

Concept of Knowledge

Knowledge is increasingly being recognized as the new strategic imperative of organizations. The most established paradigm is that knowledge is power. The common attitude of most people is to hold on to one's knowledge since it is what makes him or her an asset to the organization. The new paradigm is that within the organization knowledge must be shared in order for it to grow. It has been shown that the organization that shares knowledge among its management and staff grows stronger and becomes more competitive. This is the core of knowledge management – the sharing of knowledge.

Understanding Knowledge

In order to understand knowledge management, it is necessary to first understand the concept of knowledge. What is knowledge? How is it different from information? And how is information different from mere data?

We begin with data. What is data? Data is a number or word or letter **without any context**. For example, numbers like 5 or 100, without any context, are mere data. Without reference to either space or time, these numbers or data are meaningless points in space and time. The key phrase here is “out of context” A mere collection of data is not information. This means that if there is no relation between the pieces of data, then it is not information. What makes a collection of data information is the understanding of the relationships between the pieces of data or between the collection of data and other information. In other words, what is essential to makes data or a collection of data, information is the **context**, that is, the relation between the pieces of data.

In general, information remains relatively static in time and linear in nature. Since information merely provides the relationship between data, it therefore does not provide a foundation for why the data is, what it is, and does not indicate as to how the data is likely to change over time.

When information is further processed, it has the potential for becoming knowledge. Information is further processed when one finds a pattern relation existing among data and information. And when one is able to realize and understand the patterns and their implications, then this collection of data and information becomes knowledge. While information context dependent, knowledge creates its own context. These patterns which represent knowledge have a characteristic of being complete. These patterns are dynamic. They are constantly changing. But when these patterns are fully understood, there is a high level of predictability and reliability as to how the patterns will change or evolve over time.

Types of Knowledge

Knowledge is an essential asset that has become more important than land, labor or capital in today's economy. In general, there are two types of knowledge: tacit knowledge and explicit knowledge. Tacit knowledge is that stored in the brain of a person. Explicit knowledge is that contained in documents or other forms of storage. Explicit knowledge may therefore be stored or imbedded in facilities, products, processes, services and systems. Both types of knowledge can

be produced as a result of interactions or innovations, relationships or alliances. Both tacit and explicit knowledge enable organizations to respond to novel situations and emerging challenges.

Tacit knowledge

Tacit knowledge is personal. It is accumulated through study and experience. It is developed through the process of interaction with other people, practice of trial and error and the experience of success and failure. Tacit knowledge is context-specific. It is difficult to formalize, record, or articulate. It includes subjective insights, intuitions and conjectures. As intuitive knowledge, it is difficult to communicate and articulate. The degree and facility by which it can be shared depends to a great extent on the ability and willingness of the person possessing it to convey it to others.

Tacit knowledge can be shared and communicated through various activities and mechanisms. Activities include conversations, workshops, on-the-job training and the like. Mechanisms include, among others, the use of information technology tools such as email, groupware, instant messaging and related technologies.

The very first hurdle to most organizations is identifying the tacit knowledge that is useful to the organization. Once relevant tacit knowledge is identified, it becomes extremely valuable to the organization possessing it because it is a unique asset that is difficult for other organizations to replicate.

Accordingly, it is essential for an organization to discover, propagate and utilize the tacit knowledge of its employees in order to optimize the use of its own intellectual capital. In any organization, tacit knowledge is the essential prerequisite for making good decisions.

Explicit knowledge

Explicit knowledge is codified. It is stored in documents, databases, websites, emails and the like. It is knowledge that can be readily made available to others and transmitted or shared in the form of systematic and formal languages. Explicit knowledge comprises anything that can be codified, documented and archived. These include knowledge assets such as reports, memos, business plans, drawings, patents, trademarks, customer lists, methodologies, and the like. They are kept in a form that can readily be accessed by interested parties and replicated if desired. In many organizations these knowledge assets are stored with the help of computers and information technology.

Explicit knowledge is not completely separate from tacit knowledge. The two are mutually complementary. Without tacit knowledge it will be difficult to understand explicit knowledge. For example, a person without technical, mathematical or scientific knowledge (tacit knowledge) will have great difficulty understanding a highly complex mathematical formulation or chemical process flow diagram, although it may be available from the organization's library or databases (explicit knowledge).

And unless we try to convert tacit knowledge to explicit knowledge, we cannot reflect upon it, study and discuss it, and share it within the organization.

