Essay based on
Ikujiro Nonaka and Hirotaka Takeuchi (1995)
The Knowledge-Creating Company. How Japanese Companies Create the Dynamics of Innovation
Oxford University Press, New York

Summary of the knowledge-creating company

This is a summary of the book *The Knowledge-Creating Company* by Nonaka and Takeuchi (1995), including few my own reflections on the volume.

Part I : Summary

Knowledge-Creating Company is a book worthy of its name. The definition, utilization and production of knowledge are the themes of this hardback. The book includes a novel theory from two authors supported by their case studies from Japanese industry and an extensive philosophical introduction into Western and Eastern epistemology. The philosophy and the examples mainly serve to justify and illustrate the main contribution of the book, which is an outline of knowledge creation, use and forms of knowledge. I will start by reviewing the forms of knowledge, dismissing the epistemological concerns and the parts on corporate strategy.

Knowledge

The book relies on the taxonomy of **explicit** and **implicit** knowledge adopted from Michael Polanyi. Polanyi had a history in chemistry, but later on shifted his interests to the philosophy of science and published books on tacit knowing (Polanyi, 1958, 1967). As described in Wikipedia (http://en.wikipedia.org/wiki/Michael_Polanyi referenced 14.11.2009), Polanyi's interest in epistemology shows in appreciation of "role played by inherited practices" for knowledge, and also passing knowledge via apprenticeship, through observation and guidance of a master. This type

of knowledge was called *implicit.* Implicit knowledge could be further divided into *technical implicit* knowledge, corresponding to know-how, and *cognitive implicit* knowledge. The latter presents the wealth of beliefs, presumptions and experiences that are shared typically within a cultural group (nation, company, family, etc.) and are not commonly articulated as they are assumed to be familiar to all (all word processor users know what this symbol ¶ stands for). These types of implicit knowledge are functionally distinct from *explicit knowledge.*

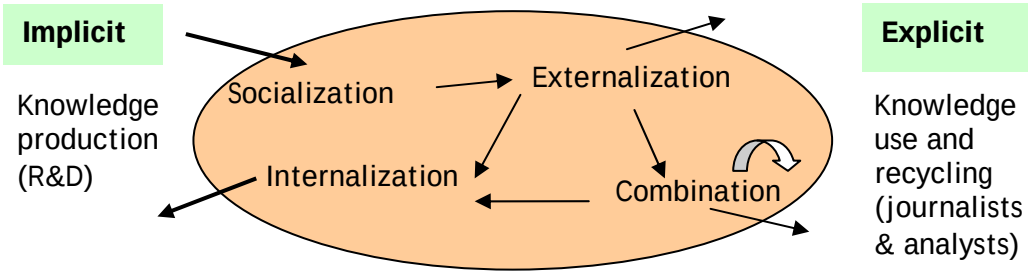
Explicit knowledge refers to books, manuals, printed procedures and guides that *express information clearly through language*, images, sounds, or other means of communication. Explicit knowledge also refers to the type of information or knowledge that western management style has traditionally been involved with. For instance, Nonaka and Takeuchi mention Taylorism and rational management theory of Herbert Simon (1945, March & Simon, 1958) as examples of how explicit knowledge and procedures can be used to govern an organization.

Knowledge processes

This basic distinction of knowledge types leads to several implications. First, the explicit-implicit contrast is an essential basis for knowledge creation in a company. The authors argue that the conversion of implicit knowledge to explicit is most crucial organizational and interorganizational method of knowledge creation. Early on, Nonaka and Takeuchi also mention that ideation during new-product development (NPD henceforth) and redundancy (competing efforts and competences) within NPD organization are the sources of implicit knowledge. Thus the challenge of the knowledge creating company is ensure the conversion of implicit to explicit knowledge. Regarding ideation, the roles of metaphorical, or analogous, thinking and ambiguity or openness of design

briefing for NPD are emphasized as key factors of success in Japanese knowledge-creating companies.

The next phase in the explicit-implicit conversion concerns the processes of how knowledge can be transformed. Four modes are considered: **socialization, externalization, combination** and **internalization.** Before we enter this spiral that connects these modes, we assume that a person has acquired implicit knowledge (procedural or understanding) through her efforts in research and development (R&D) for NPD. It is stated that "organizational knowledge creation is like a 'derivative' of new-product development." Or in other words, knowledge is created in the interactions of the front-line employees. Knowledge is defined as a *meaningful, action-oriented commitment*, which extends the traditional 'justified true belief' notion prevalent in Western thinking.



