
FUNDAMENTALS OF KNOWLEDGE SHARING IN DIGITAL ERA : A NEED-BASED APPROACH

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Abstract

Knowledge is widely recognized as a critical organizational resource irrespective of economic sector or type of organization. It is difficult if not possible to maximize the values of this resource without adequate understanding of how to leverage and share knowledge throughout the organization. Knowledge plays an important role in the overall development of intellectual capital of any organization. We are now shifting from information society to knowledge-based society, where we are not so much bothering about the visible or tangible information but deeply thinking about intangible information i.e. knowledge. In this knowledge-based society the main strategic resources are knowledge. And knowledge is the fuel, which is driving today the technology, economy, and the society itself. In this changing context there must have systematic way to capture, process, store and ultimately share knowledge for the development of an organization as well as society. Present Paper attempt to highlight the principles, efforts and barriers of knowledge sharing in Digital Environment

Keywords : Knowledge Sharing, KQML, Knowledge Management

1. Introduction

Knowledge is defined variously as (i) facts, information, and skills acquired by a person through experience or education; the theoretical or practical understanding of a subject, (ii) what is known in a particular field or in total; facts and information or (iii) awareness or familiarity gained by experience of a fact or situation. Philosophical debates in general start with Plato's formulation of knowledge as "justified true belief". There is however no single agreed definition of knowledge presently, nor any prospect of one, and there remain numerous competing theories. There are different types of knowledge available in an organization, which required to be shared. Before managing we have to understand the categories of knowledge. These are as follows :

- 1) **Explicit knowledge :** Explicit knowledge is what we encounter in books, formulas, and rules and can easily pass along from one person to another. Conventional knowledge gathering and learning techniques are geared towards this type of knowledge. It is crisp and factual and can be encoded into operating procedures and guidelines. These are traditional form of knowledge and are available in the documented form. It is also called declarative or sequential knowledge.

- 2) **Tacit knowledge** : In real-world we encounter a different type of knowledge, tacit knowledge. This knowledge is the know-how gained through years of on-the-job experiential learning by experts in the field. It is usually acquired by hit-and trial and by observing episodes from a diverse set of experiences. It is also acquired by apprenticeship under more seasoned experts. Unlike explicit knowledge, tacit knowledge is not easy to capture, quantify. This is a type of personal knowledge, which is in human brain, which is hard to formalize and is often too difficult to communicate and manage. This type of knowledge is very much important in knowledge sharing process.

Tacit knowledge is an art-form. Yet, it is practiced by many professionals: doctors, lawyers, engineers, plant-operators; and at all levels: operational, tactical, and strategic. When these tacit-knowledge workers leave, employers lose unsaid amounts of an intellectual capital. When knowledge engineering methods, which are meant for explicit knowledge elicitation, capture, and storage, are used for tacit knowledge they are unable to yield results. MindModeler is a tool and method, based on cutting edge research on psychology and artificial intelligence, which overcomes these barriers. It accesses two primary areas of the mind: the semantic memory and the episodic memory and elicits information from them. The semantic memory is the area where we keep knowledge about factors and the relationships between those factors. The episodic memory is that area of the mind where we store information about past instances. The MindModeler takes this information and builds robust mathematical models from it. These models can then be used as representations of the tacit knowledge of expert's expertise. Once computerized, the user interface allows interactive manipulations on these models namely:

- What-if analyses: what will be the outcome of changing multiple causes or stimuli? - a type of simulation
- Goal-seeking: how to achieve a desired objective under constraints?
- Categorizations: What factors behave similarly in the model
- 2-D and 3-D Graphing: What are the relationships of the factors w.r.t. each other over their operating ranges?

From these interactions, sometimes new knowledge is also surfaced which was not apparent to the expert unless he was able to see it in living color in front of him. The tacit knowledge is sometimes called implicit or simultaneous knowledge. The tacit knowledge is of two types:

- ⌚ **Embodied knowledge** : It cannot be detached or separated from its knower, may also exist across a group of people.
- ⌚ **Embedded knowledge** : It resides in the process/things (e.g. sculpture) created by individuals.

Knowledge sharing is the process of communicating knowledge. It is well defined with the help of the diagram (Fig-1).

