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## Knowledge Management (KM)

### 1. Introduction

Knowledge Management (KM) has in recent times come to feature as one of the most significant activities affecting business quality. KM is thus of rapidly rising interest in today's business. With the importance of KM being realised, businesses are viewing KM as a critical success factor in today's dynamic and limitless society.

APQC (2000) believes that knowledge supports the ability of every organisation to prosper. Every action and every output that delivers value must be aligned with one of the three platforms all businesses compete around: cost, time, and differentiation. KM will help the organisation to short-cycle internal processes, cut costs, and operate more effectively and efficiently, upon successful implementation.

For Malhotra (1998), KM is very important, because what worked yesterday may or may not work tomorrow. Manasco (1999) postulate that organisations increasing ability to support knowledge (and knowledgeable people) will, in turn enable these organisations to provide faster and better quality service to their clients.

The literature review suggests that several organisations have spent substantial amount of money on applying KM, which in turn implies that KM is considered to be very important by these companies and that companies can gain great benefits from its applications. For example, Buchman Laboratories, a specialist chemicals company that was an early adopter of a knowledge repository, spends 2.5 % of its revenues on KM. Ernst & Young calculates 6 % of its revenues, and McKinsey & Co. 10 % (Davenport et al., 1998); and Silicon Graphics reduced sales training costs from

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\$3million to \$200,000 by managing its product information communications process (Manasco, 1997b).

Grey (1996) mentioned that companies are applying KM to serve customers well, and they must reduce their cycle times, operate with minimum fixed assets and overhead (people, inventory and facilities), shorten product development time, improve customer service, empower employees, innovate and deliver high quality products, enhance flexibility and adoption, capture information, create knowledge, share, and learn.

## **2. Knowledge Definition**

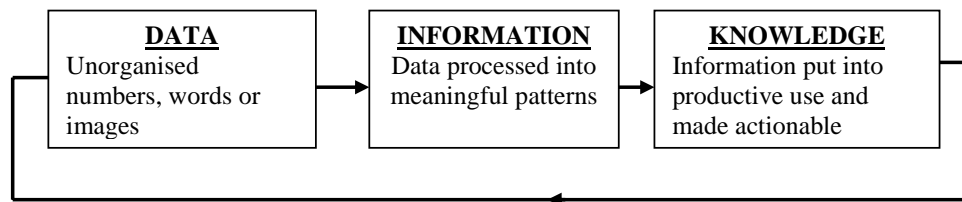
The basic building block of knowledge is data, the processing of data results in information. As a progression, knowledge is then derived by processing information (Grey, 1996;Lynn, 1998; Mullins, 1998; Zack, 1998; Newman, 1999).

In detail, Grey (1996) noted that knowledge is the full utilisation of information and data, coupled with the potential of people's skills, competencies, ideas, intuitions, commitments and motivations. Knowledge is people, money, leveraged learning, flexibility, power, and competitive advantage; it is stored in the individual brain or encoded in organisational processes, documents, products, services, facilities and systems. It is the result of learning which provides the only sustainable competitive advantage.

On the other hand, Zack (1998) added that knowledge is that which we come to believe and value, based on the meaningfully organised accumulation of information (messages) through experience, communication or inference.

Davenport et al. (1998) defined knowledge as “information combined with experience, context interpretation and reflection. It is high-value from information that is ready to apply decisions and actions”.

**Figure 1 Data to Knowledge**



Source: Adapted from Newman (1999,p 2)

### 3. Knowledge Management Definition

Eversine KM has emerged as a management initiative and there have been various proposed definitions for what knowledge is and what kind of knowledge needs to be managed (Nonaka, 1994; Davenport et al., 1996; Alavi and Leidner, 1999)

Unfortunately, the term knowledge management is not easy to define because it contains multiple representations and concepts. Many authors agree that KM requires a total organisational transformation, including organisational culture, structure, and management style (Sveiby, 1997; Buchman, 1998; Davenport and Prusak, 1998b).

Therefore many researchers have defined KM from different perspectives, because most debates are centred around the difference in meaning between information and knowledge. This research mentions some of the definitions, for example Snowden (2000) defines KM as “the identification, optimization, and active management of intellectual assets, either in the form of explicit knowledge held in artefact or as tacit knowledge possessed by individuals or communities “(Snowden, 2000: 63).

Poynder (1998) suggests that there are currently three major schools of thought on what KM is. One of them recommends that KM is mainly an IT issue, with networks

of computers and groupware being the keys. If you construct widespread computer networks and add communications tools that allow group collaboration, people will be more disposed to share information and knowledge

Grey (1996) defines KM as “an audit of ‘intellectual assets’ that highlights unique sources, critical functions and potential bottlenecks which hinder knowledge flows to the point of use. It protects intellectual assets from decay, seeks opportunities to enhance decisions, services and products through adding intelligence, increasing value and providing flexibility”

Bertels (1996) defines KM as “the management of the organisation towards the continuous renewal of the organisational knowledge base - this means, e.g. creation of supportive organisational structures, facilitation of organisational members, putting IT-instruments with emphasis on teamwork and diffusion of knowledge (as, e.g. groupware) into place.”

Finneran (1999) sees KM as the discipline that assists the spread of knowledge of individuals or groups across companies in ways that directly affect performance. KM envisions getting the Right Information within the Right Context to the Right Person at the Right Time for the Right Business Purpose.

Therefore, for Macintosh (1999), “Knowledge management involves the recognition and analysis of obtainable and required knowledge assets and knowledge asset-related processes, and the ensuing planning and control of actions to develop both the assets and the processes so as to fulfil organisational objectives.”

Starr (1999) states that KM is information or data management with the extra practice of capturing the tacit experience of the individual to be shared, used and built upon by the organisation, leading to increased productivity.

Liebowitz and Wright (1999) give a short definition of KM as the process of creating value from an organisation's intangible assets.

The definitions of Starr (1999) and Liebowitz and Wright (1999) have almost the same meaning, which is that some processes (creating, capturing, and distributing) are important towards adding value and empowering the organisational workforce to increase productivity.

From all of these definitions, knowledge is something more than information. Knowledge is seen as a capability, as something that cannot be said, as information plus something. It has demonstrated how knowledge is derived for problem solving and how it is used for forecasting or predicting customer behaviour. It only makes sense that the knowledge created for solving problems will be reused whenever the organisation faces the same problems

For the purposes of this research, the Newman (1999) definition of knowledge management will be used, with the additional modification, in italics (see below):

Finding ways to create, identify, capture, *transfer and share* organisational knowledge with the people who need it, and what people need to know to do their jobs efficiently, plain and simple, *using information technology as much as possible*.

#### **4. History of Knowledge Management**

Barclay and Murray (2000) and Sullivan (2000) suggest that the origin of KM can be traced to the early 1980s. Sullivan (2000) states that the concept was used in Japanese literature by Itami in the dating to early 1980. This article did not appear in English until 1987. In the early 1990s, a professor at the Stern School of Management at New York University, Baruch Lev first began his research into

valuing intangibles, as a colleague of David Teece at UC Berkeley's Haas School of Business.

Therefore, according to Barclay and Murray (2000), the importance of knowledge as a competitive asset was obvious by the mid-1980s. The International Knowledge Management Network (IKMN) began in Europe in 1989. By the mid-1990s, many KM initiatives were prospering, thanks in part to the Internet. Also, the authors mention that by 1990, a number of management consulting companies had begun an in-house KM programme, and several well-known U.S., European and Japanese firms had instituted a focused KM programme. KM was introduced in the popular press in 1991, when Tom Stewart published "Brainpower" in *Fortune* magazine.

Finally, Balla et al. (1999:22) and Morten et al. (1999) further support this view by arguing that KM as a concept can be dated back to at least since the early 1990s, when the large consulting firms like Andersen Consulting and Ernst & Young began committing major resources to implement KM practices and technologies. Furthermore, the KM trend began to gain momentum in the mid-1990s, attracting wide coverage in the trade press, at industry conferences, and in various business and academic fields.

## 5. Knowledge Strategy

Knowledge is considered to be one of the most important strategic resource the most strategically important resource; many managers naturally believe that strategy advantage can come from knowing more than competitors.

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Radding (1998) said that KM strategy is the knowledge manager's plan of action for developing, applying, and increasing the organisation's knowledge assets.

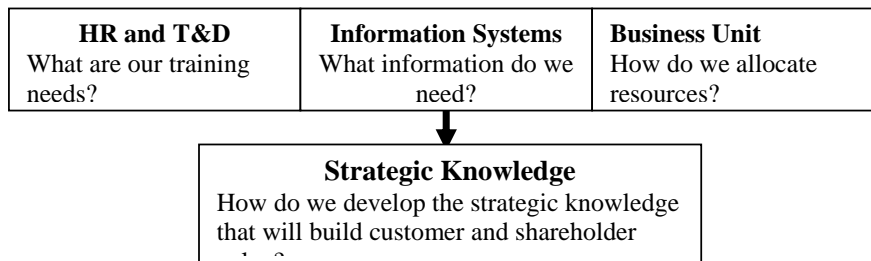
Knowledge strategy itself defines how the organisation intends to use knowledge to achieve its business objectives.

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According to Zack (1998), the most important context for guiding knowledge management is the firm's strategy. This helps to identify KM initiatives that support its purpose or mission, strengthen its competitive position, and create shareholder value. Therefore, the firm that knows more about its customers, products, technologies, markets and their linkages should perform better. Companies that do not have strong strategic models struggle to clarify the relationship between their intellectual resources and capabilities, and their competitive strategy. Moreover, Morten et al. (1999) noted that the consulting business employs two different KM strategies. First, regarding the IT infrastructure, such as codifying knowledge and storing it in databases, where it can be accessed and utilised easily by anyone in the organisation, and that is called codification strategy. And second, concerning people, that knowledge is closely tied to the person who developed it and is shared knowledge mainly through direct person-to-person contact, by face-to-face, over the telephone, by e-mail, and via videoconferences (Morten et al., 1999).