Defining Knowledge Management

There is no universally accepted definition of knowledge management. Put very simply, knowledge management is the conversion of tacit knowledge into explicit knowledge and sharing it within the organization. Putting it more technically and accurately, knowledge management is the process through which organizations generate value from their intellectual and knowledge based assets. Defined in this manner, it becomes apparent that knowledge management is concerned with the process of identifying, acquiring, distributing and maintaining knowledge that is essential to the organization.

There are various definitions of knowledge management. All these definitions hint at the same idea but each one focuses on a particular aspect of knowledge management. For example, a results-oriented definition may state that knowledge management is “to have the right knowledge at the right place, at the right time in the right format.” On the other hand, a process-oriented definition may describe knowledge management as “the systematic management of processes by which knowledge is identified, created, gathered, shared and applied.” And a technology-oriented definition may present a formula for knowledge management as “business intelligence + collaboration + search engines + intelligent agents.”

Aspects of Knowledge Management

There are two main aspects of knowledge management, namely, information management and people management. Viewed from this perspective, knowledge management is about information, on one hand, and people, on the other.

The term information management is associated with the management of knowledge related to objects that are identified and handled by information systems. As a result of continuous reflection on the subject, information management has further developed into knowledge management. Entrepreneurs and managers have become more aware that knowledge is an even more valuable resource of the organization. In practice, knowledge management involves, the identification and mapping of intellectual assets within an organization. This basically means identifying who knows what within the company. When viewed from this perspective, knowledge management can be considered as a process of performing an audit of intellectual assets focusing on the organization’s unique resources and their crucial functions.

The second aspect of knowledge management is people management. Basically, this involves the management of tacit knowledge that resides inside the brains of the people. In actual practice it entails managing the knowledge that exists alongside organizational processes involving a complex set of dynamic skills, know-how and other knowledge-related capabilities. In order to effectively manage the people that possess the desired tacit knowledge, it is essential to take into consideration their cultural and social values, attitudes and aspirations, and likes and dislikes. If this can be done successfully, it can lead to the creation of new knowledge that otherwise cannot be accomplished by information management alone.

It is precisely in this manner that knowledge management can complement and enhance the impact of other initiatives of the organization such as total quality management, business process re-engineering, and organizational learning. It is evident that knowledge management initiatives can be applied in a variety of domains to achieve superior results within almost any type of organization. And it is possible to achieve these results regardless of the level of technological availability or the market sector concerned.

Elements of Knowledge Management

A complete knowledge management system must contain four elements. These are: (a) knowledge creation and capture, (b) knowledge sharing and enrichment, (c) information storage and retrieval, and (d) knowledge dissemination.

Knowledge Creation and Capture

The first element of knowledge management is knowledge creation and capture. Knowledge is continually being created in any group, corporation or organization since the very interaction among people generates knowledge. One of the primary aims of knowledge management is to capture the knowledge that is produced during such interactions. As a consequence of the highly competitive nature of today's markets, there is increasing need within corporations and organizations to create new knowledge, generate novel ideas and concepts, and to capture these knowledge, ideas and concepts. The very survival of a corporation sometimes depends largely on how much new and advanced knowledge it can generate, capture and utilize in order to produce a more competitive or attractive product or service. For this reason, two factors have become of utmost importance in determining competitiveness – creativity and innovation. These two factors have become not only important, but essential, to the long-term viability of the corporation or organization.

Unless an organization is able to create new products, develop more efficient manufacturing processes, or introduce improvements in design or function, it will have great difficulty in competing in fast changing markets. The creation of new knowledge will not be possible without creativity and innovation. These are the two most important skills needed to make the organization more productive and competitive. For this reason, creativity and innovation require proper management.

Brainstorming is one of the most common methodologies used to bring out creativity and innovation from individuals. Different individuals have different levels of knowledge about some things as well as different ways of looking at the same thing. The process of brainstorming makes possible the sharing of views and ideas and mental models commonly used by individuals. It is also through this process such ideas, views and mental models can be challenged and defended and further elaborated or modified. Through brainstorming it becomes possible to bring out the diversity of perspectives and mental sets that exists in the brains of the participants. By properly managing such brainstorming sessions, it is possible to produce a composite perspective on a common problem. This composite perspective could lead to innovation and new knowledge.

Knowledge can be captured in various ways. Knowledge from outside the organization can be captured by accessing different sources such as publications, websites, emails and the Internet. Explicit knowledge from within and outside of the organization can be captured in various forms such as printed reports, record of meetings, copies of memos and the like. On the other hand, tacit knowledge can be created and captured during discussions and meetings with office colleagues, stakeholders, institutional partners, consultants and experts. Seminars and workshops also provide excellent venues for creating and capturing tacit knowledge that may come from the speakers or the participants.