2. Knowledge Sharing: The Real Life Situation

Every company, organisation and center has somewhat isolated "pockets" of knowledge that are represented by employees throughout the organization's various departments and workgroups. These pockets usually don't stray too far beyond their own small

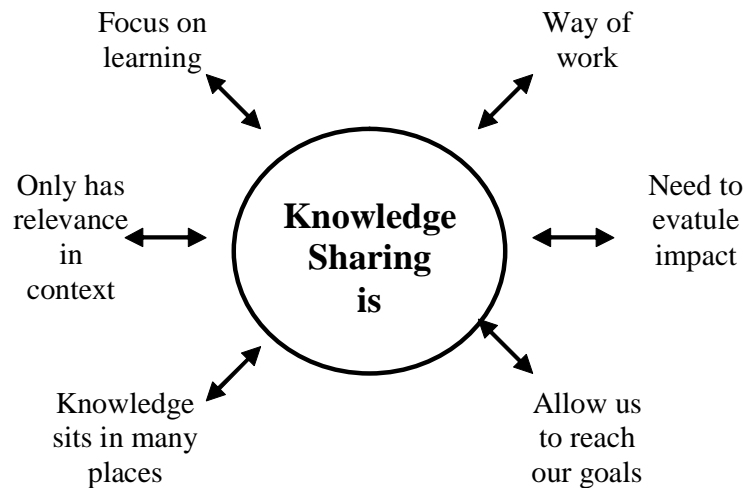


Fig-1: Knowledge sharing

circles. But there may very well be a large portion of the corporate population who will also benefit from this expertise and knowledge – unfortunately; they may never know it exists. Employees from other departments or remote offices could be climbing the walls trying to figure out a problem when the answers already exist from within the organization. And as employees of the same company, you would think that there should be a mechanism for the dissemination of this information. This is where knowledge-sharing systems come into play. Knowledge sharing has always taken place informally and manifests itself in many forms – whether you're aware of it or not. It happens when you pass a colleague in the hallway and asks them their opinion on a problem; when you solicit user feedback on a project or topic; when you're in roundtable meetings with colleagues. Knowledge is passed from mouth to mouth with little permanent record. And when knowledge bearers leave an organization, they take all their expertise with them. The only hope is that they imparted enough of their knowledge onto the remaining staff so that they can continue to carry on this information/knowledge life cycle. Knowledge sharing systems don't have to start from scratch either; the knowledge already exists in the form of the knowledge pockets I mentioned earlier. Developers only need to develop a framework in which to consolidate, manage, and publish all this information. The goal here is to allow an organization to tap into the collective knowledge of its employees in a centralized environment with a distributed model of knowledge management.

The key issue is getting people to think of themselves as part of a larger, collaborative community. However, changing people's behavior doesn't come easily, especially if they've been used to working independently. Today, the creation and application of new knowledge is essential to the survival of almost all businesses. There are many reasons. They include: -

- **Intangible products** - ideas, processes, and information are taking a growing share of global trade from the traditional, tangible goods of the manufacturing economy.
- **New Knowledge**-Increasingly the only sustainable competitive advantage is continuous innovation. In other words the application of new knowledge.
- **Increasing turn over of staff**- People don't take a job for life any more. When someone leaves an organization their knowledge walks out of the door with them.
- **Awareness**-Our problem as an organization is that we don't know what we know". Large global or even small geographically dispersed organizations do not know what they know. Expertise learnt and applied in one part of the organization is not leveraged in another.
- **Accelerating change** - In technology, business and social. As things change so does our knowledge base erode - in some businesses, as much of 50% of what you knew 5 years ago is probably obsolete today.

3. Knowledge Sharing Vs Knowledge Management: Where we are Going

Many practitioners of knowledge management increasingly see "knowledge sharing" as a better description of what they are about than "knowledge management". Advantages of "knowledge sharing" as a term include its commonsense comprehensibility, along with a certain degree of inter-activity implicit in any sharing. Drawbacks of "knowledge sharing" include the possibility that even "sharing" is insufficiently interactive, and that it implies (falsely) that the existence of knowledge precedes the sharing process, thereby (wrongly) separating knowledge management from "knowledge creation" and "innovation" and "research". It also could be taken to imply that the activity stops when knowledge has been communicated and has not yet been applied, when it is obvious that the application of knowledge is what the activity should be about. These drawbacks can be overcome by using a whole phrase "knowledge creation, sharing and application" although then the advantages of brevity and simplicity are lost. As a shorthand term, "knowledge sharing" has advantages over "knowledge management" which some would argue is a contradiction in terms, being a hangover from an industrial era when control modes of thinking were dominant. Thus knowledge is not just an explicit tangible "thing", like information, but information combined with experience, context, interpretation and reflection. Knowledge involves the full person, integrating the elements of both thinking and feeling. Hence some object to the implicit suggestion in the use of the term "knowledge management" that knowledge can be so managed, as revealing a fundamental misunderstanding of the nature of knowledge.

