DEPARTMENT OF ABVM

LECTURE NOTES

KNOWLEDGE AND INFORMATION MANAGEMENT IN VALUE CHAIN
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Learning Task: Knowledge and Information Management in Value Chain

1. Introduction

Knowledge is a fluid mix of experience, values, contextual information, expert insight that provides a framework for evaluating and imbibing new experiences and information. Therefore, **knowledge management (KM)** is the process of creation, evolution, exchange and application of new ideas, which leads to the success of enterprise, advancement of the society and vitality in the nation's economy. This learning task is repository of knowledge regarding knowledge management. It has three sections covering topics from foundation of knowledge management, to Knowledge Management System and to Knowledge Management Technology and Tools.

1. Foundation of Knowledge Management

Definition of knowledge and knowledge management

Peter Ducker defines "knowledge" "as the capacity for effective action, clearly distinguishing it from data and information." Knowledge and Knowledge Management are words and terms that are being bantered around quite a bit today. Peter makes an observation that these are terms that have become fads. He makes the point that Knowledge Management is just another term in the ongoing continuum of business management evolution.

There are many definitions of knowledge. **A dictionary definition** is 'the facts, feelings or experiences known by a person or group of people' (Collins English Dictionary). Knowledge is derived from information but it is richer and more meaningful than information. It includes familiarity, awareness and understanding gained through experience or study, and results from making comparisons, identifying consequences, and making connections. Some experts include wisdom and insight in their definitions of knowledge. In organizational terms, knowledge is generally thought of as being 'know how', 'applied information', 'information with judgment' or 'the capacity for effective action'.

The core essentials of all definition consider "Knowledge" as the sum of all coherent information, which conforms to environmental conditions. The term "Knowledge" is understood as the conscious or subconscious perception, information processing and accumulation of experiences. In organized terms, knowledge is generally thought of being "Know-how" or "applied action".

Knowledge comprises all cognitive expectancies-observations that have been meaningfully organized, accumulated and embedded in a context through experience, communication, or inference-that an individual or organizational actor uses to interpret situations and to generate

activities, behavior and solutions no matter whether these expectancies are rational or used intentionally.

Knowledge Management can be defined as a systematic discipline of policies, processes, and activities which empower organization to apply knowledge to improve effectiveness, innovation and quality. Knowledge Management is defined as 'the **creation, organization, sharing, and use of knowledge for development results'.**

Effective Knowledge Management means that an organization or network of partners (actors) gets the **right information to the right person at the right time** in a user friendly and accessible manner so that they can perform their jobs efficiently.

Lotus and **IBM** define "**Knowledge Management**" as a discipline to systematically leverage information and expertise to improve organizational **responsiveness, innovation, competency and efficiency.**

Responsiveness is often referred as the ability to rapidly respond to market changes. In the context of agriculture system, this is referred as the ability to marshal available resources to respond to unanticipated forces that often characterize the agriculture industry.

Innovation is associated with the successful fostering of an organization's creativity. This involves bringing people together across time and geography to share ideas and knowledge. The improvement in responsiveness and innovation often leads to the expansion in revenues for the organizations.

Competency is the ability to catalogue the knowledge and expertise held by employees in the organization and making it available to others. This involves the management of knowledge transfer to improve the skill of agriculture workers. The competency is achieved when the people have access to the right knowledge and possess the right skill and attitude to perform certain tasks.

Efficiency reflects the organizations require the tools to evaluate, organize and locate the relevant information and the associated expertise to facilitate e-business. There are numerous definitions of knowledge management. The following is from knowledge management consultants TFPL: 'The creation and subsequent management of an environment which encourages knowledge to be created, shared, learnt, enhanced, organized and utilized for the benefit of the organization and its customers.'

Birth/ Genesis of Knowledge

In Takeuchi and Nonaka's article, they contrast Western and Japanese approaches to KM. Their critique of our practice in the West exposes these underlying beliefs with great clarity. They

comment that we have focused on **explicit knowledge**—knowledge one can see and document—instead of dealing with the rich but intangible realm of "tacit" knowledge. They also say that we have focused our efforts on developing measures for and assigning values to knowledge. And continuing with a tradition that began with Frederick Taylor, we have called it "Knowledge Management," and treated it as a responsibility that can be assigned to a few of the elite.

1. Knowledge is created by human beings

One article title says this better; "Knowledge Sharing is a Human Behaviour." If we want to work with knowledge, we must attend to human needs and dynamics. (Perhaps we should rename it "Human Knowledge" to remind ourselves of what it is.) This learning is filled with implications for our practice. It refocuses our attention on each other and what we need, rather than trying to "decant" us. It can help us notice that when we focus on such things as "assets," that it is not knowledge that is the asset.

2. Human needs and motivation leads us naturally to create knowledge.

Study after study confirms that people want their work to provide growth, recognition, meaning, and good relationships. We want our lives to mean something, we want to contribute to others, we want to learn, and we want to be together. In addition, we must be involved in decisions that affect us. If we believed these studies, it would make working together far more productive and enjoyable. We would recognize that there are much positive energy is available. We could trust and respect one another; we could rely on one another. As a species, we are actually very good to work with.

3. Everybody is a Knowledge Worker

This truth was stated by one of my clients as an operating principle. If everybody is assumed to be creating knowledge, then the organization has a responsibility to provide open access to information to everyone. Moreover, we could assume that knowledge will be found everywhere in the organization, not just in a few functions or some special people. This is a clear learning from the Japanese experience with KM.

