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**TQM Critical Factors:
The Recipe for Successful Implementation**

Knowledge Management: A Proposed Taxonomy

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Abstract

This paper discusses the evolution, development and meaning of Knowledge Management. It covers specific elements such as Knowledge processes, Intellectual Capital and the different types of knowledge and particular on the mechanisms for effective transfer and the ensuing benefits. Following a discussion on the critical factors that impinge on the effective implementation of Knowledge Management, the paper concludes with a taxonomy which brings together an integrated perspective based on the interplay between various key elements.

Key Words: KM, Intellectual Capital, Knowledge Management Systems, Tacit Knowledge, Explicit Knowledge, Critical Factors of Success

Knowledge Definition

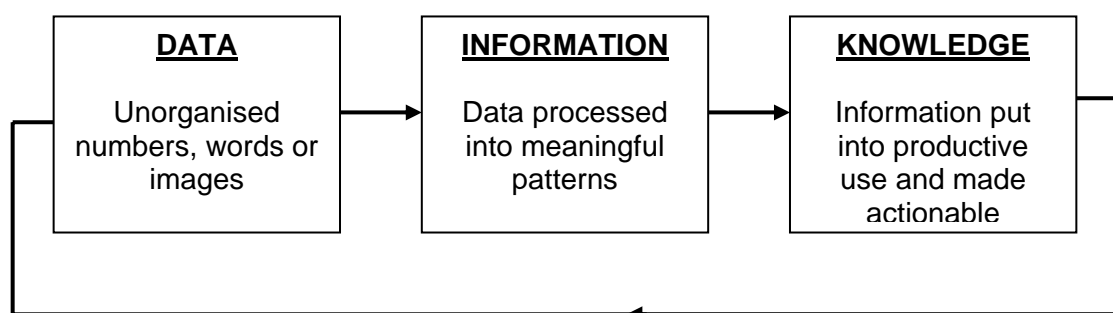
The basic building block of knowledge is data, the processing of data resulting in information, and as a consequence of processing information knowledge is derived. Knowledge is the next natural progression after information; that is, a higher order than information (Grey, 1996; Lynn, 1998; Mullins, 1998; Zack, 1998; Newman, 1999; Bollinger and Smith, 2001)

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, leverage, 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 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 2.1 Data to Knowledge



Source: Adapted from Newman (1999: 2)

The Meaning of Knowledge Management (KM)

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

There are different definitions of KM (Snyder and Wilson, 2000; Chan, 1999). Unfortunately, the term KM 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, 1997b; Buchman, 1998; Davenport and Prusak, 1998b).

Many researchers have defined KM from different perspectives, and a large number of debates thus tend to centre around the difference in meaning between information and knowledge. The present research examines some of the definitions, for example Snowden (2000) defines KM as “the identification, optimisation, and active management of intellectual assets, either in the form of explicit knowledge held in artefacts 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 such school recommends that KM is mainly an IT issue, with networks of computers and groupware being the keys. If one constructs widespread computer networks and adds communication 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) regards KM as a 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 added process of capturing the tacit experience of the individual to be shared, used and built upon by the organisation, leading to increased productivity.