Others would prefer to emphasize "learning", since the real challenge in implementing knowledge management is less in the "sending" and more in the "receiving", particularly the processes of sense making, understanding, and being able to act upon the information available. Overall, whatever the term employed to describe it, knowledge management is increasingly seen, not merely as the latest management fashion, but as signaling the development of a more organic and holistic way of understanding and exploiting the role of knowledge in the processes of managing and doing work, and an authentic guide for individuals and organizations in coping with the increasingly complex and shifting environment of the modern market economy.

4. Knowledge Sharing : Some Principles

The following list gives an idea of the types of things that have been included in various strategies. Simple statements like these make explicit the types of behaviors that the organization desires. Importantly, such principles must be customized for each setting and they generally work best when co-created rather than delivered from on high. The principles of Knowledge sharing are as follows:

- **Encourage questions**-Encourage people to ask questions, and recognize them when they do. Create opportunities for open and rigorous dialogue that allows assumptions to be explored and debated.
- **Go to the source**- Knowledge deteriorates as it is transmitted through a hierarchy. Wherever possible find the source and have a conversation with them.
- **Share**- Share what you know and help others to learn.
- **Relationships**-Value relationships and understanding between all divisions and invest in the development of these relationships.
- **Have we done this before?**- Build on what has been done rather than creating something from the ground up. Managers should ask, 'have we done this before?' when approached with ideas and issues.
- **Collaborate**-Link up with people outside your area to see if they are doing something your area can use. Form teams to collaborate on projects/tasks.
- **Value diversity**- Get new ideas and fresh perspectives into play. Teams work best when the people within them are diverse in both background and approach.
- **Synthesize**-Try to combine ideas from different fields.
- **Be approachable**- Approachability and accessibility have major impacts on knowledge sharing and communication. All staff, especially senior managers, need to be approachable and ensure all staff have the context they need to be successful in their roles.

- **Learn**- Learn before, learn during and learn after. Take time to reflect on what's happened and discuss this with your colleagues. Learn from experience Help others learn and grow. View mistakes and near misses as learning opportunities.
- **Be a team player**- Promote cooperation and trust; participate openly and actively in team projects, task forces and networks; uphold the team's ideas and proposals. Bring credit on yourself by acknowledging the contribution of others.
- **Empathize**- Consider things from the perspective of others. When you communicate, remember that people look at events in different ways and the value of your message is determined by the receiver, not by the sender.
- **Not only information**-We are talking about sharing knowledge and information – not just information.
- **Business Objective**-The purpose of knowledge sharing is to help an organization as a whole to meet its business objectives. We are not doing it for its own sake.
- **Productive**-Learning to make knowledge productive is as important if not more important than sharing knowledge.
- **Culture**-Changing a culture is tough. Not only does it mean change – which has always been tough – it means seeing the world in a different way. It means revealing our hidden paradigms like the tacit acceptance that "knowledge is power".

5. The Knowledge Cycle

In traditional organizations, knowledge tends to flow along organizational lines, from the top down. But that pattern seldom results in making knowledge available in a timely fashion and where it's needed the most. In organizations with managed knowledge, information can flow across organizational lines, reaching the people who can use it in ways that best promote the organization's goals and that enhance service to the customer at the same time.

How this happens can be understood by examining the four basic elements of the knowledge management cycle: find/create, organize, share, and use/reuse. Under "find/create," especially as it operates in a transportation organization, knowledge is gained through a variety of means, including publications, conferences and meetings, project experiences, research, and industry expertise. In the next step in the cycle, "organize," the knowledge is filtered and catalogued, and links to the outside are created. Then the information is shared for wide availability, making use of high-tech computer tools such as the Internet and other techniques such as conferences, journal articles, and the natural communication channels created in a collaborative work environment.

To help carry out the "organize" and "share" functions in a specific community of people having a common interest, many experts recommend a knowledge manager. This person has the task of soliciting good practices, indexing and cataloguing new information as it comes in, and serving as

an information broker by assisting people to obtain the information they need. The knowledge manager can also serve as an advocate for knowledge-sharing practices within and beyond his or her specific community of practice.