4. People choose to share their knowledge (Subjective & Objective)

The discovery in every organization of self-organized Communities of Practice is evidence of this willingness. Some of the conditions that make people willing to learn and share their leanings are: people understand and support the work objective or strategy; people understand how their work adds value to the common objective; people know and care about each other; people feel personally connected to their leaders; people feel respected and trusted.

5. Knowledge Management is not about technology

This would seem obvious from the preceding leanings, but it feels important to stress because, in the West, we are dazzled by technical solutions. If people are not communicating, we just create an intranet; if we don't know what we know, we just create an inventory data base; if we are geographically dispersed, we just put video cams on people's desks. However, these technical solutions do not solve a thing if other aspects of the culture - the human dimension - are ignored. BP did succeed in connecting their offshore rigs using desktop video cams. But they were also working simultaneously to create a culture that recognized individual contribution, and to rally employees behind a bold new vision. The organizations provide evidence that in the absence of face-to-face meetings, people have a hard time sharing knowledge. It is important to remember that technology does not connect us. Our relationships connect us, and then we eagerly use the technology.

6. Knowledge is born in chaotic processes that take time

But creativity is only available when we relax into confusion, open our minds to not knowing, and wait for insight to surprise us. New knowledge is born in messy processes that take time. Insights and innovations are the result of nurturing; they cannot be commanded to appear instantly, no matter how desperately we need them. In the UK, **Arthur Andersen** now lists self-awareness and reflection as critical leadership skills. Many authors here refer to companies that have created architectural spaces to encourage informal conversations, mental spaces to encourage reflection, and learning spaces to encourage journal writing and other reflective thought processes.

Dimension of Knowledge

There are four different but interrelated dimensions of knowledge

- First knowledge can be seen as cognition, a human faculty to perceive or conceive,
- Second, knowledge is practical, intrinsically woven into the daily practices of an individual or group;
- Third knowledge can be perceived as a property of the individual, enabling him or her to make inferences from experience, observation, and/or reasoning; and
- Finally, knowledge is socially constructed, embedded in the social dynamics of an organization, a community or group.

Types of Knowledge

Tacit or Explicit are two types of knowledge. Another distinguishing characteristic of KM as opposed to other information management fields is the ability of KM to address knowledge in all of its forms, notably, tacit knowledge and explicit knowledge.

Tacit knowledge (Implicit knowledge)

The knowledge or know-how (Skill or capability derived from knowledge and experience) is that people carry in their heads. Compared with explicit knowledge, tacit knowledge is more difficult to articulate or write down and so it tends to be shared between people through discussion, stories and personal interactions. It includes **skills, experiences**, **insight, intuition** and **judgment.**

Tacit Knowledge is personal knowledge embedded in individual experience and involves intangible factors such as personal belief, perspective, and the value system. Tacit knowledge is hard to articulate with formal language. Tacit Knowledge can be communicated into words, models or numbers that can be understand.

Explicit Knowledge

Explicit Knowledge can be recorded digitally in documents, records, patents and other intellectual property artefact. Explicit knowledge can be manipulated within the digital domain, can be articulated into formal language, a computer, transmitted electronically or stored in databases, can process words, numbers, in the documents manuals.

Knowledge is that can be expressed, articulated easily in words or numbers, and can be shared through discussion or by writing it down and putting it into documents, manuals or databases. Examples might include a telephone directory, an instruction manual, or a report of research findings.

Tacit Vs Explicit Knowledge

Explicit knowledge is knowledge that can be captured and written down in documents or databases. **Explicit knowledge is categorized as either structured or unstructured.** Documents, databases and spreadsheets are examples of structured knowledge because the data or information are organized for future retrieval. In contrast, e-mails, images, training courses, and audio & video selections are examples of unstructured knowledge because the information are not referenced for retrieval.

1.5. Role of Knowledge in business management

Knowledge is the necessity of today's business management, and the net work platform makes it technically feasible and economically viable. Twenty first century recognizes knowledge management as top management function. To understand the relevance of KM better, let us examine how business does better by leveraging knowledge and intellectual capital. Successful business operation and performance needs following qualities in the management team and processes of the organization.

- Proactive decision and action to pre-empt the adverse impact, or to exploit the advantage of the expected development
- Automated decision making systems and processes
- Ability to prejudge customer requirements
- Ability to anticipate competition moves
- Ability to paint different probable emerging business scenarios due to changes in environment(social, political, technical and scientific)
- Ability to develop newer and better sustainable competitive advantages
- Ability to think the impossible, out of the box and transform the business for the better

Hence, the relevance of knowledge, knowledge management and knowledge management system becomes obvious and strong for achieving superior business operations and business performances.

1.6. Context and relevance of knowledge economy

The 21st century is going through several changes and transformation affecting the economy due to globalization of business, regulatory changes in international trade, increasing customer awareness, demanding customers, and unstoppable progress of information and communication technologies (ICT). Management gurus like Tom Peters and Gary Hamel have given several prescriptions to deal with the changing business scenario in an effective manner. The essence of their recommendation is is that organizations should become more flexible, lean, flat and learn to be responsive to face a new challenges of the century.

For example in India the organization those were ranked 100 in the nineties have not maintained their ranking in the last decade. New organization have taken their place some of them have improved their ranking. The century wittiness new business models emerging out of re-structuring, re-defining, re-inventing the business, systems and processes. Those who did not the challenges of change have climbed down in the ranking or are facing the risks of extinctions.

