PART I: KEY CONCEPTS

2 SECI, *Ba* and Leadership: A Unified Model of Dynamic Knowledge Creation

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As Alvin Toffler said, we are now living in a 'knowledge-based society', where knowledge is the source of the highest quality power.[1] In a world where markets, products, technologies, competitors, regulations and even societies change rapidly, continuous innovation and the knowledge that enables such innovation have become important sources of sustainable competitive advantage. Hence, management scholars today consider knowledge and the capability to create and utilize knowledge to be the most important source of a firm's sustainable competitive advantage.[2] The *raison d'être* of a firm is to continuously create knowledge. Yet, in spite of all the talk about 'knowledge-based management' and in spite of the recognition of the need for a new knowledge-based theory that differs 'in some fundamental way'[3] from the existing economics and organizational theory, there is very little understanding of how organizations actually create and manage knowledge.

This is partly because we lack a general understanding of knowledge and the knowledge-creating process. The 'knowledge management' that academics and business people talk about often means just 'information management'. In the long tradition of Western management, the organization has been viewed as an information processing machine that takes and processes information from the environment to solve a problem and adapts to the environment based on a given goal. This static and passive view of the organization fails to capture the dynamic process of knowledge creation.

Instead of merely solving problems, organizations create and define problems, develop and apply new knowledge to solve the problems, and then further develop new knowledge through the action of problem solving. The organization is not merely an information processing machine, but an entity that creates knowledge through action and interaction.[4] It interacts with its environment, and reshapes the environment and even itself through the process of knowledge creation. Hence, the most important aspect of understanding a firm's capability concerning knowledge is the dynamic capability to continuously create new knowledge out of existing firm-specific capabilities, rather than the stock of knowledge (such as a particular technology) that a firm possesses at one point in time.[5]

Source: I. Nonaka, R. Toyama and N. Konno and N. Konno (2000) '*SECI*, Ba *and leadership: a unified model of dynamic knowledge creation', Long Range Planning*, 33(1): 5–34, Edited version.

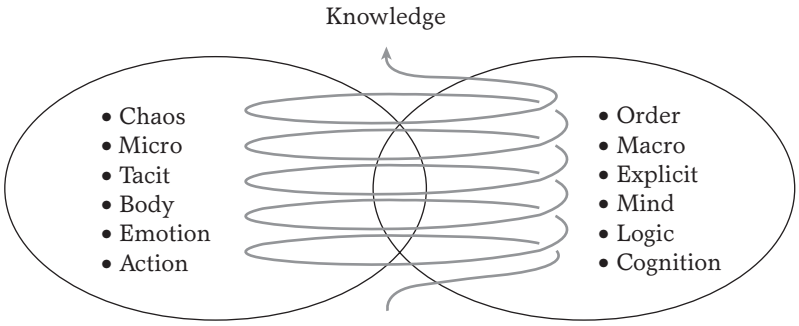

Figure 2.1 Knowledge created through a spiral

With this view of an organization as an entity that creates knowledge continuously, we need to re-examine our theories of the firm, in terms of how it is organized and managed, how it interacts with its environment and how its members interact with each other. Our goal in this chapter is to understand the dynamic process in which an organization creates, maintains and exploits knowledge. The following sections discuss basic concepts related to the organizational knowledge-creating process, how such a process is managed, and how one can lead such a knowledge-creating process. Knowledge is created in the spiral that goes through two seemingly antithetical concepts such as order and chaos, micro and macro, part and whole, mind and body, tacit and explicit, self and other, deduction and induction, and creativity and control. We argue that the key in leading the knowledge-creating process is dialectical thinking, which transcends and synthesizes such contradictions (see Figure 2.1).

What Is Knowledge?

In our theory of the knowledge-creating process, we adopt the traditional definition of knowledge as 'justified true belief. However, our focus is on the 'justified' rather than the 'true' aspect of belief. In traditional Western epistemology (the theory of knowledge), 'truthfulness' is the essential attribute of knowledge. It is the absolute, static and non-human view of knowledge. This view, however, fails to address the relative, dynamic and humanistic dimensions of knowledge.

Knowledge is dynamic, since it is created in social interactions among individuals and organizations. Knowledge is context-specific, as it depends on a particular time and space.[6] Without being put into a context, it is just information, not knowledge. For example, '1234 ABC Street' is just information. Without context, it does not mean anything. However, when put into a context, it becomes knowledge: 'My friend David lives at 1234 ABC Street, which is next to the library.' Knowledge is also humanistic,

as it is essentially related to human action. Knowledge has the active and subjective nature represented by such terms as 'commitment' and 'belief' that is deeply rooted in individuals' value systems. Information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals. Hence, knowledge is relational: such things as 'truth', 'goodness' and 'beauty' are in the eye of the beholder. As Alfred North Whitehead stated, 'there are no whole truths; all truths are half-truths'.[7] In this study, we consider knowledge to be 'a dynamic human process of justifying personal belief toward the "truth"'.[8]

There are two types of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge can be expressed in formal and systematic language and shared in the form of data, scientific formulae, specifications, manuals and suchlike. It can be processed, transmitted and stored relatively easily. In contrast, tacit knowledge is highly personal and hard to formalize. Subjective insights, intuitions and hunches fall into this category of knowledge. Tacit knowledge is deeply rooted in action, procedures, routines, commitment, ideals, values and emotions.[9] It 'indwells' in a comprehensive cognizance of the human mind and body.[10] It is difficult to communicate tacit knowledge to others, since it is an analogue process that requires a kind of 'simultaneous processing'.

