Management Information Systems

Managing Knowledge and Collaboration

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LEARNING OBJECTIVES

• Assess the role of knowledge management and knowledge management programs in business.

• Describe the types of systems used for enterprise-wide knowledge management and demonstrate how they provide value for organizations.

• Describe the major types of knowledge work systems and assess how they provide value for firms.

• Evaluate the business benefits of using intelligent techniques for knowledge management.
What is Knowledge?
**Knowledge Defined**

**Information** as defined by Dixon (2000:13) is data that is information; *that has been sorted*, analysed, and displayed and communicated through spoken language, graphic displays, or numeric tables.

**Knowledge** in contrast is the “meaningful links people make in their minds between information and its application in action in a specific setting”
• To transform information into knowledge, firm must expend additional resources to discover patterns, rules, and contexts where knowledge works

• **Wisdom:** Collective and individual experience of applying knowledge to solve problems
  
  • Involves where, when, and how to apply knowledge

• Knowing how to do things effectively and efficiently in ways other organizations cannot duplicate is primary source of profit and competitive advantage that cannot be purchased easily by competitors
  
  • E.g., Having a unique build-to-order production system
• Important dimensions of knowledge
  • Knowledge has a location
    • Cognitive event
    • Both social and individual
    • “Sticky” (hard to move), situated (enmeshed in firm’s culture), contextual (works only in certain situations)
  • Knowledge is situational
    • Conditional: Knowing when to apply procedure
    • Contextual: Knowing circumstances to use certain tool
• Important dimensions of knowledge
  • Knowledge is a firm asset
    • Intangible
    • Creation of knowledge from data, information, requires organizational resources
    • As it is shared, experiences network effects
  • Knowledge has different forms
    • May be explicit (documented) or tacit (residing in minds)
    • Know-how, craft, skill
    • How to follow procedure
    • Knowing why things happen (causality)
Types and Forms of Knowledge

- **2 Types**: Tacit and Explicit
- **4 Forms**: Individual (Tacit and Explicit) and Collective/Group

- **Tacit knowledge** often referred to as “know-how”, resides in our heads, practical skills and actions.
- **Explicit knowledge** can be codified and communicated to others and may exist in form such as rules, procedures and theories.
The Four Forms of Organisational Knowledge

- **Individual Tacit Knowledge**
  - Cannot be easily articulated, but is accessible and sustained through interaction.

- **Individual Explicit Knowledge**
  - Easily taught, written or codified.

- **Collective Tacit Knowledge**
  - Cannot be easily articulated, but is accessible and sustained through interaction.

- **Collective Explicit Knowledge**
  - Easily taught, written or codified.
Types and Forms of Knowledge

- **2 Types**: Tacit and Explicit
- **4 Forms**: Individual (Tacit and Explicit) and Collective/Group

- **Individual knowledge** as the knowledge harboured by an individual in an organisation.
- **Collective knowledge is therefore the knowledge held commonly by a group of members** of an organisation and includes organising principles, routines, practices, and relative organisational consensus on past experiences, goals and missions.
Types and Forms of Knowledge

• On the other hand, one may question whether there is any real difference between **collective knowledge** and the **aggregation of individual knowledge**

1. Collective knowledge is an attribute of the organisation just like its modus operandi and culture;

2. Collective knowledge is therefore not **reducible to what any single individual knows**, or even to any simple, aggregation of the various competencies and capabilities of all the individuals
Types and Forms of Knowledge

• On the other hand, one may question whether there is any real difference between collective knowledge and the aggregation of individual knowledge.

1. Shared knowledge is located in complex, collaborative social practices.

2. Collaborative social practices within an organisation tend to facilitate interaction of individual knowledge through which it is tested, enriched and redefined to create more collective knowledge.
• Organizational learning
  • Process in which organizations learn
    • Gain experience through collection of data, measurement, trial and error, and feedback

HOW DO ORGANIZATIONS LEARN?