Newman (1999) said that Probe Consulting presents how each of the separate departments of Human Resources (HR) and Training & Development (T&D), Information Systems, and the Business Unit sees its contribution to the organisation. Each of these groups would merge and share the goal of developing strategic knowledge, which builds customer and shareholder value.

**Figure 2. Merging of separate departments to share knowledge**



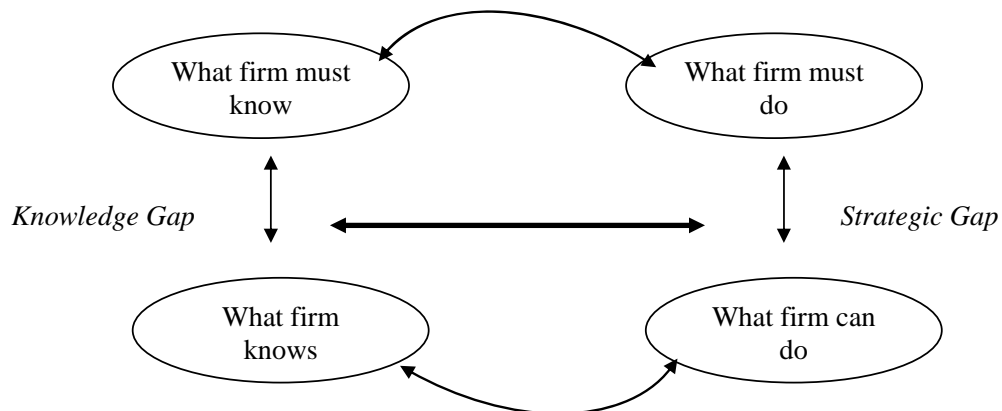
Source: Adapted from Newman (1999:3)

According to Skyrme (2000), there are two thrusts for strategy. The first is to make better use of the knowledge that already exists within the firm, for example by sharing best practices. The second major thrust of knowledge-focused strategies is that of innovation, creation of new knowledge, and turning ideas into valuable products and services. It is the most difficult, but it ultimately has the best potential for improved company performance. It is effective commercialisation of ideas that has taken companies like Netscape and Formula One to be multi-million dollar corporations in just a few years

### **5.1 Knowledge as strategic resource**

Zack (1998) suggests that there is a strategic gap between what a firm must do to compete and what it is actually does in practice. Strategy, then, represents how the firm balances its competitive cans (capabilities) and musts (necessities) to develop and protect its strategic position. Further, the organisations must audit and analyse its knowledge gap (see figure 3) periodically.

**Figure 3 Knowledge Gap**



Source: Zack (1998)

## 6. Managing Knowledge

Knowledge itself cannot be managed, only its processes or systems (Platt, 1998; Newman, 1999). For example, Newman (1999) suggested managing knowledge means finding ways to create, identify, capture, and distribute organisational knowledge to the people who need it. Platt (1998) is certain that only the processes of knowledge or its systems can be managed, such as through sharing knowledge.

Organisations are now starting to look at knowledge as a resource. This means that they need ways for managing their knowledge. These organisations could use techniques and methods that were developed as part of Knowledge Technology to analyse their knowledge sources. While using these techniques, they can perform Knowledge Analysis, which is a necessary step for the ability to manage knowledge and knowledge planning (Sierhuis, 1996).

## 7. Knowledge Management Terminology

As per other disciplines, there are terms and expressions that are unique to KM. such as knowledge assets, capital assets, intellectual capital, repository, Chief Knowledge Officer, and property capital. This report assumes that knowledge assets, capital assets, and property capital fall under the one name of intellectual capital.

## 7.1 Intellectual capital

Ellyn (1998), Stewart (1998) and Skyrme (2000) define intellectual capital as intellectual material, knowledge, information, intellectual property and experience that can be put to use in order to create wealth. It is collective brainpower. Examples are: information about customers, information about employees, information about competitors, patents, trademarks, market and technology trends, and those assets protected by law. Ulrich (2000) defined intellectual capital as an equation that is  $\text{competence} \times \text{commitment} = \text{intellectual capital}$ . Both,  $\text{competence} \times \text{commitment}$  are complementary, in which case intellectual capital requires both competence and commitment; also, since the equation multiplies rather than summing, a low score on either competence or commitment significantly decreases overall intellectual capital.

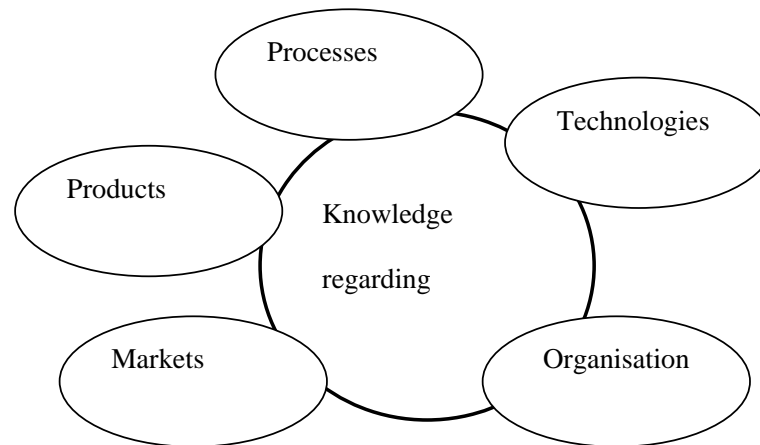
Therefore, Finneran (1999) proposed that knowledge assets are similar to capital assets. They are usually independent of the people who created them, and they can be used, moved, and leveraged by others to solve broad-based problems and to enhance performance. A knowledge artefact is a specific instance of a knowledge asset. These knowledge artefacts can be presented by a browser-based system. They can be embodied as text, diagrams, graphics, audio, video, or animation.

Skyrme (2002c) divides intellectual assets into three categories: *Human Capital* (minds of individuals: knowledge, competences, experience, know-how, etc.), *Structural Capital* (processes, information systems, databases, etc.), and *Customer Capital* (- customer relationships, brands, trademarks, etc.).

Knowledge assets constitutes of knowledge regarding markets, products, technologies and organisations that a business owns or needs to own, and which enable its business processes to generate profits, add value, etc., and they reside in

many different places, such as databases, knowledge bases, filing cabinets and people's heads, and are distributed right across the enterprise (Macintosh, 1998).

**Figure 4 Knowledge assets**



Source : Adapted from Macintosh (1998)

## 7.2 Knowledge repository

Davenport et al. (1998) and Finneran (1999) believe that a knowledge repository consists of documents, presentations, databases, charts, graphs, plans, audio files, and/or video files which are made accessible. Consequently, Finneran (1999) added that knowledge is collected from all existing sources, people, systems, data stores, file cabinets and desktops. All knowledge of worth is stored in the organisational knowledge repository.

For virtual teams, this knowledge would be immediately transmitted to those people and systems that could use it. The correct knowledge will go to the correct person or system at the correct time. Present knowledge can be retrieved from the system at any time in the future. As knowledge becomes outdated or expires, that knowledge will automatically be removed from the system.

Davenport and Prusak (1998b) considered that information internal knowledge as one of the basic repositories, such as discussion databases full of know-how,

sometimes referred to as lessons learned. (Davenport et al., 1998). Most successful knowledge projects involve structuring electronic repositories of knowledge, either structured document-based knowledge, informal discussion-type knowledge, or repositories of who knows what.

Knowledge repository is the software that is a collection of both internal and external knowledge in a KMS (Davenport et al. 1998; Turban et al. 1999; Turban et al. 2002). Davenport et al. (1998) added that he found three basic repositories: 1. external knowledge, such as competitive intelligence; 2. structured internal knowledge, such as research reports, product-oriented marketing materials, and techniques and methods; 3. information internal knowledge, such as discussion databases full of know-how, sometimes referred to as lessons learned.

Most organisations store knowledge in order to retrieve it when they need it. Radding (1998) believes that an organisation's knowledge has to be stored in accessible databases, referred to as knowledge bases. Morse (2000) support this and state that knowledge should be structured and stored in a manner, such that the system can find and deliver it quickly and correctly; However, he recommended that an organisation first has to determine what is important to retain and how best to retain it. So it is important to consider how the information will be retrieved by different groups of people.

### **7.3 Chief Knowledge Officer (CKO)**

Numerous companies have created chief knowledge officer (CKO) positions to administer KM. Liebowitz and Beckman (1998) noted that many organisations, such as Coca-Cola, Sequent, Hewlett-Packard, Coopers and Lybrand to mention but a few,

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have established this new position within their organisations in order to supervise and manage knowledge.

Davenport (1996), Liebowitz and Beckman (1998) and Newman (1999) agree that this position is responsible for creating a KM infrastructure, building a knowledge culture, and making it all pay off economically.

#### **7.4 Knowledge engineer**

Kroenke and Hatch (1994); Kroenk (1992) defined knowledge engineer (KE) as a specialist who uses expert system shells or other tools to develop an expert system. The knowledge engineer works with domain experts to acquire knowledge; this knowledge is then modelled and encoded using an expert system tool or shell.

#### **7.5 Knowledge worker**

Knowledge worker is someone whose job role is based around the use, manipulation, and dissemination of information. Therefore, Turban et al. (2002) defined knowledge workers as people who use knowledge as a significant part of their work responsibilities on a continuous and constant basis.

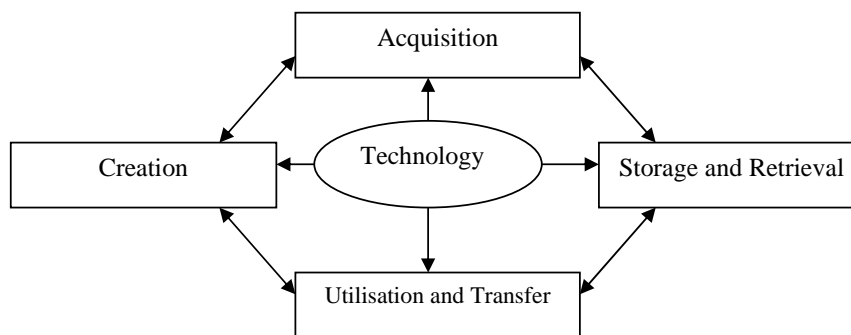
### **8. KM Processes**

Radding (1998), Bassi (2000), Bednar, (2000), and Mertins et al. (2001) noted that there are some processes in KM which are useful to focus on in developing a KM strategy. These include creating, capturing, transferring, and sharing knowledge, and Macintosh (1998) added some processes i.e. developing knowledge, preserving knowledge, and using knowledge. And the success or failure of companies depends on how well they use these processes. Therefore Radding (1998) has added two more, which are storage and processing (storing, comparing, analysing, organising, any of a variety of techniques).