Western epistemology has traditionally viewed knowledge as explicit. However, to understand the true nature of knowledge and knowledge creation, we need to recognize that tacit and explicit knowledge are complementary, and that both types of knowledge are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning. Written speech is possible only after internal speech is well developed.[11] Knowledge is created through interactions between tacit and explicit knowledge, rather than from tacit or explicit knowledge alone.

The Knowledge-Creating Process

Knowledge creation is a continuous, self-transcending process through which one transcends the boundary of the old self into a new self by acquiring a new context, a new view of the world, and new knowledge. In short, it is a journey *'from* being to becoming'.[12] One also transcends the boundary between self and other, as knowledge is created through the interactions among individuals or between individuals and their environment. In knowledge creation, micro and macro interact with each other, and changes occur at both the micro and the macro level: an individual (micro) influences and is influenced by the environment (macro) with which he or she interacts.

In order to understand how organizations create knowledge dynamically, we propose a model of knowledge creation consisting of three elements: (1) the socialization, externalization, combination, internalization (SECI) process – the process of knowledge creation through conversion between tacit and explicit knowledge; (2) *ba* – the shared context for knowledge creation; and (3) knowledge assets – the inputs, outputs, and moderator of the knowledge-creating process. The three elements

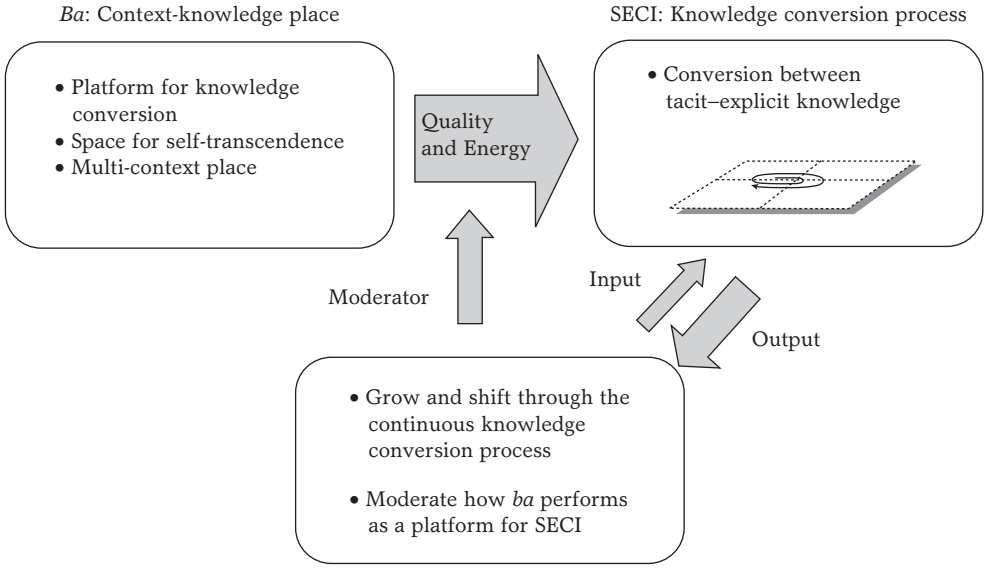

Figure 2.2 Three elements of the knowledge-creating process

of knowledge creation have to interact with each other to form the knowledge spiral that creates knowledge (see Figure 2.2). In the following sections, we discuss each of these three elements.

The SECI Process: Four Modes of Knowledge Conversion

An organization creates knowledge through the interactions between explicit and tacit knowledge. We call the interaction between the two types of knowledge 'knowledge conversion'. Through the conversion process, tacit and explicit knowledge expands in both quality and quantity.[13] There are four modes of knowledge conversion. They are: 1 socialization (from tacit knowledge to tacit knowledge); 2 externalization (from tacit knowledge to explicit knowledge); 3 combination (from explicit knowledge to explicit knowledge); and 4 internalization (from explicit knowledge to tacit knowledge).

Socialization Socialization is the process of converting new tacit knowledge through shared experiences. Since tacit knowledge is difficult to formalize and often time- and space-specific, tacit knowledge can be acquired only through shared experience, such as spending time together or living in the same environment. Socialization typically occurs in a traditional apprenticeship; where apprentices learn the tacit knowledge needed in their craft through hands-on experience, rather than from written manuals or textbooks. Socialization may also occur in informal social meetings outside

of the workplace, where tacit knowledge such as world views, mental models and mutual trust can be created and shared. Socialization also occurs beyond organizational boundaries. Firms often acquire and take advantage of the tacit knowledge embedded in customers or suppliers by interacting with them.

Externalization Externalization is the process of articulating tacit knowledge into explicit knowledge. When tacit knowledge is made explicit, knowledge is crystallized, thus allowing it to be shared by others, and it becomes the basis of new knowledge. Concept creation in new product development is an example of this conversion process. Another example is a quality control circle, which allows employees to make improvements on the manufacturing process by articulating the tacit knowledge accumulated on the shop floor over years on the job. The successful conversion of tacit knowledge into explicit knowledge depends on the sequential use of metaphor, analogy and model.

Combination Combination is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge. Explicit knowledge is collected from inside or outside the organization and then combined, edited or processed to form new knowledge. The new explicit knowledge is then disseminated among the members of the organization. Creative use of computerized communication networks and large-scale databases can facilitate this mode of knowledge conversion. When the comptroller of a company collects information from throughout the organization and puts it together in a context to make a financial report, that report is new knowledge in the sense that it synthesizes knowledge from many different sources in one context. The combination mode of knowledge conversion can also include the 'breakdown' of concepts. Breaking down a concept such as a corporate vision into operationalized business or product concepts also creates systemic, explicit knowledge.

