

Knowledge Management

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Abstract

This paper deals with the emerging discipline of knowledge management. It investigates how knowledge management has evolved and the business trends that have led to a greater emphasis on its use as a means of competitive advantage. It explores the relationships between data, information and knowledge and the background concepts of the knowledge economy. The idea of a knowledge management environment is discussed however this paper primarily focuses on the human aspect of knowledge management and how an organisation's members can affect the success of a knowledge management initiative.

Keywords: knowledge, competitive advantage, components of knowledge, tacit and explicit, KM environment, organisational culture

1 Introduction

The ideas behind knowledge management are not new, however the collective term has evolved into business use relatively recently. Davies (2000) describes how knowledge management has now become a “respectable topic”. An increased realisation of knowledge as a core competency coupled with the advances in information technology such as intranets and the World Wide Web, has heightened interest in the topic (Malhotra, 1999). The following is a simplified explanation of knowledge management. The definition of knowledge management will be explored in detail in section 2 of the paper.

“Knowledge management is a broad-based movement to bring together intellectual resources and make them available across organisational boundaries” (Davenport and Prusak, 1997)

This paper explores the various elements of knowledge management, in particular the human aspect. Its aim is to investigate these elements while focusing on the strategic impact for an organisation by considering the enablers and inhibitors of successful knowledge management. The paper looks at the conditions needed to create the right environment for successful implementation of knowledge management within an enterprise and identifies

the possible barriers that may hinder this process.

The intended audience for this paper are high-level professionals from both strategic management and Information Technology backgrounds. The author deems that there is a high level of confusion about the nature and definition of knowledge management. It will also be of relevance to academic researchers in the area and those with an interest in the subject of knowledge management. The author believes that the cultural aspect of knowledge management has not been thoroughly investigated so far and that past literature has primarily focused on technological aspect.

Research for this paper was carried out by an extensive literature review of journals, text books, white papers, online research and interviews using Dublin Institute of Technology libraries, the British Lending Library and the Internet as information resources.

Section 2 of the paper examines how knowledge management has developed, section 3 with the definitions and terms involved, section 4 with the elements of the knowledge management environment and section 5 deals with organisational culture. Success factors of a knowledge management project are discussed in section 6.

2 Knowledge management – an emerging discipline

Many definitions exist as to what constitutes knowledge management (KM), and often these definitions are very vague. There is a degree of confusion about the nature and function of KM and how it should be implemented (King *et al*, 2002). Much of the research has concentrated on definitions of data, information and knowledge theory (Nonaka and Takeuchi, 1995; Sveiby, 1997). Loermans (2002) states that there have been “many attempts at industry wide standard definitions of KM and the LO (*Learning Organisation*) with no obvious favourite emerging”. However, in order to assist the reader in their understanding of the concept of KM, this section will address what the broad topic of KM encapsulates, its development and its importance to organisations.

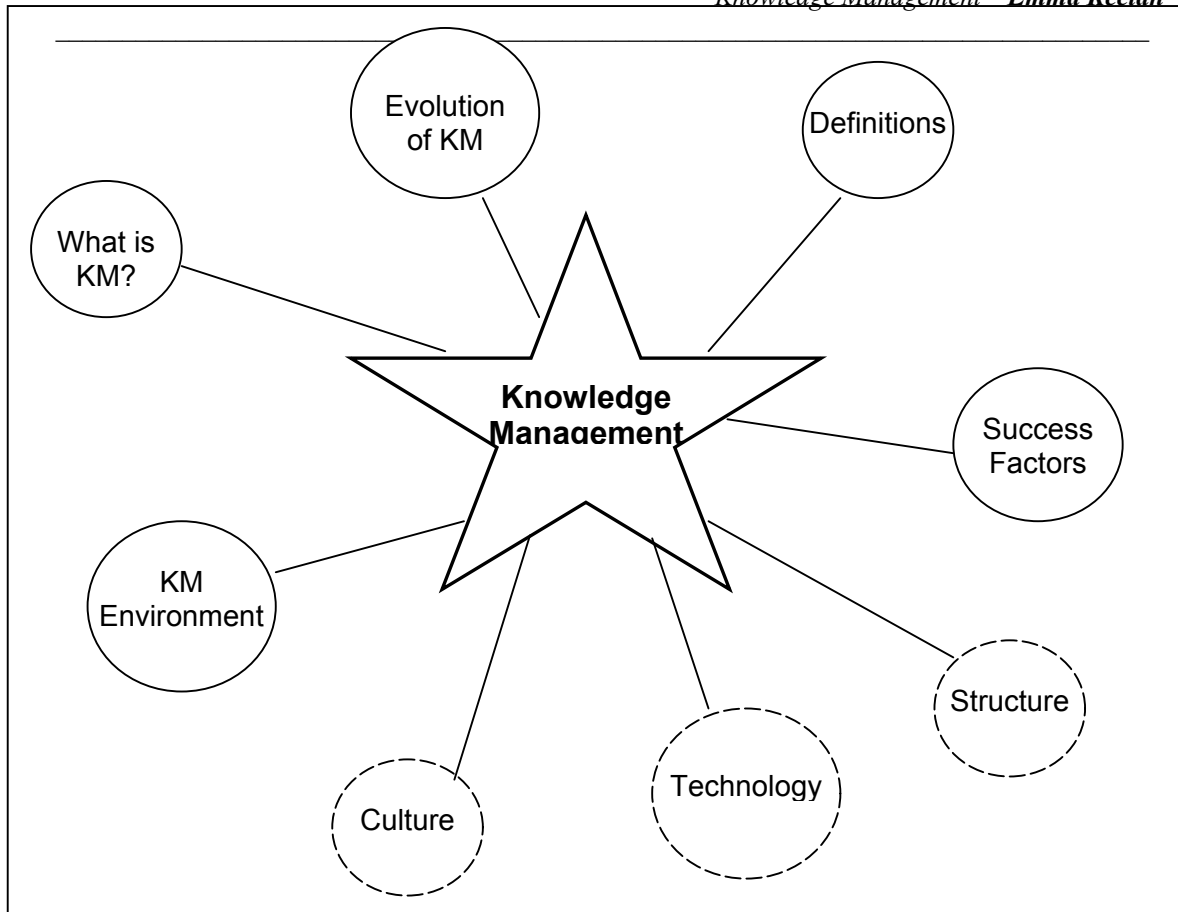


Figure 1.1 Issues in knowledge management (author)

2.1 What is knowledge management?

At a simplistic level, KM is about managing the knowledge within an organisation with the strategic aim of providing competitive advantage to that organisation. It involves management and knowledge so it relates to both technology management and organisational strategy (King *et al*, 2002). Although managers are aware of the potential that can be realised from knowledge resources, a consensus has not been reached about the characteristics of knowledge and the way these knowledge resources should be used (Bhatt, 2001). There are a number of definitions which attempt to define KM by describing the processes involved and the goals it aims to achieve.

“Knowledge management is a broad-based movement to bring together intellectual resources and make them available across organisational boundaries” (Davenport and Prusak, 1997)

A key idea of KM is knowledge sharing, not just to create a repository of knowledge but to share it *“across organisational boundaries”* and make this knowledge useful to members throughout the organisation (Davenport and

Prusak, 1997). Knowledge is used at all levels in an organisation, so the concept of somehow managing knowledge is not new. However, the formal acknowledgement of knowledge as an intellectual asset that can be used to increase the competitiveness of an organisation is relatively new. Such assets may have been recognised in successful companies but they were not managed in a systematic way, or in a way that allowed the sharing of knowledge throughout the entire organisation (Turban and Aronson, 2001). In both business and academic communities, there is a belief that by leveraging knowledge an organisation can sustain its long-term competitive advantage (Bhatt, 2001).

“KM systems attempt to break down barriers within organisations by making information available at all levels and across organisational boundaries. This allows knowledge and experience to be shared among people who otherwise would never meet each other.” (Robertson, 2002)

Robertson (2002) extends the notion of knowledge sharing to include the interaction of people who would not be in contact otherwise. This implies a conscious effort to bring people

together whether physically or remotely, to promote the creation and distribution of knowledge.

