Chapter 2:

KNOWLEDGE MANAGEMENT
– AN OVERVIEW
Chapter 2: KNOWLEDGE MANAGEMENT – AN OVERVIEW

"We must learn how to manage knowledge collectively"  
--A.P.J. Abdul Kalam

2.1 Introduction

In the past few years, “Knowledge Management” (KM) has become the latest fad in management circles. It’s difficult picking up either a business or technology journal without coming across some mention of KM. This new buzzword is being hailed as the next big thing in corporate scene. However because of the hype and the sales pitch created by the technology vendors around KM, the average corporate executive finds himself lost in this noise and clutter about KM. Given all this attention to this rather “hottest” topic, it is surprising to note that many people still cannot even put a definition to KM. This chapter helps in demystifying KM by putting it on a stronger conceptual foundation, clarifying about what KM is and what KM is not, and eventually understanding how it can be used to drive improved business performance.

2.2 Data, Information and Knowledge

Before understanding KM, it is important to first understand the distinction between data, information, knowledge (and wisdom). Though one encounters these words in everyday vocabulary, in the field of business management, they have a different connotation.

"Like water, this rising tide of data can be viewed as an abundant, vital and necessary resource. With enough preparation, we should be able to tap into that reservoir – and ride the wave – by utilizing new ways to channel raw data into meaningful information. That information, in turn, can then become the knowledge that leads to wisdom." (Les Alberthal 1)

Data comes first. Basically, it is just a meaningless point in space and time, without any reference to either space or time. It is like an event out of context, a letter out of context, a word out of context. The key concept of data is being “out of context”. And since it is out of context, it is without a meaningful relation to anything else. For example, “seven” as a piece of data may mean different things to different people. However, if someone

1 Remarks to the Financial Executives Institute, October 23, 1995, Dallas, TX
says, “This new model of car air conditioner can lower the temperature in the car by
seven degrees centigrade”, a message has been composed using data items like “seven”,
degrees centigrade” and “temperature” to inform a person about the cooling
effectiveness of the car air conditioner. This is what is called information — data arranged
in a meaningful pattern to provide a context.

Information is just not a collection of data. A collection of data for which there is no
relation between the pieces of data is not information. The pieces of data may represent
information, yet whether or not it is information depends on the understanding of the
person perceiving the data. In the above example, based on the statement “This new
model of car air conditioner can lower the temperature in the car by seven degrees
centigrade” a person intending to buy the car air conditioner can form his opinion or
understanding about the collection of data items provided to him. Hence this statement
provides some meaningful information to him. Information is quite simply an
understanding of the relationships between pieces of data, or between pieces of data and
other information.

What does the prospective buyer of car air conditioner do with the above information? He
tries to make a judgement based on this information. His prior experience, logic and
understanding of the weather and relative cooling effectiveness of various car air
conditioners comes into play. Is seven degree centigrade cooling good enough for him or
not depends upon his perceived requirements and previous experience. So he is able to
make a judgement based on the information provided to him and his experience and
understanding.

This capability and experience of using information to make judgements and the ability
to link them to decisions or actions is called knowledge. For example the buyer of car air
conditioner will go for the new model only if his previous experience makes him rate it
more effective than earlier models. If the similarly priced earlier models gave just 4-5
degrees cooling, then the new model is worth serious consideration. However, if the peak
summer temperature outside in the city of the prospective buyer is 45 degrees Celsius,
then even the new model is not effective for that city say Aligarh or Delhi. On the contrary, perhaps the buyer will perhaps go for it if he lives in Shimla. So the ultimate decision taken can be different by different persons, even though the information provided is the same. This amplifies the difference between information and knowledge.

As can be inferred from above, knowledge is highly contextual and depends largely on the mental models, experiences, values and beliefs of individuals and organisations. As illustrated above, if two persons have significantly different experiences, values and beliefs, they are likely to take decisions and act in a manner that is very different, even though they may both act on the same information.

While information entails an understanding of the relations between data, it generally does not provide a foundation for why the data is what it is, nor an indication as to how the data is likely to change with time or can have different meaning for different persons. Information is a relationship between data and, quite simply, is what it is, with great dependence on context for its meaning and with little implication for the future.

Beyond relation, there is pattern, where pattern is more than simply a relation of relations. Pattern embodies both a consistency and completeness of relations, which to an extent, creates its own context. Pattern also has both an implied repeatability and predictability.