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

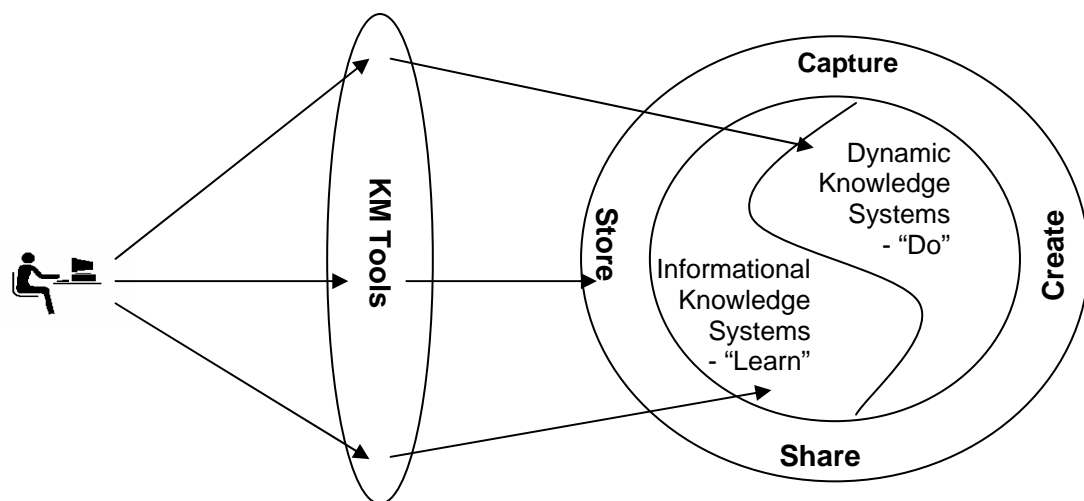
Gupta and Iyer (2000) define KM as process that assists organisations to find, select, arrange, distribute, and transfer important information and expertise essential for activities such as problem solving, lively learning, strategic planning and decision making. Morse (2000) has stated that KM focuses on understanding how knowledge is obtained, created, stored, and utilised within an organisation.

The definitions of Starr (1999), Liebowitz (1999b), Gupta and Iyer (2000), and Morse (2000) have almost the same meaning, which is that some processes (creating, capturing, and distributing) are important towards deriving value and giving power to organisation productivity.

Knowledge Management System (KMS)

Pluskowski (2002) divided KM systems into three types: information knowledge systems (IKS), KM tools (KMT), and dynamic knowledge systems (DKS).

Figure 2 Balance KM Systems



Source: Adapted from Pluskowski (2002)

Gupta and Iyer (2000) see KMS as capturing, transferring, storing, controlling, distributing, and archiving knowledge within an organisation. And they state that effectual employed KMS could facilitate an organisation's internal processes to operate easily and quickly, allow a company to take action to customer feedback quickly, supply the ability to react to its competitive situation in a timely manner, and empower workers with critical knowledge.

The Importance of Intellectual capital

Ellyn (1998), Stewart (1998) and Bocij et al. (2003) 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 competence \times commitment = intellectual capital. Both competence \times commitment are complementary, in which case intellectual capital requires both competence and commitment; also, since the equation multiplies rather than sums, a low score on either competence or commitment significantly decreases overall intellectual capital.

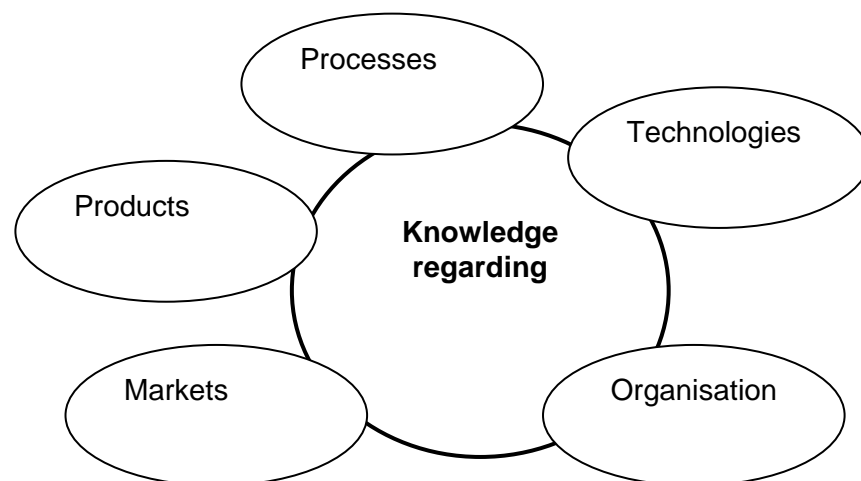
In recent times, organisations have become more focused on KM and are beginning to commit an increased proportion of their revenue towards development and management of intellectual capital(Alazmi and Zairi, 2003).

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.

