Lecture 2: Knowledge Creation and Knowledge Management in Organisations

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Contents

1 Knowledge as an Encoding

Encoding and Decoding

Definition 1 (Encoding)**.**

- Let X be the set of *signals*, and let Y be a finite set of *codes* or *codewords*.
- A mapping $\kappa : X \to Y$ is called a *code* or *encoding* of signals.
- A code defines a rule $\kappa : x \mapsto \kappa(x) = y$ mapping signals into codes.

Definition 2 (Decoding)**.**

- The reverse process of mapping signals to codewords:

$$\kappa^{-1}(y) = \{x : \kappa(x) = y\}$$

- That is, decoding of code (or symbol) y is the set if all signals x, which can be encoded by it.

Remark 1. *Knowledge can be thought of as a process of encoding experiences.*

Uniquely Decodable Codes

Definition 3 (Uniquely Decodable Code)**.**

- A code $\kappa : X \to Y$ such that $\kappa(a) = \kappa(b)$ implies $a = b$.
- That is each code corresponds to a *unique* signal.
- If a code is not uniquely decodable, then decoding can be ambiguous (i.e. $\kappa^{-1}(y)$ can have more than one signal).

Question 1. *If the set X of signals has 10 elements, how large should be the set Y of codeswords so that the code $\kappa(x) = y$ is uniquely decodable?*

Question 2. *Is human language a uniquely decodable code?*

Some Facts about Human Brain

- Human brain contains $\approx 10^{11}$ neurons
- Each neuron is connected to $\approx 10^4$ others
- Some scientists compared the brain with a 'complex, nonlinear, parallel computer'.
- The largest modern neural networks achieve the complexity comparable to a nervous system of a fly.

2 Explicit and Tacit Knowledge

Explicit and Tacit Knowledge

Definition 4 (Tacit ('Background') knowledge)**.** Knowledge that cannot be expressed or described explicitly by those who possess it.

Definition 5 (Explicit knowledge)**.** Beliefs that can be expressed or communicated (e.g. using natural language).

Remark 2.

- *Some tacit knowledge can be made explicit (Polanyi, 1958; 1966).*
- *Some define implicit knowledge as the complement of knowledge that can be made explicit.*

Declarative and Procedural Knowledge

Cognitive scientists distinguish between two types of knowledge:

Declarative : these are propositions or facts describing the current state of the problem (e.g. which facts are known to be true).

Procedural : these are logical rules (implications $a \Rightarrow b$):

IF *condition* THEN *action*

The rules are used to change a problem state (e.g. by inferring new facts). The IF part is called the *left-hand-side* (or the *antecedent*, *premise*). The THEN part is called the *right-hand-side* (or the *consequent*).

Remark 3. *Evidence suggests that these types of knowledge are encoded in different parts of the brain or even use different mechanisms. Procedural knowledge is usually difficult to describe, but also harder to forget.*

3 Knowledge Creation

Knowledge Creation, SECI model

The SECI model of knowledge creation (Nonaka & Takeuchi, 1995):

Socialisation : tacit to tact (e.g. teaching by showing).

Externalisation : tacit to explicit (e.g. writing down, formalising).

Combination : explicit to explicit (e.g. integration of different rules).

Internalisation : explicit to tacit (e.g. getting experience from repetition).

4 Managers in Organisations

Managers in Organisation

Definition 6 (System)**.** System — a collection of parts that work together as a whole

Definition 7 (Organisation)**.** Organisation is a system of resources structured by power centres to achieve purposes within an environment

System — a collection of parts that work together as a whole.

Resources — people, money, materials and knowledge.

Purpose — what the organisation is for? Can change.

Environment — what the organisation is interacting with.