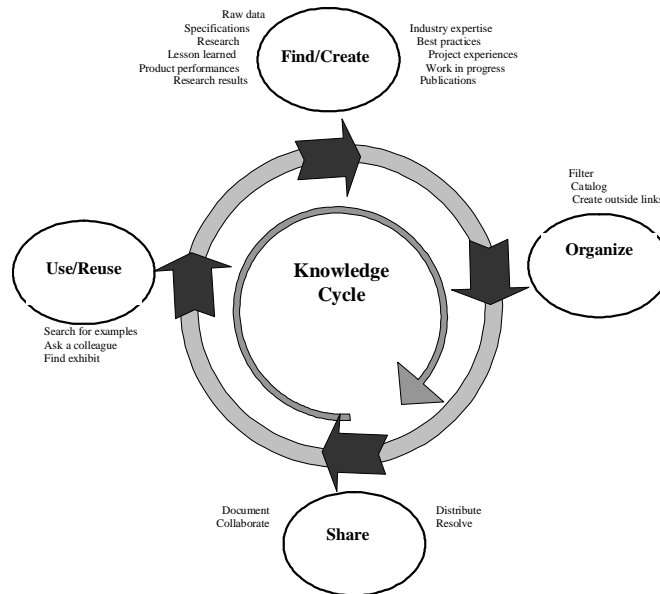


Fig-1: Cycle of knowledge

The final stage of the knowledge management cycle, "use/reuse," involves both informal contacts and access to reports, good practices, success stories, and other forms of communication, including exhibits, demonstrations, and training sessions. Much of this knowledge can be made available to a wide audience through the Internet. This is the step in which knowledge is applied and reapplied to solve real-world issues, such as building better bridges, operating roadways more efficiently, and improving highway safety. Of course, these results are then captured as part of the lessons learned for use as the knowledge cycle begins again.

6. The Role of ICT in Knowledge Sharing

Some people will argue that you do not need technology to implement a Knowledge Management programme. To some extent they are right - Knowledge Management is fundamentally about people - not technology. But it is also true that there is absolutely no way that you can share knowledge effectively within an organization - even a small one, never mind a large geographically dispersed one without using information and communication technology. Technology plays a crucial transformational role and is a key part of changing the corporate culture to knowledge sharing one. In many ways it is technology that has made knowledge sharing a reality - in the past it was

impossible to share knowledge or work collaboratively with co-workers around the globe. Today it is a reality. Information audit can effectively be done with the help of modern technology. Technology is not all good however. If implemented well and if people are trained and educated in its use, knowledge sharing technology is good. Not only can you find the information and knowledge you need quickly and effectively but you can post your knowledge on the system for access by others in the organization - be they at the next desk or on the other side of the world. Building new knowledge-based systems today usually entails constructing new knowledge bases from scratch. It could instead be done by assembling reusable components. System developers would then only need to worry about creating the specialized knowledge. This new system would interoperate with existing systems, using them to perform some of its reasoning. In this way, declarative knowledge, problem-solving techniques, and reasoning services could all be shared among systems.

6.1 The Knowledge Sharing Effort (KSE)

The **Knowledge Sharing Effort** (KSE) was initiated in 1990 by the Defense Advanced Research Projects Agency, an agency of the United States Department of Defense. It enjoyed the participation of dozens of researchers from both academia and industry. Its goal was to develop techniques, methodologies and software tools for knowledge sharing and knowledge reuse, at design, implementation, or execution time. The central concept of the KSE was that knowledge sharing requires communication, which in turn, requires a common language; the KSE focused on defining that common language. In the KSE model, software systems are viewed as (virtual) knowledge bases that exchange propositions using a language that expresses various complex attitudes (e.g., believing, asserting, wondering, desiring, etc.) about these propositions. The ARPA-sponsored Knowledge Sharing Effort is developing methodology and software for the sharing and reuse of knowledge. Much of this is very relevant for building agent-based systems, such as:

- **Knowledge Query and Manipulation Language (KQML)**

KQML is a language and protocol for exchanging information and knowledge. KQML can be used as a language for an application program to interact with an intelligent system or for two or more intelligent systems to share knowledge in support of cooperative problem solving. It focuses on an extensible set of performatives, which defines the permissible operations that agents may attempt on each other's knowledge and goal stores. The performatives comprise a substrate on which to develop higher-level models of inter-agent interaction such as contract nets and negotiation. In addition, KQML provides a basic architecture for knowledge sharing through a special class of agent called communication facilitators which coordinate the interactions of other agents. The ideas which underlie the evolving design of KQML are currently being explored through experimental prototype systems which are being used to support several test beds in such areas as concurrent engineering, intelligent design and intelligent planning and scheduling.