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k.process

KM focuses on understanding these processes as well as how they are to be acquired, stored and utilised within an organisation. Technology has to support all activities involved in the knowledge life cycle and supporting KM processes suggested by Duffy (2000). Also, Morse (2000) substantiates this view by warning organisations using technology to provide employees with an environment to learn and share knowledge, with the goal of enhancing their productivity. Figure 5 shows a generic KM Model, which is based on Morse (2000), but with technology added as an important element.

#### 14 Figure 5 Generic Knowledge Management Model



Source: Adapted from Morse (2000)

The researcher named these KM processes as KM systems, and considers them as the heart of KM, because when an organisation exploits and manages them correctly it will obtain maximum advantage, as well as being a successful company. These processes are part of the KM critical success factors. So, Radding (1998) believes that organisations rely on IT for tools, data and process of KM. Knowledge-based systems help users find acceptable solutions to problems.

Macintosh, 1998 stated,

*“The Processes are using, enacting, executing, exploiting, etc.; communicating, deploying, disseminating, sharing, etc.; compiling, formalizing, standardizing, explicating, etc.; appraising, evaluating, validating, verifying, etc.; acquiring, capturing, creating, discovering,*

*etc.; evolving, improving, maintaining, refreshing, etc.; storing, securing, conserving, retaining, etc.”*

In the best firms, everyone creates, shares, and uses knowledge instead of hoarding it. In such organisations knowledge sharing is a habit and not act. Further, employees of such organisations willingly share knowledge on a perpetual basis. Too many firms make knowledge the area of a single group (e.g. R&D department), and as such hamper the seamless flow and diffusion of knowledge (Davenport and Prusak 1998b).

### **8.1 Knowledge sharing**

Sharing knowledge is one the most important elements of KM; it plays a main role for company success, as it one of the critical success factors. Zack (1998) believes that sharing of resources must exist in order for KM to succeed. Also, most KM champions agree that focusing on the social aspects of sharing knowledge such as face-to-face meetings, virtual chat rooms, and building trust through personal communication is key, and building an integrated information management system allows a community to thrive under any circumstances (APQC, 2000).

Daudelin and Hall (2000) proposed knowledge sharing as important for numerous reasons: reformulating the wording of people’s insight assists understanding, reporting insight to others also opens chances for feedback that can result in a changed perspective or additional insight, and it also provides an opportunity to influence the learning of others. This step could be termed ‘teach’. The authors have considered that the teaching of a topic is one of the ways to master it.

Starr (1999) said success depends on a clear strategic logic for knowledge sharing, and it really depends on culture, that an organisation should make its employees

share and use knowledge automatically, and overcome the hoarding and trust issues.

These issues can mean the difference between success and failure.

Therefore, organisations should consider that knowledge workers would not “skip through earrings” to share their knowledge, unless they have a benefit to them. Creating an enveloping sharing infrastructure helps to streamline the process, but capturing knowledge will have little meaningful success without a sharing culture (Morey, 1998).

Even though sharing is very important, some people do not do it, and some organisational cultures do not support knowledge sharing. The reasons for that could be that some employees in companies feel that people are not rewarded for sharing; they consider it ‘a waste of time’ if they are ‘just thinking’, or they are just talking to someone casually; they feel that they are too busy, it is not worth the time, the timing is not right for sharing unless you need the information right now, or it takes too long to find out where to get the information from, since they do not know where to start the search. If anyone needs help, it looks like he/she cannot do his/her job, and they believe that he/she will not be as valuable to the company (Newman, 1999).

These reasons imply that some employees are lazy, they do not want to spend time to capture the value information, or to transfer and share it. An organisation must take account of these reasons in order to prepare the solution.

Stewart (2000) gave an example of failure in sharing knowledge. Ford and Firestone, he says, have been suffering the death of 1000 cuts, in part because of a catastrophic failure to share knowledge. The author believes that if those companies want to be certain that a failure never happens again, they must find one of the most successful, tried and proven schemes for knowledge-sharing at their own companies. Martinez

(2000) has presented an example of the way knowledge sharing works, that established by Buchman Labs International Inc, and known as 'Buckman's knowledge-sharing philosophy'. This philosophy has seven criteria for the worldwide systems:

In order to enable speedier resolution of issues, knowledge experts (or expert systems) must be available 24 hours a day to answer any questions or queries. This availability of knowledge will then prevent ambiguities from arising

Each employee must be encouraged towards becoming involved in contributing and increasing the availability of knowledge. Enabling processes must then be put in place, which will then prompt the systems to update the most current knowledge.

Further, processes enabling the transferability of information into the native language must then be put in the place for virtual teams (for example) to function and collaborate effectively (Martinez, 2000: 324).

## 8.2 Capturing and transferring knowledge

Simply, capturing data and transforming are only one part of KM. According to Bednar (2000) and Morse (2000), knowledge could be transferred or captured in many ways, by written communications, training, internal conference, internal publication, job rotation and job transfer, and mentoring. In addition, Bednar (2000) proposed and believed that interviewing (questions), writing (story), and video communication are effective methods of capturing and disseminating knowledge. He outlined that a growing number of corporations, such as BASF and IBM, understand this, and have hired outside journalists to interview their own people to understand how they made certain decisions which led to a successful or unsuccessful outcome.

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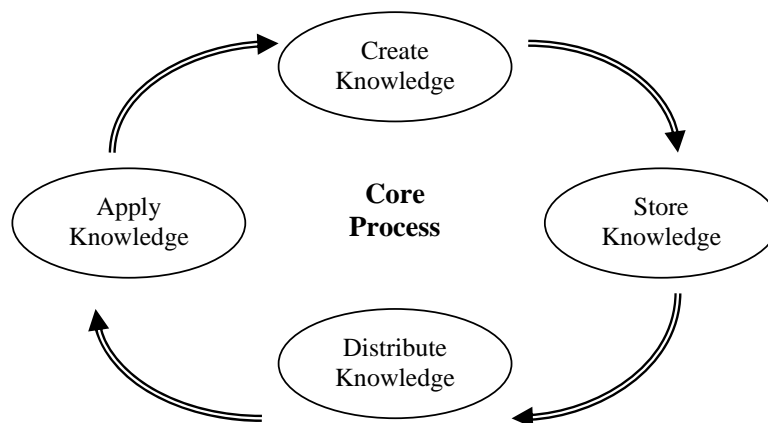
People properly trained and experienced in interviewing can often get more information from someone who may not really wish to part from the information.

In order for an organisation to capture all aspects for effective KM, it must direct attention and take account of four elements of the cost model (customer, organisation, suppliers, and technology) proposed by Pervaiz et al. (1999).

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Bednar (2000) comments that the creation of knowledge occurs with the transfer of what is inside a person's mind (tacit or explicit) to other individuals or groups, in such a way that the transfer influences the beneficiary's future actions and decisions. The desired result in this interaction is an increase in the probability of a faster and more accurate decision. Finally, Figure 5 illustrates KM core processes as presented by Heisig (2001)

**Figure 5. Core Process of KM**



Source: Heisig (2001:28)

## 9. Types of Knowledge Management

People gain or create new knowledge from numerous activities. Firstly, action based learning that involves working on problems, and implementation of solutions. Secondly, systematic problem solving, which requires a mindset, disciplined in both

reductionism and holistic thinking, attentive to details, and willing to push beyond the obvious to assess underlying causes. Thirdly, learning from past experiences, which reviews a company's successes and failures, to take the way that will be of maximum benefit to the organization, as suggested by Morse (2000).

Hubert (1996), Lim et al. (2000), Nonaka and Konno (2000), Snowden (2000), Mentzas et al. (2001) and Seubert et al. (2001) have classified KM into two primary types, namely tacit and explicit knowledge. These two types are discussed in the ensuing sections.

### **9.1 Tacit knowledge**

Tacit knowledge resides in our mind and cannot be easily shared or it is difficult to communicate with others, as defined by Hubert (1996), Nonaka and Konno (2000), and Seubert et al. (2001). Nonaka and Konno (2000) add that tacit knowledge is deeply rooted in an individual's actions and experience, as well as in the ideals, values, or emotions he or she embraces. It has two dimensions: the first is the technical dimension, which encompasses the kind of informal personal skills or crafts often referred to as know-how. The second is the cognitive dimension. It consists of beliefs, ideals, values, schemata, and mental models which are deeply ingrained in people and which they often take for granted. While difficult to articulate, this cognitive dimension of tacit knowledge shapes the way they perceive the world.

On the other hand, Snowden (2000) defines tacit knowledge as something that is simply known, possibly without the ability to explain. He illustrates this with reference to team players, stating:

*“We see it in craftsmen, or in good sporting teams where each player instinctively knows where to pass the ball”.*

He believes that the way to understand the difference between tacit and explicit knowledge is to look at the ways that the knowledge is shared and 'stored'. In reality, tacit and explicit are not absolute opposites, rather a spectrum.

Significantly, Snowden (2000) also added that the act of sharing tacit knowledge always creates something new. This is unique, the machine of innovation, and capable of real-time reactivity in decision-making. While explicit knowledge can be purchased, stolen, or re-invented, trust, and curiosity are key words in KM. Hubert (1996) said tacit knowledge is the skills and 'know-how' which reside in our mind that cannot be easily shared.

A good idea or example of tacit knowledge is amplified by Durrance (2000):

*"If we could describe how to ride a bike perfectly, describing it would never be the same as doing it".*

## **9.2 Explicit knowledge**

Hubert (1996), Nonaka and Konno (2000) and Seubert et al. (2001) defined explicit knowledge as that which can be captured and expressed in words and numbers i.e. quantitatively, and shared in the form of data by courses or books for self-reading, scientific formulae, specifications, manuals, and the like. This kind of knowledge can be readily transmitted between individuals formally and systematically.