When a pattern relation exists amidst the data and information, the pattern has the potential to represent knowledge. It only becomes knowledge, however, when one is able to realise and understand the patterns and their implications. The patterns representing knowledge have a tendency to be more self-contextualising. That is, the pattern tends to a great extent, to create its own context rather than being context dependent to the same extent that the information is. A pattern that represents knowledge also provides, when the pattern is understood, a high level of reliability or predictability as to how the pattern will evolve over time, for patterns are seldom static. Patterns which represent knowledge have a completeness to them that information simply does not contain.
Wisdom arises when one understands the foundational principles responsible for the patterns representing knowledge being what they are. And wisdom, even more so than knowledge, tends to create its own context based on these universal, context independent foundational principles.

Figure 2.1 below places data, information, knowledge and wisdom ‘in a context’

In summary, the following associations can be made from data, which is just raw, smallest, meaningless collection of figures:

- **Information** relates to description, definition or perspective (what, who, when, where)
- **Knowledge** comprises strategy, practice, method or approach (how)
- **Wisdom** embodies principle, insight, archetype or paradigm (why)

We'll now dwell deeper on knowledge and knowledge management which form the bedrock for this dissertation.

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2.3 What is Knowledge?

If we are concerned about knowledge management, we need to be clear about what we mean by the word knowledge. Taking off from the difference between, data, information and knowledge illustrated above, a working definition of knowledge as suggested by Thomas Davenport and Laurence Prusak, is given below:

"Knowledge is a fluid mix of framed experience, values, contextual information, expert insight and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms." (Davenport & Prusak)

To put it more simply: Knowledge is simply actionable information. Actionable refers to the notion of relevant, and nothing but the relevant information being available in the right place at the right time, in the right context, and in the right way so anyone can bring it to bear on decision making all the time. Knowledge is the key resource in intelligent decision-making, forecasting, design, planning, diagnosis, analysis, evaluation, and intuitive judgement making. It is formed in and shared between individual and collective minds. It does not grow out of databases but evolves with experience, successes, failures, and learning over time.

From a management perspective, there are clear distinctions between two types of knowledge. Common practice now refers to them as explicit and tacit knowledge. They can be described as follows:

- Explicit knowledge is precisely and clearly expressed, with nothing left to implication. Generally in the business situations, it is fully stated and openly expressed without reservation.

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* Tacit knowledge is understood but not clearly expressed. It is often personal knowledge embedded in individual experience and involves intangible factors, such as personal belief, perspective and values.

We need to develop the characteristics of these categories of knowledge to understand how they can be managed.

**Explicit knowledge**

Companies hold substantial documented knowledge in patents, technical specifications and procedures. Additionally, information is routinely collected, stored and distributed as management information. Financial, marketing, production, and customer service/support information is usually codified and is ready for different distribution channels. This information makes up the majority of explicit knowledge.

All of this information has value in its own right and in most organisations could be used more effectively. There is also a need to seek even more explicit knowledge in the daily conduct of business. Explicit knowledge is normally available readily in all communications with customers, suppliers, distributors, competitors, government agencies and the community at large.

**Tacit knowledge**

By definition, tacit knowledge is more difficult to recognise and collect; let alone codify, store and distribute. Yet this is the key component of knowledge management. Releasing the true potential of this asset on a continuous basis poses the sheer challenge for consulting companies and forms an important component for an effective performance measure for knowledge management.

The most valuable asset of every organisation – particularly a consulting firm – is the hidden or tacit knowledge buried in the minds of employees and other people in regular contact with the organisation. This includes experience, learning from doing as well as study, observation and informal information or even gossip.
2.4 Components of Knowledge

Apart from the explicit knowledge available in various company documents and codified in computers, KM strategy and a KM system in any company must support the following key components of knowledge:

**Judgement**

Very unlike data and information based on data association, knowledge has a component of judgement attached to it. A colourful and precise stock ticker and a real time graph on the web site can be excellent information for a share broker, however in real value it means nothing if he can’t act upon it or make a decision based on the data they provide. Unactionable information is *not* knowledge. However if the share broker recognises that he needs to sell the shares when the trend chart looks like a particular pattern or need to hold when it looks like another pattern, he is making judgement based on it. Judgement allows knowledge to rise above and beyond an opinion when it reexamines itself and refines every time it is applied and acted upon.

**Experience**

Knowledge is largely derived from experience. Being able to transfer knowledge implies that a part of experiential knowledge also gets transferred to the recipient. The benefit of experience lies in the fact that it provides a historical perspective that helps better understand present situations. Experienced people are usually valued in a company and are often paid more, because they possess this historical perspective from which they can view current situations – something that a typical newcomer will almost never have. This perspective allows them to make connections with what is happening now with what might have happened earlier, and evaluate decisions in that light.