Refer to extra notes on class website
we can identify three ways individuals come to know something:

1. firstly, through the verbal transmission of information - ideas voiced by others, books, reports, et cetera,

2. secondly, direct experience; the receipt of sensory data such as colour, sound and pain, and

3. lastly, by reorganising what we already know into a new configuration
Learning is about the accessibility of knowledge
SECI Model

Socialization → Externalization

Internalization → Combination

Tacit → Implicit

Explicit → Explicit

Source: Nonaka & Takeuchi (1995)
**Knowledge management:** Set of business processes developed in an organization to create, store, transfer, and apply knowledge

**Knowledge management value chain:**
- Each stage adds value to raw data and information as they are transformed into usable knowledge
- Knowledge acquisition
- Knowledge storage
- Knowledge dissemination
- Knowledge application
• **Knowledge management value chain**
  • **Knowledge acquisition**
    • Documenting tacit and explicit knowledge
      • Storing documents, reports, presentations, best practices
      • Unstructured documents (e.g., e-mails)
      • Developing online expert networks
    • Creating knowledge
    • Tracking data from TPS and external sources
• Knowledge management value chain:
  • Knowledge storage
    • Databases
    • Document management systems
  • Role of management:
    • Support development of planned knowledge storage systems
    • Encourage development of corporate-wide schemas for indexing documents
    • Reward employees for taking time to update and store documents properly
Knowledge management value chain:

Knowledge dissemination

- Portals
- Push e-mail reports
- Search engines
- Collaboration tools
- A deluge of information?
  - Training programs, informal networks, and shared management experience help managers focus attention on important information
• Knowledge management value chain:
  • Knowledge application
    • To provide return on investment, organizational knowledge must become systematic part of management decision making and become situated in decision-support systems
      • New business practices
      • New products and services
      • New markets
Knowledge management today involves both information systems activities and a host of enabling management and organizational activities.
• New organizational roles and responsibilities
  • Chief knowledge officer executives
  • Dedicated staff / knowledge managers
• Communities of practice (COPs)
  • Informal social networks of professionals and employees within and outside firm who have similar work-related activities and interests
  • Activities include education, online newsletters, sharing experiences and techniques
  • Facilitate reuse of knowledge, discussion
  • Reduce learning curves of new employees
Three major types of knowledge management systems:

- **Enterprise-wide knowledge management systems**
  - General-purpose firm-wide efforts to collect, store, distribute, and apply digital content and knowledge

- **Knowledge work systems (KWS)**
  - Specialized systems built for engineers, scientists, other knowledge workers charged with discovering and creating new knowledge

- **Intelligent techniques**
  - Diverse group of techniques such as data mining used for various goals: discovering knowledge, distilling knowledge, discovering optimal solutions
There are three major categories of knowledge management systems, and each can be broken down further into more specialized types of knowledge management systems.

**Figure 11-3**
Three major types of knowledge in enterprise

Structured documents
- Reports, presentations
- Formal rules

Semistructured documents
- E-mails, videos
- Unstructured, tacit knowledge

80% of an organization’s business content is semistructured or unstructured
Learning management systems

- Provide tools for management, delivery, tracking, and assessment of various types of employee learning and training
- Support multiple modes of learning
  - CD-ROM, Web-based classes, online forums, live instruction, etc.
- Automates selection and administration of courses
- Assembles and delivers learning content
- Measures learning effectiveness
Discovering Knowledge from Data
Case-based reasoning (CBR)

- Descriptions of past experiences of human specialists, represented as cases, stored in knowledge base
- System searches for stored cases with problem characteristics similar to new one, finds closest fit, and applies solutions of old case to new case
- Successful and unsuccessful applications are grouped with case
- Stores organizational intelligence: Knowledge base is continuously expanded and refined by users
- CBR found in
  - Medical diagnostic systems
  - Customer support
Case-based reasoning represents knowledge as a database of past cases and their solutions. The system uses a six-step process to generate solutions to new problems encountered by the user.
• **Neural networks**
  
  • Find patterns and relationships in massive amounts of data that are too complicated for human to analyze
  
  • “Learn” patterns by searching for relationships, building models, and correcting over and over again model’s own mistakes
  
  • Humans “train” network by feeding it data inputs for which outputs are known, to help neural network learn solution by example
  
  • Used in medicine, science, and business for problems in pattern classification, prediction, financial analysis, and control and optimization
  
  • **Machine learning**: Related AI technology allowing computers to learn by extracting information using computation and statistical methods
A neural network uses rules it “learns” from patterns in data to construct a hidden layer of logic. The hidden layer then processes inputs, classifying them based on the experience of the model. In this example, the neural network has been trained to distinguish between valid and fraudulent credit card purchases.

**Figure 11-11**
Neural Analysis

- Taxi Drivers Behaviour in Society