Hubert (1996), Sveiby (1997a), and Skyrme (2002c) divide 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 consist 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 3: Knowledge assets



Source : Adapted from Macintosh (1998)

Alazmi and Zairi (2003) stated that many organisations have accepted that the knowledge of their employees is their most valuable asset. With this in mind,

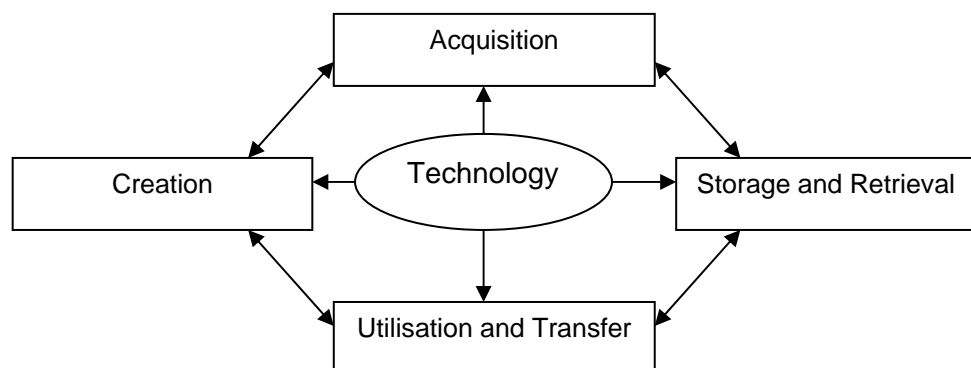
organisations of differing size have actively started to manage their knowledge assets on a broad scale.

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, e.g. developing knowledge, preserving knowledge, and using knowledge. And the success or failure of companies depended on how well they develop and 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).

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 3.5 shows a generic KM Model which is based on Morse (2000), but with technology added as an important element.

Figure 4 Generic Knowledge Management Model



Source: Adapted from Morse

The researchers have named these KM processes 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 the part of the KM CSFs. So, Radding (1998) believes that organisations rely on IT for tools, data and process of KM. Knowledge-based system help users find acceptable solutions to problems. According to Macintosh, 1998,

“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. Confident people transfer knowledge now, already satisfying the role of knowledge manager, without realising. 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).

Knowledge Sharing

Sharing knowledge is one the most important elements of KM; it plays a main role for company success, as 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, as Morey (1998) puts it, 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.

Even though sharing is very important, some people do not do it, and some organisational cultures do not support sharing. The reasons for that could be that some employees in companies feel that people are not rewarded for sharing; they consider it 'a wasting 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, had 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. which is known as 'Buckman's knowledge-sharing philosophy'. This philosophy has seven criteria for the worldwide systems:

- Minimum number of handoffs before a question gets answered. Instead of a question circulating through many levels, everyone in the company can be asked the same question. Employees with best answer need to get asked the questions.
- Provide access to every employee.
- 24-hour daily access available to every employee.
- Each employee has to be encouraged to become involved in contributing questions, comments and solutions to customer concerns and challenges.
- Every word has to be searchable (completely accomplished at the time of writing).
- System updated automatically.
- Multilingual capability available in English, Spanish, Portuguese, French and German. Use of languages of all employees allows easy access and understanding in own language better than in others (Martinez, 2000: 324).