The single most important deriver of this radical change is ICT affecting both the internal and the external world of the organization. ICT can be factored into six components:

Processing (computing, collaborating and communication), interfacing and ***connectivity*** (networking-LAN, WAN, internet), ***storage and sharing*** (DBMS and delivery technology), ***hardware*** (computers, laptops, PDAs, mobile phones, mobile devices), ***software*** (operating systems, languages and so on) and ***input types*** (data, text, audio/video, multimedia).

All these components are continuously improving, becoming more efficient and effective in performing business operations. The ICT revolution has transformed the business environment radically. It has affected the way we live, work and perform. Independent business organizations are now interdependent organizations. They collaborate to achieve the respective goals. They share information and have access to each other's information. The process scope now extends beyond the organization boundaries. All businesses have become customer centric. The customer initiates the process and the organization responds. Customer requirements and their fulfilments handled by the organization and its alliances partners, each doing a limited role based on its core competence. Along with the resources, information knowledge are also shared among them.

If the history of business researched, it will be found that the core competence and the deriver have changed in almost every decade since the seventies. First, it was the ability to procure raw material, then possession of manufacturing technology, followed capital capacity strength, and now knowledgeable learned human resource. The same transformation can be put in different way starting with agrarian economy, followed by industrial economy and now HR: knowledge economy.

In the era of agricultural economy, land was an asset and the landowner engaged people to cultivate the land to grow the crop by the season the water was the only resources available in plenty. The management strategy was to exploit the land for food production, limiting to the owners requirement. It was a local affair of the landowner and the people around. Commodities were exchanged in return for labour. The critical resource was land. Those who had land were the leaders.

In the industrial age, people were not paid for what they had, but were paid what they did and the employer told them how to do it. The management strategy was to turn raw materials into finished products more efficiently and effectively. Manufacturing technology, plant and equipment were the critical resources. The people engaged from converting raw material into product were paid for the hour spent by then in the factory. Business strategy was driven by

manufacturing capacity and underlying technology. Those who were leaders in these actives were also business leaders.

In the era of internet economy, the strategy was to get bigger market, split and could distribute the process of manufacturing amongst those who can do a thing best in all respects, and make whole business competitive. The connectivity for speed and collaboration for productivity was the business mantra. The sharing among the business partiers, very broadly, was that of factored process components, such as design, component manufacturing, assembly, distribution and delivery to the customer. The critical resource was management competence in core process management in such a way that the cost of product was competitive and the quality of the offer was very high. The business model was product centric as visualized by the management for the customers. It was termed ***'push model'***

The strategy was to exploit core competence by each business partners. Leverage was on what one could best and the rest was done by others. The product strategy largely driven by material and manufacturing resources. The management process was designed to push the product in the market. This model was called' ***inside out'***.

The changing landscape of the business

This century is termed as human resource (HR): knowledge economy. The economy is driven by the knowledge, the information and the people the organization have. In this economy, every aspect of business has changed radically. Business model, strategy, systems and processes are now very different from earlier. The critical resource of the business organization is information and knowledge possessed for proactive customer management. Manufacturing capacity and technology have become essential competitive necessities. But that is not enough; one should have customer knowledge in terms of requirement of functions and features of product or service, behavioural and operational needs, price, quality, the most important service, pre-and post-delivery. The business model is termed as customer centric '***pull model'***. This model is called as ***outside in***.

Paradigm shift in the way business is done

This century is witnessing and experiencing paradigm shifts in a number of areas. And knowledge is the key mover in making these paradigm shifts a success. ***Industrial Society is now Information and Knowledge Society.*** Any business, like agriculture, manufacturing, tourisms, hospitals, technologies, infrastructure, real-estate or, health care can survive and grow if it is

driven by information and knowledge. They are the only critical success factors. Let us list an information and knowledge entities in each business.

Agriculture: soil condition and seed, rainfall and temperature variation and their impact on crop output. Market needs and price changes, imports and exports trade treaties, and so on.

Manufacturing: which ever may be the product, manufacturing design is highly intelligent, and it selects technology in all capable of making decision based on the status knowledge. Manufacturing has become smart and self-driven based on knowledge input which it get on continuous basis.

Hospitality and Tourisms: the core competency in this industry is up-to-date knowledge about the people who are serviced according to their comfort, life style and social segment needs. Understanding customer behaviour and expectations and accordingly making changes in the service model is the key to success.

Technology: technology, in character, is no static It changes or becomes obsolete. Business like IT and ITes run on technology platforms. It is the key differentiator. Products and process are technology specific and any change in it call for changes in the product or services. Obtaining knowledge by keeping tab on technology trends in its life cycle is the survival need of the business in the sector.

Infrastructure and Real Estate: knowledge about demographic changes, migration trends upcoming cities and areas. Knowledge of needs about housing, roads, public amenities, and so on, is an absolute must.

Health Care: knowledge about demographic changes requiring different kinds of health care services, hospitals, medicines, insurance protections, etc, is an absolute must.

Learning activity

Group discussion on knowledge genesis, types of knowledge, knowledge economy and the changing landscape of business and its implication for Agribusiness and Value Chain

Continuous Assessment

Tests, ***assignment*** on how the nearby agro-industries are feeling and responding to the changing landscape of business; and ***reflections*** (self-assessment)-on the student's perception about the tacit knowledge s/she has, how s/he wants to externalize the knowledge.

