Knowledge Has to Do with Truth, Goodness, and Beauty

Conversation with Professor Ikujiro Nonaka
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C. O. Scharmer: Professor Nonaka, why and when did you become interested in knowledge creation?

I. Beginnings in Berkeley

Ikujiro Nonaka: It's a long story. Originally, I was interested in information processing. I spent five and a half years at UC Berkeley in the M.B.A. and Ph.D. programs and finished my Ph.D. dissertation in 1972. My major was marketing and Francisco M. Nicosia was my mentor. He's Italian. He had been an assistant professor at the University of Rome and came to Berkeley, got a degree there, and stayed. I studied consumer decision processes under him. His work at that time was based on behavioral science. Professor Nicosia's major contribution was the conceptualization of consumer decision processes from the perspective of information processing. Perhaps that was why Herbert Simon wrote a preface to his book. So, my interest shifted from marketing to organization theory. One of the major reasons for that shift was a sociology course I took. At Berkeley, doctoral students were required to have two fields, a major and a minor, so I took sociology as a minor. I took a course, in fact a sequence of three courses for one year, taught by Neil J. Smelser and Arthur L. Stinchcombe.

That course was taught from Smelser's theoretical viewpoint and Stinchcomb's methodological viewpoint. It was a really beautiful case of marriage of theory and method. For that course, we had to submit a final paper that constructed our own social theory. So I proposed a theory on the centralization versus decentralization issue. At the time I met Charles Perrow, another sociologist from Berkeley. He was then a visiting professor there, and I took his seminar on organizational strategy and structure. I was interested in the issue of centralization versus decentralization.

Why does the environment influence organization structure?

In the late '60s, contingency theorists came in to the field of organization theory, such as Burns and Stalker, Joan Woodward, James Thompson, and Lawrence and Lorsch. Contingency theory focused mainly on the relationship between an organization and its environment. The basic idea is: "Why does the environment influence organization structure?" I incorporated that idea and tried to explain the relationship between an organization and its environment from the perspective of information processing. There are intervening variables, which I called the information and decision burdens. I think this idea came from Stinchcombe. The more variety the market generates, the more information and decision burdens increase; the more variety each firm faces, the more variety of information it needs to record, monitor, and interpret for decision-making.

A way to cope with this variety is to respond in kind by creating variety in one's own organization structure. This is a fundamental principle called the law of requisite variety, first proposed by Ashby: "Only variety can destroy variety." That is what my dissertation was about. Then I came back to Japan and published a book titled Organization and Market in Japanese. It won the Nikkei Prize for Excellent Books in Economics and Management Science. So, people characterized me as a contingency theorist with information processing in perspective.

II. From Information Processing To Knowledge Creation

A turning point from information to knowledge came when I participated with my colleagues Hirotaka Takeuchi and Ken-ichi Imai in the Harvard Business School 75th Anniversary Colloquium on productivity and technology. It was organized by Bill Abernathy, Bob Hayes, and Kim Clark in March 1984.

We agreed to do a joint project to study the innovation processes at several Japanese companies. We then presented a paper titled "Managing the New Product Development Process: How Japanese Companies Learn and Unlearn." What I found was that the existing theory of information processing is not enough. The process of innovation is not simply information processing; it's a process to capture, create, leverage, and retain knowledge. I was beginning to theorize how an organization creates knowledge.

What I found was that the existing theory of information processing is not enough. Innovation process is not simply information processing. It's a process to capture, create, leverage, and retain knowledge.

COS: What brought you to the insight that information processing is not sufficient? Was it your exposure to companies, or was it your thinking, or was it exposure to particular pieces of literature? What happened between the '70s and '80s?

Ikujiro Nonaka: When we talked with individuals who did innovations, they always started with their beliefs. A belief about images of the world — you may call it a mental model — is a very subjective thing. And they tried to convert this subjective belief into a concept of objective language. They also tried to justify it within their organization and finally realized it in a concrete form. This whole process originated in their subjective beliefs.