As people’s experience in their jobs increases, they begin to figure out *shortcut solutions* to problems they have seen before. When they see a new situation, they match it to compare patterns that they are aware of. An experienced car driver, for example, recognises that excessive rattle in the car could mean a flat tyre. Similarly a computer
hardware technician can diagnose the fault for a computer that fails to boot up, with help from his earlier experience of having diagnosed a failed power supply or a bad hard drive for computers with similar fault symptoms. With experience, these *scripts* guide our thinking and help avoid useless decision paths that we might have followed earlier. Such *rules of thumb* or *heuristics* provide a single option out of a limited set of specific, often approximate approaches to solving a problem or analysing a situation accurately, quickly and efficiently.

Not only in the simplistic situations like above, even in the complex business environment, it is the subconscious repertoire of scripts and rules of thumb that make experienced managers more valuable than experienced new hires. Many such rules of thumb are in people's heads as tacit knowledge, providing the power that decades of machine learning research have been unable to give to business.

*Values, Assumptions and Beliefs*

Business processes are very often, based on a set of assumptions. These are so natural and so deeply ingrained within the minds of people who hold them that they find their way into most of the decisions that people make, but they are never expressed. For example engineers, by their training, *assume* that anything that is behaving strangely has to have an underlying rationale. Managers often assume that their ordinate goal is to maximise their profit centre's financial profits. One level above this, people might assume that companies are rational and neutral. And for a good reason, after the widespread influence of Herbert Simon's research on the concept of *bounded rationality*.

Companies are often shaped by the beliefs of a few key people working there. In some companies - particularly the visual media and dotcom companies – the culture of having fun is ingrained in their work environments; while creating innovative and aesthetically great products (like iMac or iBook) is done as a matter of conviction and belief in other companies like Apple. The belief on profits and market dominance by Microsoft's founder Bill Gates has been brought into the very character of the firm.
Such values, beliefs and assumptions are integral and key components of knowledge. These values and beliefs explain the varying reactions of different companies to the same development and often differentiate a risk-taking competitor from a risk-averse one. And knowing, capturing and sharing this component of knowledge can make all the difference between complete knowledge and incomplete, unactionable information. It is mentioned here that not all beliefs can be captured or codified explicitly and this is still a separate area of ongoing research in the field of KM.

*Intelligence*

When knowledge can be applied, acted upon when and where needed, and brought to bear on present decisions, and when these lead to better performance and results, that knowledge often qualifies as intelligence. When it flows freely throughout the company, is exchanged and developed further, it transforms the company to an intelligent enterprise.

Apart from the above key components, knowledge comes into the KM system of a company from various other sources. A roundup of the sources, which feed a KM system of a company, is given in Table 2.1 below:

<table>
<thead>
<tr>
<th>Source</th>
<th>Explicit/ Codifiable</th>
<th>Tacit/ Needs Explication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee knowledge, skills, and competencies</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Experiential knowledge (individual/group level)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Team based collaborative skills</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Informal shared knowledge</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Values</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Source: Tivana, Amrit The Knowledge Management Toolkit, Prentice-Hall (2000), 71*
<table>
<thead>
<tr>
<th>Norms</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beliefs</td>
<td>Yes</td>
</tr>
<tr>
<td>Task-based knowledge</td>
<td>Yes</td>
</tr>
<tr>
<td>Knowledge embedded in physical systems</td>
<td>Yes</td>
</tr>
<tr>
<td>Human capital</td>
<td>Yes</td>
</tr>
<tr>
<td>Knowledge embedded in internal structures</td>
<td>Yes</td>
</tr>
<tr>
<td>Knowledge embedded in external structures</td>
<td>Yes</td>
</tr>
<tr>
<td>Customer capital</td>
<td>Yes</td>
</tr>
<tr>
<td>Experience of employees</td>
<td>Yes</td>
</tr>
<tr>
<td>Customer relationships</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Although the list given above is not exhaustive, it is clear that much of the knowledge can be explicated, put into KM systems and reused. However, some critical pieces of tacit knowledge are extremely difficult, if not impossible, to externalise in such a manner.