Summary

This century is termed as ***Human Resource: knowledge economy***. In this economy, every aspect of the business has changed radically. Business model, strategy, systems and process are now different from earlier. The model is customer centric pull model unlike that of product centric push model. This century is witnessing an experiencing paradigm shifts in number of areas and knowledge is the key mover in making these paradigm shifts success. The history of business transformation records that the core competency and business drives have changed almost every decade since seventies. First, it was the ability to procure raw material, then possession of manufacturing technology followed by capital and capacity strength, and now knowledge learned human resources.

Information and Communication Technology (ICT) revolution has transformed the business environment radically. Independent business organizations are now interdependent organizations. They collaborate to achieve their respective goals. They share information and have access to each other information base. The business process scope now extents beyond the organization's boundaries. The customer initiates the process and the organization responds. The knowledge has three components, people, process and technology. Together they are termed as body knowledge. The people are the generators, users, custodians of knowledge. Technology is the facilitator and active participant in the knowledge management process. Organizations use knowledge to ride high on the customer value chain. They create sustainable competitive business advantages from the knowledge mix to remain ahead of the competition. The relevance of knowledge, knowledge management and knowledge management system becomes very obvious and strong for achieving superior business operations and business performances. If we take business growth, customer satisfaction is and superior balanced performance as the criteria to rank business organization, we will soon conclude that knowledge driven organizations have come on top of the list. The implication of knowledge economy is that there is no alternative way to prosperity than to make knowledge management of prime importance in the organization. There are to kinds of knowledge, tacit and explicit. Tacit knowledge is knowledge gained from experience, lessons learned during execution of projects insight gained with continuous problem resolution. In the knowledge economy, tacit knowledge is more important than formal, codified, structured and explicit knowledge. In knowledge driven economy, generation and exploitation of knowledge plays predominant part in the creation of wealth or value. In this economy importance of intellectual capital is highest as it is an important factor in valuation of organization and its business. In knowledge economy, a business model has changed to the customer centric pull model. The threat perception to business is more competition oriented. The resource-based growths in the market strategies are no longer adequately effective to challenge

competition. The customer centric business model needs knowledge driven strategies to focus on customer's requirement.

Chapter two. Knowledge and Information Managements Systems (KMS)

2.1. Generic Model of Knowledge Management System

Knowledge management system is defined as the process to manage knowledge in the organization in steps, beginning with identification, validation, creation, acquisition, codification and transfer, measurement and creation of intellectual capital and conversion of some into intellectual prosperity to meet the business strategy requirements and its implementation. The purpose of KMS is to support decision-making personnel and stakeholders in the organization with the online ready access to the organization knowledge resources***. It has to phases/cycles, development and management.*** We call the system dynamic because knowledge is not a fixed entity; it continuously changes and improves with application in business. Each phase of change or improvement is termed as a cycle.

This definition of KMS is extended to include the integration of knowledge in business operations and decision-making systems. Integration is done through business rules, model algorithms, formula and so on, embedded into the decision-making framework. The distinguishing features of KMS are:

- Purpose: it has a clear purpose to exist and grow. It has a place in the organization due its justified business cases
- Context: the system is required for knowledge creation, its organization and its application in solving business problems
- Scope: the scope of KMS includes the management of knowledge and its enabling IT infrastructure. The scope of KMS is limited to the organization and its business needs of knowledge.
- Processes: KMS detail processes are identification, creation, capturing, acquisition, selection, valuation, structuring, formalization, visualization, transfer, distribution, retention, maintenance, refinement, revision, revolution, accessing, and retrieval.

- Participants: KMS users are knowledge workers with different backgrounds and experiences. They play their managerial role by involving as participants in knowledge networks and communities. They are user as well as contributors to knowledge growth.
- Use: KMS business use is made by communities virtual organizations and societies to extract and generate knowledge for business application.
- Design: KMS design is open to change with changing needs of the business. It is flexible and caters to the needs and capabilities of the users of knowledge.
- Derivers: business strategy, technology and competitive pressures are the drives of KMS.

2.2. Knowledge Management System: Development Cycle

There are the following steps in knowledge development cycle:

a. Identify knowledge

This is the first step in the system. It examines the present knowledge base to see if it is adequate or new knowledge is to be searched to take the new strategy approach. The search for new knowledge becomes imminent because the world around is changing or has changed. The change environment may call for anew set of competitive advantages to make it undisputable differentiator from competition. The knowledge body is never static in business, and for the people and organization.

The current knowledge may no longer be relevant to face the competitive challenges. The five knowledge may call re-look from the business strategy point of view, to confirm its effectiveness. It is not just to confirm the adequacy and defectiveness of the existing knowledge portfolio; of the last, it has to search for new knowledge as additional weaponry to design the new strategy. The management focuses on **five knowledge** areas fro developing business strategy creating a competitive advantage. These are customer knowledge, product and service knowledge, process knowledge, people knowledge and technology knowledge.

- ***Customer knowledge***: the customer knowledge is all about different segments curved out of customer population based on different socio-economic conditions. The customer in each of this segments may have different considerations while demanding products and services. Hence, customer behaviour in each of the segments would differ. Customer knowledge about choices, preferences, therefore, needs to be continuously searched to

ensure that the communication strategy and associated supportive strategies are built on strong footing of current requirements and expectations.