Snowden (2000) agrees with the above and notes that explicitly knowledge, it is easier to identify. It is reusable in a consistent and repeatable manner. It may be stored as a written procedure in a manual or as a process in a computer system. The documented procedure of a lesson-learn workshop, the written-up comment of an economist examining a set of financial data, minutes of a meeting, a chain of e-mail correspondence, are all examples of explicit knowledge that workers use to support or to make decisions and exercise judgment.

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Nonaka et al. (1996) have suggested that knowledge is created through four different modes: (1) *socialisation*: involves conversion from individual tacit knowledge to group tacit knowledge (watching somebody, then doing it), (2) *externalisation*: involves conversion from tacit knowledge to explicit knowledge (doing it, then describing it), (3) *combination*: involves conversion from separate explicit knowledge to systemic explicit knowledge (reading about it, then describing it), and (4) *internalisation*: involves conversion from explicit knowledge to tacit knowledge (reading about it, then doing it). Whenever knowledge translates from one form to another, the result is liberated energy, innovation, and performance

## 10. Learning Organisation and Organisation Learning

To the organisation, knowledge means what it knows about customers, products, practice, faults, and successes. Wiig (1997) has identified two objectives of KM: to make the organisation act as intelligently as possible in order to save its viability and overall success, and to otherwise realise the best value of its knowledge assets. If this is the case, the target of KM for an organisation should be to generate a learning organisation that is competent in measuring, storing, and capitalizing on the expertise of its workers to create an organisation that is more than the total of its part

The two terms, learning organisation and organisation learning, are used interchangeably, and both of them focus on how important it is for organisations to learn continuously. It is difficult to distinguish between them (McGill et al., 1992; Redding and Catalanello, 1994; Slater and Narver, 1994; Solomon, 1994).

Argyris (1977) defines organisational learning as the process of “detection and correction of errors.” In his view, organisations learn through individuals acting as agents for them: “The individuals’ learning activities, in turn, are facilitated or

inhibited by an ecological system of factors that may be called an organisational learning system” (116).

McGill et al. (1992) define organisational learning as the ability of an organisation to gain insight and understanding from experience, through experimentation, observation, analysis, and a willingness to examine both successes and failures. Radding (1998: 151) defined a learning organisation as that “organisation where actions and decisions are guided by an appreciation for the importance of communities in organisational life and where management is focused on building and sustaining relationships”. Therefore, Pedler et al. (1991) proposed that the learning organisation is able to find out what is effective by refraining from its own experiences and learning from that process; by developing the skills of its employees it constantly transforms itself.

Organisation learning is defined by Pedler et al. (1991), Probst and Buchell (1997) and Radding (1998) as the process of gaining knowledge and developing skills that empower us to understand. Thus, to improve problem-solving ability and capacity for effective action.

KM researchers claim that the KM paradigm lies beyond the organisational learning boundary (Nevis et al., 1998). Moreover, the increasing importance of knowledge assets or intellectual capital suggests an intensifying need for individuals and organisations to increase their store of knowledge. To increase stores of knowledge, organisations need to learn continuously, as Aubrey and Cohen (1995) pointed out. Thus, the concept of organisational learning is an essential element of KM.

## **11. Importance and Benefits of Knowledge Management**

The literature review reveals that there are several organisations that have spent substantial amount of money on applying KM, which implies that KM is very important to these companies in their pursuit of competitive advantage. Grey (1996) mentioned that companies are applying KM to serve customers as well, and they must reduce their cycle times, operate with minimum fixed assets and overhead (people, inventory and facilities), shorten product development time, improve customer service, empower employees, innovate and deliver high quality products, enhance flexibility and adaption, capture information, create knowledge, share, and learn. Also, he suggested that none of this is potential without a continual concentration on the creation, updating, availability, quality, and use of knowledge by all employees and teams, at work and in the marketplace.

Moreover, Malhotra (1998) and Manasco (1999) believe that KM is necessary for organisations. For Malhotra (1998), it is very important, because what worked yesterday may or may not work tomorrow. He considered a simplistic example: companies that were manufacturing the best quality of buggy whips became obsolete, regardless of the efficiency of their processes, since their product definition did not keep up with the changing needs of the market. The same holds for assumptions about the optimal organisation structure, the control and coordination systems, the motivation and incentive schemes, and so forth. To remain aligned with the dynamically changing needs of the business environment, organisations need to assess continuously their internal theories of business for ongoing effectiveness. That is the only feasible means for ensuring that today's 'core competencies' do not become 'core rigidities' of tomorrow.

Manasco (1999) said the more organisations can support people with more knowledge, the more they can provide faster and better quality service to their clients. Skyrme (2001) focused on knowledge strategy, and said that as a result of developing a knowledge strategy and effective implementation, firms will typically achieve some benefits listed in Figure 6.

APQC (2000) believes that the knowledge supports the ability of every organisation to prosper. Every action and every output that delivers value must be aligned with one of the three platforms all businesses compete around: cost, time, and differentiation. KM will help the organisation to short-cycle internal processes, cut cost, and operate more effectively, which could happen, if implemented successfully.

Hildebrand (2000) refers to the Tennessee Valley Authority's nuclear division, which is the nation's largest public power supplier, which cuts time and errors out of the cycle by creating and focusing on the KM system.

Figure 6 summarises various authors views on potential benefits of KM:

**Figure 6 Knowledge Benefits based on the literature review**

<b>Authors</b>	<b>Knowledge Benefit</b>
APQC (1996)	<ol style="list-style-type: none"> <li>1. Greater customer intimacy and satisfaction.</li> <li>2. Improve cycle time and operational excellence.</li> <li>3. Better use of organisational knowledge to improve operations and deliver products and services.</li> </ol>
Grey (1996)	<ol style="list-style-type: none"> <li>1. Serve customers well.</li> <li>2. Reduce cycle times.</li> <li>3. Operate with minimum fixed assets and overhead.</li> <li>4. Shorten product development time.</li> <li>5. Empower employees.</li> <li>6. Innovate and deliver high quality products.</li> <li>7. Enhance flexibility and adaption.</li> <li>8. Capture information and create knowledge.</li> <li>9. Share and learn.</li> </ol>
Radding (1998)	<ol style="list-style-type: none"> <li>1. Prevention of knowledge loss.</li> <li>2. Improved decision.</li> <li>3. Adaptability and flexibility.</li> <li>4. Competitive advantage.</li> <li>5. Assets development.</li> <li>6. Product enhancement.</li> <li>7. Customer management.</li> <li>8. Leverages investment in human capital.</li> </ol>
Pervaiz et al. (1999)	<ol style="list-style-type: none"> <li>1. Reduces loss of intellectual capital from employees who leave.</li> <li>2. Reduces cost of development of new product / services.</li> <li>3. Increases productivity of workers by making knowledge accessible to all employees.</li> <li>4. Increasing employee satisfaction.</li> </ol>

**Figure 6 (Continued)**

<b>Authors</b>	<b>Knowledge Benefit</b>
Uit Beijers (1999)	<ol style="list-style-type: none"> <li>1. Improve efficiency.</li> <li>2. Improve market position.</li> <li>3. Enhance continuity of company.</li> <li>4. Enhance profitability of company.</li> <li>5. Optimise interaction between product development and marketing.</li> <li>6. Improve relevant (group) competencies.</li> <li>7. Make professionals learn more efficiently and more effectively.</li> <li>8. Provide better foundation for making decisions.</li> <li>9. Improve communication between knowledge-workers.</li> <li>10. Enhance synergy between knowledge-workers.</li> <li>11. Ensure knowledge-workers stay with company.</li> <li>12. Make company focus on core business and on critical company knowledge.</li> </ol>
APQC (2001)	<ol style="list-style-type: none"> <li>1. Short-cycle internal processes.</li> <li>2. Cut cost.</li> <li>3. Operates more effectively.</li> </ol>
Santosus and Surmacz (2001)	<ol style="list-style-type: none"> <li>1. Foster innovation by encouraging the free flow of ideas.</li> <li>2. Improve customer service by streamlining response time.</li> <li>3. Boost revenues by getting products and services to market faster.</li> <li>4. Enhance employee retention rates by recognizing the value of employees' knowledge and rewarding them for it.</li> <li>5. Streamline operations and reduce costs by eliminating redundant or unnecessary processes.</li> </ol>
Skyrme (2001)	<ol style="list-style-type: none"> <li>1. Faster and better solution to customer problems.</li> <li>2. Improved innovation and new product development.</li> <li>3. Early warning of potential market changes.</li> <li>4. Identify new business opportunities through better knowledge management (KM).</li> <li>5. Minimising of duplication of effort and loss of knowledge following organisation restructuring.</li> <li>6. Improved alignment between business strategy and technology.</li> </ol>

These benefits undoubtedly depend on the knowledge critical success factor (CSFs) that will be detailed in the next section. These benefits could be misplaced unless the organisation takes account of CSFs, including people's needs, such as how people learn, how they implement what they learn, and how they share their knowledge. It is easy to understand why a multitude of factors become considerations in implementing a KM function.

## **12. Knowledge Management Measurement**

Measurement is the foundation through which it is possible to control, evaluate and improve processes. The common reason for measuring is to help monitor the value of KM initiatives and to supply a link to the key performance indicators. In order for organisations to attain goals they must use measurement (Pervaiz et al., 1999; Lim et al., 2000). Many of the knowledge heads have now attempted and checked not just one measurement system but a whole range, combining different measures and developing new and better methods for measuring intangible assets (Skyrme, 2003)

On the other hand, O'Dell and Grayson (2000b) focused on the internal benchmarking and knowledge transferring; they said that there are two types of measurement: 1. measuring performance to identify a best practice, and 2. measuring the impact of initiatives and best practices transfer itself.

Gooijer (2000) and APQC (2001a) argue that the measuring of KM is possible; however, it is not simple. Intangible assets need to be processed differently from other business tangible assets, such as classifying the value of information and other intangible assets.