2.5 What is Knowledge Management?

After knowledge, let’s now deal with the other lofty concept – Knowledge Management (KM). This concept has been debated by academics and managers since long, and so is not new. Business organisations have been practising it in some way or the other - however informal and unstructured - but only a few businesses have mastered it. Despite this, as a field of systematic study and discipline, KM is definitely new. Many practitioners have come up with myriad definitions and often there is little agreement on any one. So in this and the following section, let’s try to arrive at an acceptable definition and clarify the term further.

In the simplest terms, knowledge management means exactly that: “management of knowledge”. In our context, it can be extended to “management of organisational
knowledge for creating business value and generating a competitive advantage." KM enables the creation, communication and application of knowledge of all kinds to achieve business goals and often refers to broad collection of organisational practices and approaches related to generating, capturing and disseminating knowledge relevant to the organisation's business.

One particular definition given below (proposed by Gartner Group\(^5\)) is quite comprehensive. This definition not only tells us what KM is all about, but also emphasise on what is required for effective KM, and more specifically what it can do or not do.

"KM is an emerging set of processes, organisational structures, applications, and technologies that aim to leverage the ability of capable, responsible, autonomous individuals to act quickly and effectively. KM achieves this end by providing this capable, responsible, autonomous individual with ready access to the company's entire store of knowledge, including much of what is not documented. KM requires an integrated approach to identifying, managing, and - most importantly - sharing the company's information assets, including database, documents, policies and procedures (explicit knowledge) as well as undocumented expertise resident in individual workers (tacit knowledge)."

To get a better insight into this definition, let's look at some keywords. It speaks of processes, organisational structures, applications and technologies. Knowledge is too critical an asset - particularly for a consulting firm - to be left to its own devices. To leverage knowledge it can no more be left as an informal activity and so KM has to be seen as an important business process. And as with any other business process, be it financial management, human resource management or supply chain management, this process too would require appropriate organisational structures and a framework for measuring its effectiveness to be put in place.

Another set of keywords is capable, responsible, autonomous individual. As explained earlier while defining knowledge, it is highly contextual and person dependent. Having the right people with appropriate competencies and skill-sets is equally important for the

\(^5\) Source "Building Resource Champs", The Economic Times, September 11, 2000
KM processes to be effective. Extending the argument further for bringing relevance to the subject of this dissertation, any effective framework for measuring the KM performance in a company has to specifically factor in the people dimension too.

2.6 What Knowledge Management is not?
KM as a topic has generated so much buzz in business circles that a host of technology consultants and IT vendors have rushed in to make the “quick bucks”. Claimed to be dealing in KM, some vendors of desktop PCs, search engines, enterprise software, storage devices, scanners and even photocopiers are offering the “KM Solutions” for the organisations. Within this “vendor noise” however, is a concrete reality that KM is much more than mere technology. It is a potent competitive tool for delivering competitive advantage and so KM must be grounded solidly in the context of business strategy. Competing on knowledge requires either aligning business strategy to what the company knows or developing KM capabilities required to support a business strategy. Amidst the IT vendor sales pitches claiming to offer KM solutions, let’s be clear on what KM is not.

- **KM is not knowledge engineering.** Knowledge engineering is a vital part of artificial intelligence (AI) within the discipline of computer science, but is not related to KM which is a business problem falling within the domain of information systems and management. KM melds information systems and people in ways that knowledge engineering has never been able to.

- **KM is about business processes, not just technology.** Management of knowledge has to encompass and improve business processes. IT can be the biggest enabler for effective KM, if used correctly. However, focussing on the T and not the I in IT will deliver little value. The T will never be used effectively, if the people who are supposed to use it do not understand its alignment with the business strategy.

- **KM is not about building an Intranet.** A KM system can use a firm’s Intranet as its front end and a building block, but must never be confused for one. There are crucial differences between an Intranet and KM system in terms of content, performance,
- **KM is not about “capture”**. Document management vendors often claim so but KM is really not about capturing data or documents’ “knowledge”. While, a document management system lacks context, experience and insight, it still has a marginal place in KM technology. This is because knowledge, in its entirety, cannot be captured.

- **KM is not about a one-time investment**. KM, like other future-oriented programmes, requires consistent attention (and investment) over a substantial period of time even after it begins to deliver results. KM critically requires performance measures or metrics that allow the firms to measure its impact, provide room for improvement, and to provide a robust basis of resource allocation.