KM can also be described as a process by which organisations identify, select, organise, disseminate and transfer important information and expertise. The terms ‘organisational memory’ or ‘corporate memory’ are often used to describe the detailed knowledge about the organisation that resides within the individuals of that organisation (King *et al*, 2002). This infers that the knowledge is common to everyone within the organisation, however this knowledge typically resides within the enterprise in an unstructured manner.

Quintas (2001) describes KM as about “*creating a thriving work and learning environment that fosters the continuous creation, aggregation, use and re-use of organisational and personal knowledge*”. The important element of this definition is that the endeavour is continuous. The creation, sharing and distribution of knowledge cannot be a once off effort if it is to provide the company with an ongoing advantage over its competitors. This continual nature of the entire process is not addressed in many of the definitions of KM or in the previous definitions mentioned in this section. According to (Hauschild *et al*, 2001) the KM programs of successful organisations are “*long-term efforts that involve all aspects of the business and dovetail with other strategic decisions*”. Therefore KM is not a once-off project.

An important function of KM is the re-use of knowledge which has been identified as being important. KM focuses on identifying knowledge, clarifying it in a way that it can be shared in a formal manner and thus reusing it. This aids effective and efficient problem solving, dynamic learning, strategic planning and decision making (Turban and Aronson, 2001). KM aims to exploit an organisation’s information for greater productivity, new value and increased competitiveness (Davies, 2000). Managing knowledge is as much about managing capabilities, such as capabilities to learn and create knowledge, as it is about managing resources (Quintas, 2001). By learning and creating new knowledge, this promotes a cyclical KM environment which is needed for sustained competitive advantage.

The following definition by Davenport *et al* (1998) is a more comprehensive explanation of KM:

“Knowledge management is concerned with the exploitation and development of the knowledge assets of an organisation with a view to furthering the organisation’s objectives. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge. Management entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organisational learning. Organisations that succeed in knowledge management are likely to view knowledge as an asset and to develop organisational norms and values, which support the creation, and sharing of knowledge”

(Davenport *et al*, 1998).

This lengthy definition describes the aims of KM and the processes involved, however it does not emphasise the continuous nature of these processes such as knowledge creation and knowledge sharing. The following summary is a list of concepts which in the view of the author, the term KM embodies.

Summary:

- The importance of knowledge as an asset to the organisation must be recognised.
- Identify knowledge which is valuable to the organisation and its sources.
- Capture and store relevant knowledge where necessary
- Encourage the development of an environment where knowledge can be shared.
- Re-use of knowledge or distribution in order to provide strategic advantage.
- Continuous creation and sharing of knowledge.
- Creation of values and standards which support these processes.

2.2 Evolution of knowledge management

The popular use of the term KM has only evolved into business recognition during the last decade. However as discussed in the previous section (see 2.1) a consistent understanding or consensus on the definition of KM has not been achieved to any significant extent (Loermans, 2002).

According to Quintas (2001) there are a number of business trends which have led to the current emphasis on knowledge management:

- Acceptance that knowledge itself and intangible assets create wealth and are the drivers of economic success.
 - A realisation that people in an organisation are the key knowledge resources.
 - Increased interdependence between organisations and an increased need to collaborate and share knowledge across organisational, functional and disciplinary boundaries.
 - A realisation that competitive advantage comes through innovation
 - A realisation in late 80's and early 90's that technology already in place "*did not actually capture the knowledge that was driving the organisation*"
 - An increasing pace of change which requires organisations to be continually learning and at a faster rate than before.
- (Quintas, 2001)

KM has its roots in a number of information technology systems and principles including:

- artificial intelligence
 - business process reengineering
 - information systems
 - information management
 - expert systems and decision support systems
 - data mining and data warehousing
- (Swan *et al*, 1999)

Expert and knowledge based systems were earlier attempts to capture the knowledge and skills of organisational specialists into systems designed to automate decision making. These systems had limited success partly because of their lack of consideration for human judgement in the decision making process (Swan *et al*, 1999). These advances in information technology have allowed KM to evolve. According to Swan *et al* (1999) many of the same groups and individuals who promoted Business Process Reengineering (BPR) in the past such as Davenport and Prusak, have now turned their attentions to KM as a more viable means of sustaining competitive advantage. BPR and KM are similar in that they involve changes to the organisation's structure in order to further the objectives of the organisation.

The requirement for a highly skilled labour force in many industries, the increased pace of innovation, shorter product cycles as well as new technologies in computing and telecommunications, has caused a huge change in the way organisations compete. "*Knowledge is now the key battleground for competition*" (Davies, 2000). Other factors driving companies

to try to manage and exploit their intellectual assets more effectively are increasing employee turnover rates, a more mobile workforce and globalisation. Employee turnover means a loss of knowledge within the organisation if that knowledge has not been managed, stored or distributed among others. Globalisation often requires people to collaborate and exchange knowledge across continents and time zones (Davies, 2000). The management of the organisation's knowledge would involve putting an infrastructure in place to facilitate this.

An possible trend would suggest that in the future organisations in the knowledge economy may be judged upon their KM capabilities, in that they will all be competing for the:

- **Best talent:** In order to attract the best employees, the organisation must keep up-to-date with new developments in knowledge management. In particular, new recruits will demand excellent KM infrastructures, since many are likely to be already very IT literate and used to sharing knowledge across virtual networks before they even join the workforce.
- **Best clients:** Customers will increasingly evaluate their suppliers on the basis of how knowledge about them is solicited, collated and shared, as well as on how they can collaborate with their suppliers.
- **Best alliance/merger partners:** a good KM infrastructure will be vital when organisations try to collaborate with, or integrate, new partners or suppliers quickly.

(Kelleher and Levine, 2001)

2.2.1 Issues in knowledge management

A Harvard Business Review survey (King *et al*, 2002) of high-level managers concerning the top issues in knowledge management, produced the results shown in figure 2.2.1.1

In this survey the most important among the managers surveyed was how best to use KM in order to provide strategic advantage to their organisation. King *et al* (2002) state that KM must be focused to provide strategic advantage, possibly "*by turning the knowledge resource into an element of the organisation's strategic vision and planning*". This suggests that in order for KM to be successful in providing the organisation with strategic advantage that it must be central to the organisations strategic objectives and goals.

Number	Issue
1	How to use KM to provide strategic advantage
2	How to obtain top management support for KM
3	How to maintain the currency of organisational knowledge
4	How to motivate individuals to contribute their knowledge to a KM system
5	How to identify the organisational knowledge that should be captured in KM systems
6	How to assess the financial costs and benefits of KM
7	How to verify the efficacy, legitimacy, and relevance of knowledge contributed to a KM system
8	How best to design and develop a KM system
9	How to sustain KM's progress in the organisation
10	How to ensure knowledge security

Figure 2.2.1.1 Top Ten Issues in Knowledge Management (King et al, 2002)

Issue 9 identified in the survey relates to the continuity of the KM process, how KM should be allowed to evolve in order to provide sustained advantage to the organisation.

Issue 4 relates to organisational culture, the behaviours attitudes and values of the people in the organisation. *“The idea of an individual sharing knowledge through a system is foreign to many people, as well as to some organisational cultures”* (King et al, 2002). The concept of facilitating an environment where knowledge sharing can flourish to the benefit of the organisation is seen as an important issue which must be addressed.

Many of the issues identified in the survey could be areas of future research within knowledge management.

Summary:

- KM has its roots in a number of information technology systems and principles.
- Various business trends have lead to current emphasis on KM.
- The way organisations compete has changed and knowledge is now the basis of this competition.

- An organisation will be judged on the basis of it's KM strategy by potential employees, clients and partners.

2.3 Why is knowledge management important?

As previously discussed in section 2.1, the aim of KM is to provide a sustained competitive advantage to the organisation. Rowley declares that *“there is an agreement that the knowledge-based society has arrived”*. It is recognised that the organisations who will succeed in the global information society are those that can identify, value, create and evolve their knowledge assets. Knowledge, and the processes to generate and manage it, have become key factors in creating competitive business advantage (Laszlo and Laszlo, 2002). It has been argued that knowledge has in fact become the main competitive tool for many businesses (Rowley, 1999).