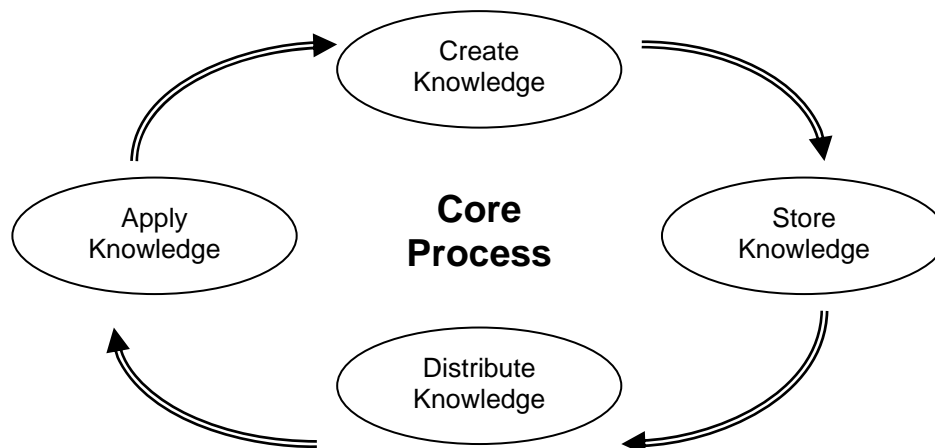
Capturing and Transferring knowledge

Simply, capturing and transferring data 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 mentioned, 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. People properly trained and experienced in interviewing can often get more information from someone who may not really wish to part with 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).

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.

Figure 5 illustrates the KM core process, as presented by Heisig (2001)

Figure 5 Core Process of KM

Source: Heisia (2001:28)

Types of KM

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), Bollinger and Smith (2001), 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.

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 us and which we often take for granted. While difficult to articulate, this cognitive dimension of tacit knowledge shapes the way we 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”.

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, as its name suggests, 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 we use to support or to make decisions and exercise judgment

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, is liberated energy, innovation, and performance

Benefits from Knowledge Management

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.

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 knowledge management system.

Table 1 summarises some authors' views on the benefits of KM:

Table 1 Knowledge Benefits based on the literature review

Authors	KMBenefit
APQC (1996)	<ol style="list-style-type: none"> 1. Greater customer intimacy and satisfaction. 2. Improve cycle time and operational excellence. 3. Better use of organisational knowledge to improve operations and deliver products and services.
Grey (1996)	<ol style="list-style-type: none"> 1. Serve customers well. 2. Reduce cycle times. 3. Operate with minimum fixed assets and overhead. 4. Shorten product development time. 5. Empower employees. 6. Innovate and deliver high quality products. 7. Enhance flexibility and adaption. 8. Capture information and create knowledge. 9. Share and learn.
Radding (1998)	<ol style="list-style-type: none"> 1. Prevention of knowledge loss. 2. Improved decision. 3. Adaptability and flexibility. 4. Competitive advantage. 5. Assets' development. 6. Product enhancement. 7. Customer management. 8. Leverages of investment in human capital.
Pervaiz et al. (1999)	<ol style="list-style-type: none"> 1. Reduces loss of intellectual capital from employees who leave. 2. Reduces cost of development of new product / services. 3. Increases productivity of workers by making knowledge accessible to all employees. 4. Increases employee satisfaction.
Uit Beijers (1999)	<ol style="list-style-type: none"> 1. Improve efficiency. 2. Improve market position. 3. Enhance continuity of company. 4. Enhance profitability of company. 5. Optimise interaction between product development and marketing. 6. Improve relevant (group) competencies. 7. Make professionals learn more efficiently and more effectively. 9. Provide better foundation for making decisions. 10. Improve communication between knowledge-workers. 11. Enhance synergy between knowledge-workers. 12. Ensure knowledge-workers stay with company. 13. Make company focus on core business and on critical company knowledge.
APQC (2000)	<ol style="list-style-type: none"> 1. Short-cycle internal processes. 2. Cut cost. 3. Operate more effectively.
Santosus and Surmacz (2001)	<ol style="list-style-type: none"> 1. Foster innovation by encouraging the free flow of ideas. 2. Improve customer service by streamlining response time. 3. Boost revenues by getting products and services to market faster.

	<ol style="list-style-type: none"> 4. Enhance employee retention rates by recognising value of Employees' knowledge and rewarding them for it. 5. Streamline operations and reduce costs by eliminating redundant or unnecessary processes.
Skyrme (2001)	<ol style="list-style-type: none"> 1. Faster and better solution to customer problems. 2. Improved innovation and new product development. 3. Early warning of potential market changes. 4. Identify new business opportunities through better (KM). 5. Minimising of duplication of effort and loss of knowledge following organisation restructuring. 6. Improved alignment between business strategy and technology infrastructure for knowledge sharing and development

These benefits undoubtedly depend on the knowledge CSFs that will be detailed in the next section. These benefits could be missing 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

KM 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.