### 2.7 Knowledge Management as a Set of Processes

The comprehensive definition of KM from the Gartner Group given in section 2.5 above is based on a framework for consideration of KM as the “set of processes” by which knowledge is manipulated in an organisation. The set of processes⁶ comprising the KM programme in an organisation is as follows:

1. **Knowledge creation**: To discover, realise, conclude, articulate and discuss for creating new knowledge
2. **Knowledge capture**: Includes documenting, digitising, extraction, representation and storage of relevant knowledge
3. **Organising knowledge**: Structuring, cataloging, abstracting, analysing and categorising of knowledge for specific usage
4. **Knowledge access**: Presentation, display, notification, profiling and searching the knowledge for a specific application
5. **Knowledge application or use**: Includes application of knowledge for business performance, providing service, making new products and continual learning at organisational level.

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The set of KM processes primarily involves people. Thus, KM activities are fundamentally linked with collaboration, interaction with people, and the systems, which support this. The technology plays an enabling role for KM processes. For example, use of company Intranet facilitates collaboration and interaction among people, but it is finally the human dimension, which plays a driving role for KM processes.

2.8 Knowledge Management Strategies

Any organisation depending on people competencies and the development of ideas should have a KM strategy. This is particularly true for consulting firms. The way these firms leverage the people skills and ideas may determine the strategic direction and mode of implementation of KM. Some firms may choose to automate KM while others will emphasise a people centered knowledge sharing approach. Both are valid approaches and the choice should be determined by the nature of the firm and its business strategy. Choosing the wrong approach or trying to implement both processes at the same time can be dangerous.

A research carried out at Harvard Business School\(^7\) into how different consulting companies approached the subject revealed the following:

- The *codification strategy* is centered on computer systems. Knowledge is documented, codified and stored in databases (warehouses) where it can be accessed and used easily by anyone in the organisation.
- The *personalisation strategy* is centered on people with in-depth knowledge, which they have developed from experience and study, and is mainly shared through direct person-to-person contact. Here the computer is used to help people communicate knowledge rather than store it.

The Harvard study notes that though examples are based on consulting companies, they are not unique to consulting. These two distinct strategies are at work in many other

\(^7\) Hansen, Morten T, et. al. "What is your strategy for managing knowledge", *Harvard Business Review*, (March –April 1999) 106-116
sectors. Indeed the choice between codification and personalisation is the central issue facing all organisations involved in KM. This decision depends on the nature of the organisation and its business objectives.

The Table 2.2 below compares the two KM strategies followed by consulting firms.

**Table 2.2: How Consulting Firms Manage Their Knowledge?**

<table>
<thead>
<tr>
<th><strong>Codification Strategy</strong></th>
<th><strong>Personalisation Strategy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reusing codified knowledge through high-quality, reliable and fast information systems implementation</td>
<td>Channeling individual expertise for providing creative, analytically rigorous advice on high-level strategic problems</td>
</tr>
</tbody>
</table>

**Reuse Economics**
- Invest once in knowledge asset; reuse it several times
- Use large teams with a high ratio of associates to partners
- Focus on generating large overall revenues

**Expert Economics**
- Charge high fees for highly customised solutions to unique problems
- Use small teams with a low ratio of associates to partners
- Focus on maintaining high profit margins

**People-to-documents**
- Develop an electronic document system that codifies, stores, disseminates and allows reuse of knowledge
- Invest heavily in IT to connect people with reusable codified knowledge
- Hire new college graduates for knowledge reuse and implementation
- Train people in groups through computer-based learning
- Reward people for using and contributing to document databases

**Person-to-person**
- Develop networks for linking people for sharing tacit knowledge
- Invest moderately in IT; the goal is to facilitate conversions and the exchange of tacit knowledge
- Hire MBAs who like problem solving and can tolerate ambiguity
- Train people through one-to-one mentoring
- Reward people for directly sharing knowledge with others

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Above table provides some guidance on the selection of alternative KM strategies. The codification route lends itself to organisations that rely heavily on explicit knowledge. The personalisation strategy is more directed at companies that rely heavily on tacit knowledge. Some other characteristics favouring each strategy are given in Table 2.3:

**Table 2.3: Characteristics favouring different KM strategies**

<table>
<thead>
<tr>
<th>Favouring codification</th>
<th>Favouring personalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similar products or services for each customer</td>
<td>One off products, services or projects for each customer</td>
</tr>
<tr>
<td>Work may demand high skills but relatively little creativity</td>
<td>High premium on creativity and innovation</td>
</tr>
<tr>
<td>Business and market strategies based on analysis of specific knowledge</td>
<td>Business and market strategies based on ‘feel’ or intuition</td>
</tr>
<tr>
<td>Ratio of operational staff to leaders very high</td>
<td>Ratio of operational staff to leaders almost non-existent</td>
</tr>
<tr>
<td>Relative similarity in operating characteristics over locations and functions</td>
<td>High diversity in operating characteristics over locations, functions and markets</td>
</tr>
</tbody>
</table>

Within the general guidelines given above, the decision on KM strategy to be adopted by a firm must consider the specific sector of the business of the firm and the specific assessment and evaluation of various KM dimensions and infrastructure.

