groups, organisations or industries. Much learning and innovation takes place in informal networks often called "communities of practice". GroupWare or collaborative systems facilitate these networks. They allow the joint construction and distribution of experiences and insights and enable the creation of social networks. Thus, they not only support communication but also collaboration (Cormican & O'Sullivan, 1999). Finally, Osterloh & Frey (2000) contend that the transfer of knowledge, especially tacit knowledge, enhances a firm's performance and is essential to its competitive advantage.

Protection Capability

As discussed by Kaplan, Schenkel, von Krogh, & Weber (2001) for capability protection, firms provide the physical, social and resource allocation to shape knowledge into

competence and have the ability to protect intellectual rights (Teece, 1998). Firms establish formal mechanisms of knowledge protection (Liebeskind, 1996), such as patents, copyrights and trademarks, as well as informal mechanisms such as accumulating tacit knowledge (Kogut & Zander, 1992). Protective capabilities, such as privately held knowledge (Conner & Prahalad, 1996) give a firm competitive advantage, which subsequently influences the firm's performance in a positive way (Liebeskind, 1996).

Each of these capabilities combines the knowledge and resources of the firm, which allows for the development of new knowledge, giving the capacity to produce better products and services. Penrose (1959) noted a firm's ability to manage knowledge in terms of internal resources is the basis for strategy making (Barney, 1991; Grant, 1991; Wernerfelt, 1984; Zeleny, 1989). Each firm must have the ability to allocate the resources in a manner that enables and constrains the exercise of these three capabilities. In doing so they need to adopt a strategic direction or a change strategy in which knowledge and resources will be a key influence on the strategy employed (Sveiby, 1997; Von Krogh, Ichijo, & Nonaka, 2000)

The Strategic Options

According to Bloodgood & Salisbury (1998:2) based on the resource-based view of the firm, (Barney, 1991; Penrose, 1959; Wernerfelt, 1984) organisations have four primary choices in strategic change: *reconfiguring existing resources, reconfigure with new resources, acquiring new resources without reconfiguring* and *business as usual*. Stated briefly by Bloodgood & Salisbury (1998):

"Organisations that use a strategy of knowledge creation focus on creativity and experimentation to construct new knowledge that can be used to develop new products and services. Organisations that use a strategy of knowledge transfer focus on moving knowledge through their organisation in an effort to utilize it to its fullest extent as

quickly as possible. Organisations that use a strategy of knowledge protection focus on keeping knowledge from being transferred to other organisations".

A key determinant of the amount of emphasis that should be placed on each of the three strategies is the degree of tacitness of the knowledge. As opposed to explicit knowledge, which is knowledge that is readily communicable because of its clear-cut nature, tacit knowledge is more difficult to express to others (Polanyi, 1967).

Bloodgood & Salisbury (1998) state that from a strategic perspective tacit knowledge has an impact on the change strategy of *reconfiguring with existing resources* through learning by doing. The organisation has built up a cache of tacit knowledge concerning the existing resources. Therefore, successful change strategies that involve the reconfiguration of existing resources are likely to focus on the tacit knowledge already in existence.

On the other hand, a strategy of *reconfiguring using new resources* indicates a different degree of importance for tacit knowledge (Bloodgood & Salisbury, 1998). To *acquire resources and not reconfigure* them indicates a relatively low importance assigned to tacit knowledge and an increased role for explicit knowledge. Finally, (Bloodgood & Salisbury, 1998) defines the *business as usual* approach, which indicates a relatively low importance for tacit knowledge, and for explicit knowledge.

Hansen, Nohria, & Tierney (1999) describe two examples of tacit and explicit knowledge being strategically managed within the organisation. Andersen Consulting and Ernst & Young, pursued a codification strategy. The firm developed elaborate ways to codify, store, and reuse (explicit) knowledge. Knowledge is codified using a "people-to-documents" approach: it is extracted from the person who developed it, made independent of that person, and reused for various purposes. Naturally, people-to-documents is not the only way consultants in firms like Ernst & Young and Andersen Consulting share knowledge. There is also communication between employees but the dominant knowledge is linked to the codification strategy.

In the second example, consulting firms such as Bain, Boston Consulting Group, and McKinsey emphasize a personalization strategy. The firms focus on the dialogue between individuals, not knowledge objects in a database. Knowledge that has not been codified i.e. tacit knowledge is transferred in brainstorming sessions and one-on-one conversations. Consultants collectively arrive at deeper insights by going back and forth on problems they need to solve. Such singular strategies create clear definitions of the type of knowledge within the firm but there is a lack of strategic direction in terms of resource and capability association.