Internalization Internalization is the process of embodying explicit knowledge into tacit knowledge. Through internalization, explicit knowledge created is shared throughout an organization and converted into tacit knowledge by individuals. Internalization is closely related to 'learning by doing'. Explicit knowledge, such as the product concepts or the manufacturing procedures, has to be actualized through action and practice. For example, training programmes can help trainees to understand an organization and themselves. By reading documents or manuals about their jobs and the organization, and by reflecting upon them, trainees can internalize the explicit knowledge written in such documents to enrich their tacit knowledge base. Explicit knowledge can also be embodied through simulations or experiments that trigger learning by doing.

When knowledge is internalized to become part of individuals' tacit knowledge bases in the form of shared mental models or technical know-how, it becomes a valuable asset. This tacit knowledge accumulated at the individual level can then set off a new spiral of knowledge creation when it is shared with others through socialization.

The following lists summarize the factors that characterize the four knowledge conversion modes.[14]

Socialization – from tacit to tacit:

- Tacit knowledge accumulation: managers gather information from sales and production sites, share experiences with suppliers and customers, and engage in dialogue with competitors.
- Extra-firm social information collection (wandering outside): managers engage in bodily experience through management by wandering about, and get ideas for corporate strategy from daily social life, interaction with external experts and informal meetings with competitors outside the firm.
- Intrafirm social information collection (wandering inside): managers find new strategies and market opportunities by wandering inside the firm.
- Transfer of tacit knowledge: managers create a work environment that allows peers to understand craftsmanship and expertise through practice and demonstrations by a master.

Externalization – from tacit to explicit:

- Managers facilitate creative and essential dialogue, the use of 'abductive thinking', the use of metaphors in dialogue for concept creation, and the involvement of the industrial designers in project teams.

Combination – from explicit to explicit:

- Acquisition and integration: managers are engaged in planning strategies and operations, assembling internal and external data by using published literature, computer simulation and forecasting.
- Synthesis and processing: managers build and create manuals, documents and databases on products and services and build up material by gathering management figures or technical information from all over the company.
- Dissemination: managers engage in the planning and implementation of presentations to transmit newly created concepts.

Internalization – from explicit to tacit:

- Personal experience; real world knowledge acquisition: managers engage in 'enactive liaising' activities with functional departments through cross-functional development teams and overlapping product development. They search for and share new values and thoughts, and share and try to understand management visions and values through communication with fellow members of the organization.
- Simulation and experimentation; virtual world knowledge acquisition: managers engage in facilitating prototyping and benchmarking and facilitate a challenging spirit within the organization. Managers form teams as a model and conduct experiments and share results with the entire department.

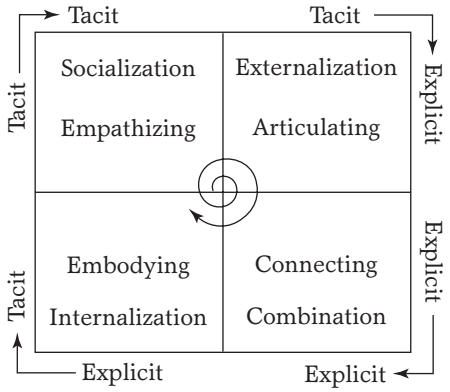

Figure 2.3 The SECI process

As stated above, knowledge creation is a continuous process of dynamic interactions between tacit and explicit knowledge. Such interactions are shaped by shifts between different modes of knowledge conversion, not just through one mode of interaction. Knowledge created through each of the four modes of knowledge conversion interacts in the spiral of knowledge creation. Figure 2.3 shows the four modes of knowledge conversion and the (evolving spiral movement of knowledge through the SECI process.

It is important to note that the movement through the four modes of knowledge conversion forms a *spiral,* not a circle. In the spiral of knowledge creation, the interaction between tacit and explicit knowledge is amplified through the four modes of knowledge conversion. The spiral becomes larger in scale as it moves up through the ontological levels. Knowledge created through the SECI process can trigger a new spiral of knowledge creation, expanding horizontally and vertically across organizations. It is a dynamic process, starting at the individual level and expanding as it moves through communities of interaction that transcend sectional, departmental, divisional and even organizational boundaries. Organizational knowledge creation is a never-ending process that upgrades itself continuously.

This interactive spiral process takes place both intra- and inter-organizationally. Knowledge is transferred beyond organizational boundaries, and knowledge from different organizations interacts to create new knowledge.[15] Through dynamic interaction, knowledge created by the organization can trigger the mobilization of knowledge held by outside constituents such as consumers, affiliated companies, universities or distributors. For example, an innovative manufacturing process may bring about changes in the suppliers' manufacturing process, which in turn triggers a new round of product and process innovation at the organization. Another example is the articulation of tacit knowledge possessed by customers that they themselves have not been able to articulate. A product works as the trigger to elicit tacit knowledge when customers give meaning to the product by purchasing,