### 2.9 Building a Knowledge Management System

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KM is a complex activity and needs a concrete plan for designing, developing and deploying the KM system linked with business strategy, for delivering business results. A 10-step KM roadmap⁹ to guide through the entire process of creating a business-driven KM strategy; designing, developing and implementing a KM system; and effecting the soft changes required to make KM work is given below. The ten steps of KM roadmap are categorised in four distinct phases.

**Phase 1: Infrastructural Evaluation**

- Step 1: Analysing existing infrastructure
- Step 2: Aligning knowledge management and business strategy

**Phase 2: KM System Analysis, Design, and Development**

- Step 3: Designing the KM architecture and integrating existing architecture
- Step 4: Auditing and analysing existing knowledge assets and systems
- Step 5: Designing the KM team
- Step 6: Creating the KM blueprint
- Step 7: Developing the KM system

**Phase 3: Deployment**

- Step 8: Deploying, using the result-driven incremental methodology
- Step 9: Change management, culture, reward structure design, and the choice of Chief Knowledge Officer

**Phase 4: Performance Evaluation**

- Step 10: Measuring results of KM, devising ROI metrics, evaluating system performance, and incrementally refining the KM system

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⁹Source: Tiwana, Amrit, *ibid.*, 101
Each of the four phases is explained further:

The first phase of the 10-step roadmap involves two steps. In the first step, the firm analyses its existing infrastructure and then identifies concrete steps it can take to leverage and build its KM system. In the second step, knowledge gaps are analysed by creating knowledge maps for the firm. These knowledge maps are further used to create a high level strategic link between business strategy and KM. This link can further develop both the KM strategy and system in a manner that aligns them with business performance and objectives.

When such an alignment between KM and business strategy is clearly established at the outset, one can be sure that the firm’s KM system is moving in a direction that holds promise for long-lasting competitive advantage and that it will actually benefit both the firm’s employees and its bottom line.

The second phase of KM implementation involves analysis, design, and development of the KM system. For deploying KM, one must select the infrastructural components that constitute the KM system architecture. KM systems use a seven-layer architecture and the technology required to build each layer is readily available. Integrating these technology components to create the KM system model requires thinking in terms of an ‘infostructure’ rather than an infrastructure. The seven layers of KM architecture and the associated technology components making up each layer are as follows:

1. User-interface layer
   - Browser, GUI tools
2. Access & Authentication layer
   - Authentication, Recognition, Firewall, Security, Tunneling
3. Collaborative Intelligence and Filtering
   - Intelligent agent tools, Content personalisation, Search, Indexing, Meta tagging
4. Application layer
- Skill directories, Yellow pages, Collaborative work tools, Video Conferences, Digital white boards, Electronic forums, Rationale capture tools, DSS tools, GDSS Tools

5. Transport layer
- Web and TCP/IP deployment, Streaming audio, Document exchange, Video Transport, VPN core, Electronic mail, POP/SMTP support

6. Middleware and Legacy Integration layer
- Wrapper tools (such as TCL/TK or scripts to integrate legacy or cross-platform data)

7. Repositories
- Legacy data, Data warehouse, Discussion Forums, Document Bases, etc.

For integrating various technologies for the seven-layer architecture, the first big choice of course is the collaborative platform. The firm can choose to use an open standard such as Web, or opt for a packaged solution such as Lotus Notes or a similar proprietary group support platform. The firm has also to create the profiling mechanisms for push- and pull-based knowledge delivery while balancing cost versus value-added for each additional enabling technology component. While choosing these components, the corporate culture and work norm existing in the company has to be considered.

The next step after KM architecture and design is to audit and analyse the knowledge assets within the firm to identify those that are both critical and the weakest. This enables arriving at a strategic position for the firm’s KM system, in line with the strategic gaps identified earlier. Depending on this strategic position, next the design of KM team is done. To design an effective KM team, the firm must identify key stakeholders both within and outside the firm and also identify the sources of expertise needed to successfully design, build, and deploy the system while balancing the technical and managerial requirements.