Since there are a number of methods to measure KM, it can be said that each company has its own perception and prescribed method way of measuring its KM.

For example, Ernst & Young measures the amount of knowledge it reuses in the form of proposals, presentations, and deliverables, and the contributions of its knowledge repository to closing sales (Davenport et al., 1998).

Ghalayani and Noble (1996) therefore suggested there are three stages of measurement. The first one, which is believed to have started in the 80s, concentrates heavily on financial measures such as profits, and productivity. Contained by this system, measures are based on the traditional system of management accounting. Unfortunately, this viewpoint is handicapped by a number of shortcomings. The second is characterised by non-financial measures. Typically, these are measures that are related to manufacturing strategy, and are primarily non-financial measures such as those related to operational matters that facilitate decision making for managers and workers, foster improvement rather than just monitor performance, and change with the dynamics of the market place. The last stage includes financial and non-financial measures. These include systems to inspect performance from multiple angles and inspect the trade-offs openly in an attempt to guard against sub-optimisation.

However, before offering some of the methods that can measure KM, the objectives of measurement should be stated explicitly and known. As illustrated by the literature review, measurement is a powerful tool to help organisations understand their underlying quality structures and help to diagnose improvement activities. Drucker (1995) said that the measurement of intangible assets (e.g. expertise, experience, patents) is increasing in importance because these assets are permanent, rather than the tangible assets by which organisations' values have traditionally been evaluated.

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Thus, Skyrme and Amidon (1998) propose that there are three main reasons for measuring KM. First, it provides a basis for company valuation, it is very important for trading assets or to price the company in the marketplace, and to earn a proper return for shareholders. Second, it stimulates management to focus on what is important; this is the role of approaches such as the balanced scorecard, which is one of the KM measurements methods that will be examined in the ensuing sections. Third, it justifies investing in KM activities; some of the advocates of KM differ over what measures they can use to convince management of its value.

## **12.1 Measurement methods**

Knowledge is information with a process applied to it to give (value-added). It is not clear whether knowledge can be measured, although various researchers and practitioners (Edvinsson and Malone, 1997) are attempting to build metrics and models to measure knowledge. Others like Davenport and Prusak (1998a) believe that knowledge itself cannot be measured, but the actions or results associated with applying knowledge can be measured.

The following are some methods that could be used to measure KM.

### **12.1.1 Balanced Scorecard (BSC)**

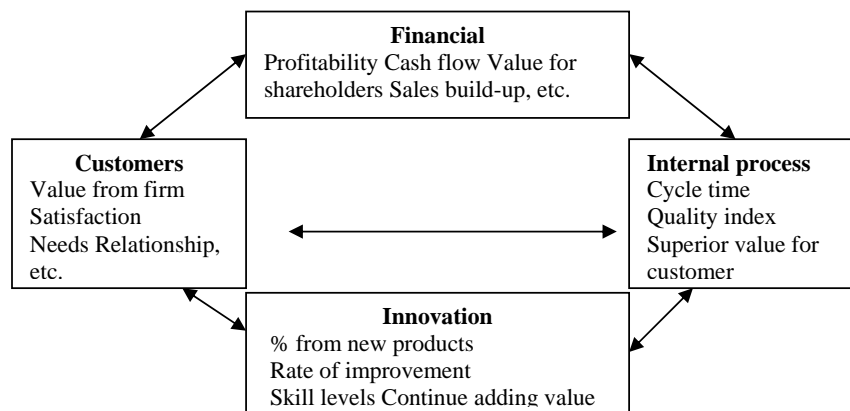
This method was devised by Kaplan and Norton (1992). It consists of four dimensions: customers, financial, internal business processes, and innovation and learning. Also, Barker (1997) and Gooijer (2000) agree, but Gooijer has two models for measuring the KM performance framework which is based on this method, and a KM behaviour framework that identifies levels of practice demonstrated by individuals.

The BSC approach examines performance related to finance, human resources, internal processes, and customers (Kaplan and Norton, 1992; Oliveira, 2001; Brewer, 2002). Because the BSC requires substantial amounts of data, it is a necessity to establish an organisational data warehouse of its perspectives, like human resources, customers, processes, and financial data that can be used in decision support.

Kaplan and Norton (1992) noted that this method helps companies to move from being financially driven to mission driven. In other words, it becomes a key part of the wider management system of planning, monitoring and control.

Also, practitioners report that the scorecard forces them to think of the links, and explicitly identify trade-offs between different factors. It also encourages cross-organisational activities (Skyrme and Amidon, 1998).

**Figure 7 Balanced Scorecard (BSC)**



Source: Adapted from Skyrme and Amidon (1998:21)

Oliveira (2001) noted that the unrelated data must be integrated, the data values standardised, and invalid data removed or corrected. The process and information technology to effect the extraction, integration, correction, and transformation of data

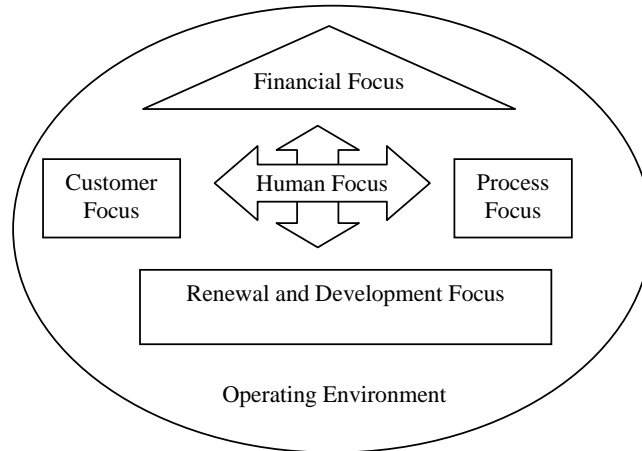
are best supplied by IT experts. The data is then loaded into the BSC data warehouse. Oliveira believes that organisations must use IT; and as regards a data warehouse, he suggests that the design team should be educated in the principles of the BSC and how a data warehouse can provide the required performance data. Also, the group should determine the functionality needed and an acceptable price range, prior to selecting and purchasing the appropriate software.

Brewer (2002) provided an example from the Dell Computer Corporation, a company which uses an IT-supporting BSC. He said that Dell invests in the IT infrastructure that supports real-time communication among its customers, its own manufacturing facilities, component suppliers, and airfreight carriers. Also, a number of collaborative customer-solution teams that motivate Dell to collaborate with its customers and jointly create technology solutions that fulfil any unmet customer needs. Furthermore, a number of emerging technologies evaluation inspired Dell's leaders to stay abreast of technology threats and opportunities that may alter the competitive landscape in the future.

### **12.1.2 Scandia Navigator**

This is another method for measuring knowledge. The Navigator is used as a model to drive sustained business development and to ensure that management actions and behaviours are consistent with renewal and development as well as financial performance (Skyrme and Amidon, 1998).

**Figure 8. Scandia Navigator**



Source: Skyrme and Amidon (1998: 22)

Table 1 illustrates how some of the different factors are quantified and reported utilising the Scandia navigator. This case is particular to Scandia’s direct sales insurance subsidiary.

**Table 1. Measures used in Scandia Navigator**

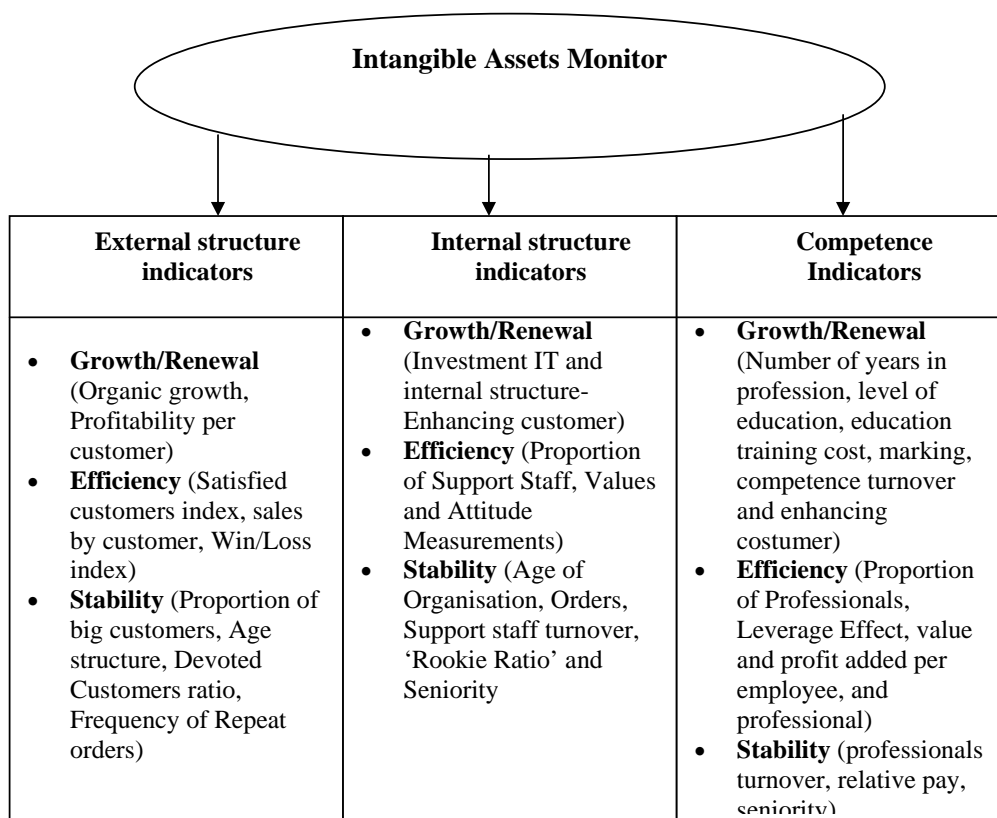
Measure		1994	1995
Financial	Premium income per employee	3,586	3,592
Customer	Telephone Accessibility Satisfied customer index	90 % 4.15	93 % 4.32
Human	Training days per year	3.50	6.0
Process	I/T employees as % of total	8.1 %	7.3 %
Renewal	Increase in premium income	28.5 %	31.9 %

Source: Skyrme and Amidon (1998: 22)

### 12.2.3 Intangible Assets Monitor

This is one of the methods for measuring intangible assets and has a presentation format, which displays a number of relevant indicators for measuring intangible assets in an easy style. It consists of three dimensions: external structure indicators, internal structure indicators, and competence indicators. Figure 9 details the Intangible Assets Monitor elements suggested by Sveiby (1997).