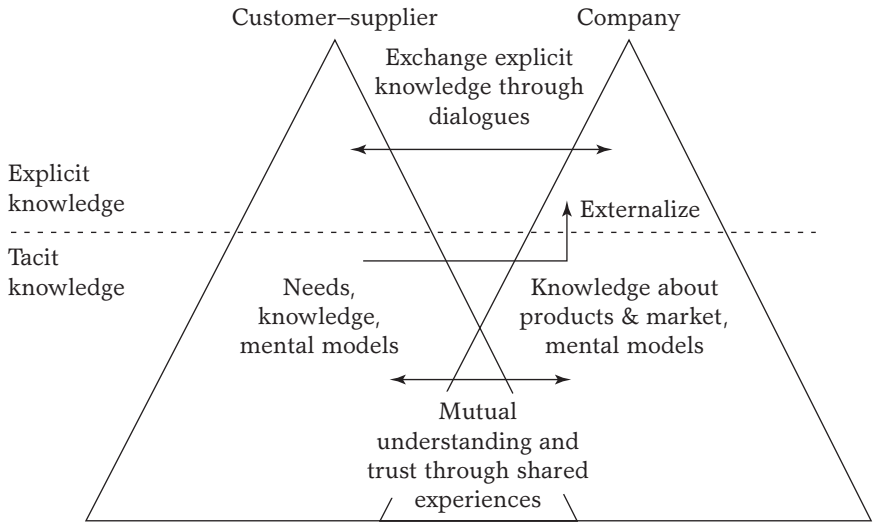

Figure 2.4 Creating knowledge with outside constituents

adapting, using or not purchasing it. Their actions are then reflected in the innovation process of the organization, and a new spiral of organizational knowledge creation starts again. Figure 2.4 shows how the organization interacts with outside constituents to create knowledge.

It should also be noted that knowledge creation is a self-transcending process, in which one reaches out beyond the boundaries of one's own existence.[16] In knowledge creation, one transcends the boundary between self and other, inside and outside, past and present. In socialization, self-transcendence is fundamental because tacit knowledge can only be shared through direct experiences, which go beyond individuals.[17] For example, in the socialization process people empathize with their colleagues and customers, which diminishes barriers between individuals. In externalization, an individual transcends the inner and outer boundaries of the self by committing to the group and becoming one with the group. Here, the sum of the individuals' intentions and ideas fuse and become integrated with the group's mental world. In combination, new knowledge generated through externalization transcends the group in analogue or digital signals. In internalization, individuals access the knowledge realm of the group and the entire organization. This again requires self-transcendence, as one has to find oneself in a larger entity.

Ba: Shared Context in Motion for Knowledge Creation

Knowledge needs a context in which to be created. Contrary to the Cartesian view of knowledge, which emphasizes the absolute and context-free nature of knowledge,

the knowledge-creating process is necessarily context-specific in terms of who participates and how they participate. Knowledge needs a physical context to be created: 'there is no creation without place'.[18] *Ba* (which roughly means 'place') offers such a context. Based on a concept that was originally proposed by the Japanese philosopher Kitaro Nishida[19] and was further developed by Shimizu,[20] *ba* is here defined as a shared context in which knowledge is shared, created and utilized. In knowledge creation, generation and regeneration of *ba* is the key, as *ba* provides the energy, quality and place to perform the individual conversions and to move along the knowledge spiral.[21]

In knowledge creation, one cannot be free from context. Social, cultural and historical contexts are important for individuals, as such contexts provide the basis for one to interpret information to create meanings. As Friedrich Nietzsche argued, 'there are no facts, only interpretations'. *Ba* is a place where information is interpreted to become knowledge.

Ba does not necessarily mean a physical space. The Japanese word *ba* means not just a physical space, but a specific time and space. *Ba* is a time–space nexus, or as Heidegger expressed it, a locationality that simultaneously includes space and time. It is a concept that unifies physical space such as an office space, virtual space such as email, and mental space such as shared ideals.

The key concept in understanding *ba* is 'interaction'. Some of the research on knowledge creation focuses mainly on individuals, based on the assumption that individuals are the primary driving forces of creation. For example, quoting Simon's 'All learning takes place inside individual human heads', Grant claims that knowledge creation is an individual activity and that the primary role of firms is to apply existing knowledge.[22] However, such an argument is based on a view of knowledge and human beings as static and inhuman. As stated above, knowledge creation is a dynamic human process that transcends existing boundaries. Knowledge is created through the interactions among individuals or between individuals and their environments, rather than by an individual operating alone. *Ba* is the context shared by those who interact with each other, and through such interactions, those who participate in *ba* and the context itself evolve through self-transcendence to create knowledge (see Figure 2.5). Participants of *ba* cannot be mere onlookers. Instead, they are committed to *ba* through action and interaction.

Ba has a complex and ever-changing nature. *Ba* sets a boundary for interactions among individuals, and yet its boundary is open. As there are endless possibilities to one's own contexts, a certain boundary is required for a meaningful shared context to emerge. Yet *ba* is still an open place where participants with their own contexts can come and go, and the shared context (*ba*) can continuously evolve. By providing a shared context in motion, *ba* sets binding conditions for the participants by limiting the way in which the participants view the world. And yet it provides participants with higher viewpoints than their own.

Ba lets participants share time and space, and yet it transcends time and space. In knowledge creation, especially in socialization and externalization, it is important for participants to share time and space. A close physical interaction is important in sharing the context and forming a common language among participants. Also,

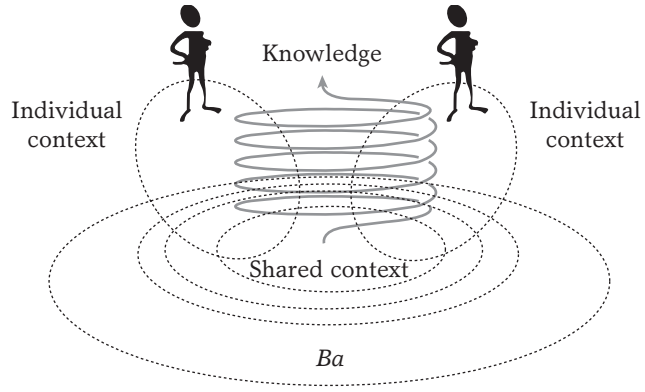

Figure 2.5 *Ba* as shared context in motion

since knowledge is intangible, unbounded and dynamic and cannot be stocked, *ba* works as the platform of knowledge creation by collecting the applied knowledge of the area into a certain time and space and integrating it. However, as *ba* can be a mental or virtual place as well as a physical place, it does not have to be bound to a certain space and time.