The KM team so identified builds upon a KM blueprint that provides a plan for building and incrementally improving a KM system. The seven layers of KM architecture have to
be specifically understood in the context of the company for determining how each of these can be optimised for performance and scalability as well as high levels of interoperability. Integration of work from all preceding steps so far culminates in a strategically oriented KM system design at this stage. The final step of this phase is that of actually putting together a working system integrating an array of hardware (including copiers, printers, and scanners) and software into the KM system.

The third phase in the 10-step roadmap involves the process of deploying the KM system built in the preceding phase. This phase involves:

- Deployment of the system with a results-driven incremental technique. This involves the selection and implementation of a pilot project to precede the introduction of a full-fledged KM system

- Cultural change, revised reward structures, and the choice of using (or not using) a Chief Knowledge officer (CKO) to make KM produce results. This is perhaps the most important complimentary step that is critical to the acceptance, and the consequent success, of a KM system in any company.

The last phase of the KM roadmap involves one step that most companies have been struggling with (and forms the subject matter of the present dissertation): measuring business value of KM. When pushed for hard data on KM performance measures, most firms have often resorted to ill-suited and easily misused approaches, such as cost-benefit analysis, net present value (NPV) evaluation, vague ROI measures, or at best, Tobin’s q. Very often, most companies are vulnerable to the following pitfalls in their choice of KM performance metrics:

- Using too many metrics
- Delayed and risky rewards tied to metrics
- Choosing metrics hard to control
- Choosing metrics hard to focus on
- Choosing metrics that neglect the “soft results” or intangible outcomes
- Choosing metrics that are too rear-view oriented
- Measuring the wrong things

A robust set of company-specific metrics avoiding above possible pitfalls is necessary to be devised to measure the KM performance. Apart from proving the impact of effective KM, well designed KM metrics enable the refinement of KM design through subsequent iterations. The present research addresses this issue in detail in the context of consulting firms.

2.10 Challenges of Knowledge Management

The challenges for management in developing and implementing a successful knowledge management system are numerous. A few challenges of considerable interest to the CEO/top management team are as follows:

Getting employees on board

The major problems that occur in KM usually result because companies ignore the people and cultural issues. It is critical to establish a culture that recognizes tacit knowledge and encourages employees to share their knowledge. The need to sell the KM concept to employees shouldn’t be underestimated; after all, in many cases employees are being asked to surrender their knowledge and experience — the very traits that make them valuable as individuals.

Typically, the business organisations encounter the following impediments to knowledge sharing and reuse, which are to be handled tactfully by the leadership:

- "Knowledge is Power". This common saying reflects one of the main underlying challenges to the success of any knowledge management initiative. Knowledge

10 Source: Arora C.S., From Information Technology to Knowledge Management: The Challenges Ahead for Corporate Managers, Chartered Secretary, July 2003, pp. 970-973
hoarding is often cited by managers as one of the key impediments to knowledge flows. Why would one individual share secrets with the rest of the organisation if he or she feels that this knowledge ensures his or her continued future ‘value’? And if this individual then leaves the company, then the valuable knowledge leaves too. Thus, this issue is becoming increasingly important as the rate of employee turnover continues to rise in knowledge-based sector.

- "Not-Invented-Here (NIH)” syndrome. The opposite to the "Knowledge is Power” impediment is the NIH syndrome – a desire to develop one’s own solution rather than reuse existing solutions. Often one comes across individuals who actually avoid using the company’s internal databases and solutions, in part because there was a certain ‘prestige’ associated with being hooked into external networks of like-minded people – like professional associations, vendor - sponsored user communities, business school alumni associations, internet chat forums, etc.

- Opportunity cost of time. In terms of knowledge sharing, taking the time to teach a routine to fellow colleagues or to contribute to a company database means losing valuable time that could be spent on more self-rewarding activities. And in terms of knowledge acquisition, the reasons for the use of the Internet over internal sources may also be a function of opportunity cost. Individuals often feel that it takes too long to search for a solution somewhere in the firm’s knowledge repositories and then adapt it to their needs. They feel that it is relatively quicker to search for an external solution with the help of external associations including Internet searches.

- Lack of trust. With the introduction of advanced multimedia communication infrastructure, employees can communicate with each other anywhere within a company – spread over different locations. However, effective communication using these systems appears to be dependent upon the establishment and maintenance of trust between the concerned employees, which is dependent on face-to-face communication. Thus, individuals may not trust solutions that have
been developed by others within the firm if they have not developed a face-to-face relationship. And in certain cases, individuals feel that they can trust others they know outside the firm over individuals they do not know inside the same firm.