2.3.1 Competitive advantage

According to Senge (1990) organisations must be able to learn, adapt and change in order to survive. They must *“innovate or die”*. Knowledge as a form of capital, must be exchangeable among people and it must be able to grow. Knowledge about how problems are solved can be captured so that KM can promote

organisational learning, leading to further knowledge creation. As KM aims to provide a sustained competitive advantage, it involves a long-term investment (Turban and Aronson, 2001).

Business is a key shaper of the emerging global society. The exchange of knowledge, materials and people, the blending of cultures, and the dissipation of geo-political boundaries are largely the product of trans-national business operations (Laszlo and Laszlo, 2002). Increased global connectivity, distributed expertise and shorter product development cycles has changed the nature of competition. Organisations are streamlining their processes and exploring ways of “*working smarter*” through improved collaboration and communication (Turban and Aronson, 2001).

As the migration towards a knowledge-based economy continues, knowledge management has emerged as a methodology for capturing and managing the intellectual assets of an organisation as a key to sustaining a competitive advantage. KM is a new strategic initiative that is changing the paradigm of information systems from one of processing data and providing information to one of harvesting and exploiting the knowledge of an entire organisation (Turban and Aronson, 2001).

2.3.2 Pooling and exploiting the organisation’s knowledge

“KM is the capture, retention and reuse of the foundation for imparting an understanding of how pieces fit together, and how to convey them meaningfully to some other person” (Davidson, 1996).

The value of KM relates directly to the effectiveness with which the managed knowledge enables the members of the organisation to deal with current situations and also to effectively envision and create their future. Without on-demand access to managed knowledge, every situation is addressed based on what the individual or group brings to the situation with them. However, with on-demand access to managed knowledge, every situation is addressed with the sum total of everything anyone in the organisation has ever learned about a situation of a similar nature (Davidson, 1996).

2.3.3 Duplication

It is widely recognised that organisations often repeat mistakes, duplicate projects and otherwise waste resources (Robertson, 2002).

This could be attributed to the fact that the members of the organisation are unable to see each other’s work, so they do not know that work is being replicated. Also people cannot learn from past mistakes if they are not aware of them, or if they are not recorded in some way. Knowledge management seeks to create common repositories for information and offer search capabilities across organisations so that people within the organisation can “*see across the enterprise and take advantage of each others’ work products and experiences*” (Robertson, 2002). If members of the organisation have access to other members current work and past experiences, then duplication of effort and repetition of mistakes can be reduced.

2.3.4 Employee turnover

Due to the people-centric nature of many modern organisations, “*employees are more important than ever*” (Stovel and Bontis, 2002). Modern commercial organisations are facing pressures which have caused them to lose personnel. Employee turnover can be as a result of downsizing, retirement or be voluntary. This can cause a loss of knowledge within the organisation (Hildreth *et al*, 2000).

“When they lose people, they also lose their knowledge”(Hildreth *et al*, 2000).

Information is created and decisions are made at all levels of the organisation. Greater responsibility is being dispersed throughout the company to enable stronger performance of the firm as a whole, creating both strong and fragile components to the corporate structure. Dispersed knowledge strengthens the organisation by empowering employees to improvise at a faster pace. However it also leaves the firm open to serious damage such as if an employee voluntarily leaves the organisation or if they then share their loyalties with competitors after they leave (Stovel and Bontis, 2002).

Each time an employee leaves the organisation, it is presumed that productivity drops for a time due to the learning curve involved in understanding the job and the organisation. The loss of intellectual capital adds to this cost, since not only do firms lose the human capital and relationship capital of the departing employee, but also competitors are potentially gaining these assets (Stovel and Bontis, 2002).

Organisations also have to cope with the globalisation and internationalisation of business, forcing collaboration and knowledge

sharing across time and distance (Hildreth *et al*, 2000). While globalisation is heightening competition, firms must continue to develop intangible products based on strategies created by key personnel. These key personnel or knowledge workers, are extremely important since their value to the organisation is essentially intangible and not easily replaced. There is a realisation among management that employees are “*major contributors to the efficient achievements of the organisation’s success*” (Stovel and Bontis, 2002).

2.3.5 Viewpoints on the importance of knowledge management

According to Turban and Aronson (2001) knowledge management is critically important because:

- Knowledge is a firm’s only appreciable asset. Most assets depreciate from the day of acquisition. Probst *et al* (2000) states that “*knowledge is the only resource that increases with use*”.
- Knowledge work is increasing, not decreasing. The service economy is growing, and so intellectual capital is growing in importance.
- Many managers ignore intellectual capital and lose out on the benefits of its capture and use.
- Employees with the most intellectual capital are often the least appreciated.
- Many current investments in intellectual capital are misfocused e.g. knowledge is mismanaged.

The previous list, compiled by Turban and Aronson (2001), details the growing awareness of knowledge as a valuable asset to the organisation and the importance of capturing and sharing the knowledge of the organisation’s employees.

According to Kelleher and Levine (2001) KM has become important because:

- Organisations are realising how important it is to be able to make maximum use of the knowledge they possess. A famous KM quote generally attributed to Lew Platt CEO of HP is “*if we only knew what we know, we would be three times more profitable*” A common problem is that people in one part of an organisation repeat work of another part. This leads to increased cost and causes a business risk.
- In the new knowledge economy, many believe that an organisation’s knowledge is rapidly becoming its only sustainable competitive advantage and that long-term success depends on an organisations

capacity to create new knowledge through a continuous process of learning and unlearning. Knowledge now needs to be protected, cultivated and shared across an organisations entire stakeholder base. In the past success could often be based upon the knowledge of a handful of strategically positioned individuals.

- Many people are finding they can create more value selling an hour of knowledge than selling an hour of physical time hourly-billing e.g. value-added billing in service based organisations.
- Organisations have begun to realise that knowledge, experience and learning must be harnessed and nurtured as vital assets. The means to manage these assets systematically are now available. Relatively recent information technology advances, such as intranets and groupware, make it possible to capture and share knowledge across a widely dispersed organisation. “*This combination of management sensitivity to the issue of KM and the availability of technological enablers may mean that the notion of a ‘learning organisation’ can finally move from theory to practice.*”
- A organisation’s book values are often poor indicators of it’s true value and in many cases this will be due to the value created by intellectual capital. Some leading organisations have been able to sustain a growth rate that outstrips their rivals, which indicates investor confidence in their intangible assets.
- There is a view that organisations can be seen regarded as complex organic systems which continually generate, elaborate and rearrange patterns of interactions and meanings e.g. common norms, values, world views and perceptions (Nonaka, 1991). Mechanisms or institutions spontaneously emerge and evolve, leading in a dynamic and sometimes unintended manner to both the creation of new individual knowledge and the codification of collective knowledge. The creation, dissemination and utilisation of such knowledge may be understood using principals of complex adaptive systems.

(Kelleher and Levine, 2001)

There are a number of stages involved in the knowledge process which lead to competitive advantage for the organisation (Probst *et al*, 2000). These stages are illustrated in figure 2.3.5.1. However these processes are not specifically addressed in this paper.