The concept of *ba* seemingly has some similarities to the concept of 'communities of practice'.[23] Based on the apprenticeship model, the concept of communities of practice argues that members of a community learn through participating in the community of practice and gradually memorizing jobs. However, there are important differences between the concepts of communities of practice and *ba.* While a community of practice is a living place where the members learn knowledge that is embedded in the community, *ba* is a living place where new knowledge is created. While learning occurs in any community of practice, *ba* needs energy to become an active *ba* where knowledge is created. The boundary of a community of practice *is firmly set* by the task, culture and history of the community. Consistency and continuity are important for a community of practice, as it needs an identity. In contrast, the boundary of *ba* is fluid and can be changed quickly as it is set by the participants. Instead of being constrained by history, *ba* has a 'here and now' quality. It is constantly moving; it is created, functions and disappears according to need. *Ba* constantly changes, as the contexts of participants or the membership of *ba* change. In a community of practice, changes mainly take place at the micro (individual) level, as new participants learn to be full participants. In *ba*, changes take place at both the micro- and the macro-level, as participants change both themselves and *ba* itself. While the membership of a community of practice is fairly stable, and it takes time for a new participant to learn about the community to become a full participant, the membership of *ba* is not fixed; participants come and go. Whereas members of a community of practice belong to the community, participants of *ba* relate to the *ba*.

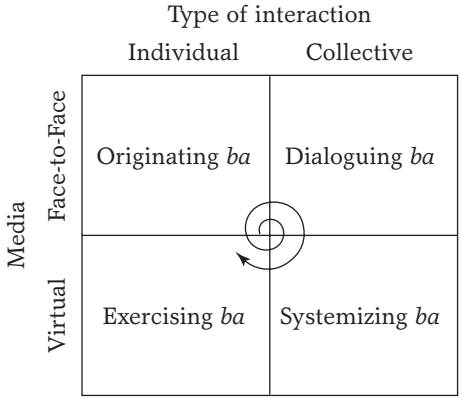

Figure 2.6 Four Types of *ba*

There are four types of *ba:* that is, originating *ba,* dialoguing *ba,* systemizing *ba* and exercising *ba,* which are defined by two dimensions of interactions (see Figure 2.6). One dimension is the type of interaction, that is, whether the interaction takes place individually or collectively. The other dimension is the media used in such interactions, that is, whether the interaction is through face-to-face contact or virtual media such as books, manuals, memos, emails or teleconferences. Each *ba* offers a context for a specific step in the knowledge-creating process, though the respective relationships between each single *ba* and conversion modes are by no means exclusive. Building, maintaining and utilizing *ba* is important to facilitate organizational knowledge creation. Hence, one has to understand the different characteristics of *ba* and how they interact with each other. The following sections describe the characteristics of each *ba*.

Originating *Ba* Originating *ba* is defined by individual and face-to-face interactions. lt is a place where individuals share experiences, feelings, emotions and mental models. It mainly offers a context for socialization, since an individual face-to-face interaction is the only way to capture the full range of physical senses and psycho-emotional reactions, such as ease or discomfort, which are important elements in sharing tacit knowledge. Originating *ba* is an existential place in the sense that it is the world where an individual transcends the boundary between self and others, by sympathizing or empathizing with others. From originating *ba* emerge care, love, trust and commitment, which form the basis for knowledge conversion among individuals.

Dialoguing Ba Dialoguing *ba* is defined by collective and face-to-face interactions. It is the place where individuals' mental models and skills are shared, converted into common terms, and articulated as concepts. Hence, dialoguing *ba* mainly offers a context for externalization. Individuals' tacit knowledge is shared and articulated through dialogues among participants. The articulated knowledge is

also brought back into each individual, and further articulation occurs through self-reflection. Dialoguing *ba* is more consciously constructed than originating *ba.* Selecting individuals with the right mix of specific knowledge and capabilities is the key to managing knowledge creation in dialoguing *ba.*

Systemizing *Ba* Systemizing *ba* is defined by collective and virtual interactions. Systemizing *ba* mainly offers a context for the combination of existing explicit knowledge, as explicit knowledge can be relatively easily transmitted to a large number of people in written form. Information technology, through such things as online networks, groupware, documentation and databanks, offers a virtual collaborative environment for the creation of systemizing *ba.* Today, many organizations use such things as electronic mailing lists and news groups through which participants can exchange necessary information or answer each other's questions to collect and disseminate knowledge and information effectively and efficiently.

Exercising *Ba* Exercising *ba* is defined by individual and virtual interactions. It mainly offers a context for internalization. Here, individuals embody explicit knowledge that is communicated through virtual media, such as written manuals or simulation programs. Exercising *ba* synthesizes the transcendence and reflection through action, while dialoguing *ba* achieves this through thought.

Let us illustrate how a firm utilizes various *ba* with the example of Seven-Eleven Japan, the most profitable convenience store franchiser in Japan. The success of Seven-Eleven Japan stems from its management of knowledge creation through creating and managing various *ba.*

Seven-Eleven Japan uses the shop floors of the 7000 stores around Japan as originating *ba,* where store employees accumulate tacit knowledge about customers' needs through face-to-face interactions with customers. Long-term experiences in dealing with customers give store employees unique knowledge of and insight into the local market and customers. They often say that they can just 'see' or 'feel' how well certain items will sell in their stores, although they cannot explain why.