The spiral process starts at *socialization* where knowledge can be shared with another person through dialogue, observation, imitation or guidance. According to the authors, socialization activities for a company could also involve research or consultation of users, and they list *tama dashi kai* (Honda brainstorming boot camps) as one form of socialization. This means that in addition learning or transfer of knowledge, socialization boosts creation of knowledge through combined perspectives.

Explicit knowledge appears after socialization in the *externalization* phase. At this stage, the possibly vague metaphorical dialogue or non-conceptual

observations are turned into explicit knowledge that becomes *external* to the subject. For instance, in a computer database, service manual or visual assembly guide. After explicit knowledge has been created, it can be refined further. *"Combination is a process of systemizing concepts into a knowledge system. This mode… involves combining different bodies of explicit knowledge."* (p. 67) Nonaka and Takeuchi stress that different computer systems can play an important role in this process. My feeling about this poorly articulated stage is that is has been added for the sake of unifying the whole and is too poorly defined and operationalized, lacking a clear function in contrast to the other phases.

The final mode of knowledge processing is *internalization.* It is the counterpart of socialization and refers to the successful transfer of knowledge to a person from a book or database to another person. Once the person gains the ability to utilize novel knowledge, this knowledge becomes successfully internalized. As example, the authors mention GE new NPD staff "re-experiencing" customer difficulties from help center transcripts or "prototyping" 1,800 hours work time goal at Matsushita for one month. This emphasizes that internalization *goes beyond facts*, into sharing feelings, experiences and know-how and could this way be easily connected to numerous design approaches presently popular in interaction and product design thinking.

The authors explain that these four modes of knowledge creation penetrate through the ideal organization. Even though the knowledge is created at the individual level, it should be passed on to other levels of organization (externalization) in order to be exploited widely (internalization and combination). This process is depicted as a spiral model of knowledge creating organization shown on the following figure:

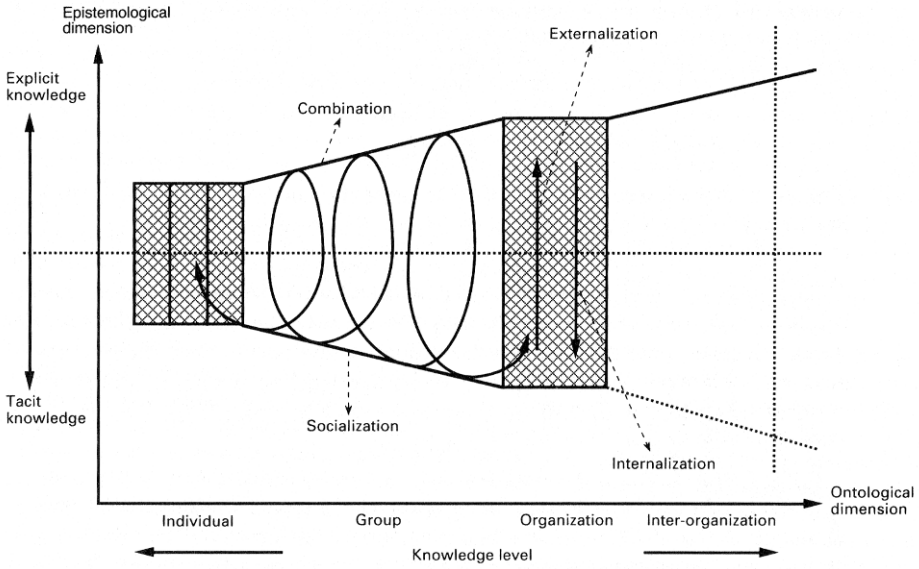


Figure 3-5. Spiral of organizational knowledge creation.

The organization needs to support the spiral process. The writers introduce five organizational enablers of knowledge creation. These are

1. **Intention and commitment** in the organization
2. **Autonomy** at all levels (cross-functionality, self-organization))
3. Fluctuation and **creative chaos** (breakdown of patterns and standards, reflection in action, cf. Schön [1983])
4. **Redundancy** (internal overlaps and competition)
5. **Requisite variety** (along Ashby, 1956; meeting external complexity with internal diversity, staff heterogeneity)

In this description of the organizational support, Nonaka and Takeuchi come closer to realizing their model in actual organizations. The five enablers mainly describe how the company R&D should be organized to ensure success in knowledge creation. They further go describe a five step model, which is somewhat a derivate from the rugby team metaphor (all players constantly moving and looking ways to turn the game for their teams advantage) used to describe successful Japanese industry units.