- ***Product and service knowledge***: the customers demanding value for money. They want faster delivery cycles. The offerings (product and services) should not only meet in functional needs, but should also have smart features to make them efficient and effective. The customer choices are changing fast because of online access to the world market information. The demands are becoming more precise and focused on key functions. Customers want more automated products and services. They prefer products and services which requires less maintenance, less power and much less service; that are user friendly.
- ***Process knowledge***: process technologies undergoing rapid change. The process, for that matter, should lean and flexible. Process productivity should continuously so that the cost is reduced. Process knowledge means having knowledge of latest technology which derives the processes. Knowledge also includes the bench mark which the process designer should at to achieve. Process knowledge means the current measures in terms of cost, cycle time and quality of the process versus the benchmark.
- ***People knowledge***: the people here mean people in the organization who are deriving and executing the business and its processes. People knowledge means their capability and capacity to face the challenges and their ability to manage the changes effectively. This knowledge portfolio includes subject, function knowledge, social and technology skills. They should be creative and innovative to develop new strategies to meet the challenges of changing business environments. People knowledge is all about who is who and what knowledge they have.
- ***Technology knowledge***: modern business is driven by technology. It is an enabler to make system and processes efficient and effective. It helps to solve number of issues, like better use of resources, quick communication, prompt deliveries to customer, monitoring tracking of events, and so on. The organization must have up to date knowledge of current technology, also of the emerging technologies, so that they can be deployed for leveraging the benefits.

In the process of identification of knowledge, what is being achieved is the search for knowledge, which could be useful in the identification of problems due to the changing business environment, in the probable knowledge driven strategies, which could overcome these problems on implementation. It is expected that the knowledge search would help to develop the wining strategy.

b. Validation of knowledge

The objective of this step is to confirm the relevance, utility and application of knowledge to current problems of the business. In this phase identified knowledge crosschecked with current problems, probable solution, future trends and the likely strategy approach required to move ahead. This crosscheck shortlists the knowledge, which KMS should pursue to gain and consolidate.

c. Create knowledge

Creation includes number of strategies. They are:

- If knowledge already exists outside the organization, it needs **procurement.** It can be done by purchasing from research bodies, consultant organizations to provide knowledge by capturing through systematic methods, such as survey, test exercises, simulation models and so on, building alliances with the partners who possesses it and are willing to share and so on.

- If knowledge already exists with in the organization, it needs **processing to gather, capture.** The organization possesses knowledge and also aware where it is stored in the information systems, files and folders. A system is needed to process this source of knowledge to produce it in the required form, to store and share.

- If knowledge does not it needs a **design of experiment** to build. There is possibility that the identified knowledge does not exist in the organization or not available from external sources. The only alternative is to design and experiment around the subject of concern and conduct for a large sample size, or for a reasonable time period, to generate input-out put data. This data on analysis would provide a new insight into the problem and, may through up some guidelines on resolving the problem. Hence, new knowledge is created.

2.3. Knowledge Management System: Application Cycle

Knowledge transfer is the step taken in knowledge, knowledge objects are finalized for delivery to users. The transfer takes knowledge to the users and stays with him for use by choice. Sharing is a step where knowledge is at one location and access is given to authorized users for use as they like. Knowledge transfer is done in a number of ways. Some prominent ways and mechanisms of knowledge transfer are:

- Working together: internal consultants, personnel transfer, on the job training, handholding, informal visit and chat, mentoring.

- Communicating through formal channels: e-mail, fax, telephone, video conferencing, e-manuals, posting on knowledge portals.
- Creation of socializing opportunities: form communities of practice and interest, conduct workshop and seminars, and get together.
- Codifying knowledge for easy of transfer: make rules, policies, build protocols, procedures, models, programs, etc.
- Use data management technologies: develop knowledge basis, data warehouses, and knowledge repositories.

Knowledge, when created goes to knowledge repositories and then is handled through transfer processes. In some cases, it is transferred from individual to teams. In case of tacit knowledge, the transfer is daily routine, though not systematic in the formal since. Most of such transfers are at will and by choice of the user and the person who processes it. Knowledge is also present in databases, warehouses, books, programs and so on, is also transferred to users.

One of the prerequisite to knowledge transfer is codification of knowledge, which makes management of knowledge efficient and effective. The code is of two types, the first identifies of the knowledge and the other signifies its types, kind, domain and format. For example if knowledge relates to customer requirements and is explicitly expressed in relation matrix then relevant identifications keys are put into the code.

Three entities are involved in transfer of knowledge. They are source of knowledge repository and the media holding it, methods of transfer and recipient, a user of knowledge workers.

Sharing is the process of transfer where experts share knowledge on demand by the user. This may happen if expert has no issue in sharing it or he welcomes the sharing in the interest of the organization. The transfer of sharing operation takes place on the network, supported by internet, intranet and web portals. The transfer knowledge, or shared knowledge, may or may not be used by the recipient. The application or adoption in any manner is not automatic; it is at the will of the recipient.

Learning Activities

Project works on knowledge management system (development and application cycle) identification and analysis of the nearby Agro-industry, and **buzz group**.

Continuous Assessment

Project works on model knowledge management system: development cycle of a given dairy farm, **test** and, **reports** and **presentation**

Summary

Knowledge management system is defined as the process to manage knowledge in the organization in steps, beginning with identification, validation, creation, acquisition, codification and transfer, measurement and creation of intellectual capital and conversion of some into intellectual prosperity to meet the business strategy requirements and its implementation. The purpose of KMS is to support decision-making personnel and stakeholders in the organization with the online ready access to the organization knowledge resources**.** This definition of knowledge management system is extended to include the integration of knowledge in business operations and decision-making systems. Integration is done through business rules, models, algorithms, formulae, so on. KMS provide structured way of capturing knowledge that exists with in the organizations; it gives organization the ability to improve the productivity and knowledge of it employees by means of knowledge sharing. The management focuses on five key knowledge areas, customer knowledge, product and service knowledge, Process knowledge, people knowledge and technology knowledge.