The Dynamic Knowledge Strategy

Basically the organisation needs to determine the value of knowledge to its business and then align its knowledge assets, resources and capabilities to the intellectual resources of its business strategy (Burns, 2000). Burns (2000) states this association should be measured against two dimensions and related to knowledge aggressiveness. The first dimension addresses the extent to which an organisation is primarily a creator or user of knowledge and the second addresses whether the primary sources of knowledge are internal or external. These together will provide the strategic framework in which the knowledge management strategy can be developed.

From a literary perspective (Vera, 2001) describes the work of Bierly & Chakrabarti (1996) who define a knowledge strategy as a set of strategic choices that shape and direct the organisation's learning process and determine the firm's knowledge base.

Bierly & Chakrabarti, (1996:133) suggest that the development of a dynamic knowledge strategy typology or taxonomy will offer more insight than the static strategy typologies developed to date.

In the case of Zack (1999a, 1999b) research, he states that firms must explicitly address, as part of their knowledge strategy, a range of decisions regarding the creation, development, and maintenance of their knowledge resources and capabilities.

Several other researchers have also offered insights about strategic choices that confirm a knowledge strategy. Besides the internal/external source of knowledge dimension, (Zack, 1999a, 1999b) proposes that firms must determine whether their efforts are best focused on knowledge creation, knowledge use, or on both.

Zack presents a 3x3 matrix, where the most conservative knowledge strategy is pursued by companies exploiting internal knowledge and the most aggressive knowledge strategy is represented by companies that are both creators and users of knowledge and that integrate internal and external knowledge.

The knowledge profile of the organisation is a major factor influencing the choice of the appropriate knowledge strategy. Dutta (1997:25) states that a centralized approach is desirable if there is a high degree of integration in knowledge flows across different functions in an organisation. This integration can be seen in the firm, Digital that is in the sole business of selling computers, and requires a tight integration of knowledge flows across sales, engineering, manufacturing, and customer service

Decentralized strategies are more preferable if the organisation has many different sub-units, each of which is relatively independent in its knowledge requirements (Dutta 1997:25). DuPont is a good example of such an organisation. The organisation has different product lines, with relatively independent knowledge profiles. To stay at the leading edge in so many different products, the company encourages a strong sense of independence and technical excellence amongst its employees.

Dutta (1997:26) goes on to say that,

"Resources such as people, capital, and information systems architectures also impact on the choice of a knowledge processing strategy. If a company has a large base of computer literate end users (as in DuPont), decentralized strategies may be appropriate; but if there is a limited number of computer literate end users, centralized strategies may be better. Centralized strategies are facilitated by the presence of uniformly consistent information systems architecture. For example, Digital has fairly uniform data and communication standards throughout the company".

General Strategic Approaches

Over recent years a number of broad distinctive strategic approaches have emerged within firms (Blumentritt & Johnston, 1999). One focuses on intellectual capital and its measurement and management. This is based on the recognition that traditional accounting and performance measures fail to identify, let alone capture the intangible assets that increasingly define the market value of a company, particularly those that are intensively knowledge-based (Blumentritt & Johnston, 1999).

The organisation Scandia (Edvinsson, 1997) has led the way in developing models to assess their intangible assets in human capital, customer capital and structural capital. Sveiby (1997) has developed 'the invisible balance sheet' to account for knowledge-based assets.

Blumentritt & Johnston (1999) define a second approach, which addresses the knowledge economy, as largely the domain of economists and their critics. Their concern is with deciphering the rules and best-practice models that will determine effectiveness, even survival, in the knowledge economy, and to provide a reliable basis for national assessment, policy, and regulation.

Organisations such as the United Nations, the World Trade Organisation and the World Bank are also engaged in assessing the influences that the development of knowledge

management tools and knowledge companies will have on the economies of the world (OECD, 1996).

For Wiig (1997) knowledge management is a more detailed and 'everyday management' approach than intellectual capital management. It focuses on facilitating and managing knowledge-related activities, such as the creation, capture, transformation and use of knowledge (Blumentritt & Johnston, 1999). This third approach addresses directly the management of knowledge, where researchers and organisations are concerned with optimising the knowledge creation, capture and flow into and within a company.