Content management

A principal component of knowledge creation and capture is content management which involves the creation of an information database. In general, three essential decisions are involved in the process of populating the information database.

The first decision is on how new information will be created, contributed and published. Information can be contributed in many ways. It can be submitted into the database via a prescribed form or it can be contributed through web page, email, shared public folders and shared network directories.

The second decision is on who will have the access or rights to subsequently update or delete information in the database. Users of a database are usually provided multiple paths to facilitate access to information. On the other hand, contributors to the database should not encounter too many barriers as to discourage them from further contributing useful data or information. For these reasons, the system's ability to distinguish those who have rightful access from those who have not, is an important component of content management.

The third decision is on which information are worthy of inclusion in the database. Information from documents, web pages and emails are generally not structured in accordance to the requirements of the database. On the other hand, information that is retrieved from the database is usually structured in a certain way. Content management requires that there be a means to determine which structured information from databases and unstructured information from other sources are to be included in the system.

Submission and indexing

There are many ways by which knowledge or information can be gathered and submitted into the KM system. Information can be collected from existing data storage systems within an organization. Information can also be automatically captured as they are created, for example, from structured reports being prepared by the staff. Alternatively, authors can first write the reports and submit them when complete. It is important that the process of submitting information or knowledge be designed in a way that it is as natural as possible. It must be unobtrusive and as closely integrated as possible with the organization's day-to-day systems and processes. This will encourage the users to submit their contributions and follow the set procedures. To facilitate the subsequent retrieval of information, it is necessary to tag content as data and information are added into the database or KM system.

This can be done by creating a web interface through which a user can submit a document to the system. The user will then be asked to answer a series of questions about the document. Through the answers provided by the user, the document will be properly tagged or categorized, which will facilitate subsequent search and retrieval. This is achieved through what is termed XML indexing. By indexing the organization's file system information and data can be captured and organized. Information can become search-able as a component of a central depository by generating a keyword index against the files. Compared to a system where users have to submit or post new documents, this system of indexing is easier to use and implement. However, this system suffers from two disadvantages: first, this indexing method does not support the same level of categorization in comparison to a more active system; and second, this may require the development of workflow processes such as an approval process to validate the information.

Knowledge Sharing and Enrichment

The second element of knowledge management is knowledge sharing and enrichment. This element is probably the most crucial among the four. It is during the process of sharing that knowledge is usually refined and enriched. Knowledge can be shared by the organization with its employees (e.g., through memos and instructions) and sharing of knowledge can occur between employees of the organization (e.g., through group discussions and internal meetings) as well as with people outside of the organization (e.g. through attending seminars and workshops). Knowledge sharing does not automatically take place. It must be encouraged and nurtured. In general, it is necessary to facilitate communication and nurture the right culture within the organization in order for proper sharing of knowledge to take place.

Knowledge sharing can be enhanced through the implementation of appropriate technologies, operations and systems that stimulate collaboration, facilitate the process of sharing, and reward those individuals that share the most knowledge as well as the individuals that actually utilize knowledge that have been shared. Organizations are generally able to make decisions with impact when knowledge is efficiently shared. They are able to make and execute decisions rapidly.

Information Storage and Retrieval

The third element of knowledge management is information storage and retrieval. The organization should ensure that acquired or shared knowledge is readily accessible to others. This can be done by storing information in a centralized location with sufficient provisions for easy retrieval. For example, reports, statistical data on economic, social and environmental areas can be stored in databases.

There are four main options for storing the information that are captured or shared. These are: (a) file system storage (local and network directories and folders); (b) databases; (c) e-mail; and (d) websites (intranet and external).

In order to facilitate retrieval, a two-step process has to be implemented: first, the information should be divided into manageable units; and second, each unit should be categorized. Once the repository of information is created and populated, the next step will be to provide various means

for users to have access to the information needed. Since users have different levels of technical expertise and have different purposes for accessing information, multiple access methods will have to be provided.

Knowledge Dissemination

The fourth element of knowledge management is knowledge dissemination. Unless knowledge is effectively disseminated, the development impact of knowledge will remain limited. It requires the transformation of highly individualized tacit knowledge into explicit knowledge that can be more widely shared.