The generic KMS model considers dynamic business environment as the basis of developing KMS, which is a set of process and tools that gives the ability to leverage and to combine the collective abilities of the knowledge workers. It is imperative that the management recognizes KM as an important function; it needs separate organization for managing KM life cycle**.** ***KM has to phases/cycles, development and management.*** In knowledge development phase(creation and consolidation), the major steps are: ***identification of the knowledge*** need supporting business strategy, ***validation of knowledge***(relevance, applicability and adaptability to the organization), ***creation of knowledge*** by extracting, organizing and giving some from to it, and ***acquiring knowledge*** from internal and external sources. Where as in knowledge application phase knowledge has to be stored, transferred, shared and capitalized to crate intellectual capital and convert some into intellectual property

Chapter 3. Knowledge and Information Management Tools and Technologies

The management of knowledge and knowledge workers involves a number of different tools and practices. Agriculture Knowledge has been encoded with the help of ICT (Information and Communication Technology) systems or embedding it in the rules and procedures of the organization itself. Most important forms of knowledge, however, can not be separated from the human work groups who create, communicate and apply them.

3.1. **Types of technology for knowledge management**

The followings are some of the technologies used in knowledge management:

1. Codification Technology
2. Personalization Technology
3. Digital Technology
4. Multimedia Technology
5. Collaborative Technology

1. Codification Technology

One of the most important contributions to this perspective comes from Hansen *et.al*. (1999) who argue that there are basically two technologies/strategies for managing knowledge. The process of getting people's knowledge into a form that can be communicated independently of those people. The most common method is writing things down and putting them into documents and databases. Other methods include pictures, and sound and video recordings.

Codification Knowledge is carefully codified and stored in databases where it can be accessed and used readily by anyone in the company. The codification approach to knowledge demands well-trained people who are able to exploit ICT databases and communication systems.

- Invest heavily in ICT – connect people with reusable knowledge
- Hire new college graduates who are well-suited to the reuse of knowledge and the implementation of solutions
- Train people in groups and through computer-based distance learning
- Reward people for using and contributing to document databases

Internal - External. This dimension describes an organization's primary source of knowledge. **Internal knowledge** is knowledge readily available within the organization, such as individual knowledge (in the heads of employees), knowledge embedded in behaviours, procedures, software and equipment as well as codified knowledge (in documents, data bases and on-line repositories). **External knowledge** can be acquired from outside the organization, e.g., publications, universities, government agencies, professional associations, personal relations, professional services companies, vendors, knowledge brokers and inter-organizational alliances. Internal learning aims more at the development of organization-specific core competencies whereas external learning extends the organizational knowledge base and improves flexibility.

2. Personalization Technology

Personalization: Knowledge is closely tied to the person who developed it and is shared mainly through direct person-to-person contacts. In Personalization technology, knowledge is closely tied to the person who developed it, and it is shared informally through person-to-person contacts. Again a different kind of employee is required, one able to creatively develop and apply knowledge to unique business problems. Both Knowledge Management and HRM to the competitive strategy of the organization, a useful corrective to the idea that the management of knowledge work is all about creating massive ICT databases – as if the sheer quantity of "Knowledge" communicated and stored was the secret of business success.

- Invest moderately in ICT to facilitate conversations and 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.

These two Knowledge Management technologies call for different incentive systems. In the codification model, managers need to develop a system that encourages people to write down that they know and to get those documents into the electronic repository …… companies that are following the personalized approach… need to reward people for sharing knowledge directly with other people.

Digital Technologies and Agricultural Information

Contemporary challenges facing agricultural information parallel those facing agricultural research and practice. Agriculture today must feed a growing population in a world of static or shrinking natural resources and increasing social and environmental constraints. Agricultural information professionals similarly must support agriculture by managing and improving access

to a proliferating and increasingly complex array of information resources in a climate of shrinking resources and expanding constraints. Yet both fields have access to powerful resources and technologies. Informatics for agricultural development requires coordinated inter-sectoral approach and application of appropriate information technology (IT) tools. For increasing production at micro level, an inventory of those currently used and potentially available, and an evaluation of the quantity and quality of these resources is required. This requires design and development of agricultural resources information system using state-of-the-art IT tools, as given below, to facilitate effective agricultural planning and development:

- Data warehousing (Data Bases & Model Bases)
- Expert Systems & Knowledge Bases
- Networking (Internet, Intranet and Extranet)

Intranet

A computer network that functions like the internet, but the information and web pages are located on computers within an organization rather than being accessible to the general public.

Extranet

A website that links an organization with other specific organizations or people. Extranets are accessible only to those specified organizations or people and are protected via passwords.

- Geographical Information System (GIS)
- Application of Remote Sensing Data
- Multi-media Information System
- Decision Technology System
- E-Commerce and E-Governance, and
- Digital Library / Virtual Library

Digital preservation, processing, and managing of agricultural information involves a number of issues and problems. The process initially starts with preservation of information in archives or by conversion to other digital formats. The second issue facing agricultural research and information is the rapid growth of technology, whether biotechnology (BT) or information technology (IT), which also influence agricultural information management. Technological advances create new challenges and often require new skills and infrastructure. The third issue is diversity. Agriculture practice and research are becoming increasingly interdisciplinary while serving widely diverse populations. Agricultural information experiences a high level of diversity, too, in content, format, technology, audiences, and services. Understanding the central

models and metaphors of a profession helps information professionals in two ways. First, it provides insight into the thought processes of users, which leads to better understanding of their information needs. Second, thinking metaphorically and abstractly offers fresh perspectives on the profession and sparks new insights and practices.