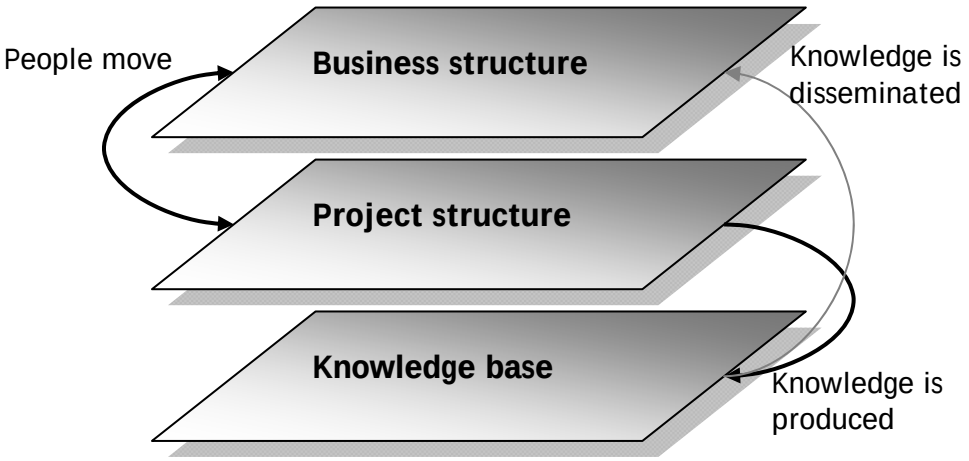
Organizing for knowledge creation

The first part in R&D (here equivalent of organizational knowledge creation) is *utilizing tacit* knowledge through socialization and internalization. Through these knowledge ventures, new (product) concepts can be created. Concepts need to be *justified* (the analogy from authors references the traditional epistemological claim of justified true belief, but remains a bit hollow) to be accepted. After this *archetypes* can be built. The process concludes in *cross-level knowledge* transfer, which should involve the whole organization. Although authors are explicitly proposing this process, they do later on in the book bring up that this can not be a cascading relay model, but a parallel, rugby-style process.

Nonaka and Takeuchi are also proposing a new kind of organizational model, one that focuses on knowledge as **the resource** for a company's innovative success. To implement their vision, they critically evaluate the existing management models. The bureaucratic top-down models (e.g. Taylor, Weber, Simon) are put a next to bottom-up models (e.g. 3M) and a new, considerably different middle-ground model is requested. The bottom-up organizations receive in my mind strange accusations stating that the front-line has too narrow focus and cannot generalize the knowledge they produce for the benefit of the company. So the authors suggest removing the pressure from both top management and front-line employees to **middle managers** who are commonly disapproved by the western management thinkers quoted by Nonaka and Takeuchi. It is said that "*middle managers provide a conceptual framework to put things into a perspective*", providing them a heroic role in the **middle-up-down** structure depicted by the book.

The introduction of the new model is followed by a discussion on the benefits of bureaucratic and task force organization styles. Through

examples from US and Japanese army, the authors argue that bureaucracy may work in stable, predictable environment utilizing its standard and formal operating principles, but a task force structure used for ephemeral, cross-functional terms maybe better for dynamic environments. However, they see that a good organization should combine characteristics of both, in a format called **hyper-text organization**. This model is metaphor of the hyper-text used in computers, referring to convenient and easy swapping between different perspectives. It is illustrated in the following figure:



The main idea of the hypertext organization is the non-ambiguous positioning of knowledge practitioners between "business teams" and project teams (both labeled *structures* in the figure), in contrast to existing matrix, taskforce or cross-functional organization models. Thus project teams should be free and autonomous as they please. The knowledge production happens mostly within project teams.

Book's example of an ideal project team is Sharp, which had URGENT project teams. These teams were separated form project teams and regular structures with privileged golden patches. With the patch, they receive unlimited resources and solely dedicated to the URGENT project. The knowledge base in Nonaka and Takeuchi thinking corresponds to both implicit and explicit company knowledge, former in philosophy and

vision, latter in lectures, newsletter and databases, for example. Case study of Kao Corporation showed how they had stacked knowledge base into five scientific categories considered core elements of their product R&D.

Global knowledge creation

Final part of the book concerns knowledge creation in global, multicultural organizations. Using two case examples, Nissan automobile and Shin Caterpillar Mitsubishi, they illustrate both the differences between Japanese and US and cultural environments of Europe vs. Japan traffic environments. The message is that cross-cultural socialization is necessary to overcome the obstacles created by the considerable differences in (tacit) knowledge and values. This socialization can happen through experiencing foreign culture and socializing with foreigners. The case of Nissan trying to create the first European style success (Primera) shows two outcomes of this socialization: **understanding the market** (what sells, attracts in Europe) and **bridging the knowledge gap** (exporting expertise, or tacit knowledge, to enable production).