But as you know, the information processing paradigm of Herbert Simon tries to separate facts and values. Value problems are always avoided in "science," which has to be based on facts. So in his theory he intentionally excludes value problems. That is a fundamental difference between [Chester] Barnard and [Herbert] Simon. Simon is a scientist. In his *The Function of the Executive*, Barnard concludes with issues of ethics or morale. That's a function of the executive; it is a value problem. In Simon's concept of decision premises, value is treated as given because it is subjective. Information processing excludes our beliefs and images of reality. But an innovation comes from a subjective belief or an image of the world.

And I tried to differentiate two types of information, namely syntactic versus semantic aspects of information. I wrote a book entitled The Corporate Evolution: Managing Organizational Information Creation. So, I shifted from information processing to information creation. With this in mind, I continued research on the innovation process. Through this research, I discovered that information creation is not enough. And finally, I arrived at the concept of knowledge creation.

COS: What is the difference between information creation and knowledge creation?

Ikujiro Nonaka: In very simple terms, information is the flow, and knowledge is the stock. Information is the flow of a message, while knowledge is created by accumulating information. Thus, information is a necessary medium or material for eliciting and constructing knowledge.

The second difference is that information is something passive. When we switch on a TV set, information comes regardless of my commitment. But knowledge comes from my belief, so it's more proactive.

I emphasize the nature of knowledge as "justified belief and skill." We consider knowledge as a dynamic human process of justifying personal belief toward the "truth." More broadly, knowledge has to do with goodness, beauty, and truth. I found this aspect of knowledge while studying the innovation process. When you look into

the innovation process, it's really something to do with developing a justified true belief. The innovation process is not simply information creation, but it starts from our beliefs and aspirations and is finally crystallized within and between organizations through collaboration.

III. The Spiral of Organizational Knowledge Creation

In the West, there is a long history of philosophical inquiry into knowledge or epistemology from Plato to Descartes to Michael Polanyi. Drawing especially on Polanyi, I conceptualized knowledge in terms of two types, tacit knowledge and explicit knowledge. Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate. Explicit knowledge, on the other hand, is transmittable in formal and systematic language.

Tacit knowledge and explicit knowledge are not totally separate but mutually complementary entities. Without experience, we cannot truly understand. But unless we try to convert tacit knowledge to explicit knowledge, we cannot reflect upon and share it organizationally. Through this dynamic interaction between the two types of knowledge, personal knowledge becomes organizational knowledge. And the organizational knowledge or intellectual infrastructure of an organization encourages its individual members to develop new knowledge through new experiences.

This dynamic process is the key to organizational knowledge creation. This interaction between the two types of knowledge brings about what we call four modes of knowledge conversion — that is, socialization (from individual tacit knowledge to group tacit knowledge), externalization (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge), and internalization (from explicit knowledge to tacit knowledge) (see Figure 1).

	To tacit knowledge	To explicit knowledge
From tacit knowledge	Socialization	Externalization
From explicit knowledge	Internalization	Combination

Figure 1: Spiral of Organizational Knowledge Creation: The process of knowledge creation is based on a double spiral movement between (a) tacit and explicit knowledge and (b) individual-group-divisional and corporate-wide levels.

Socialization is a process of creating common tacit knowledge through shared experiences. For socialization, we need to build a "field" of interaction, where

individuals share experiences and space at the same time, thereby creating common unarticulated beliefs or embodied skills.

Externalization is a process of articulating tacit knowledge into such explicit knowledge as concepts and/or diagrams, often using metaphors, analogies, and/or sketches. This mode is triggered by a dialogue intended to create concepts from tacit knowledge. Creating a new product concept is a good example.

Combination is a process of assembling new and existing explicit knowledge into a systemic knowledge, such as a set of specifications for a prototype of a new product. Often, a newly created concept should be combined with existing knowledge to materialize it into something tangible.

Internalization is a process of embodying explicit knowledge into tacit, operational knowledge such as know-how. This mode is triggered by "learning by doing or using." Explicit knowledge documented into text, sound, or video formats facilitates the internalization process. Therefore, manuals, a quintessential example of explicit knowledge, are widely used for internalization.

IV. Hypertext Organization and Middle-Up-Down Management

COS: How does middle-up-down management relate to the hypertext organization? And what is the integration between the three structural levels of the hypertext organization?