**Figure 9. Intangible Assets Monitor (IAM)**



Source: Based on Sveiby (1997)

The authors of both the Balanced Scorecard and Scandia Navigator argue that non-financial measures must complement the financial indicators. They also argue that

the non-financial ratios and indicators must be lifted from the operational to the strategic level of the firm

Further, a comparison may be between three concepts of the Scandia Navigator and the Intangible Assets Monitor:

1. Customer Focus is Scandia's equivalent of External Structure.
2. Process Focus is Scandia's equivalent of Internal Structure.
3. Human Focus is Scandia's equivalent of Competence.

Graef (1997) added several approaches for measuring intellectual capital: relative value, competency models, subsystem performance, benchmarking, business worth, business-process auditing, knowledge bank, brand-equity valuation, calculated intangible value, colorised reporting, as well as BSC.

These are some methods to measure intangible assets. But companies must understand that systematic KM must be a means, not an end, and must work to ensure that KM initiatives are linked to their company strategies.

The American Productivity & Quality Center (APQC) (2001b) focused on the customer area by creating access to an increasing number of communication channels, including phone, fax, e-mail, and real-time chat, and what barriers could be faced. APQC (2001b) took the first step in understanding this issue by interviewing contact centre professionals from a variety of companies and an industry consultant about their views on the subject matter, and how they have tried to overcome these barriers in their organisations. APQC (2001b) from Response Design Corporation (RDC) carried out the study to assess how contact centres measure success in a new environment of multiple customer access channels

Figure 10 represents summarised results of the interviewees, which show that these organisations have attempted to overcome these barriers in a variety of ways, including dedicated cross-functional teams, evaluation of CRM packages, and using Intranet and Internet sites.

**Figure 10 Barriers to Success in Measurement**

Title	Company	Key Measures of Success	Barriers	Attempt to overcome
Consultant	Pearl Advisory Group	<ul style="list-style-type: none"> <li>• Customer Satisfaction</li> <li>• Employee Satisfaction</li> <li>• Revenue (Sales Targets)</li> <li>• Efficiency (cost and quality)</li> </ul>	<ul style="list-style-type: none"> <li>• Determine how attributes differ among channels for each key performance metric</li> <li>• Capture appropriate data</li> </ul>	Approach with same rigorous discipline used to measure traditional phone contract
Director Client Services	Industry Canada	<ul style="list-style-type: none"> <li>• No. of Phone inquiries vs. no. of online inquiries</li> <li>• No. of enquiries as percentage of Internet visits</li> <li>• Response rate across channels</li> </ul>	Encouraging employees to use call centre information	<ul style="list-style-type: none"> <li>• Get back to client as quickly as possible, regardless of channel</li> <li>• Development of on-demand Intranet site</li> </ul>
Direct Customer contact	Verizon Logistics	Revenue, margin, quality, and employee satisfaction	Systems capabilities that enable holistic view of customer interaction, sales and service quality across all access channels.	<ul style="list-style-type: none"> <li>• Building business case for RCM system for long term</li> <li>• Trial ling separation of duties by access channel</li> <li>• Metrics productivity model</li> <li>• Call monitoring to measure FCR</li> <li>• Solicits continual feedback from customers</li> </ul>

**Figure 10 (Continued)**

<b>Title</b>	<b>Company</b>	<b>Key Measures of Success</b>	<b>Barriers</b>	<b>Attempt to overcome</b>
Manager Customer contact planning	Aliant Inc.	Key Measures of Success	Process, technological and people challenges	Dedicated team to focus on company- wide integration issues
Manager Dallas Welcome Centre	The Document Company Xerox	Solution provided to customer	Reluctance of customer to use tool that will enable company to measure solution rate using case base Tool on Internet	<ul style="list-style-type: none"> <li>• Technology to make it easier for customer to state if solution achieved</li> <li>• Dedicated people who call customer to see if they are satisfied and have achieved solution</li> </ul>
Resource Allocation Manager	Avaya	Response rate	<ul style="list-style-type: none"> <li>• Providing seamless service across access channels</li> <li>• Providing all relevant information on associates' desktops</li> <li>• One measurement system for all types of contacts</li> </ul>	Dedicated process improvement teams

Source: ADQC (2001b)

Measuring knowledge is crucial for organisations to guarantee that they are achieving their goals. Measurement provides a significant mechanism to evaluate, control, and improve upon existing performance. Measurement generates the basis for comparing performance between different organisations, different processes, and different teams and individuals (Pervaiz et al., 1999).

Therefore, researchers like Liebowitz and Wilcox (1997), Liebowitz and Beckman (1998), Liebowitz (1999a), and practitioners (Edivness and Malone, 1997) are

attempting to develop metrics and models to measure knowledge. Zairi (1994) suggests that the function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations. Others, like Davenport and Prusak (1998a), feel that knowledge itself cannot be measured, but the activities or outcomes associated with applying knowledge can in fact be measured.

#### 12.2.4 Matrix structure

Lim et al. (2000) have designed a tool referred to as matrix structure, combining four steps for a knowledge (capturing, sharing, measuring, and learning) and cost model. This matrix helps to show how KM impacts the organisation as a whole, and forces practitioners to consider all factors, soft as well as hard, and allows them to examine the various aspects of KM implementation. It also forces managers to link KM to the organisation's overall policy and strategy, and presents them with an opportunity to list the important functions that support KM and strategy (Figure 11)

**Figure 11. Matrix Structure**

	<b>Capturing</b>	<b>Sharing</b>	<b>Measuring</b>	<b>Learning</b>
Customer				
Organisation				
Supplier				
Technology				

Source: Lim (2000:12)

The following is the explanation of the four elements of the matrix structure by Pervaiz et al. (1999):

1. Customer matrix: This part could include customer satisfaction, customer retention, and customer relation. The user can be prompted to think of a future

measure that would indicate the success or failure of KM activities by comparing horizontally across the matrix. Some of these measures are based on the actual number, and some are simply based on outcomes. Therefore, Edvinsson and Malone (1997) proposed that market share, number of customers and annual (sales/customer) are included in the customer matrix.

2. Organisation Matrix: This involves exploration of people within the organisation. The main idea of this step is to establish how to transfer individual knowledge to organisation knowledge. Measures could include number of employees participating and number of employees rotated.

3. Supplier Matrix: The suppliers' knowledge is of vital importance to an organisation. For example, the suppliers' knowledge can be passed on to the customer to permit more informed decisions to be made. This part could be called the foundations of KM, and companies can measure those, which can be useful, like supplier meetings, supplier development programmes, and benchmarking activities between suppliers.

4. Technology Matrix: This stage is concerned with the system a firm needs to acquire in order to improve its knowledge management.

### **13. Critical Success Factors (CSFs) for Knowledge Management**

For any business, there are a limited number of areas in which satisfactory results ensure successful competitive performance, and those areas are typically referred to as CSFs. Digman (1990: 247) defined CSFs as the areas where things must go right for the business to flourish. Oakland (1995:325) defined them as what the organisation must accomplish to achieve the mission by examination and categorisation of the impacts. He adds that they are the minimum key factors or sub-

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goals that the organisation must have or needs, and which together will achieve the mission.

Kanji and Tambi (1999: 137) stated that CSFs are the few things that must go well to ensure success for a manager and/or organisation. They represent those managerial areas that must be given special and continual attention to cause high performance.

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There are several methods and techniques for determining CSFs. Leidecker and Bruno (1984) proposed environment scanning, industry structure analysis, opinions of experts in the industry, analysis of competitors, analysis of the industry's dominant firm, a specific assessment of the company, intuitive judgment or (feel) of insiders, and profit impact of market strategy (PIMS) data.

These definitions see CSFs as points, areas, or goals that have to be given extensive attention and support by the management to achieve the mission, quality and high performance. Consequently, these areas have to be defined and measured before the organisation starts implementing any project. So, a clear study and understanding of the important areas in the working field environment (secondary case studies), and reviewing the literature published in the area will help to develop better understanding of the CSFs that may affect companies' success in KM.

Successful KM must be founded on an understanding of how people learn, how they implement what they learn, and how they share their knowledge (Bassi, 2000).

On the other hand, Haxel quoted in Mertins et al. (2001) using knowledge in a structured and organised way is one of the key factors that determine corporate success. The goal is to share and apply knowledge faster and more efficiently than your competitors.

Many authors have different elements that they believe contributes toward the successful application of KM within an organisation. Manasco (1999) suggests that there are five keys to learning that could leverage its knowledge (Figure 12), while Skyrme (2000, 2002b) recommends seven keys to knowledge levers (Figure 13).

**Figure 12. Five Keys to Knowledge Leverage**

<b>Keys</b>	<b>Explanations</b>
1. Knowing community	Comprehension of information needs.
2. Creating context	Building environment for learning, knowledge creation, and information sharing.
3. Overseeing content	Quality information, (updating information and sustaining ability to identify and fill knowledge gaps).
4. Supporting infrastructure	Knowledge leader must be fully skilled, knowledge manager has proper technology at its disposal.
5. Enhancing process	Knowledge sharing must be simple, straightforward and efficient for sharing or tapping into knowledge pool. Otherwise, people will be discouraged from contributing to or tapping into enterprise's overall body of knowledge

Source: Based on Manasco (1999)

**Figure 13. Seven Keys to Knowledge Leverage**

<b>Lever</b>	<b>Key Activities</b>	<b>Example</b>
1. Customer Knowledge	Developing deep knowledge sharing relationships. Understanding needs of your customers. Articulating unmet needs. Identifying new opportunities	Steel Case (office products manufacturer) has totally redefined its market into knowledge worker productivity through opening a customer knowledge channel from its product end-users into its R&D.
2. Stakeholder Relationships	Improving knowledge flows between suppliers, employees, shareholders, community, etc. using this knowledge to form key strategies.	Toshiba collects comparative data on suppliers ranking 200 quantitative and qualitative factors. It has an active suppliers' network and association where knowledge is shared and suppliers are integrated into future strategies.
3. Business Environment Insights	Systematic environmental scanning, including political, economic, technology, social and environmental trends. Competitor analysis. Market intelligence systems.	Smith Kline Beecham has evolved virtual library that delivers market updates, patent information and wealth of externally sourced material to desk - tops of research scientists.
4. Organisational Memory	Knowledge sharing. Best practice databases. Directories of expertise. Online documents, procedures and discussion forums. Intranets	Price Waterhouse typical of several consultancies who have knowledge databases to allow sharing of company knowledge. In addition to KnowledgeView, knowledge centres that provide human analysts and navigators. Helps to solve customer problems faster.