To promote the use of its stores as originating *ba,* Seven-Eleven Japan gives its employees extensive on-the-job training (OJT) on the shop floor. Every new recruit is required to work at Seven-Eleven stores in various functions for about two years to accumulate experiences in dealing directly with customers, and in actually managing Seven-Eleven stores. Another instrument to create originating *ba* is 'Burabura Shain' (Walking around Employee), who has the task of wandering around and socializing with customers in stores to discover new knowledge in the field.

The tacit knowledge about the customers is then converted into explicit knowledge in the form of 'hypotheses' about market needs. Since local employees are the ones who hold tacit knowledge about their local markets, Seven-Eleven Japan let them build their own hypotheses about the sales of particular items by giving store employees the responsibility to order items. For example, a local worker can order more beer, based on the knowledge that the local community is having a festival.

To facilitate hypothesis building, Seven-Eleven Japan actively builds and utilizes dialoguing *ba,* where the tacit knowledge of local employees is externalized into explicit knowledge in the form of hypotheses through dialogue with others. Several employees are responsible for ordering merchandise instead of just one manager. Each employee is responsible for certain merchandise categories, and through dialogues with others who are responsible for other categories they can build hypotheses that better fit changing market needs.

Another instrument to facilitate hypothesis building is the use of field counsellors, who visit the stores regularly to engage in dialogues with the owners and employees of local stores, and give them advice in placing orders and managing stores so that owners and employees can articulate their tacit knowledge well. If a field counsellor notices a unique hypothesis, such as a new way to display merchandises at one store, he or she takes note and shares that hypothesis with other stores.

The hypotheses built at shop floor level are shared throughout the company through various dialoguing *ba.* Field counsellors report on the knowledge built at the stores they are responsible for to their zone managers, who then disseminate knowledge acquired from one field counsellor to other field counsellors. Zone managers from across Japan meet at the headquarters in Tokyo every week, where success stories and problems at local stores are shared with Seven-Eleven's top management and other zone managers. Field counsellors also have meetings every week, where field counsellors and staff members from the headquarters, including the top management, share knowledge.

The cost of maintaining such *ba* is not small. To hold such meetings in Tokyo every week, it has been estimated that Seven-Eleven Japan spends about US$18 million per year on travelling, lodging, and so on. However, Seven-Eleven Japan emphasizes the importance of face-to-face interaction.

The hypotheses built at dialoguing *ba* are tested by the actual sales data that are collected, analysed and utilized through a state-of-the-art information system. The information system works as systemizing *ba,* where explicit knowledge in the form of sales data is compiled, shared and utilized by the headquarters and local stores.

The explicit knowledge compiled at systemizing *ba* is immediately fed back to stores through the information system so that they can build new hypotheses that suit the reality of the market better. Utilizing point-of-sales data and its analysis, store employees test their hypotheses about the market everyday at their local store, which works as exercising *ba.* In exercising *ba,* knowledge created and compiled in systemizing *ba* is justified by being compared with the reality of the world, and the gap between the knowledge and the reality then triggers a new cycle of knowledge creation.

The Plurality of *Ba* *Ba* exists at many ontological levels and these levels may be connected to form a greater *ba.* Individuals form the *ba* of teams, which in turn form the *ba* of organization. Then, the market environment becomes the *ba* for the organization. As stated above, *ba* is a concept that transcends the boundary between micro and macro. The organic interactions amongst these different levels of *ba* can amplify the knowledge-creating process.

As *ba* often acts as an autonomous, self-sufficient unit that can be connected with other *ba* to expand knowledge, it seems to work in a similar way to a modular system or organization, in which independently designed modules are assembled and integrated together to work as a whole system. However, there are important differences between a modular organization and *ba.* Knowledge, especially tacit knowledge, cannot be assembled in the way in which various modular parts are assembled into a product. In a modular system, information is partitioned into visible design rules in a precise, unambiguous and complete way. 'Fully specified and standardized component interfaces' make the later integration of modules possible.[24] However, relationships among *ba* are not necessarily known a priori. Unlike the interfaces between modules, the relationships among *ba* are not predetermined and clear.

The coherence among *ba* is achieved through organic interactions among *ba* based on the knowledge vision, rather than through a mechanistic concentration in which the centre dominates. In organizational knowledge creation, neither micro nor macro dominates. Rather, both interact with each other to evolve into a higher self. The 'interfaces' among *ba* also evolve along with *ba* themselves. And the interactive organic coherence of various *ba* and individuals that participate in *ba* has to be supported by trustful sharing of knowledge and continuous exchanges between all the units involved to create and strengthen the relationships.

For example, Maekawa Seisakusho, a Japanese industrial freezer manufacturer, consists of 80 'independent companies' that operate as autonomous and self-sufficient *ba.* These companies interact with each other organically to form Maekawa as a coherent organization. Some of the independent companies share office space and work closely together. Individual employees of the different independent companies often spend time together and form informal relationships, out of which a new project or even a new independent company can be created. When they encounter problems too large to deal with alone, several independent companies form a group to work on the problem together. Such interactions among independent companies are voluntarily created and managed, not by a plan or order from the headquarters.

Knowledge Assets

At the base of knowledge-creating processes are knowledge assets. We define assets as 'firm-specific resources that are indispensable to create values for the firm'. Knowledge assets are the inputs, outputs and moderating factors of the knowledge-creating process. For example, trust among organizational members is created as an output of the knowledge-creating process, and at the same time it moderates how *ba* functions as a platform for the knowledge-creating process.