Multimedia Technology in Agriculture Extension

Agriculture is a mainstay of the state economy, and it is the role of government to motivate and instruct the farmers about new developments in agriculture. As a result, the government has set up various institutions, agricultural universities, centers, and agencies such as T&V (Training and Visit), other extension agencies such as **ATVET, FTC, FSS** etc.

Agricultural extension is aimed at promoting agricultural development by providing information on improved production technologies and their adoption. The Directorate of Extension (DOE) is a national agency that implements specific programmes and activities. Though, the agricultural extension is primarily the responsibility of State Departments of Agriculture (SDAs), the Directorate of Extension works in collaboration with SAUs and Agricultural Institutes. The programmes and activities of the Directorate are in areas like extension management, extension training, farm information and farm women's development.

Development Agents (DAs) are the most important source in **transmitting technology** to users (Sharma 2003). **Radio, television, publications, demonstrations, tele-conferencing and Internet technology** have all been used to accomplish this (Singh et. al. 2003). The Internet plays a major role in the transfer of high-tech agriculture technologies from global pocket to farmers' field (Kumar et. al., 2002). For developing countries, the use of the Internet in farm decision-making is much less. Only 12% of farmers use this technology, and the majority of them use traditional technologies like radio (77.3%) and newspapers (11.3%) (Cecchini, 2002). Agricultural extension agencies must make farmers aware of the use of the Internet in technology transfer. This can help farmers keep pace with rapidly changing agricultural technologies (Vashistha, 1987).

Sharma (2003) states that, **"Quick dissemination of technological information from the Agricultural Research System to the farmers** in the field and reporting of farmers' feedback to the research system is one of the critical inputs in transfer of agricultural technology. The information and communication support during last 55 years has mainly been conventional. The extension personnel of the Department of Agriculture disseminated the technological messages to the farmers manually. Through this approach information has not been able to reach majority

of the farmers who are spread across the whole country. This gap remains a challenge for the Extension system even today. ... Farmers' needs are much more diversified and the knowledge required to address them is beyond the capacity of the grass root level extension functionaries".

It is possible to find a solution to this situation using information technology to meet the location specific information needs of farmers. Information and communication networks are expanding quickly. The weak linkages among extension, research, marketing networks, and farmers limits the ability of research and extension to contribute to agricultural development. The use of the vernacular press, radio, and television for reaching farmers is being augmented with state-of-the-art communication technologies such as Internet and satellite communication. Under the NATP initiative, adequate attention is being paid to ICT connectivity.

This connectivity will facilitate two-way communication among all the stakeholders in the Research-Extension-Marketing-Farmers loop. Apart from core Information and connectivity, other forms of audio and visual communication like Satellite Communication (SATCOM) are also being promoted. Cyber Extension includes effective use of information and communication technology, national and international information networks, Internet, Expert Systems, Multimedia Learning Systems, and Computer based training systems to improve information access to the Farmers, Extension Workers, Research Scientists, and Extension Managers.

Technology Drivers for Information Systems

- Networks and the Internet
- Mobile and Wireless Technologies
- Object Technologies
- Collaborative Technologies
- Enterprise Applications

Networks and the Internet

Networks include mainframe time-sharing systems, network servers, and a variety of desktop laptop, and handheld client computers.

Knowledge Network

A voluntary, flexible group of people with a common interest or passion in a specific area, who are willing to develop, share and build their knowledge, practice and expertise over a period of time.

- Broad, global communities

- Electronic networks.
- Formal groups for which a corporate policy has been established; not time-bound.
- Services and activities are determined by corporate objectives.

Examples of Knowledge Network activities:

- Referrals;
- Surveys;
- Information sharing;
- Agenda setting;
- Vetting documents;
- Identifying member expertise; and
- E-discussions

The most pervasive (advanced and widely used) networking technologies are based on the Internet.

- xHTML and XML
- Scripting languages
- Web-specific programming languages
- Intranets
- Extranets
- Portals
- Web Services

The terms **'the internet'** and **'the web'** are often used interchangeably; however the World Wide Web is actually a collection of web pages that can be accessed on the internet. The web has become the most popular area on the internet because everyone can view the pages regardless of what kind of computer they are using.

Some Mobile and Wireless Technologies

- PDAs
- Smart phones
- Bluetooth
- Wireless networking

- **Impact on Information Systems**

- Wireless connectivity must be assumed
- Limitations of mobile devices and screen sizes must be accommodated

Object Technologies

- **Object Technology** – a software technology that defines a system in terms of objects that consolidate data and behaviour.
- **Object-oriented Analysis and Design –** utilize object technologies to construct a system and its software in system development process.
- **Agile Development** – a system development strategy in which system developers are given the flexibility to select from a variety of tools and techniques to best accomplish the tasks at hand.