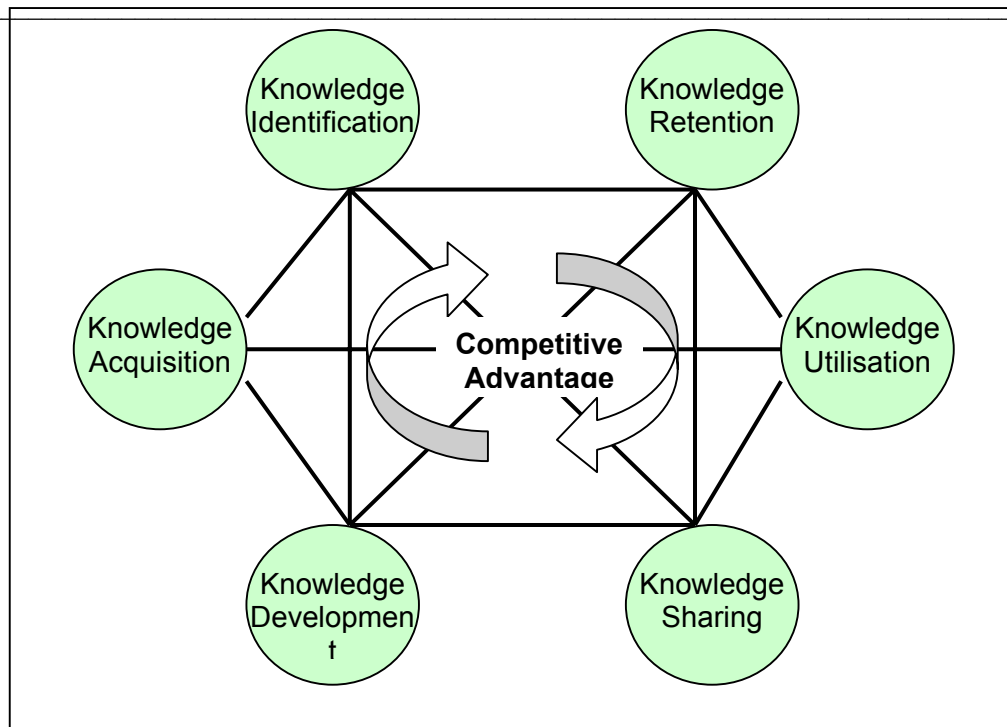


Figure 2.3.1 Stages of knowledge process (after Probst et al, 2000)

Summary:

- Knowledge is a firm’s only appreciable asset, it increases with use.
- KM aims to provide a sustained competitive advantage.
- Organisations have to innovate to survive.
- Pace of change is ever increasing.
- Effective KM reduces repetition of mistakes and duplication of effort.
- KM strategy combats loss of knowledge through employee turnover.
- Globalisation and internationalisation of organisations, has created a need for KM.
- Intellectual capital accounts for part of the true value of an organisation, which is generally not represented in the book value.

context and are without a meaningful relationship to anything else.

- **Information** can be described as pieces of fact that have a structure. It relates to description, definition or perspective.
- **Knowledge** can be described as usable pieces of information in a defined context. It comprises strategy, practice, method or approach.

According to Turban and Aronson (2001):

- **Data** are a collection of facts, measurements and statistics.
- **Information** is defined as organised or processed data that are timely, inferences from the data are drawn within the time frame of applicability and accurate, with reference to the original data.
- **Knowledge** is information that is contextual, relevant and actionable. This implies that knowledge has strong experiential and reflective elements, that distinguish it from information in a given context.

3 Definitions and terms

“There are as many techniques for implementing knowledge management as there are definitions of KM.” (Turban and Aronson, 2001).

There are many definitions as to what constitutes knowledge and how knowledge is created. This section explores these definitions and the different classifications of knowledge.

3.1 Data, information and knowledge

According to Bellinger (2000):

- **Data** can be described as unstructured pieces of fact. They are facts with no

From these definitions it can be ascertained that information is at a higher level than data and knowledge is at a higher level again. They differ from data in that they have structure and context. A simplified example to show the difference between the three types is a small local shop:

Data = 10
 Information = 10 apples
 Knowledge = 10 apples are sold every

day

In this example, 10 apples is considered information as it is structured data; however it is not considered knowledge because it is not in a usable form, nor does it contain the human element of experience.

While data, information and knowledge can all be viewed as assets of an organisation, “*knowledge provides a higher level of meaning about data and information*”. It conveys meaning, and hence tends to be much more valuable (Turban and Aronson, 2001). “*Knowledge is information that changes something or somebody*”, either by becoming grounds for actions, or by making an individual or an institution, capable of different or more effective actions (Drucker, 1994). These definitions affirm that knowledge conveys meaning and is usable or provides the means for action, therefore it is more valuable to an organisation than in its lower forms such as data or information.

Laszlo and Laszlo (2002) state that “*knowledge is a product of human experience and reflection*”. Given that it is context dependent, knowledge is a resource that can be embodied in an individual or a collective, or embedded in a routine or a process.

“*Knowledge develops over time with experience, which makes connections among new situations and events in context*” (Davenport and Prusak, 1998).

Davenport and Prusak (1998) define knowledge as a “*fluid mix of framed experience, values, contextual information and expert insights that provides a framework for evaluating and incorporating new experiences and information*”. They define knowledge as information combined with experience, context, interpretation and reflection.

These definitions stress the human input which converts information to knowledge. The addition of human experience, values and reflection convert data and information into a form which can then be used as a basis to evaluate new data and information. This is much like the aim of KM itself, which is to incorporate all knowledge already known within an organisation and bring this to bear on each new situation faced; then this experience will become the basis for a future situation.

Figure 3.1.1 shows the relationship between data, information and knowledge. It illustrates how data can be converted to either information or knowledge. Some researchers argue that data must always become information before it can be transformed into knowledge (Nonaka and Takeuchi, 1995). Davenport and Prusak (1998) claim that “*knowledge is derived from information as information is derived from data*”, which would also support this view. They state that information is converted to knowledge through the process of “*comparison, connection (understanding relations), conversation (uncovering what others think about the same information), and consequences (how information affects decisions)*”.

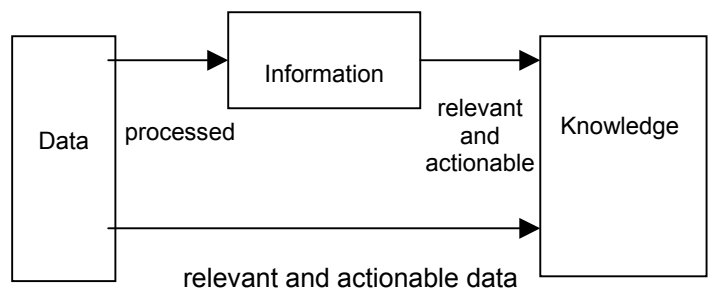


Figure 3.1.1 Relationship between data, information and knowledge (Turban and Aronson, 2001)

Figure 3.1.2 represents the “pyramid of meaning” which places knowledge in context with other forms of meaning. It has additional levels of meaning, understanding and wisdom. According to Laszlo and Laszlo (2002) “*understanding cannot be taught, it has to be created by each person for themselves*”. Since it involves active engagement in learning and creative meaning, it is an individual experience. As a result, a person’s understanding of a situation is unique to them, and by learning and collaborating together it may be possible to expand each person’s individual understanding in order to share a “*common cognitive map*”(Laszlo and Laszlo, 2002). Bellinger (2000) states that wisdom embodies “*principle, insight, moral or archetype*”. Wisdom differs from understanding in that it employs the morals of the individual involved, their past experiences and their intuition about the situation as a whole. In relation to wisdom, meaning is often counter to what is considered logical. This is described in the following explanation by Laszlo and Laszlo (2002).

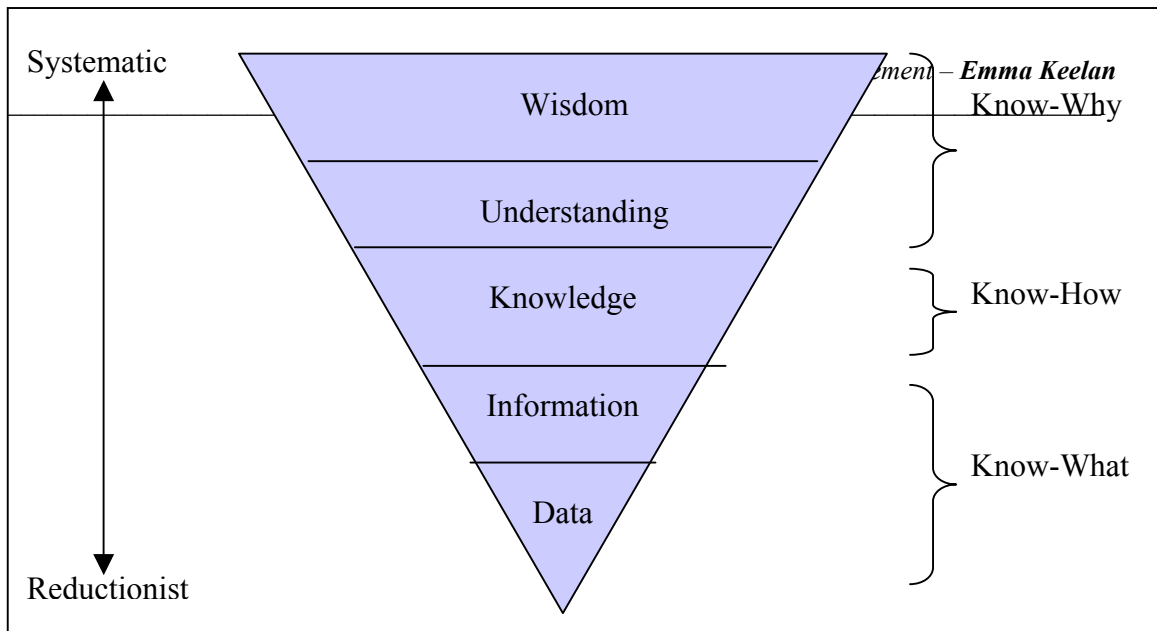


Figure 3.1.2 The pyramid of meaning (Laszlo and Laszlo, 2002)