**Figure 13. (Continued)**

Lever	Key Activities	Example
5. Knowledge in Processes	Embedding knowledge into business processes and management decision-making.	CIGNA made best underwriting knowledge available as guidance screens in their computerised underwriting processes. This helped them turn loss into profit.
6. Knowledge in Products and Services	Knowledge embedded in products. Surround products with knowledge, e.g. in user guides, and enhanced knowledge-intensive services.	Campbell Soup's 'Intelligent Quisine' (IQ) delivers weekly packages of nutritionally designed, portion-controlled meals to those suffering hypertension or high cholesterol.
7. Knowledge in People	Knowledge-sharing fairs. Innovation workshops. Expert and learning networks. Communities of knowledge practice.	Tetra Pak Converting Technologies has learning networks, where people across the organisation, pool, update and develop their expertise in key technologies such as laminating and printing

Source: Based on Skyrme (2000, 2002b)

On the other hand, Finneran (1999) noted that KM practitioners have found that a CSF in the implementation of KM is the creation of a cultural environment that gives confidence to the sharing of information. Experts have estimated that 90 % of success of KM is involved with gaining the buy-in of knowledge users and encouraging knowledge sharing.

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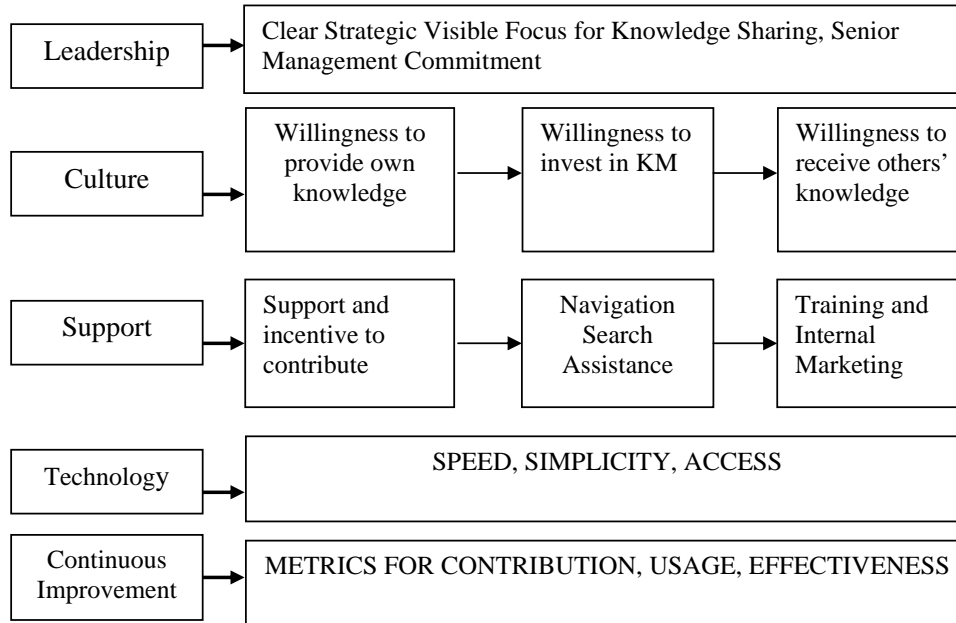
Success of the KM function also requires some issues that must be addressed by the business practice the researcher is designing; the KM process itself must be highly

adaptable. The intent of the initiative is to create a growing and competitively superior organisation. This can be undermined if any function that contributes to this is not able to change to accommodate conditions encountered throughout the organisation's evolution. Certain key activities must be incorporated into the knowledge environment. These include an evolution and acceptance of deeper and better competency understandings over time, and accommodations for new applications that capitalise on key competencies, recognise and incorporate knowledge developed elsewhere, and develop an issue-focused design which understands the required objectives before committing to a solution (Dove, 1998).

British company, Process Edge's product and services are intended to assist users in successfully harnessing knowledge within their organisation. They consider people as the factor that is an important determinant of success of KM systems, and people are advised to support knowledge processing and business decision-making. They implement systems, where this is required, and they supply software tools and techniques for knowledge workers, and for leaders who are creating a new internal culture and business purpose (Process Edge, 1999)

According to Trussler (1998), there are some essential steps in the successful implementation of KM. Figure 14 shows some of the key building blocks for a successful KM programme, from leadership and strategic focus to systems and follow-up metrics. Some of the most critical issues start within the culture and support areas e.g. motivating employees to share knowledge so as to leverage the knowledge network. A culture must exist within organisations, which encourage employees and virtual team to collaborate in order to share knowledge (Trussler, 1998:18).

**Figure 14. Building Blocks for Successful Knowledge Management**



Source: Trussler (1998:18)

In the ensuing section an attempt will be made to highlight the factors that are critical towards the successful implementation of KM. Table 4 summarises the diverse perspectives on CSFs of some authors.

**Figure 15. CSFs for KM implementation**

Authors	CSFs
Wiig (1996)	<ol style="list-style-type: none"> <li>1. Knowledge assets - to be applied or exploited - must be nurtured, preserved, and used to the largest extent possible by both individuals and organisations.</li> <li>2. Knowledge-related processes - to create, build, compile, organise, transform, transfer, pool, apply, and safeguard knowledge - must be carefully and explicitly managed in all affected areas.</li> </ol>
Davenport et al. (1998)	<ol style="list-style-type: none"> <li>1. Link to economic performance or industry value.</li> <li>2. Technical and organisational infrastructure.</li> <li>3. Standard, flexible knowledge structure.</li> <li>4. Knowledge-friendly culture.</li> <li>5. Clear purpose and language.</li> <li>6. Change in motivational practices.</li> <li>7. Multiple channels for knowledge transfer.</li> <li>8. Senior management support.</li> </ol>

**Figure 15. (Continued)**

<b>Authors</b>	<b>CSFs</b>
Davenport and Prusak (1998b)	<ol style="list-style-type: none"> <li>1. Technology (network).</li> <li>2. Knowledge creation and dissemination.</li> <li>3. Knowledge sharing.</li> <li>4. Electronic repositories of knowledge.</li> <li>5. Intellectual curiosity.</li> <li>6. Training, Culture and Leadership</li> <li>7. Operational improvement of an isolated process or function, rather than fundamental transformation of the firm.</li> <li>8. Issues of trust.</li> <li>9. Knowledge infrastructure (Address political obstacles and issues of trust before attempting to set up and manage knowledge initiatives – knowledge mapping is one of the best early activities in KM).</li> </ol>
Morey (1998)	<ol style="list-style-type: none"> <li>1. Available (if knowledge exists, is it available for retrieval?).</li> <li>2. Accurate in retrieval (if available, knowledge retrieved).</li> <li>3. Effective (knowledge retrieved useful and correct).</li> <li>4. Accessible (knowledge available during time of need).</li> </ol>
Trussler (1998)	<ol style="list-style-type: none"> <li>1. Appropriate infrastructure.</li> <li>2. Leadership and strategic (Management commitment).</li> <li>3. Creating motivation to share.</li> <li>4. Find right people and data.</li> <li>5. Culture.</li> <li>6. Technology (Network).</li> <li>7. Available to collaborators (Transferring).</li> <li>8. Training and learning.</li> </ol>
Finneran (1999)	<ol style="list-style-type: none"> <li>1. Creation of cultural</li> <li>2. Sharing of information and knowledge</li> <li>3. Creative knowledge</li> <li>4. Workers' buy-in. (90% of success of KM is involved with gaining buy-in of knowledge users and encouraging knowledge sharing).</li> </ol>
Liebowitz (1999b)	<ol style="list-style-type: none"> <li>1. KM strategy with support from senior leadership.</li> <li>2. Chief Knowledge Officer (CKO).</li> <li>3. Knowledge ontologies and knowledge repositories to serve as organisational/corporate memories in core competencies</li> <li>4. KM systems and tools (Technology)</li> <li>5. Incentive to motivate employees to share knowledge.</li> </ol> <p>Supportive culture for KM.</p>

**Figure 15. (Continued)**

Authors	CSFs
Manasco (1999)	<ol style="list-style-type: none"> <li>1. Knowing community.</li> <li>2. Creating context.</li> <li>3. Overseeing content.</li> <li>4. Supporting infrastructure. (proper technology).</li> <li>5. Enhancing process (Creating and sharing knowledge).</li> </ol>
Bassi (2000)	<ol style="list-style-type: none"> <li>1. People learn (how, what).</li> <li>2. People implement (how).</li> <li>3. Sharing.</li> </ol>
Choi (2000)	<ol style="list-style-type: none"> <li>1. Employee training</li> <li>2. Employee involvement</li> <li>3. Teamwork</li> <li>4. Employee empowerment</li> <li>5. Top-management leadership and commitment</li> <li>6. Organisation constraints</li> <li>7. Information systems infrastructure</li> <li>8. Egalitarian climate, benchmarking</li> <li>9. Knowledge structure.</li> </ol>
Skyrme (2000, 2002)	<ol style="list-style-type: none"> <li>1. Top management support.</li> <li>2. Clear and explicit links to business strategy.</li> <li>3. Knowledgeable about knowledge.</li> <li>4. Compelling vision and architecture.</li> <li>5. Knowledge leadership and champions.</li> <li>6. Systematic knowledge processes (supported by specialists in information management (librarians) but close partnership between users and providers of information)</li> <li>7. Well-developed knowledge infrastructure (hard &amp; soft).</li> <li>8. Appropriate bottom line measures.</li> <li>9. Creation of culture that supports innovation, learning and knowledge sharing.</li> <li>10. Technical infrastructure that supports knowledge work</li> </ol>
Skyrme and Amidon (2000)	<ol style="list-style-type: none"> <li>1. Strong link to a business imperative.</li> <li>2. Compelling vision and architecture.</li> <li>3. Knowledge leadership.</li> <li>4. Knowledge creation and sharing culture.</li> <li>5. Continuous learning.</li> <li>6. Well-developed technology infrastructure.</li> <li>7. Systematic knowledge processes.</li> </ol>