Remark 4. *Managers are the power centres of an organisation*

Functions of Managers

POCCC Model
We consider the five main functions (POCCC):

Planning — definition and preparation of tasks

Organising — providing the necessary resources

Commanding — issuing instructions

Co-ordinating — interrelating tasks

Controlling — monitoring and correcting

5 Organisational Structures and Cultures

Levels of Management

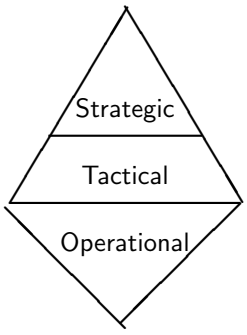
Strategic : mostly planning (POCCC)

Tactical : organisation and co-ordinating (POCCC)

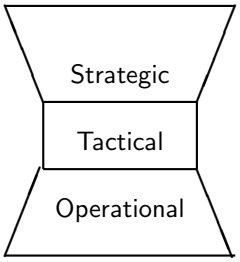
Operational : little planning, more commanding and control (POCCC)

Remark 5. *The levels differ by power (authority) and number of people.*

Management Structures



Diamond



Hour-glass

Four Types of Organisational Cultures

Goffee and Jones (2000)	High Solidarity	Low Solidarity
High Sociability	1. Communal Culture	2. Networked Culture
Low Sociability	3. Mercenary Culture	4. Fragmented Culture

Organisations as Complex Adaptive Systems

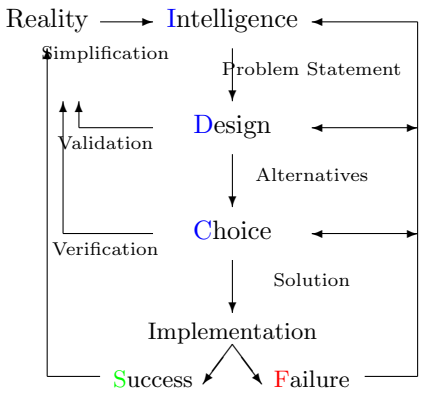
Definition 8 (Complex Adaptive System)**.** A goal-directed open system attempting to fit itself to its environment.

- Beer (1981); Bennet and Bennet (2004) view organisation as an intelligent complex adaptive system (ICAS).
- ICAS consists of multiple *agents* interacting locally with each other.
- The complex adaptive behaviour emerges from *combined* behaviour of the agents.
- The environment (customers, suppliers, competition) defines the *selection* pressure, and an organisation has to adapt in order to *survive*.

Remark 6. *Firestone and McElroy (2003) point out that the key issue in KM is whether it should be hierarchical (i.e. engineered, structured and managed) or organic (i.e. implementing policies supporting CAS).*

6 Decision-Making in Organisations

Three Phases of Decision-Making



 Herbert Simon

Bounded Rationality

- Rational decision-making occurs under constraints:
  1. Uncertainty and insufficient information.
  2. High complexity of problems
  3. Limitations on capacity of the human mind.
- Problem-solving occurs via multiple short-term subgoals (Simon, 1957).
- Bounded rationality is characterised by high use of approximations, short-cuts, rules of thumb or *heuristics*.

Structure of Decisions

Herbert Simon introduced the idea of **structured** (programmable) and **unstructured** (nonprogrammable) decisions.

Structured	Semi-structured	Unstructured
goals defined	···	the outcomes are uncertain
procedures are known	···	appear in unique context
information is obtainable and manageable	···	the resources are hard to assess

Remark 7. *Consider in the context of explicit and tacit knowledge.*

Summary

- Understanding organisational structure is crucial for successful implementation of KM cycle.
- Decision-making (DM) in organisations is influenced by multiple constraints (bounded rationality).
- Different types of organisational cultures influence DM and KM.
- Hierarchical vs organic approach to KM.

Additional Reading

1. *Organizational Knowledge Creation Theory: A First Comprehensive Test* by Nonaka, Byosiere, Borucki, and Konnot (1994).
2. *Management Focus The 'ART' of Knowledge: Systems to Capitalize on Market Knowledge* by Nonaka, Reinmoeller, and Senoo (1998).
3. *SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation* by Nonaka, Toyama, and Konno (2000).
4. *Knowledge Management and the Dynamic Nature of Knowledge* by McInerney (2002).

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