In overall, it becomes obvious that the Japanese have more trust in tacit knowledge, acquired through being there, where as American employees want things spelled out and justified in an explicit form. This shows in how Japanese trust authorities almost blindly, possibly because of shared tacit knowledge is supposed to cover up for the lack of explicit justification in decision making. I would thus depict Japanese practitioners or knowledge producers as distilled *supermen engineers with secret powers* where as Westerners are individual *men-with-manuals.* The reality is not so black and white but the book does entertain this kind of hypothesis.

The book concludes by putting together the main arguments embedded in paired concepts. They are listed here, extremes separated by a slash and the authors' middle concept in parentheses if such was presented:

Tacit / explicit	→	[spiral of conversion]
Body / mind	→	[oneness]
Individual / organization		
Top-down / bottom-up	→	[middle-top-down]
Bureaucracy / task force	→	[hyper text]
Relay / rugby	→	[American football]
Eastern / western	→	[cross-socialization]

This concludes the summary and those interested in learning more about the intriguing case studies are recommended to refer to the original.

Part II : Discussion and Conclusions

The description of knowledge creation and discussion on its importance provided by Nonaka and Takeuchi is very enticing. However, I do not find all parts their theory as compelling as others. To me their greatest contribution is in elaborated analysis of how types of knowledge come to being, interact and what they signify.

I feel that the types of implicit knowledge should add a third dimension which may also be important for knowledge-creating, innovative organizations. As stressed by the authors, *requisite variety* may not only refer to the knowledge bases possessed by the organization members, but to their **personal characteristics**, *values, insights* and *feelings* which may influence their production and decision-making, performance within a company alike technical and cognitive implicit knowledge. Important notion is that these qualities are not kind of 'knowledge' that could be easily (if at all) internalized; i.e. everything's not knowledge. On the other

hand, what has become to be known as experiential knowledge is widely appreciated by the authors. This could be thought of as a predecessor of "experience prototyping", design methodology later on defined by innovative US design companies (Buchenau & Suri, 2000).

The perspective taken by the authors, namely how Japanese companies succeed in innovation game through knowledge management is also their weak spot. While they do go to great detail in revealing the fallacies and cultural biases in US and European R&D mindset, they remain blind to the inherent problems in their beloved Japanese R&D culture. Of course, the role of devil's advocate here is an easy one, but more self-criticism would have strengthened the book.

Reading the book about 15 years after its publication and almost three decades past from 1982 when the ideas first sparked, the R&D world has somewhat changed. The included Japanese giants, Honda, Nissan, Matsushita, Sharp and so forth have not perished, but they have not gained any particular edge since then. For instance, would there be any proof that the hypertext organization promoted in the book at Sharp really achieved something remarkable?

One important change in the time since then is that the different forms of user-centered product development and user innovation methods have made a breakthrough. Nonaka and Takeuchi do already discuss prototypes as communication medium between R&D organization and outsider (top-level management, customers, so forth), but their view of R&D remains science or **technology-driven**. This is contrasted to the time **market-driven** US development style. The technology drive is very evident through the book. Even though some hints of human factors reveal themselves every here and there, they generally seem to hold the

assumption that **boss (or the superman engineer) knows what's best for the consumer**.

I believe that this global fallacy is augmented in Japanese environment where the authoritarian rule in companies is still strong. For instance, the case example of developing an Electronic organizer at Sharp could be interpreted as a prime example of this (p. 190-192). One year's development efforts were discarded by the top management without explicit feedback. Later on the team responsible for the concept found out that the probable reason for rejection (and what would have been deleterious in the market) was the lack of Kanji alphabet. To me, this highlights a lack of insight for **user-driven** R&D innovation and blind faith in authority, possibly emerging from the expectations of rationalizing the situation based on tacit beliefs ("you should know that this cannot work"). For the former accusation, I see that Nonaka and Takeuchi are somewhat misguided in their discussion of cross-cultural socialization. They are right in acknowledging the vitality of the issue, but their methods of achieving cross-cultural insight stay fully expert-driven.

To be less harsh on the book, by the end authors do bring up the value of customer input. "*Creative customers … adept at externalizing their tacit needs*" (p. 235) and acting as opinion leaders are highlighted as an important, possibly underused source of knowledge. However, the main fuel for the knowledge creating company is its own knowledge base (of technology and science), which drives the designer-centered R&D to prosper.

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