APQC (2001a) argues 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 intangibles assets.

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

It is 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, ROI, 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.

It appears that Zairi (1992) does not prefer the traditional measures that focused heavily on financial elements, because he feels they are harmful and incompatible with improvement measures.

However, before offering some of the methods that can measure KM, the objectives of measurement have to be stated precisely and known. As illustrated from the literature review, measurement is a powerful tool to help organisations understand their underlying quality structures and diagnose improvement activities. 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.

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 measurement 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.

Critical Success Factors (CSFs) for KM

KM is of growing 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 borderless society. Making knowledge available to the right people at the right time is crucial for building and sustaining an organisation's competencies.

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-goals that the organisation must have or need, 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.

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 (2001) says that 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 contribute towards the successful application of KM with an organisation. Manasco (1999) suggests that there are five keys to learning that could leverage its knowledge (Table 2), while Skyrme (2002b) recommends seven keys to knowledge levers (Table 3).

Table 2 Five Keys to Knowledge Leverage

Keys	Explanations
Knowing community	Comprehension of information needs.
Creating context	Building environment for learning, knowledge creation, and information sharing.
Overseeing content	Quality information, (updating information and sustaining ability to identify and fill knowledge gaps).
Supporting infrastructure	Knowledge leader must be fully skilled, knowledge manager has proper technology at its disposal.
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

Table 3 Seven Keys to Knowledge Leverage

Lever	Key Activities	Example
1. Customer knowledge	Developing deep knowledge sharing relationships. Understanding needs of your customers' 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 which have knowledge databases to allow sharing of company knowledge. In addition to Knowledge View, knowledge centres that provide human analysts and navigators. Helps to solve customer problems faster.
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

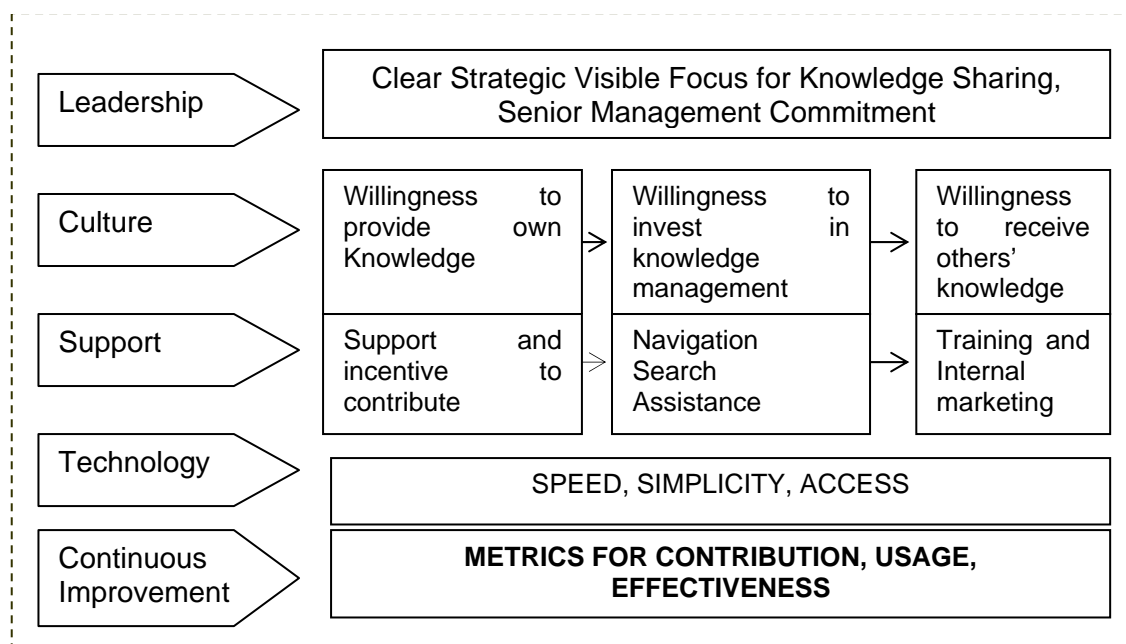
Source: Based on Skyrme (2002b)

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.