Ikujiro Nonaka: First of all, why middle-up-down? I emphasize the positive roles of middle managers. In the U.S., middle managers are denigrated as cancer. We see middle managers playing a key role in facilitating the process of organizational knowledge creation. They serve as the strategic "knot" that binds top management with front-line managers. They work as a "bridge" between visionary ideals of the top and the often chaotic realities of business confronted by front-line workers. They are the true "knowledge engineers" of the knowledge-creating company.

In the middle-up-down (MUD) model, top management creates a vision or a dream, while middle management develops more concrete concepts that front-line employees can understand and implement. Middle managers try to solve contradictions between what top management hopes to create and what actually exists in the real world. In other words, top management's role is to create a grand theory, while middle management tries to create a mid-range theory that it can test empirically within the company with the help of front-line employees. The MUD model is not an either-or approach; it is an interactive process of both top-down and bottom-up.

COS: They have to integrate the whole system, right?

Ikujiro Nonaka: Yes. And to try to promote integration structurally, hypertext comes in. A hypertext organization is the dynamic synthesis of the bureaucratic structure and the task-force structure, and it reaps benefits from both. The bureaucratic structure efficiently implements, exploits, and accumulates new knowledge through combination and internalization, while the task force is indispensable for creating new knowledge through socialization and externalization. Efficiency and stability of the bureaucratic structure are combined with effectiveness and dynamism of the task force in a hypertext organization. Moreover, it adds another layer, the knowledge base, that serves as a "clearinghouse" for the new knowledge generated in the bureaucratic structure and the task force.

COS: What exactly is the knowledge-base layer?

Ikujiro Nonaka: The knowledge-base layer includes intellectual capital such as corporate vision, organizational culture, databases, and individual knowledge. Once the cross-functional team completes its task, team members move down to the knowledge-base layer and make an inventory of newly created knowledge. Then team members return to the business layer for routine operations until called on to another project.

There are five enabling conditions in my theory: intention, autonomy, fluctuation/creative chaos, redundancy, and finally requisite variety. Intention is embodied in an organizational vision. Autonomy increases the chance of serendipity. Fluctuation and creative chaos stimulate a sense of crisis and change. Benefits of creative chaos are possible only if members can reflect on their actions; otherwise chaos leads to destruction. Redundancy includes intentional overlapping of information about business activities, management responsibilities, and company. Requisite variety means a minimum internal variety for the purpose of organizational integration and a maximum internal variety for an effective adaptation to the environment. Organizational information and knowledge must match the external complexity.

A hypertext organization is a structural device that incorporates these enabling conditions. What is unique about a hypertext organization is that three totally different layers or contexts coexist within the same organization.

Five Stage

COS: You differentiate between five phases of knowledge creation: (1) sharing tacit knowledge, (2) creating concepts, (3) justifying concepts, (4) building an archetype,

(5) cross-leveling knowledge. From the view of Western companies the most crucial ones are your steps number one and five.

Ikujiro Nonaka: Socialization, right?

COS: Yes. Because, you have a healthy tacit infrastructure in place here in Japan, whereas this infrastructure is mostly missing in the U.S. and Europe. In the U.S. we have different conditions. We don't have the Japanese context, we do not have these fields. How could you create such an infrastructure that would give a point of departure for the whole process? How could you create this field?

Ikujiro Nonaka: Socialization is crucial. I agree. But when we look at companies like 3M or HP, they are very team-oriented as well as individual-oriented. Organizationally, Japanese companies enforce the formation of cross-function teams, but in 3M's case it's more voluntary, spontaneous, or autonomous. But the difference is a matter of degree, not kind.

I have to admit that socialization is harder in the U.S. because of its individualism and incentive systems. The Japanese incentive system is more team-oriented. And in principle, we don't lay off people. Consequently, it is relatively easy to share experiences at Japanese companies.

If you can do socialization, your teams are stronger than Japanese ones, because you have strong individuals. Strong individuals and a strong team are complementary. To institutionalize team-oriented spirit, however, U.S. organizations may need strong corporate cultures. 3M, HP, or the Marine Corps, all of them have very strong corporate values. For us, it's relatively easy to do that without strong organizational cultures.