“Sometimes, regardless of the facts, the strongest arguments, the greatest incentives, you cannot be convinced because in the greater scheme of things, you know it is not right or it simply does not make sense” (Laszlo and Laszlo, 2002).

In figure 3.1.2 the lower portion is concerned with reductionistic approaches which assume that adding together an understanding of pieces will result in an understanding of the whole

(Laszlo and Laszlo, 2002). The author believes that the inverted nature of the pyramid infers that there is physically a lesser amount of understanding than wisdom, less knowledge than understanding, less information than knowledge and so on. The author argues that it is in fact the opposite, as large amounts of raw data may ultimately lead to a small nugget of knowledge or eventually wisdom. In figure 3.1.3 the pyramid is pointing upwards to reflect this.

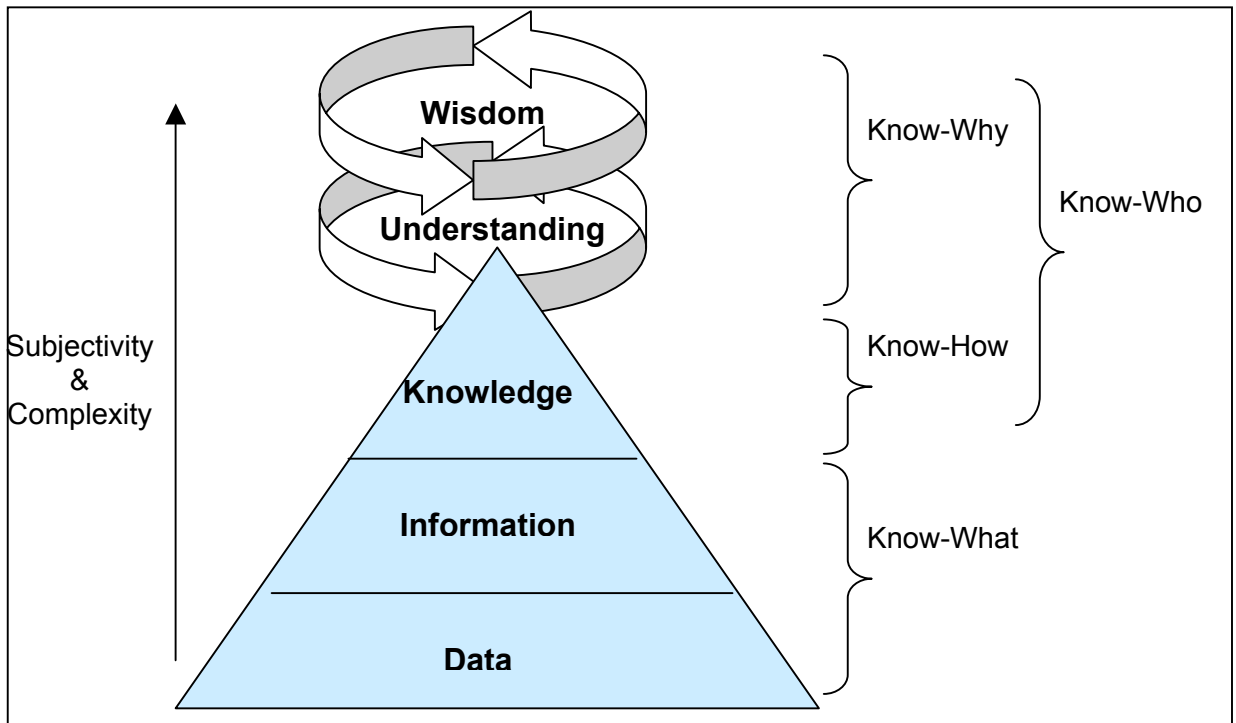


Figure 3.1.3 Layers of meaning (author)

The author considers understanding and wisdom to be quite different from the other layers of meaning because of the level of human impact on them. As humans are constantly learning and unlearning, assimilating other knowledge and experiences with what they already know, then their understanding and wisdom are also constantly changing. This is represented by the spiraling arrows above the pyramid (see figure 3.1.3). Subjectivity increases as the level of meaning increases. This is due to the human perspective introduced as the higher layers of meaning become individual to each person.

“Know-what” refers to data and information. Using the previous example of the local shop:

Data = 5

Information = 5 apples

Knowledge = 5 apples are sold every

day.

If we ask the question “5 what?” the answer is 5 apples. “Know-how” refers to knowledge for example “How many apples are sold?”. “Know-why” however is not as straightforward to answer as it is subjective, depending on the individual involved. Harryson (2002) argues that we need to move from “*knowing what we know*” type of approaches to “*knowing who knows what*”. The concept of “know-who” relates to the layers of meaning with human input; knowledge, understanding and wisdom.

3.2 Key components of knowledge

Knowledge has a number of properties which define it. Knowledge can be characterised by:

- **Ground truth:** This is the truth gained from experience. It is what works in practice as opposed to theory.
- **Complexity:** Complex situations indicate complex approaches to solving them. Sometimes a lack of knowledge makes a problem complex.
- **Judgement:** Judgement puts knowledge into actionable context. Knowledge evolves and may no longer apply to the situation that it originally did.
- **Heuristics and intuition:** Heuristics are rules of thumb. Heuristics and intuition includes guides to action, shortcuts and simplifications for problem solving as well as the individual’s instincts and insights of the situation.
- **Values and beliefs:** Different people have different “*problem-solving frames*”. They solve problems in different ways and based on their own personal values and beliefs.

(Davenport and Prusak, 1998)

It is also argued that experience should be a property of knowledge as knowledge is a property of “*human experience and reflection*” (Laszlo and Laszlo, 2002). However ‘ground truth’ incorporates the individuals own experiences. Following on from the definitions of knowledge already discussed in section 3.1 the author would also add the properties of usable or actionable, and contextual to this list of properties.

3.3 Classification of knowledge

An organisation’s knowledge can be classified and categorised in a number of ways. This is important in the identification of knowledge sources for the capture and distribution of knowledge that will benefit the organisation as a whole.

In the context of an organisation, local knowledge can be described as knowledge about a particular thing, global refers to departmental knowledge and universal refers to company or organisational knowledge (Nonaka and Takeuchi, 1995). Knowledge within the organisation must be categorised to allow for personalisation and/or localisation so that the knowledge can be distributed throughout the enterprise.

Human knowledge is both explicit and tacit, it is what individuals know (e.g. cognitively) or know how to do (e.g. procedurally). Social knowledge exists in relationships between individuals and groups. It comprises “*synergetic knowledge*”, is largely tacit, and is the result of working and learning together. Structured knowledge is embedded in the processes and infrastructure of a social system. Knowledge in this form is explicit and rule-based, it exists independently of “*human knowers*” and represents an organisational resource (Laszlo and Laszlo, 2002).

3.3.1 Tacit and explicit knowledge

Two types of knowledge often discussed in research literature are tacit and explicit knowledge. Nonaka and Takeuchi (1995) state that explicit knowledge can be described as “*formal and systematic*”. It can be articulated in formal language such as specifications, manuals, grammatical statements or mathematical expressions. It is articulated knowledge, knowledge which has been formalised by way of speech, text, or visual graphics for example. Therefore it can be easily communicated and shared (Nonaka and Takeuchi, 1995).