Although knowledge is considered to be one of the most important assets for a firm to create a sustainable competitive advantage today, we do not yet have an effective system and tools for evaluating and managing knowledge assets. Although

Experiential knowledge assets Tacit knowledge shared through common experiences • Skills and know-how of individuals • Care, love, trust and security • Energy, passion and tension	**Conceptual knowledge assets** Explicit knowledge articulated through images, symbols and language • Product concepts • Design • Brand equity
Routine Knowledge assets Tacit knowledge routinized and embedded in actions and practices • Know-how in daily operations • Organizational routines • Organizational culture	**Systemic knowledge assets** Systemized and packaged explicit knowledge • Documents, specifications, manuals • Database • Patents and licences

Figure 2.7 Four categories of knowledge asset

a variety of measures have been proposed,[25] existing accounting systems are inadequate for capturing the value of knowledge assets, due to the tacit nature of knowledge. Knowledge assets must be built and used internally in order for their full value to be realized, as they cannot be readily bought and sold. We need to build a system to evaluate and manage the knowledge assets of a firm more effectively. Another difficulty in measuring knowledge assets is that they are dynamic. Knowledge assets are both inputs and outputs of the organization's knowledge-creating activities, and hence they are constantly evolving. Taking a snapshot of the knowledge assets that the organization owns at one point in time is never enough to evaluate and manage the knowledge assets properly.

To understand how knowledge assets are created, acquired and exploited, we propose to categorize knowledge assets into four types: experiential; conceptual; systemic; and routine (see Figure 2.7).

Experiential Knowledge Assets Experiential knowledge assets consist of the shared tacit knowledge that is built through shared hands-on experience among the members of the organization, and between the members of the organization and its customers, suppliers and affiliated firms. Skills and know-how that are acquired and accumulated by individuals through experiences at work are examples of experiential knowledge assets. Other examples of such knowledge assets include emotional knowledge, such as care, love and trust, physical knowledge such as facial expressions and gestures, energetic knowledge such as senses of existence, enthusiasm and tension, and rhythmic knowledge such as improvization and entrainment.

Because they are tacit, experiential knowledge assets are difficult to grasp, evaluate or trade. Firms have to build their own knowledge assets through their own experiences. Their tacit nature is what makes experiential knowledge assets

the firm-specific, difficult-to-imitate resources that give a sustainable competitive advantage to a firm.

Conceptual Knowledge Assets Conceptual knowledge assets consist of explicit knowledge articulated through images, symbols and language. They are the assets based on the concepts held by customers and members of the organization. Brand equity, which is perceived by customers, and concepts or designs, which are perceived by the members of the organization, are examples of conceptual knowledge assets. Since they have tangible forms, conceptual knowledge assets are easier to grasp than experiential knowledge assets, though it is still difficult to grasp what customers and organizational members perceive.

Systemic Knowledge Assets Systemic knowledge assets consist of systematized and packaged explicit knowledge, such as explicitly stated technologies, product specifications, manuals, and documented and packaged information about customers and suppliers. Legally protected intellectual properties such as licences and patents also fall into this category. A characteristic of systemic knowledge assets is that they can be transferred relatively easily. This is the most 'visible' type of knowledge asset, and current knowledge management focuses primarily on managing systemic knowledge assets, such as intellectual property rights.

Routine Knowledge Assets Routine knowledge assets consist of the tacit knowledge that is routinized and embedded in the actions and practices of the organization. Know-how, organizational culture and organizational routines for carrying out the day-to-day business of the organization are examples of routine knowledge assets. Through continuous exercises, certain patterns of thinking and action are reinforced and shared among organizational members. Sharing the background to and 'stories' about the company also helps members to form routine knowledge. A characteristic of routine knowledge assets is that they are practical.

Mapping Knowledge Assets These four types of knowledge asset form the basis of the knowledge-creating process. To manage knowledge creation and exploitation effectively, a company has to 'map' its stocks of knowledge assets. However, cataloguing the existing knowledge is not enough. As stated above, knowledge assets are dynamic, and new knowledge assets can be created from existing knowledge assets.

Leading the Knowledge-creating Process

In the previous section, we presented a model of the organizational knowledge-creating process consisting of three elements: SECI, *ba* and knowledge assets. Using its existing knowledge assets, an organization creates new knowledge through the SECI process that takes place in *ba.* The knowledge created then becomes part of

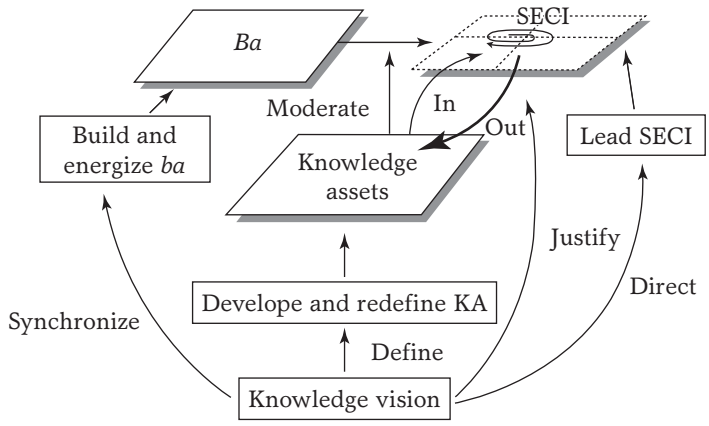

Figure 2.8 Leading the knowledge-creating process

the knowledge assets of the organization, which become the basis for a new spiral of knowledge creation. We now turn our attention to how such a knowledge-creating process can be managed.