COS: Now, talking about the fifth stage, cross-leveling. Is it really a fifth phase, or is it another way of the previous four but on a higher level? In many cases I have seen huge successes in projects, but when it comes to corporate organization-wide sharing, the dissemination process often does not work and that's one of the problems right now.

Ikujiro Nonaka: Fractal or holographic structures help.

COS: What exactly does fractal mean? In terms of different functions, or in terms of different hierarchical levels?

Ikujiro Nonaka: Both are related. Autonomous individuals function as part of the fractal or holographic structure, in which the whole and each part share the same information and knowledge. Original ideas emanate from autonomous individuals,

diffuse within the team, and then become organizational ideas. In this respect, the self-organizing individual assumes a position that may be seen as analogous to the core of a series of nested Russian dolls. From the viewpoint of knowledge creation, an organization is more likely to maintain greater flexibility in moving from an individual to a group, to a department, a division, and corporation, and again back to the individual. What we call hypertext organization is made up of interconnected layers or contexts: the business system, the project team, and the knowledge base.

In the case of Sharp, the Urgent Project System gives its members, who could be recruited from any section or department within the company, [with] the same "gold-badge" authority as corporate directors during the project period. Once the team develops a concept and a prototype, they are quickly transferred to the relevant divisions for crystallization. In hypertext, you have to have very strong support from top management to form this type of team.

COS: So that then is the answer. The way you sometimes phrase this definition of hypertext organization is that the ideal would be that everybody in any situation could choose any context. I'm exaggerating a little bit. Hypertext means that the members of an organization can switch to the context they need.

Ikujiro Nonaka: Right.

COS: But in the examples you gave, it's actually not that flexible. If I'm appointed by the president to a very urgent team, that doesn't mean that I can switch the context during my work time whenever I choose.

Ikujiro Nonaka: Of course, changing the context within the company is constrained by management. But the degree of friction of individuals and groups in setting their task boundaries is larger and more dynamic in the hypertext organization. Once the members of the Urgent Project Team are approved by top management, they are empowered to do whatever they like to do to complete the project within the limited period of time. Also, they closely interact with top management. The roles and functions of top, middle, and lower may rotate depending on the context within this compressed process of management. For example, a project leader may take the role of top management and a CEO can come below him or her, depending on the phase of the project.

V. Organizational Learning vs. Knowledge Creation

COS: On the one hand you are criticizing approaches to learning that are overly centered in the mind, that lack the body-based "learning by doing." On the other

hand, you relate learning concepts to internalization, which primarily is learning by doing. How does that go together?

Ikujiro Nonaka: It seems to me that organizational learning theories do not comprehend the whole dynamic process of knowledge creation. I see learning as related to the mode of internalization, namely conversion from explicit knowledge to tacit knowledge. Learning theories cannot explain the innovation process or the total process of organizational knowledge creation.

COS: Isn't it interesting that your criticism against Western theoreticians such as Senge is that there is a lack of theory? So you're using an argument that usually is used by Western folks against, for instance, Japanese approaches, because the West invented this concept of theory. Do you see my point?

Ikujiro Nonaka: Yes, I understand what you mean. While the learning model is rooted in the Skinnerian behavioral paradigm, our theory is rooted in epistemology. My criticism of learning perspectives are twofold:

First, they have not developed any comprehensive theory:
They lack the view on the fundamentals of epistemology: what is knowledge, the nature of knowledge, and what constitutes learning.
They are not clear about how the knowledge is captured, created, leveraged, and disseminated.
They tend to focus on methods and tools of internalization.
They are focused on the relationship between individuals and groups, but not clear about the relationships between individuals, groups, organizations, and inter-organizations.

Second, they generally consider learning as an adaptive process:
They are trapped in the behavioral concept of stimulus-response.
They lack an active stance toward the environment; it is difficult to explain an innovation process. They view the "double-loop learning" as a special task.

In our framework, learning is internalization.

COS: Would you agree in the sense that there is a need for deeper theoretical reflection? You can't do everything, and the main focus of the Learning Center's work is not to create consistent theory, but to create a new...

Ikujiro Nonaka: Practice.