“Explicit knowledge can be clearly articulated, communicated in formal and systematic languages or codes and set down in written documents” (Laszlo and Laszlo, 2002).

Turban and Aronson (2001) describe explicit knowledge as knowledge that has been codified (documented) in a form that can be distributed to others without requiring interpersonal interaction or has been transformed into a process or strategy. Examples are the policies, procedural guides, white papers, reports, designs, products, strategies, goals, missions and core competencies of the enterprise and the IT infrastructure.

From these definitions it can be ascertained that explicit knowledge is knowledge which can be explained and easily shared. It has the properties of being codified, structured and accessible to others.

According to Kelleher and Levine (2001) tacit knowledge is related to the mind, behaviour and perception of people. It usually relates to subjective, cognitive and experiential learning whereas explicit knowledge deals more with objective, rational and technical knowledge e.g. data, policies, procedures, software, documents (Nonaka and Takeuchi, 1995). As it is subjective and dependent on the individual, this makes it difficult to codify or share with others.

“Tacit knowledge is demonstrated through actions, embodied in personal experiences and is difficult to transfer” (Laszlo and Laszlo, 2002).

Tacit knowledge is highly personal. It is hard to formalise and therefore difficult to communicate to others such as the kind of informal, hard-to-pin-down skills captured by the term know-how (Nonaka and Takeuchi, 1995).

Quintas (2001) gives the following analogy to explain tacit knowledge:

“A good analogy is the ability of a concert violinist. You could spend six months with a concert violinist who describes to you in minute detail how he or she plays the violin, but there’s no way that you could then stand up and play the violin. You would have to go through an experience learning process in order to gain that knowledge” (Quintas, 2001).

Tacit (or embedded) knowledge, is usually localised either to a particular individual or embedded in the group interactions within a

department or branch office. It typically involves expertise or high-level skills. It is “diffused, unstructured, without tangible form” and is therefore difficult to codify. Tacit knowledge is the “cumulative store of the experiences, mental maps, insights, acumen, expertise, know-how, trade secrets, skills set, understanding and learning that an organisation has”, as well as the organisational culture that has embedded it in the past and present experiences of its people, processes and values (Turban and Aronson, 2001).

From these definitions it can be ascertained that tacit knowledge is knowledge which is highly-personal to an individual or the relationships of a group, is unstructured and not easily explained. As it is difficult to articulate, therefore it is difficult to share with others.

According to Harryson (2002) “*A next generation K&I (knowledge and innovation) management needs to more purposefully address the tacit dimension, rather than primarily dealing with explicit knowledge and databases.*”

Knowledge can also be categorised as hard or soft. Hard knowledge corresponds to explicit, and soft to tacit. Hard knowledge is knowledge that easily be articulated and captured. Soft knowledge on the other hand is not so easily articulated and cannot be so readily captured e.g. experience, work knowledge that has been internalised, tacit knowledge e.g. using a word processor (Hildreth *et al*, 2000).

Nonaka and Takeuchi (1995) claim that intangibles like insights, intuitions, hunches, gut feelings, values, images, metaphors and analogies are often overlooked assets of organisations. They state that harvesting this intangible asset can be “critical to a firm’s bottom line” and its ability to meet its goals.

3.4 Terms related to knowledge management

A number of new terms have emerged which describe concepts and processes relating to the emerging concept of knowledge management. The terms **knowledge economy** and **knowledge society** have emerged as the concept of knowledge management has come to prominence.

“The new economy has shifted away from one based on traditional manufacturing to one propelled by knowledge” (Carroll and Tansey, 2000)

This shift is most evident among high-tech firms e.g. the ability of Intel to use intellectual capital to maintain and extend competitive advantage has created huge returns for shareholders. Intel has over \$10 billion in sales through the Internet and has cut data flow between trading partners from three weeks to 48 hours, while reducing inventory by 70 percent (Carroll and Tansey, 2000).

“In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge” (Nonaka, 1991).

The long predicted knowledge economy is now becoming a reality (Probst *et al*, 2000). According to Davies (2000) *“Knowledge is now the key battleground for competition”*. The basis of competition among organisations has changed and managing an enterprise’s knowledge can provide a sustained competitive advantage (Probst *et al*, 2000).

A term often used as a stage in the knowledge cycle, is the ‘**codification** of knowledge’. This means the documentation or recording of knowledge. Knowledge which has been codified is generally classified as explicit, if it is codified in such a way as to be easily shared (Turban and Aronson, 2001).

Members of an organisation that contribute to the creation or distribution of knowledge can be termed **knowledge workers**. Their value to the organisation is essentially *“intangible and not easily replaced”*. A goal of knowledge

management strategy is that all members of the organisation should become knowledge workers (Stovel and Bontis, 2002).

Just as the ‘Information Age’ has now become the ‘knowledge economy’, within organisations alongside the traditional the role of Chief Information Officer (CIO), the role of **Chief Knowledge Officer (CKO)** has emerged. The aim of the CKO is to make everyone in the organisation aware of the importance of knowledge as a resource, to structure the knowledge base and guide its development. The CKO is responsible for encouraging and facilitating the appropriate environment to create the desired knowledge culture. He or she represents all levels of knowledge strategy throughout the organisation to senior management, and must liaise with all managers to create cohesive objectives which are aligned to the knowledge objectives of the enterprise. He or she is responsible for knowledge infrastructure and the co-ordination of knowledge management processes (Probst *et al*, 2000).

Smaller companies often cannot afford to develop special centres to support internal requests for information or knowledge, generally this is outsourced e.g. market research companies, business consultants. These are known as **knowledge brokers**. They manage the kinds of knowledge that small and medium-sized companies need access to, but cannot afford to pursue for themselves (Probst *et al*, 2000).

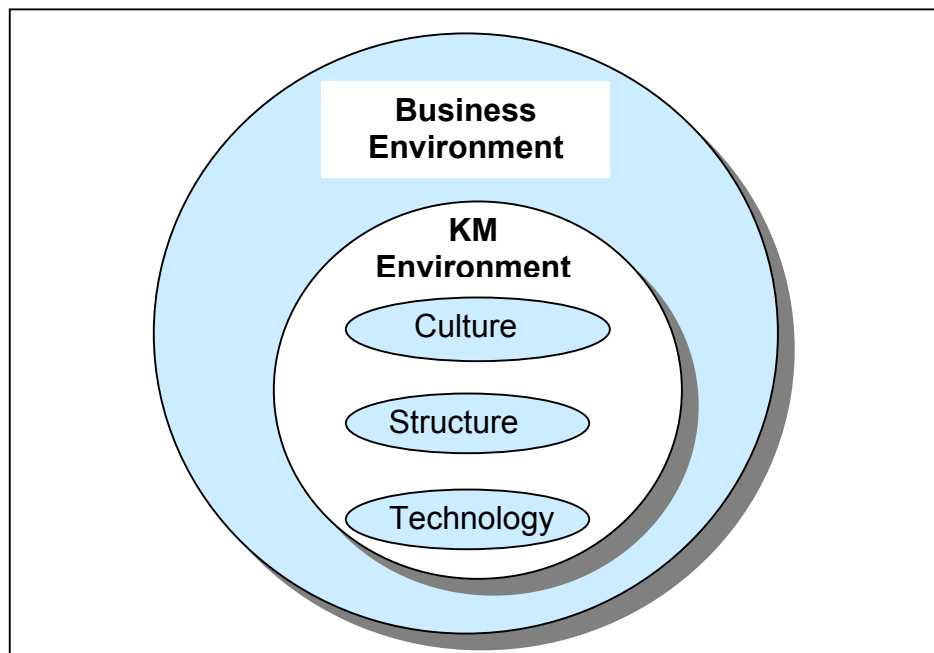


Figure 4.1 Components of the Knowledge Management Environment (author)

4 Knowledge management environment

The knowledge management environment consists of people, process and technology. This is also referred to as culture, structure and technology. According to Kelleher and Levine (2001) a KM-friendly culture should be the primary focus of knowledge management strategy, which is supported by structure, and enabled through technology (see figure 4.1).