Collaborative Technologies

Our ongoing research into a wide range of knowledge tools and technologies continues to show that it is collaborative technologies that have the most impact on developing a successful organizational knowledge program. These technologies connect people to information, but more importantly people to people, on a global basis. The commonly used technologies in this category are:

Internet/Intranet

Installing an intranet is often the first activity of knowledge program. It makes it easy for users to access **"any information, anywhere, at any time."** Booz Allen and Hamilton's Knowledge Online is an intranet that provides a wealth of information (e.g., best practice, industry trends, database of experts) to their consultants worldwide. Through active information management by knowledge editors (**subject experts and librarians**) the information remains well structured and relevant. Remember too, that the Internet today is more than simply Web information pages. It includes email discussion lists, multimedia presentations and Web conferencing (like a bulletin board), all-important tools for knowledge development and exchange.

Groupware/Lotus Notes

Groupware products like Lotus Notes offer several features over and above intranets, although the two are converging. They provide discussion databases, different levels of security (especially useful for remote access by mobile workers). Users such as Thomas Miller & Co., a London-based manager of insurance mutual companies, access their "organizational memory" as well as current news feeds in areas of interest, through one of Lotus Notes's key features, its

multiple "views." Thus, they can view information by geographic area, name of client, industry, type of risk, topic, etc., according to the task in hand.

Videoconferencing

The development of **desk-top videoconferencing** makes it practicable for dispersed knowledge workers to have a face-to face conversation over a telecommunications link, while at the same time viewing and even manipulating computer held information. At BP, desktop videoconferencing has helped achieve better communication and higher levels of trust. Many problems at off-shore oil fields can now be solved without resorting to jumping into the next available helicopter as was formerly the case.

The benefits of these technologies are well known, for example, **asynchronous** as well as **synchronous communications**, access to the most current information, recording of information, access to expertise, even when the existence of the expert is not previously known, etc. The value of such mechanisms increases if there is a continual process of knowledge editing and refining. Elements of transient conversation are reviewed for ongoing relevance, synthesized, and sometimes rewritten, for example, into more formal thought pieces or best practice databases.

This can be done either by subject matter experts, as part of their **knowledge- sharing role**, or by abstractors especially skilled at doing this. Although stored messages and discussion might remain anyway as part of organizational memory, the editing process makes the knowledge available in a more understandable format, without all the iterations that occurred during its development. Despite ever increasing functionally in collaborative technologies, organizations frequently do not get the benefits they anticipate from collaborative technologies. They fail to give due attention to people and organizational processes - the elements of **"soft infrastructure."**

Virtualness "As-if-reality"-an object that has an effect and shows behavior without physically existing in reality.

Virtual organization Structure in which organization members in different locations work together using e-mail, phone, fax, and other communication methods; a cluster of organizations united by a series of electronic linkages.

Web log Also called a blog. Basically a journal that is available on the web. The activity of updating a log is **"blogging**," and someone who keeps a blog is a **"blogger."** Blogs are typically updated daily using software that allows people with little or no technical background to update

and maintain the blog. Postings on a blog are almost always arranged in chronological order, with the most recent additions featured most prominently. An online diary or journal, typically documenting the day-to-day life of an individual; often very personal.

Wiki From the Hawaiian **"wiki wiki**" for "**quick"** or "**super-fast**"; refers to a website or other hypertext document collection that gives users the ability to add content, as on an Internet forum, but also allows this content to be edited by other users. The term can also refer to collaborative software used to create such a website.

XML eXtensible Markup Language; a subset of SGML constituting a particular text markup language for interchange of structured data. The Unicode Standard is the reference character set for XML content. XML is a trademark of the World Wide Web Consortium. It is a flexible way to create standard information formats and share both the format and the data on the World Wide Web.

The Human Dimension

A common problem in most knowledge management programs is that individuals do not share their knowledge, a problem that is compounded when people work virtually over a globally distributed network. Most organizations need a change of culture. There is no quick fix. They need to apply levers of organizational change over a period of time, including:

• **Leadership by example.** Bob Buckman, when CEO of Buckman Laboratories, actively participated in computer forums to help sales people on the front-line, and he expected his managers to do the same!
• Knowledge sharing events. These bring people together in exhibition and workshop settings, so that they can share their expertise. Often face to face contact is an important prerequisite to effective computer knowledge networking.

• **Embedding learning into every day processes**. This includes building in reflection time at meetings and writing down feelings and experiences in learning diaries. Larger projects will have post-project reviews where lessons are drawn from a semi-structured process involving a wide range of participants. This learning is codified and becomes part of the organization's formal "lessons learned" knowledge base.

• **Active moderation of online discussions**. Many discussion databases are limited in usefulness because they do not have critical mass or because certain contributors, sometimes unwittingly,

discourage dialogue. Active moderators will post items gained elsewhere, and work behind the scenes to encourage contributions and to moderate online behaviour.

• **Reward systems.** Many companies do not reward people for sharing information. Management consultancies now include people's contribution to their knowledge bases as part of their performance and salary review.

A complementary approach is to draw people together in "communities of practice." Electronic communities are well known on the Internet, in the form of newsgroups, discussion lists, etc. In the organizational context, such communities have a sharper purpose and more is at stake. Their purpose may be mutual learning of new techniques, sharing best practice or a shared goal on a project or corporate program. Companies like Shell actively nurture these communities, and blend online activities with embedding learning methods into regular work practice.

Collaborate Technologies

- Collaborate technologies are those that enhance interpersonal communications and teamwork.
  - E-mail
  - Instant messaging
  - Groupware
  - Work flow

Learning Activities

Computer lab works/ practical, writing down feelings and experiences in learning diaries, project work on developing knowledge data base and group discussion.

Continuous Assessment

Written test, presentation on the project and report on tools and technonogies used in knowledge generation and management.

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