Success of the KM function also requires some issues that must be addressed by the business practice we are 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 5 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 5 Building Blocks for Successful KM



Source: Adapted from 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.

Table 5: CSFs for KM implementation

Authors	CSFs
Wiig (1996)	<p>Knowledge assets - to be applied or exploited - must be nurtured, preserved, and used to the largest extent possible by both individuals and organisations.</p> <p>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.</p>
Davenport et al. (1998)	<ol style="list-style-type: none"> 1. Link to economic performance or industry value. 2. Technical and organisational infrastructure. 3. Standard, flexible knowledge structure. 4. Knowledge-friendly culture. 5. Clear purpose and language. 6. Change in motivational practices. 7. Multiple channels for knowledge transfer. 8. Senior management support.
Davenport and Prusak (1998b)	<ol style="list-style-type: none"> 1. Technology (network). 2. Knowledge creation and dissemination. 3. Knowledge sharing. 4. Electronic repositories of knowledge. 5. Intellectual curiosity. 6. Training, Culture and Leadership 7. Operational improvement of an isolated process or function, rather than fundamental transformation of the firm. 8. Issues of trust. 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).
Morey (1998)	<p>Available (if knowledge exists, is it available for retrieval?).</p> <p>Accurate in retrieval (if available, knowledge retrieved).</p> <p>Effective (knowledge retrieved useful and correct).</p> <p>Accessible (knowledge available during time of need).</p>
Trussler (1998)	<ol style="list-style-type: none"> 1. Appropriate infrastructure. 2. Leadership and strategic (Management commitment). 3. Creating motivation to share. 4. Find right people and data. 5. Culture. 6. Technology (Network). 7. Available to collaborators (Transferring). 8. Training and learning.
Finneran (1999)	<p>Creation of cultural</p> <p>Sharing of information and knowledge</p>

	<p>Creative knowledge Workers' buy-in. (90% of success of KM is involved with gaining buy-in of knowledge users and encouraging knowledge sharing).</p>
Liebowitz (1999b)	<p>KM strategy with support from senior leadership. Chief Knowledge Officer (CKO). Knowledge ontologies and knowledge repositories to serve as organisational/corporate memories in core competencies KM systems and tools (Technology) Incentive to motivate employees to share knowledge. Supportive culture for KM.</p>
Heisig (2001)	<p>Keeping it simple, like using video-tapes to store experiences from experts Building on existing processes like underwriting process and exiting e-mail culture (Culture corporate) Internal branding and naming metaphors for internal marketing and achieving commitment of staff. Senior management support. Success as success factor. External recognition helps internal coordination. IT director business-focused and business process-oriented. Integrated among KM processes (create, store, distribute, apply knowledge.) KM tasks must be combined with daily work tasks and integrated into daily business processes</p>
Skyrme (2002a)	<p>Top management support. Clear and explicit links to business strategy. Knowledgeable about knowledge. Compelling vision and architecture. Knowledge leadership and champions. Systematic knowledge processes (supported by specialists in information management (librarians) but close partnership between users and providers of information) Well-developed knowledge infrastructure (hard & soft). Appropriate bottom line measures. Creation of culture that supports innovation, learning and knowledge sharing. Technical infrastructure that supports knowledge work</p>

Snyder and Wilson (2000) believe that KM can guide to competitive advantage, and competitive advantage based on KM is greatly valued by the stock market

Therefore, the factors that are mentioned above 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 KM function can survive and grow. Alazmi and Zairi (2003) stated that organisations must take account of these factors in order to exploit as much as possible the KM advantage, as well as how people learn, how they implement what they learn, and how they share their knowledge.

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

Therefore, organisations must take into account of these factors in order to exploit KM- related advantages fully, as well as how people learn, how they implement what

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