The culture of an organisation refers to the attitudes, values and behaviours of its members. It is argued that this is the most important element of a KM environment and the most critical for successful implementation of KM strategy. Structure refers to the actual physical structure of the organisation and its processes. Internal business processes or the organisational structure itself may have to be adjusted in order to support KM. Technology is described as an enabler of KM. It is “*not a pure solution*” (Kelleher and Levine, 2001).

From their survey review Chauvel and Despres (2001), identified the key themes of KM research. They created an overarching framework to represent these themes, using six dimensions they had identified: phenomena, action, level, knowledge, technology and outcomes (see figure 4.2). This six-dimension framework incorporated surveys that were aimed at higher levels of aggregation, such as the organisation and they examined work structures, business processes and environmental elements related to culture.

4.1 Technology

According to Kelleher and Levine (2001) “*As recently as about 1996, most KM tools were no*

more than on-line filing cabinets”. An over-reliance on such repositories remains one of the commonest KM mistakes, but it is already possible to find many examples of organisations extracting value from more sophisticated tools that can:

- Provide customised access to everything published in organisations e.g. portals or search tools.
- Allow people to cope with the challenges posed by “information overload” e.g. by profiling or through use of personalisation software.
- Allow virtual teams to work on products and service developments together e.g. synchronous collaborative work tools.
- Allow leaders to communicate corporate news while it is still relevant e.g. intranets, instant messaging, streaming media.
- Provide a real-time forum through which virtual communities can connect and share opinions e.g. portals, extranets, asynchronous collaborative work tools, Communities of Practice.
- Allow an organisation and its clients to share information and perspectives in real time e.g. customised portals, extranets
- Allow marketing professionals to position audiences so that only relevant people are part of the communication loop e.g. profiling or personalisation software
- Provide “virtual classrooms” in which teaching happens in the employee’s own environment e.g. e-learning software, synchronous collaborative work tools

(Kelleher and Levine, 2001)

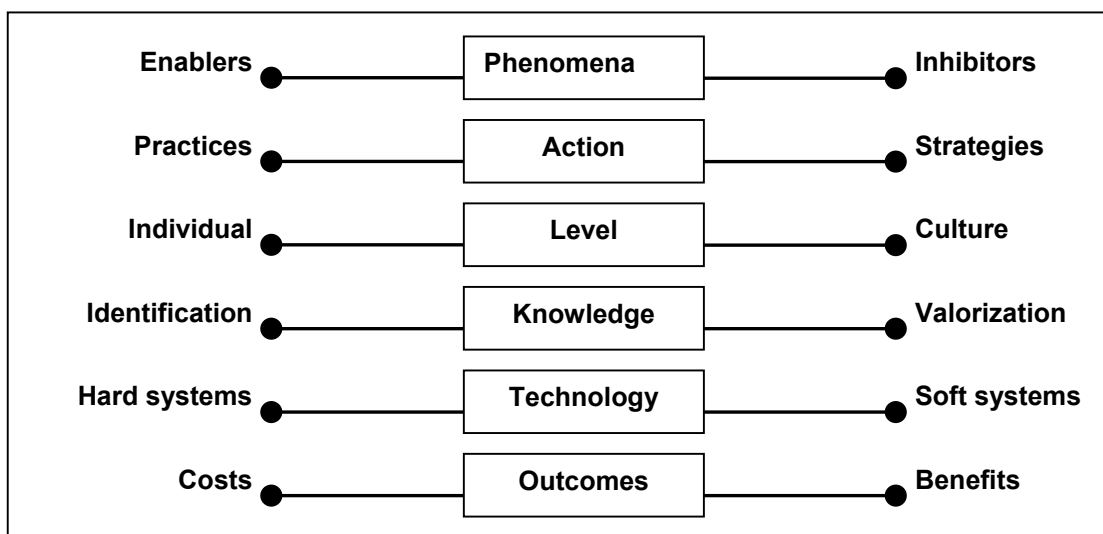


Figure 4.2 Six-dimension Framework (Chauvel and Despres, 2001)

Example:

In the Novartis pharmaceutical company, the aim of the knowledge management programme introduced in 1998 was to convert accumulated knowledge into a company asset. The implementation of a “Knowledge Marketplace” has involved three linked technological elements:

- The Yellow Pages: a directory of internal experts
- The Blue Pages: a directory of external experts, and
- The Virtual Forum: a discussion forum that works like a news group.

All three elements are deployed through the company intranet (Probst et al, 2000).

Technology is an enabler of KM and therefore organisations may need formal or informal policies and standards to govern the usage of such tools. Consideration should also be given to the content that an organisation wishes to share, and the context in which this content will be used (Kelleher and Levine, 2001).

4.2 Structure

In order to improve knowledge sharing, organisation may need to change the way their internal business processes are structured and sometimes may need to adjust the organisational structure itself (Kelleher and Levine, 2001) Modern organisations are becoming less hierarchical and more decentralised, this has an effect on the dissemination of knowledge (Harryson, 2002). Departments of an organisation which reside in different locations may not feel any incentive to share knowledge with each other (Kelleher and Levine, 2001) The internationalisation of enterprises means that different departments may in fact be in different countries or even continents causing differences in time-zones as well as other factors such as language.

4.3 Culture

In the previous diagram (figure 4.2), “Level” refers to the distinction between individuals groups, organisations and organisational culture or environment. Individuals are obviously the fundamental unit of organisations and this is particularly true in knowledge-intensive systems. Individuals accomplish work in groups that confer an identity, physical and psychological resources, and organisational power (Chauvel and Despres, 2001). Organisations are complex systems in which individuals and groups are the foundational elements, while according to Chauvel and Despres (2001):

“organisational culture is that somewhat intractable concept that relates to ideology, collective norms, common values, the semiotics that generate understanding, stories, beliefs and so on.”

Chauvel and Despres (2001) cite that the concept of knowledge culture was not addressed in a meaningful way in the surveys they had reviewed (23 surveys). They observed *“little attempt to differentiate organisational types or environments in a meaningful way”* and claimed that *“differences in organisational cultures were seldom addressed”* . However they do state that the topic of organisational culture has now become *“respectable”*.

The concept of organisational culture is expanded in the following section, section 5.

5 Culture

As discussed in the previous section, technology is an enabler of KM, however in the past the focus was primarily on the technological aspect of KM systems.

“It has become something of a commonplace in KM circles that ‘technology is only 20% of the solution, the rest is culture’” (Davies, 2000)

Robertson (2002) states that *“The system that is deployed is not as important as the context into which it is deployed”* , and that those involved in KM initiatives should pay as much attention to the team structure, workflow issues and collaborations among members of the organisation in which the application will be placed. KM requires a major transformation in organisational culture to create a desire to share, the development of methods that ensure that knowledge bases are kept current and relevant, and a commitment at all levels of a firm for it to succeed (Turban and Aronson, 2001). In the end, knowledge sharing is a human activity, and understanding the humans who will do it is the first step in successfully supporting that activity (Robertson, 2002).

Due to the effects of globalisation, many organisations have taken steps to downsize, outsource and deskill in an effort to remain competitive. Both downsizing and outsourcing mean a reduction in staffing levels and as people left, companies have realised that with them they have taken a valuable stock of knowledge. This knowledge is increasingly seen as central to the success of organisations and an asset that needs to be managed. It can be both knowledge of how the work is done in

practice, and knowledge of a particular domain (Hildreth *et al*, 2000). An aim of KM is to combat this loss of knowledge by capturing the knowledge that exists and distributing it among the members of the organisation.

However, Quintas (2001) states that the “*emphasis in knowledge management is on what we already know*” and “*how we capture it*”. He believes that this is important but that “*the real challenge is to foster an organisational culture in which people create new knowledge.*” Through a supportive organisational climate, facilitated through good knowledge management strategy, an organisation can bring its entire organisational memory and knowledge to bear on any problem they might face (Turban and Aronson, 2001).