- **Knowledge Interchange Format (KIF)**

Knowledge Interchange Format (KIF) is a computer-oriented language for the interchange of knowledge among disparate programs. It has declarative semantics it is logically comprehensive. It provides for the representation of knowledge about the representation of knowledge; it provides for the representation of non-monotonic reasoning rules; and it provides for the definition of objects, functions, and relations.

7. Factor Affecting Knowledge Sharing Process

In the knowledge sharing process, there may possibly be three types of barriers. These are individual, organizational and technological. The different barriers are listed below.

7.1 Individual knowledge sharing barriers

- **Lack of time**-general lack of time to share knowledge, and time to identify colleagues in need of specific knowledge;
- **Fear**-apprehension of fear that sharing may reduce or jeopardize people's job security;
- **Awareness**-low awareness and realization of the value and benefit of possessed knowledge to others;
- **Domination**-dominance in sharing explicit over tacit knowledge such as know-how and experience that requires hands-on learning, observation, dialogue and interactive problem solving;
- **Usability**-use of strong hierarchy, position-based status, and formal power
- **Past mistake**-insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes that would enhance individual and organizational learning effects;
- **Experience**-differences in experience levels;
- **Time**-lack of contact time and interaction between knowledge sources and recipients;
- **Communication**-poor verbal/written communication and interpersonal skills;
- **Age**-age differences;
- **Gender**-gender differences;
- **Social application**-lack of social network;
- **Education**-differences in education levels;
- **Ownership**-taking ownership of intellectual property due to fear of not receiving just recognition and accreditation from managers and colleagues;
- **People**-lack of trust in people because they misuse knowledge or take unjust credit for it;

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- **Accuracy**-lack of trust in the accuracy and credibility of knowledge due to the source; and
 - **Cultural differences**-differences in national culture or ethnic background; and values and beliefs associated with it (language is part of this).

7.2 Organisational Knowledge Sharing Barriers

- **Integration of KM strategy and sharing initiatives** into the company's goals and strategic approach is missing or unclear;
- **Lack of leadership** and managerial direction in terms of clearly communicating the benefits and values of knowledge sharing practices;
- **Shortage of formal and informal spaces** to share, reflect and generate (new) knowledge;
- **Lack of transparent rewards** and recognition systems that would motivate people to share more of their knowledge;
- **Existing corporate culture** does not provide sufficient support for sharing practices;
- **Deficiency of company** resources that would provide adequate sharing opportunities;
- **External competitiveness** within business units or functional areas and between subsidiaries can be high.
- **Communication and knowledge flows** are restricted into certain directions (e.g. top-down);
- **Physical work environment** and layout of work areas restrict effective sharing practices;
- **Internal competitiveness** within business units, functional areas, and subsidiaries can be high;
- **Hierarchical organization** structure inhibits or slows down most sharing practices; and
- **Size of business** units often is not small enough and unmanageable to enhance contact and facilitate ease of sharing.

7.3 Technological Knowledge Sharing Barriers

- **Lack of integration of IT systems** and processes impedes on the way people do things;
- **Lack of technical support** (internal and external) and immediate maintenance of integrated IT systems obstructs work routines and communication flows;
- **Unrealistic expectations of employees** as to what technology can do and cannot do;
- **Lack of compatibility** between diverse IT systems and processes;
- **Mismatch** between individuals' need requirements and integrated IT systems and processes restrict sharing practices;
- **Reluctance to use IT systems** due to lack of familiarity and experience with them;
- **Lack of training** regarding employee familiarization of new IT systems and processes; and

- **Lack of communication** and demonstration of all advantages of any new system over existing ones.

8. Conclusions

Knowledge sharing is the ultimate aim of knowledge management work. But question is there- why should people give up their hard-won knowledge, when it is one of their key sources of personal advantage? In some organizations, sharing is natural. In others the old dictum "knowledge is power" reigns. In practical field it is observed that knowledgeable people do like to share their expertise - just listen to them in the bar after work. It's just something about their work environment that discourages this natural inclination. Understanding these barriers and individual motivations is the first step towards creating knowledge sharing environment. How can we overcome such barriers? Certainly address the issues of organizational structure and inadequate technology. But focus will be given to the three Cs of Culture, Co-opetition (a blend of co-operation and competition), and Commitment. The knowledge can not be share but what situation we are working that can be share.

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