COS: Yes. To really cooperate with real live companies, not only with single companies, but to create a group of companies which then do practical experiences in

projects. So in other words, to generate data which could be the source to generate a new generation of theory. So, you can't do everything at the same time.

Ikujiro Nonaka: Yes. American pragmatism is fine. In my view, management is not about technique or methodology, but about value. What is good? What is beautiful? What is truthful? That's something that is a fundamental difference between pragmatism and epistemology. We have to go back to Plato and Descartes; this is the issue for contemporary management.

COS: I agree. And Senge would agree as well on that. But you know, essentially I think what learning organizations are about is something that cannot be done from one place in the total sense. In other words, the American contribution to this topic may be based on pragmatism and an action orientation. And then from Japan and from Europe there may be other contributions, which could develop the epistemological foundations. It's something that needs to be done on a global scale with all major countries contributing, especially Japan, and Europe as well.

Ikujiro Nonaka: You may be right, and I understand Dr. Senge has a more profound philosophy behind the developed techniques, but I'd like to see him...

VI. Knowledge Has to Do with Truth, Goodness, and Beauty

COS: Russ Ackoff differentiates among data, information, knowledge and understanding. So my question is, what is your view of knowledge? Would you agree with Russ Ackoff's distinction between knowledge and understanding?

Ikujiro Nonaka: Well, I think understanding is built into knowledge.

COS: So knowledge is not just know how, but also know why?

Ikujiro Nonaka: In our dynamic theory of organizational knowledge creation, know-how is acquired mainly in socialization, know-why is in externalization and combination, and understanding is achieved after internalization. Through one cycle of knowledge spiral we truly understand. We view knowledge as a dynamic human process of justifying personal belief toward the "truth." And the complete cycle across four modes is the transcendental process in that individual knowledge becomes group, organizational, and interorganizational knowledge, and then back to the individual level.

COS: What works is true?

Ikujiro Nonaka: Knowledge has something to do with truth, goodness, and beauty. Then the question is what is true? In management, it is determined by the size and height of justification. How much personal belief or aspiration can be approved by a group, an organization, a community, and a global society. For example, Toyota might have created true knowledge when they developed the just-in-time concept. But when it comes to the community level, they have problems. Suppliers are exhausted, lots of traffic jams are created to carry all the just-in-time deliveries. This may effect a lower aspiration of top management, or the lack of higher values. I like some companies more than Toyota, but they are not necessarily good at making money. Knowledge-creating companies may not necessarily be good at making money, but in the long run they will win.

VII. Reflection

This conversation with Ikujiro Nonaka outlines the context in which he developed his pathbreaking theory of knowledge creation. He also talks about two managerial and organizational key concepts that he and his co-author Hiro Takeuchi presented in their *The Knowledge Creating Company*: Middle-Up-Down Management (MUD) and hypertext organization. Hypertext organization conceives of organizations in terms of three distinct layers: the business system layer, the project layer, and the knowledge base layer. The hypertext organization can be thought about in two modes: integrated by top-management (top-management appoints the project teams) or integrated by all individuals, who participate in all three layers. In his book Nonaka described the first mode. In the interview he says that the second mode could be developed in the West.

VIII. Bio

Ikujiro Nonaka is Xerox Professor of Knowledge at the Haas School of Business, UC Berkeley, and a professor at the Graduate School of International Corporate Strategy at Hitotsubashi University in Tokyo. He also is the Visiting Dean of the Center for Knowledge and Innovation Research (CKIR) at the Helsinki School of Economics and Business Administration and the founding dean of the Graduate School of Knowledge Science at Japan Advanced Institute of Science and Technology. Nonaka received both his MBA and Ph.D. in business from the University of California at Berkeley and has long been one of Japan's foremost authorities on developing and using the intellectual capital of workers to create and expand business knowledge. With co-author Hirotaka Takeuchi, Professor Nonaka wrote *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* (Oxford: 1995), which was awarded the "Best Book of the Year in Business and Management" by the Association of American Publishers Professional and Scholarly Publishing Division. The book introduced the issues of tacit and explicit knowledge, and also

the important role of individuals in the creation of organizational knowledge. These views have gained a strong position in current management and organization theory and practice and resulted in a knowledge-based view of the firm.