Intellectual Capital

Those pieces of knowledge that are of business value to the organization referred to as intellectual capital or assets. Intellectual assets generally refer to an organization's recorded information, and human talent where such information is typically either inefficiently warehoused or simply lost, especially in large, physically dispersed organizations. Although some of these are more visible (e.g., patents, intellectual property), the majority consist of know-how, know-why, experience, and expertise that tend to reside within the head of one or a few employees

Intellectual capital is often made visible by the difference between the book value and the market value of an organization (often referred to as goodwill). Intellectual assets are represented by the sum total of what employees of the organization know and what they know how to do. The value of these knowledge assets is at least equal to the cost of re-creating this knowledge.

Some examples of intellectual capital include:

1. Competence—the skills necessary to achieve a certain (high) level of performance.
2. Capability—strategic skills necessary to integrate and apply competencies.
3. Technologies—tools and methods required to produce certain physical results.

Components of intellectual capital consist of human capital, structural capital and external (customer) capital.

Human capital

Human capital is the knowledge, skill and capability of individual employees providing solutions to customers. Human capital is the firm's collective capability to extract the best solutions from the knowledge of its people. It is important because it is a source of innovation and strategic renewal.

Structural capital

Structural capital is the firm's organizational capabilities to meet market requirements. This consists of a wide range of patents, concepts, models, and computer and administrative systems. These are created by the employees and are thus generally 'owned' by the organization.

External Capital

External capital is also named relational capital and customer capital. Relational capital refers to the organization's relationships or network of associates and their satisfaction with and loyalty to the company. It includes knowledge of market channels, customer and supplier relationships, industry associations and a sound understanding of the impacts of government public policy.

Decision Support System

Decision support systems are interactive, computer-based systems that aid users in judgment and choice activities. They provide data storage and retrieval but enhance the traditional information access and retrieval functions with support for model building and model-based reasoning. They support framing, modeling, and problem solving.

Typical application areas of DSSs are management and planning in business, health care, the military, and any area in which management will encounter complex decision situations. Decision support systems are typically used for strategic and tactical decisions faced by upper-level management—decisions with a reasonably low frequency and high potential consequences—in which the time taken for thinking through and modeling the problem pays off in the long run.

There are three fundamental components of DSSs.

- Database management system (DBMS). A DBMS serves as a data bank for the DSS. It stores large quantities of data that are relevant to the class of problems for which the DSS has been designed and provides logical data structures. It should also be capable of informing the user of the types of data that are available and how to gain access to them.
- Model-base management system (MBMS). The role of MBMS is analogous to that of a DBMS. Its primary function is providing independence between specific models that are used in a DSS from the applications that use them. The purpose of an MBMS is to transform data from the DBMS into information that is useful in decision making.
- Dialog generation and management system (DGMS). The main product of an interaction with a DSS is insight. As their users are often managers who are not computer-trained, DSSs need to be equipped with intuitive and easy-to-use interfaces. These interfaces aid in model building, but also in interaction with the model, such as gaining insight and recommendations from it. The primary responsibility of a DGMS is to enhance the ability of the system user to utilize and benefit from the DSS.

Characteristics of DSS: - The characteristics of the DSS are as follows: -

1. DSS focus on towards providing help in analyzing situations rather than providing right information in form of various types of reports.
2. DSS is individual specific. Each decisions maker can incorporate his own perceptions about the problem and analyze its effect.
3. DSS incorporates various mathematical, statistical and operations research models.
4. DSS is only supportive in nature and human decisions makers still retain their supremacy. It does not thrust its outcomes on the decision maker.
5. DSS is effective in providing assistance to solve semi-structured problems at all levels. It is used at first line, middle level and top level management.
6. DSS needs an effective database management system. It is extensively uses databases.
7. DSS helps decisions makers to carry out 'What-if' analysis.

Steps in constructing a DSS

There are following steps which are constructing the DSS.

1. **Identification of the problem:** - In this stage the developer and the knowledge engineer interact to identify the problems. The following points are discussed:-
 - i) The scope and extent are analyzed.
 - ii) The return of investment analysis is done.
 - iii) The amount of resources needed is identified.
 - iv) Areas in the problems that can give much trouble are identified and a conceptual solution of that problem is found.
 - v) Over all specification is made.
2. **Decision about mode of development:** - Once the problem is identified, the immediate step would be to decide about the tool for development. In this stage various shells and tools are identified and analyzed in details for their suitability.
3. **Development of a prototype:** - Before the development of a prototype we decide the knowledge level to solve the particular problem. For this we adopted some methods in sequence. After this the taste of knowledge begins the knowledge of Engineer and developer which interact frequently and domain specific knowledge is entranced. When knowledge representation scheme and knowledge is available a prototype is constructed.
4. **Prototype validation:** - The prototype under goes the process of testing for various problems and revision of the prototype takes place. It is very important step the DSS.
5. **Planning for full scale system:** - In prototype construction, the area in the problem that can be implemented with relative ease is first choice extensive planning is done. Each subsystem development is assigned a group leader and schedules are drawn.
6. **Final implementation, maintenance and evaluation:** - This is the final stage of DSS Life Cycle. The full scale system developed is implemented at the basic resources requirements are fulfilled and parallel conversion.