The success of KM projects is often highly dependent on cultural change (Kelleher and Levine, 2001). Organisations with cultures where the sharing of knowledge is actively discouraged either by official or unofficial policy and where capability and autonomy are limited will not gain real benefits from investments in KM technology. Such conditions are likely to produce minor operational efficiencies at best (Bair *et al*, 1997). The failure to implement cultural changes accounts for a large number of failed KM projects (Kelleher and Levine, 2001).

5.1 Why people don't share knowledge

Despite the fact that it can cripple an organisation, sometimes people refuse to share what they know. Organisational culture barriers are often the cause of this situation (Turban and Aronson, 2001).

According to Holloway (2000), people do not share knowledge because:

- they believe that “knowledge is power” and that hoarding it guarantees job security.
- they believe they won't get credit for sharing knowledge or won't be able to own it anymore.
- they don't have time to share knowledge and do not see it as a primary responsibility of their job.
- they are afraid of making mistakes and looking bad or being reprimanded.
- the technology in place for sharing knowledge does not really meet their needs.
- they don't know how much they know and are unaware of how valuable their knowledge is to the organisation.

- they don't know how to share their knowledge and have no example to follow (Holloway, 2000)

The author has identified the key areas of trust, privacy, transparency and motivation, which have to be addressed if a supportive organisational culture is to be created. The idea that “knowledge is power”, is a deep-rooted one. People in general do not view the organisation as a whole, but understandably, from their own personal perspective. Often they believe that possessing knowledge that no-one else has makes them valuable to the organisation and that this will secure their job or promotion prospects (Hauschild *et al*, 2001). As such, any KM project will require adjustments to any system of recognition or reward as well as to the general mindset of the organisation members.

In the case of the Novartis pharmaceutical company, some employees did not wish to be listed as part of a directory of internal experts partly because they were afraid of being asked a question they did not know the answer to. Another issue was the display of personal information (Probst *et al*, 2000). Turban and Aronson (2001) argue that many people do not see the value of knowledge sharing for their organisation. The author would argue that they do not see the value of it for themselves. Education is essential to create an awareness of the importance of knowledge to the members and the organisation as a whole. Reward schemes may also play a role in encouraging knowledge sharing.

5.2 How to encourage knowledge sharing

“Though knowledge sharing is not difficult, many people do not understand what it is all about, do not see the value in it for their organisation, or have been discouraged by organisational culture barriers” (Turban and Aronson, 2001).

According to Holloway (2000) knowledge sharing can be encouraged through the following means:

- educate people on the value of knowledge. The author argues that the value to the individual must be shown as well as to the organisation as motivation plays an important role.
- revamp reward and recognition systems. Knowledge sharing should be rewarded and knowledge hoarding actively discouraged.
- show people what knowledge sharing looks like, set an example from the highest level.

- let people know its alright to make a mistake and not know something
- make knowledge sharing a requirement of the job
- educate people about the kinds of knowledge that are valuable and how they can be used
- “make the technology work for the people”, not the other way round. The technology should be adapted to the needs of the people and make it easier for them to do their part in implementing KM.

(Holloway, 2000)

Incentive schemes should promote a broad range of corporate objectives, one of these being KM. However they should be carefully developed so as to avoid rewarding knowledge-hoarding or the creation of unhealthy rivalry between employees or departments (Hauschild *et al*, 2001).

Quintas (2001) states that “*there must be a culture in which people are given time and recognition for knowledge sharing, and they feel there is reciprocity – that others too will share their knowledge.*” While Robertson (2002) believes that cultural change could lead to a “*democratisation of the workplace*” and that this could foster a greater feeling of common purpose and in turn lead to more collaboration.

The less successful KM projects tend to be in organisations where a top-down approach has been taken, by pushing knowledge to where it is needed. Successful enterprises however, reward employees for seeking, sharing and creating new knowledge. Hauschild *et al* (2001) describe the idea of “*knowledge pull*”, where a grassroots desire is create among the employees to use their organisations knowledge. However this “*knowledge-pull*” concept can only be successful if it is made an integral part of a organisational culture (Hauschild *et al*, 2001).

5.3 Identifying types of culture

Organisational culture can be thought of as the range of factors that shape not only employees thinking but also their behaviour and perception of their immediate business environment. Culture effectively establishes the set of guidelines by which members of an organisation work. According to Kelleher and Levine (2001), at least three types of organisational culture have been identified within the context of KM:

1. Organisations with multiple stakeholders competing against each other in an

atmosphere of mutual suspicion and information hoarding, in which the potential for knowledge sharing is naturally low.

2. Organisations with top-down authoritarian rule, and officially approved and disapproved subjects whose status may quickly change (the potential for knowledge sharing here is better than in type 1, but is still limited)
3. “federations” with local autonomy, a global framework and civilised dispute resolution, in which co-operation is based on self-interest (potential is high here for knowledge sharing). This view is supported by Handy (2000) who argues that employees should be “citizens” who hold a financial stake in the company where they work, and enjoy an alienable set of rights.

(Kelleher and Levine, 2001)

There are various classification sets of organisational culture. Handy (1976) describes four main types of organisational culture: power culture, role culture, task culture and person culture. This could be an area of research for culture types specific to the area of knowledge management.

5.4 Communities

“*in the future the most valuable individuals will be those who become a source of knowledge by sharing what they have with others*” (Kelleher and Levine, 2001).

Soft knowledge is difficult to articulate so new ways of how it be shared have been developed (Hildreth *et al*, 2000). Various communities have developed as a social method of implementing KM as opposed to a technological answer. These include

- communities of interest
- communities of practice
- expert networks

“*The importance of knowledge sharing and reuse in knowledge management in order to share best practice and prevent duplication of effort has led to the emergence of the concept of communities of practice.*” (Davies, 2000). Communities of interest are those involving people with a common interest as opposed to a specific task to perform. Lave and Wenger (1991) describe Communities of Practice (CoP) as “*a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice*” In these communities, newcomers learn from old-timers by being allowed to participate in certain tasks relating to the

practice of the community. Over time, newcomers move from peripheral to full participation in the community (Hildreth *et al*, 2000).

The term expert network can be used in relation to communities of practice or as in the case of Novartis pharmaceutical company, used to describe a directory of internal experts (Probst *et al*, 2000). An effective KM intranet or knowledge community can play a major role in making individual employees better informed and more effective (Kelleher and Levine, 2001).

6 Success factors

There are a number of issues which can contribute to or hinder the success of a KM project. For a successful KM environment it must contain the three elements of culture, structure and technology. This includes facilitating a knowledge-oriented culture with a supportive organisation infrastructure and appropriate technology to enable KM implementation.

According to Robertson (2002) KM works best when:

- Information content is dynamic
- User activities include active sharing across multiple parties: across departments and with outsiders e.g. vendors, consultants
- Information activities are integrated with workflow
- All team members at all levels use the system
- Information content is known to users
- The system is familiar
- A leadership team sets collaboration goals and oversees content.

(Robertson, 2002)

Organisations need to improve their capacity to continually “re-invent” their knowledge base, developing “absorptive capacity”, the capacity to absorb new knowledge on an ongoing basis. This relates to organisational learning (Quintas, 2001).

7 Conclusions

No consensus has been reached on definition of KM or of knowledge itself. However the author believes that any definition of KM should include the following ideas:

- The importance of knowledge as an asset to the organisation must be recognised.
- Identify knowledge which is valuable to the organisation and it’s sources.

- Capture and store relevant knowledge where necessary
- Encourage the development of an environment where knowledge can be shared.
- Re-use of knowledge or distribution in order to provide strategic advantage.
- Continuous creation and sharing of knowledge.
- Creation of values and standards which support these processes.

KM has developed through advances in IT and according to business trends.

KM growing in importance as a means of providing sustained competitive advantage. It is a firm’s only appreciable asset, as it increases with use. The need for KM has arisen from modern trends such as globalisation and internationalization and this in turn has affected employee turnover rates. Employee turnover can cause a loss of knowledge to the detriment of the organisation if a KM strategy has not been introduced to manage the organisational knowledge.

The culture of an organisation is an important factor into the success or failure of any KM project introduced. The author believes there is scope for further research needed into the impact of organisational culture on KM, for example the power structures that exist in organisations.

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