The management consultant fraternity has largely driven this approach and has identified a large new market. In the *Knowledge Management Research Report*, published by KPMG (2000:2), four hundred and twenty three organisations in the United Kingdom, mainland Europe and the United States were asked whether they had a knowledge management programme. Over four-fifths (eighty-one percent) said they had, or were considering, a knowledge management programme. Thirty-eight percent had a knowledge management programme in place, thirty percent were currently setting one up and thirteen percent were examining the need.

The scale of this potential market, together with a perspective that the core element knowledge is digitisable, has also attracted major software companies such as Lotus and Microsoft to offer knowledge management applications e.g. Lotus Notes (Canon, 1998; Hibbard, 1997). Information and communication technology packages such as Intranets, GroupWare, list servers, knowledge repositories, database management and 'knowledge action networks' are now available and in intensive development.

As companies externally and internally optimise the knowledge, resources and capabilities, e.g. creation, transfer and protection within organisations, a consolidation of strategies is required (Von Krogh & Roos, 1996). To explore this further Wiig (1997) identified five distinctive knowledge management strategies that enterprises pursue in

practice: knowledge creation strategy, knowledge transfer strategy and personal asset responsibility strategy, intellectual asset management strategy and knowledge strategy as a business strategy.

Wiig (1997) defines as follows: The knowledge creation strategy emphasises organisational learning, research and development, and motivation of employees to innovate. In the knowledge transfer strategy the focus is on systematic approaches for organising, warehousing and distributing knowledge to the points of action, where it will be used. The personal asset responsibility strategy, on the other hand, emphasises personal responsibility for knowledge-related investments and innovations as well as renewal, effective use and availability to others of the knowledge assets within each employee's area of accountability.

In contrast, the intellectual asset management strategy focuses on enterprise-level management of specific intellectual assets such as patents, technologies, operational and management practices, customer relations and other structural knowledge assets.

These strategies are not mutually exclusive, but usually one of them better describes the focus of the organisation. The choice of one or a combination of these strategies should reflect the strength of the organisation, the nature of its business and the inclinations and expertise of its personnel (Khalifa, Lam, & Lee, 2000; Wiig, 1997).

Knowledge Management Strategies

A survey of international best practice in knowledge management in leading international corporations, conducted in support of the Standards Australia publication of a knowledge management framework, presents a range of knowledge management strategies across industry sectors (Rollo & Clarke, 2001).

The empirical study of the thirty-seven case studies illustrated what constituted a knowledge management infrastructure within each firm and identified the different

projects and specifications across different industry sectors. Based on this information a series of knowledge strategies are defined. Five knowledge management strategies are maturing within large corporate organisations around the world (Full Circle Systems, 1998). They are as follows:

1. The Transfer of Knowledge and Best Practices

This strategy was the most widespread, focusing on systematic approaches to knowledge reuse and the transfer of best practices. It also focuses on moving knowledge to where it will be used to improve operations or be included in products and services. The strategy aims to design systems and practices to obtain, organise, restructure, warehouse or memorise, reward, repackage for deployment and distribute knowledge. An example of this type of strategy has been developed at the Ford Motor Company.

Case Study: Ford Motor Company

Ford uses knowledge management to leverage intellectual capital through a best practice replication process, which was developed to enable knowledge sharing amongst plants around the globe.

The Best Practice Replication (BPR) program begins with a person or group from a division, putting a description of its practice into a database at the Ford's BPR Intranet web site (Anthes, 2000). Each week, the plants receive through the Intranet between five and eight best practices.

Each plant manager appoints production engineers as 'focal points' they are responsible for best practice, they retrieve information passed to them and enter their own plant's best practice into the system (Public Management, 2000). It is the employee's responsibility to check the Intranet once a week to see what new best practices have been entered.

Once entered human review processes take place through discussions with supervisors and the practices are presented at the plant management committee meetings. Each plant is “tasked” by corporate headquarters to make a five-percent improvement in productivity. This is a major driver for Best Practice Replication, this number is referred to as the “task” and each plant is obligated to achieve it (Dixon & Ungerleider, 1998:10).

Recipients of the best-practice proposals are expected to reply to the web site as to whether they intend to implement them or not (Anthes, 2000). Once implemented the details of the cost and accumulated savings must be entered.

Those who manage the best practice replication process, report that such a system would not work without first building trust through face-to face exchanges. Ford has quarterly meetings among the production engineers in each type of plant. As evidence of their importance the meetings usually produce an immediate jump in best practice submissions (Dixon & Ungerleider, 1998).