- **Difficulty in making knowledge explicit.** On an equally challenging level is the sharing of tacit knowledge or that knowledge which has not yet been made explicit. An example of this is the manner in which an experienced project manager determines the future potential of projects. This knowledge is extremely difficult to articulate and not only that, much of the valuable knowledge is lost in this articulation process. In addition, this leads to problems when knowledge from one setting within the firm is to be transferred to another setting.

One way companies can motivate employees to participate in KM is by creating an incentive programme. However, then there's the danger that employees will participate solely to earn incentives, without regard to the quality or relevance of the information they contribute. The best KM efforts are as transparent to employees' workflow as possible. Ideally, participation in KM should be its own reward. If KM doesn't make life easier for employees, it will fail.

**Allowing technology to dictate KM**

It has already been explained in detail earlier that KM is not a technology-based concept. Managers often fall prey to the IT hardware and software vendors touting their 'all-inclusive KM solutions'. Companies that implement a centralised database system, electronic message board, Web portal or any other collaborative tool in the hope that they've established a KM program are wasting both their time and money.
While technology can support KM, it's not the starting point of a KM programme. The KM decisions should be based on who (people), what (knowledge) and why (business objectives). The how (technology) decisions should be saved for last.

**Not having a specific business goal**

A KM program should not be divorced from a business goal. While sharing best practices is a commendable idea, there must be an underlying business reason to do so. Without a solid business case, KM is a futile exercise.

**KM is not static**

As with many physical assets, the value of knowledge can erode over time. Since knowledge can get stale fast, the content in a KM programme should be constantly updated, amended and deleted. What's more, the relevance of knowledge at any given time changes, as do the skills of employees. Therefore, there is no endpoint to a KM program. Like product development, marketing and R&D, KM is a constantly evolving business practice.

**Not all information is Knowledge**

The difference between data, information and knowledge has been illustrated earlier in detail. Distinguishing relevant knowledge from the sea of data and information, nevertheless remains a serious management challenge. Companies diligently need to be on the lookout for an effective mechanism to separate knowledge from the information overload. Quantity rarely equals quality, and KM is no exception. Indeed, the focus of an effective KM programme is to identify and disseminate knowledge gems from a sea of information.
Not having a framework for KM Evaluation/ Performance Measurement

Finally, the last – but not the least - managerial challenge is the measurement and evaluation of the business impact of KM programme in a company. The traditional measurements (such as ROI and Tobin’s q) of business or financial performance are not effective for measurement of KM programme because these traditional measures provide a snapshot of company’s health at a given point of time, but provide no direction for KM strategy development. Some companies like Skandia, Buckman Laboratories, Dow Chemical, Canon, etc have begun to measure their intellectual capital (IC), with the belief that growth on this front is often a good indicator of future financial health. But here too, the dynamics of KM process in an organisation is not fully mirrored in IC as a KM performance measure. The role of factors like customer satisfaction, employee satisfaction, vision and leadership of the top management, values and beliefs, relationships, etc. – which are dynamic in nature – for construction of a performance framework for KM becomes very important for knowledge-driven sector like consulting companies.

The present dissertation is focussed specifically on this managerial challenge for putting in a place a representative and effective framework of performance measures. Consulting companies are focussed as the target in the present research, because for consulting companies, KM forms the core capability to achieve competitive advantage.

2.11 KM Research Related to Present Study

This chapter provided an ‘encapsulated’ treatise of the existing understanding (and misunderstanding) about KM concepts, strategies, implementation roadmaps and managerial challenges. The aim and focus of this chapter was to provide an overview of KM as the broad management discipline and hence can be viewed as a management guide for implementing KM systems in an organisation. Within
this overview, the context has been established for KM Performance Measurement, which is the subject of present research.

From a researcher’s viewpoint however, some concepts of KM have to be taken up in a little more detail for understanding and establishing relevance with KM assessment and performance evaluation. Also the KM-IT nexus – though already explained in this chapter at an overview level – requires to be surveyed in-depth for settling the ‘confusion’ decidedly before proceeding further. These ‘supplementary’ issues/ concepts of KM are taken in the initial part of next chapter on literature review.

After taking up these supplementary KM concepts in the initial part, the next chapter then provides a review of the present literature on KM applications in consulting firms and the present state of research on KM performance measurement. The implications of the literature reviewed for the present research are also given alongside.