**Figure 15. (Continued)**

Authors	CSFs
Streele (2000)	<ol style="list-style-type: none"> <li>1. Staff must buy into the new model.</li> <li>2. Lines of communication must be kept open.</li> <li>3. Sharing information.</li> <li>4. Writing weekly updates.</li> <li>5. Management supporting.</li> </ol>
Haxel (2001)	<ol style="list-style-type: none"> <li>1. Knowledge structured.</li> <li>2. Knowledge organized (goal is to share and apply knowledge faster and more efficiently than competitors).</li> </ol>
Heisig (2001)	<ol style="list-style-type: none"> <li>1. Keeping it simple, like using video-tapes to store experiences from experts</li> <li>2. Building on existing processes like underwriting process and exiting e-mail culture (Culture corporate)</li> <li>3. Internal branding and naming metaphors for internal marketing and achieving commitment of staff.</li> <li>4. Senior management support.</li> <li>5. Success as success factor.</li> <li>6. External recognition helps internal coordination.</li> <li>7. IT director business-focused and business process-oriented.</li> <li>8. Integrated among KM processes (create, store, distribute, apply knowledge.)</li> <li>9. KM tasks must be combined with daily work tasks and integrated into daily business processes</li> </ol>

These factors are aimed at creating a KM environment which provides the company with sustainable competitive advantage through the continued creation of knowledge, maintenance of current knowledge resources, and creating an environment in which the knowledge management function can survive and grow.

From these factors, some are more important than others, such as technology, top management commitment, culture, and knowledge management processes which contain creating, transferring and sharing of knowledge.

Therefore, organisations must take account of these factors in order to exploit KM related advantages fully, as well as leveraging learning (learning to learn),

application and implementation of knowledge in order to offer enhanced knowledge sharing experience.

### 13.1 Implementation barriers

During the knowledge application phase, organisations are likely to encounter a host of problems or barriers. Trussler (1998) noted that such barriers could be, either technical, like client-server databases that were slow and not user-friendly, or non-technical, like lack of motivation to share knowledge, resources to capture and synthesise organisational learning, and ability to navigate the knowledge network to find the right people and data.

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Therefore, Pervaiz et al. (1999) proposed that what would seem to be the surmounting technology and technically-related barriers are the easiest area to overcome. The next sets of barriers are getting people to become involved and understand the critical implications of KM. The most difficult aspect is capturing, by getting people to state whether they are willing to allow capture of their knowledge or expertise, and with turning tacit knowledge to explicit; and the most problematic of all issues is concerned with linking KM to bottom-line results.

Malhotra (1998) and Trussler (1998) have agreed that an organisation should get the overall goals clear, and how the employees do their work should fit within their organisational business. Trussler (1998) explained that the next step is to decide on the appropriate channels for transferring knowledge.

There are also some other hurdles that present themselves, such as the propensity to hoard knowledge, unwillingness to learn from others, lack of motives to share or learn, and low priority and resource for knowledge gathering, as opposed to more urgent day-to-day business needs. But most were cultural and organisational; for

instance, people were not ready, willing, or able to share knowledge, and sometimes even structurally prevented from doing so (Trussler, 1998).

Heisig (2001) believes that “ I have no time” or “Team has no time” is the most common barrier.

### 13.2 KM implementations

The following are examples of some companies implementing measurement of intellectual assets. They get better understanding of the drivers of value and are improving management and growth of these vital assets.

- Skandia AFS uses the Navigator and tools such as the Intellectual Capital Index to set management goals and drive the business forward. It publishes Intellectual Capital Supplements alongside twice-yearly financial reports (APQC, 1996; Skyrme, 2000, 2002a). Both APQC (1996) and Stuart (1996) reported that Skandia Insurance cut time for a new corporate office in Mexico from 7 years to 7 months.
- Buchman Laboratories, a specialist chemicals company that was an early adopter of a knowledge repository, spends 2.5% of its revenues on KM. Ernst & Young calculates 6 % of its revenues, and McKinsey & Co. 10 % (Davenport et al., 1998).
- Dow Chemicals saved \$4 million during the first year of its new programme and expects to generate more than \$100 million in licensing revenues that might otherwise have forgone (Davenport et al., 1998). Further, Manasco (1997a) mentioned that it was increasing annual revenue from licensing by \$100 million. By focusing on the active management of patent portfolio, Dow Chemicals have

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generated over \$125 million in revenues from licensing and other means of exploiting intangible assets Skyrme, (2002a)

- Glaxo Wellcome, by focusing on shareholder value, and better understanding of the value of its R&D pipeline, has significantly increased its share price over the last few years (Skyrme, 2000).
- Texas Instruments (TI) went from last (1992) to first (1994) in on-time delivery satisfaction in customer ranking of suppliers (APQC, 1996), and it saved the \$500 million cost of new plant by leveraging internal knowledge and best practices (O'Dell and Grayson, 2000a). Further, Skyrme, (2002a) stated that TI has saved the equivalent of investing in a new plant by sharing best practice between their semiconductor fabrication plants.
- Chevron has saved millions through sharing practices across its refineries and other business units, (O'Dell and Grayson, 2000b).
- Silicon Graphics reduced sales training costs from \$3million to \$200,000 by managing its product information communications process (Manasco, 1997b).
- Kaiser Permanent, in one of its branches (the Northwest Region), was able to implement an open access programme six to twelve months faster than they predicted by transferring in internal best practice from another region (APQC, 1996).
- Price Waterhouse's collaborative behaviour improved and circulation of information increased by its implementation of Lotus Notes, and by the formation of a central group to capture and document best practices, analysis and documentation time was reduced (APQC, 1996).

- Regarding the final report of American Productivity & Quality Center (APQC) (1996), the benefits of KM they have gained are greater customer intimacy and satisfaction, improved cycle time and operational excellence, and better use of organisational knowledge to improve operations and deliver products and services.

Nonaka (1991) mentioned that some of the highly successful Japanese organisations like Honda, Canon, Mutsushita, NEC, Sharp and Kao have become famous because of their ability to respond quickly to customers, create new markets, rapidly develop new products, and dominate emergent technologies. The reason for their success is the way that they use management for the creation of new knowledge.

### **15. The Future of Knowledge Management**

It is hard to predict the future, but there are some things one can predict with great confidence. KM will be expanded and it will have a bright future. Some authors believe that, and maintain optimistic view toward KM. Their suggestions confirm that, such as Davenport (1998) who noted that one reason that KM never ends is that the categories of required knowledge are always changing. New technologies, management approaches, regulatory issues, and customer concerns are always emerging. Companies change their strategies, organisational structures, and product and service emphasis. New managers and professionals have new needs for knowledge.

In addition, Manasco (1999) expected that there are two reasons for KM to become a gradually more important issue in the corporate world over the next few years. The first is the essential of carrying out more with less in the wake of downsizing and restructuring. Second is the need to strengthen relationships with customers. Also

Seubert et al. (2001) noted that Gartner researchers believe that by 2003, intellectual capital will be the primary way by which businesses measure their value.

Therefore, Morey (1998) proposed that the most important factor in the long-term success of information knowledge is an individual and an organisation. He believes that the only source of competitive advantage in the future will be the knowledge that an organisation contains and an organisation's ability to learn faster than the competition.

Davenport (1996) said that since knowledge is information that is highly valued by people and has at some point resided in someone's brain, people are the most important resource in effective KM. In the future, as today, firms that excel at KM will corner the market for people who are adept at creating and using knowledge. These people will be evaluated and rewarded for their knowledge activities. Managers will be evaluated not only on how successful their decisions were, but also on the knowledge used in making them. The most successful firms in the future will make KM every employee's responsibility, not just that of a select few. He also recommended that if anyone wants to be good at managing knowledge in the future, now is a good time to start.

Finally, Trussler (2000) proposed that the ability to gather and use knowledge effectively would become a most important source of competitive benefit in many businesses over the next few years. Also, Heisig et al. (2001) substantiate this view by warning that North America and Asia named intellectual capital as a critical factor for their future business success.

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## **16. Conclusion**

Today's knowledge management system can place information in a variety of different data stores, deliver information to users when they need it at the right time, and encourage them to share knowledge. Furthermore, everyone within the company must understand the benefits of sharing knowledge and contributing to the knowledge pool.

This report has shown that there are a number of factors which are critical for adopting KM. These factors are top management commitment, KM strategy, KM processes, KM infrastructure, and culture.

Therefore, the process for sharing or tapping into the knowledge pool must be simple, straightforward and efficient. Otherwise, people will be discouraged from contributing to or tapping into an enterprise's overall body of knowledge. In addition, successful business managers have to capture data from numerous internal and external production systems, databases, and resources to be competitive, they also must analyse, divide, associate, and compare the raw data; transform them into meaningful business information; and convert the meaningful business information into useful knowledge.

Organisations should recognise the information needs of the enterprise with their overall business strategy; In addition, they must update the information and sustain the ability to identify and fill knowledge gaps by using the proper technology in their enterprise.

The discipline of KM is far from maturity and exhibits many gaps. In order to eradicate these gaps, there is need for continuous high quality research within the KM arena. In the forthcoming stage of the present research questionnaire will be

designed to determine the criticality and impact of KM related factors for organisation.

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