Dixon & Ungerleider (1998) state that,

“A revolving report is generated that indicates how many best practices each of the thirty-eight Vehicle Operations plants have submitted and how many they have implemented. This “public” report serves as a subtle inducement to plants to both submit and adopt. Attached to each Best Practice is a record of the plants that have implemented it. Steering committees in Europe and North America review these reports as well and if they note that some plant under their wing is not participating adequately, a member of the steering committee calls applying peer pressure to participate. Thus far, the most used practice has been replicated in thirty-five of thirty-eight plants. The value added is, of course, in the replication. If one plant makes an improvement worth \$20,000 the value is quickly multiplied to \$200,000 when ten additional plants make the same improvement”.

2. Customer-Focused Knowledge

This strategy is focused on capturing knowledge about customers, developing and transferring this knowledge as well as understanding customer's needs and preferences. This strategy is found in many of the banking and financial services, for example the Chase Manhattan Corporation.

Case Study: Chase Manhattan Corporation

The Chase Manhattan Corporation is one of the largest banks in the United States. Its six hundred and fifty relationship managers each manage thirty to sixty relationships in the middle market - organisations with sales ranging from \$3 million to \$500 million. (A "relationship" is defined as either a company or a person who owns one or more companies. One relationship may include many individuals.) The relationship managers are responsible for maintaining current relationships and bringing in new business (Waite & Company, 1996).

By 1993 Chase's relationship managers were having to devote an inordinate amount of time to extracting customer and product data from several independent bank information systems.

This time could have been spent cultivating prospects and selling new products to existing customers -- and generating revenue for the bank. The relationship managers also were not equipped with the knowledge they needed to ensure that both the customer and the bank were benefiting from the relationship. Information about the bank's products, its policies, and about the accounts themselves was scattered and unreliable, making it impossible for relationship managers to properly identify and assess the options available to their customers. Exacerbating this lack of knowledge, the data in the bank's legacy systems was organised by product and transaction, not by relationship. This meant that relationship managers had to make decisions without a big-picture assessment of the bottom-line impact for the bank (Waite & Company, 1996).

To understand the profitability of customers, Chase needed to understand all aspects of the relationship while the bank might have been making a profit on a loan. For instance, it might at the same time have been losing money on other aspects of the relationship. Without a complete picture of each relationship, relationship managers couldn't make sure that their customers were getting a good value from Chase, while ensuring that the bank earned a fair profit. This situation led to the development of the Chase Manhattan's Relationship Management System (RMS).

3. Innovation and Knowledge Creation

This strategy emphasizes innovation and the creation of new knowledge, through both basic and applied research and development and virtual universities. An example of this type of strategy has been put into practice at the Boeing Company.

Case Study: The Boeing Company

In the early days of the airline industry, planes were designed and developed in Boeing's Red Barn by teams of engineers who gathered around drafting tables located next to the assembly line. Today's aeroplanes are vastly more complex, but teamwork remains just as important.

Boeing began investing in creating a paperless design and manufacturing infrastructure for its new generation 777 aircraft in 1995. The networked team used GroupWare and communications technology such as Lotus Notes and Telepresence to work together without having to be in the same building, town, or country. Telepresence enabled workers to communicate over the network as effectively as if they were in the same room -this means video conferencing and much more - including sharing design, performance and production data over the network (Caltech, 1997).

The paperless design of the Boeing 777 used some 1700 workstations connected to four IBM mainframes (Shakorella, 1997). Through more efficient knowledge sharing,

potential problems could be identified before anything was manufactured. Engineering changes at the early stages of production were reduced. This resulted in lower manufacturing costs because the parts were integrated before production and there was 60 to 90% less scrap and rework than previously. In addition, maintenance engineers and mechanics were involved in the design process resulting in easier maintenance and a 30,000-page manual was delivered with the aircraft on CD-ROM. This can be contrasted with the traditional approach where maintenance was often overlooked in the initial design and the manual was the last aspect of the plane to be created (Shakorella, 1997).

4. Intellectual Asset Management

This strategy views items such as patents, copyrights, trade secrets and trademarks as information assets. If managed properly, these assets can provide not only short term returns, but also they can energize the future success of the organisation. An example of this strategy was developed at the Dow Chemical Company.

Case Study: The Dow Chemical Company

Several years ago, Dow Chemical began to realise that its patent database, containing over twenty-nine thousand patents, represented under-utilised intellectual capital.

The database had become a neglected source of knowledge. To combat this neglect, Dow Chemical hired a new director of intellectual asset management. The executive took immediate action to identify and index all of Dow Chemical's patents (Chen, 2000). The initial search of the patent records revealed that less than half of them were being utilised. Patent portfolios for each of Dow Chemical business units were developed. All unused patents were indexed and checked for royalty opportunities. Eighteen months later, Dow Chemical saved more than \$1 million in patent maintenance fees alone (Chen, 2000).