Role of DSS in Business

DSS is computer based information system for management decision maker who deal with the semi-structured problems. DSS play an important role in business. It performs various activities.

1. What if analysis
2. Goal oriented
3. Risk analysis
4. Model building
5. Graphical analysis

1. What - if analysis: - This is the process of assessing the impact of variables. This helps managers to be proactive rather than reactive in their decision making. This analysis is critical for semi-structured and unstructured problems because the data necessary to make such decisions are not available.

2. Goal oriented: - It is process of determining the input values required to achieve a certain goal. For example house buyers determine the monthly payment they can afford (say for example Rs. 5000/-) and calculate the number of such payments required to pay the desired house.

3. Risk analysis: - Risk is the important factor which affects the business enterprise. DSS allows managers to assess the risks associated with various alternatives. Decisions can be classified as low risk, medium risk and high risk. A DSS is particularly useful in medium risk and high risk environments.

4. Model building: - DSS allows decisions markets to identify the most appropriate model for solving the problems. It takes into account input variables; inter relationship among the variables problem assumptions and constraints. For example a marketing manager of a television manufacturing company is charged with the responsibility of developing a sales forecasting model for color TV sets.

5. Graphical analysis: - This helps managers to quickly digest large volumes of data and visualize the impacts of various courses of action. They recommend the use of graph when

- a) Seeking a quick summary of data.
- b) Forecasting activities.
- c) Detecting trends over time.
- d) Composing points and patterns at different variables.

Advantages of DSS :

1. Fast computation: - A decision maker can perform a large number of computations very quickly and that too at a low cost with the help of computer support systems.

2. Enhanced productivity: - Decision support system can enhance the productivity of support staff and also enable the group members to discuss the problems among themselves as a distance.

3. Better decisions: - Computer support system can help a decision-maker in arriving at a better decision. For example, more alternatives can be evaluated, risk analysis be performed quickly, and views of experts from different places can be collected quickly and at a lower cost.

4. Data transmission: - Sometimes the data, which may be stored at different locations, may be required to be transmitted quickly from distant locations. Computer support system can search, store, and transmitted the required data quickly and economically.

Group decision support system (GDSS):- A group decision support system is a decision support system that facilitates decision making by a team of decision makers working as a group. The importance of collective decisions is being felt today. For main issue to be sorted out, brainstorming sessions are carried out and the collective pool of ideas and opinions give a final shape to a decision.

A GDSS is a DSS that facilitates decision making by a team of decision maker working as a group.

“A GDSS is an interactive, computer based system that facilitates solution of unstructured problems by a set of decisions makers working together as a group. A GDSS is superior then DSS because in GDSS the decisions are taken by a group of DSS. So it is superior to the DSS.”

Characteristics of GDSS : The main features of GDSS is explained as follows,

- I) A GDSS is a goal oriented. A GDSS is designed with the goal of supporting groups of decision makers in their work.
- II) A GDSS is a specially designed information system.
- III) A GDSS is easy to learn and to use.
- IV) A GDSS is designed with the goal of supporting groups of decisions makers in their work.
- V) The GDSS is designed to encourage activities such as idea generation, conflict resolution and freedom of expression.

Advantages of GDSS

1. Take better decision: Through the GDSS we can take better decisions because the under GDSS the decisions are taken by a group of DSS.

2. To solve the problem: GDSS provide solution to unstructured problems. GDSS collects various type of information at various sources.

3. To minimize the risk: GDSS allows managers to assess the risks associated with various alternatives. This helps managers to be proactive rather than reactive.

4. To collect large amount of information: GDSS collect information at various sources for making decision making. This information minimizes the risk.

5. To provide interactive communication: GDSS provide interactive communication. It takes better decision through the interactive communication.

6. To improve the decision making process :GDSS improve the decision making process because GDSS is a goal oriented. When the GDSS is designed the goal is considered.

7. To make coordination in various activities : In GDSS decision are taken by a group of DSS. The work is divided into different parts then each DSS performs own work. So the coordination is possible.

Disadvantage of GDSS : The disadvantage of GDSS are as follows: -

1. More chances for clash of opinions are there.
2. Very large group bring work complex.