The knowledge management strategy at Dow Chemical (called Intellectual Asset Management) sought to entice top management to exploit the value of knowledge

management by converting its patents and other knowledge assets into hard cash. This strategy was also termed cash-conversion of explicit knowledge. The initial phase yielded a \$40 million “demonstration case”. With this cash on hand, the firm focused on eliciting employee knowledge to generate even more revenue. The initial phase focused on cash-conversion of explicit knowledge, the knowledge management initiative earned credibility at the top levels of management. The next phase moved to tacit knowledge. This phase sought to generate even more revenue out of existing resources with minimal capital expenditure (Godbout, 1999).

5. A Knowledge Strategy within a Business Context

Zack's definition of a knowledge strategy explicitly includes the notion of fit to the firm's business strategy. He suggests that a knowledge strategy describes the overall approach an organisation intends to take to align its knowledge resources and capabilities to the intellectual requirements of its business strategy, and adds that it is a natural extension of the historical development of business strategy in general (Zack, 1999b:viii).

Such a strategy views knowledge as a key marketplace differentiator, or more specifically, as a product. Companies that pursue this strategy believe that knowledge management is a core capability and critical to the health of the business as a whole. The knowledge management strategy is tightly aligned and integrated with the company's global business framework and strategies. This has been described as the 'second level' in a knowledge management strategy, connecting the knowledge and the strategic focus, a virtual team at BP Amoco plc are already working at this level (Huisman, Kouwenhoven, & Kruizinga, 1999).

Case Study: BP Amoco plc.

BP's organisational structure has evolved significantly during the last ten years, towards a "federation" of 100 business units. There is no hierarchy between the business unit general managers and the nine operating executives. The top management team set

strategic directives that encouraged learning and assured mechanisms are in place to transfer lessons learned. Decision-making had been pushed down to where it can be managed most effectively (the business units). The organisation was flatter still because every managing director works in a team with the business units (Choo, 1998).

BP's knowledge management approaches are encompassed by a framework, based on a collection of capabilities associated with the knowledge and resources of the firm, all supported by process tools. The lessons arising are agreed and distilled by a community of practice – peers across the organisation who have a stake in agreeing and defining BP's best practice. Finally, the lessons – both specific and generic are incorporated into "Knowledge Assets" on the corporate Intranet (BP Amoco, 2000).

The business benefits of applying a consistent approach to knowledge management have been significant, BP business managers attributed around \$260 million of added value as a direct result of using this approach (SAIC, 2000).

A practical example of this has been in the cost reduction in the construction of European retail sites: At the beginning of 1998 a challenge was set of reducing the build costs of retail sites in Europe by 10%. The Alliance (a joint venture between BP and Bovis) is responsible for the management of these activities in Europe. The Alliance was engaged in the benefits of knowledge management and invited the BP knowledge management team to help them achieve this outcome. Step change in costs was delivered in 1998 (savings of \$74 million) due to the sharing of knowledge between the project engineers in Europe. This gave BP Downstream Retail competitive advantage in the Mature European Marketplace. This knowledge is now also being leveraged on a global scale by project engineers in Venezuela, China, Poland, and Japan (SAIC, 2001). Similar examples of increased performance have come from BP's knowledge management application in speeding up refinery turnarounds, developing new oil & gas fields, business restructuring, improving polyethylene plant reliability and accelerating new retail market entry (SAIC, 2001).

The existence of such a supportive culture in an organisation such as BP Amoco is deemed vital in developing the association between the knowledge capabilities and the business strategy (Khalifa, Lam, & Lee, 2000; Pentland, 1995). A supportive culture is characterised by organisational members' recognition of the value and importance of knowledge management to organisational performance (Alavi, 1997; Gopal & Thompson, 1995) and more importantly their willingness to engage in knowledge management related activities and to use corresponding technologies. Traditionally, organisations rewarded their employees based on their individual performance and know-how. When putting knowledge management into action, a deep cultural renovation is required because collaboration and sharing of knowledge and insight are necessary for effective knowledge management (Alavi, 1997). Hence, the ability of an organisation in publicising the knowledge management concept and its advantages to the individual and organisation is a critical yet challenging element of knowledge management.

Leadership is also important and responsible for setting the knowledge management vision. Subsequently establishing strategic priorities, altering skills of management, facilitating suitable culture and gaining commitment from senior executives so as to move the company in the direction of that vision (Alavi, 1997; Davenport, 1997; Davenport, 1996; Davenport & Prusak, 1998; Earl & Scott, 1999; Manasco, 1996; Perez-Bustamante, 1999; Petrash, 1996). "Leadership refers to a person or a group of people who takes ownership of knowledge management initiatives in the organisation" (Khalifa, Lam, & Lee, 2000:6)

Without the proper leadership to lead the pace, the knowledge management endeavor may be in vain. Leadership is an important characteristic of the knowledge management structures (Khalifa, Lam, & Lee, 2000:7). The Head of Knowledge Management BP Amoco until 1999, Kent Greenes' main objectives were to establish knowledge management as a key performance lever for the organisations next level of performance and growth. He initiated and directed BP's global Virtual Teamwork (VT) Program and created an internationally recognised knowledge management practice.

Also using suitable tools and technologies can serve as an instrument to catalyze the movement of knowledge management (Davenport & Prusak, 1998). Proper technology can enable the extraction and structuring of individual or group knowledge to make such knowledge available to organisational members; and can extend the reach and enhance the speed of knowledge transfer. For example, BP Amoco shifted the focus from real-time collaboration and sharing of information to integrating virtual work behaviour and business capabilities using leading-edge technology.

Technical and organisational structures and capabilities, when aligned and integrated, can provide a comprehensive structure to support knowledge management. But while the appropriate structure can enhance an organisation's ability to create and exploit knowledge, it does not insure that the organisation is making the best investment of its resources or that it is managing the right knowledge in the right way (Zack, 1999a:1). This requires strategic direction.

Strategy is an important dimension in knowledge management not only because it helps to identify knowledge management initiatives, but also because it guides the organization in making the best knowledge management investment. Zack (1999a.) describes strategy as “the balancing act between the internal capabilities of the firm (strengths and weaknesses) and the external environment (opportunities and threats)”. Strategy reflects the management’s choices about key concepts of their knowledge environment. The adequacy of the knowledge structures depends greatly on the knowledge management strategy employed. In particular, a company’s strategy for knowledge management should reflect its competitive strategy in order for knowledge management to be effective (Davenport, 1999; Hansen, Nohtria, & Tierney 1999). It is important to note that only in the last few years that researchers Bierly & Chakrabarti, (1996), Zack (1999a, 1999b) have introduced the concept of a knowledge strategy and positioned it in the context of a firm's business strategy (Vera, 2001).

Conclusions and Perspectives

Not one of the five knowledge strategies, as discussed above, is inherently superior even though the characteristics of the management of knowledge within the different strategies vary. An organisation is not limited to any one strategy (Rollo & Clarke, 2001; Dutta, 1997). It may change strategies with time, and can even pursue more than one strategy simultaneously. It is also possible to adopt different strategies in different parts of the organisation depending upon their relative knowledge management needs.

Although strategic frameworks are being defined, many executives are struggling to articulate the relationship between their organisation's intellectual resources and the competitive strategy. They are unsure of how to translate the goal of making their organisations more intelligent into a strategic course of action (Zack, 1999a:2). They do not have well-developed strategic models to help them to link knowledge-oriented routines, technologies and organisational forms to the business strategy.

Many companies appear to be working within the existing business strategy. There is no mandate from the top for a separate knowledge management strategy or an alignment with the existing business strategy (Rollo & Clarke, 2001). Companies are focusing on leveraging tacit knowledge. But due to the lack of strategic management the organisations are experiencing difficulties in generating flows and the knowledge is remaining in codified pockets around the company.

This paper concludes there is a profound lack of understanding for many firms of how to exploit a knowledge strategy into a source of sustained competitive advantage. In order to gain such understanding it is necessary to firstly focus on how organisations can mobilize existing knowledge and resources within new capabilities. How to create viable and flexible patterns of action between them and the business strategy of the firm.

Further research needs to review the organisational structures e.g. culture, technology, strategy and leadership, needed to develop the core capabilities. Research into the

strategic alignments should be based on the idea of the knowledge strategy replacing a firm's business strategy or a business strategy evolving to become a knowledge strategy or the two strategies complementing one another (Vera, 2001).

The strategies presented and the conclusions reached in this paper provide a perspective of the strategic challenge of knowledge management. In examining the association between knowledge, the firm's capabilities and the business strategy this provides an integral framework to further understanding and identifying the areas where the greatest impact can be made on the knowledge management of an organisation.

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