The knowledge-creating process cannot be managed in the traditional sense of 'management', which concentrates on controlling the flow of information.[26] Managers can, however, lead the organization to actively and dynamically create knowledge by providing certain conditions. In this section, we discuss the roles of top and middle managers in leading a dynamic knowledge-creating process. Especially crucial to this process is the role of knowledge producers, that is, middle managers who are at the intersection of the vertical and horizontal flows of information in the company and actively interact with others to create knowledge by participating in and leading *ba.* In knowledge creation, 'distributed leadership' as seen in 'middle-up-down' management[27] is the key, as it cannot be 'managed' with traditional top-down leadership.

Top and middle management take a leadership role by 'reading' the situation, as well as leading it, in working on all three elements of the knowledge-creating process. Leaders provide the knowledge vision, develop and promote sharing of knowledge assets, create and energize *ba,* and enable and promote the continuous spiral of knowledge creation (see Figure 2.8). Especially important is the knowledge vision, which affects all three layers of the knowledge-creating process.

Providing the Knowledge Vision

In order to create knowledge dynamically and continuously, an organization needs a vision that synchronizes the entire organization. It is top management's role to articulate the knowledge vision and communicate it throughout (and outside) the

company. The knowledge vision defines what kind of knowledge the company should create in what domain. The knowledge vision gives a direction to the knowledge-creating process, and the knowledge created by it, by asking such fundamental questions as 'What are we?', 'What should we create?', 'How can we do it?', 'Why are we doing this?' and 'Where are we going?' In short, it determines how the organization and its knowledge base evolve over the long term. Since knowledge is unbounded, any form of new knowledge can be created regardless of the existing business structure of the company. Therefore, it is important for top management to articulate a knowledge vision that transcends the boundaries of existing products, divisions, organizations and markets.

The knowledge vision also defines the value system that evaluates, justifies and determines the quality of the knowledge the company creates. The aesthetic value of higher aspiration sets a boundary to the expansion of knowledge creation. Together with organizational norms, routines and skills, value system determines what kinds of knowledge are to be needed, created and retained.[28] It also fosters the spontaneous commitment of those who are involved in knowledge creation. To create knowledge, organizations should foster their members' commitment by formulating an organizational intention, as commitment underlies the human knowledge-creating activity.[29]

Serving as a bridge between the visionary ideals of those at the top and the chaotic reality of the front line, the middle then has to break down the values and visions created by the top into concepts and images that guide the knowledge-creating process with vitality and direction. Middle managers work as knowledge producers to remake reality, or 'produce new knowledge', according to the company's vision.

Developing and Promoting the Sharing of Knowledge Assets

Based on the knowledge vision of the company, top management has to facilitate dynamic knowledge creation by taking a leading role in managing the three elements of the knowledge-creating process. First, top management has to develop and manage the knowledge assets of the company, which form the basis of its knowledge-creating process. Recently, many companies have created the position of chief knowledge officer (CKO) to perform this function.[30] However, the role of these CKOs has so far been mostly limited to managing knowledge assets as a static resource to be exploited. Top management has to play a more active role in facilitating the dynamic process of building knowledge assets from knowledge.

Since knowledge is unbounded, top management has to redefine the organization on the basis of the knowledge it owns, rather than by using existing definitions such as technologies, products and markets. Top management and knowledge producers have to read the situation, in terms of what kind of knowledge assets are available to them. It is perhaps even more important to read the situation in terms of what kind of knowledge they are *lacking,* according to the knowledge vision that answers the question 'Where are we going?'

To do so, they can take an inventory of the knowledge assets and on that create a strategy to build, maintain and utilize the firm's knowledge assets effectively and efficiently. For example, after studying a hybrid power system that uses both a conventional engine and an electric motor, Toyota realized that it did not have the technology to make the main components of the hybrid system, such as the battery, motor, converter and inverter. Realizing that it lacked knowledge assets that could determine the future of the firm, the top management of Toyota took a major initiative to research, develop and produce the hybrid system internally.

It is also important to have knowledge producers who know where they can find the knowledge or personnel that will enable the firm to create and exploit its knowledge. It is often difficult for a large organization to know exactly what it knows. Top management has to foster and utilize knowledge producers who can keep track of the firm's knowledge assets, and utilize them when they are needed.

It should be noted that knowledge assets, especially routine knowledge assets, can hinder as well as foster knowledge creation. Organizations are subject to inertia and it is difficult for them to diverge from the course set by their previous experiences. Successful experience leads to excessive exploitation of the existing knowledge, and in turn hinders the exploration of new knowledge.[31] Therefore, current capabilities may both impel and constrain future learning and actions taken by a firm.[32] Core capabilities may turn into 'core rigidities'[33] or a 'competence trap',[34] which hinders innovation rather than promotes it. To avoid rigidities and traps, a firm can use an R&D project, which requires different knowledge from the existing knowledge assets, as an occasion for challenging current knowledge, and for creating new assets.

Building, Connecting and Energizing *Ba*

Ba can be built intentionally, or created spontaneously. Top management and knowledge producers can build *ba* by providing physical space such as meeting rooms, virtual space such as a computer network, or mental space such as common goals. Forming a task force is a typical example of the intentional building of *ba.* To build *ba,* leaders also have to choose the right mix of people to participate, and promote their interaction. It is also important for managers to 'find' and utilize spontaneously formed *ba,* which changes or disappears very quickly. Hence, leaders have to read the situation in terms of how members of the organization are interacting with each other and with outside environments in order to quickly capture the naturally emerging *ba,* as well as to form *ba* effectively.

Further, various *ba* are connected with each other to form a greater *ba.* For that, leaders have to facilitate the interactions among various *ba,* and among the participants, based on the knowledge vision. In many cases, the relationships among *ba* are not predetermined. Which *ba* should be connected in which way is often unclear. Therefore, leaders have to read the situation to connect various *ba* as the relationships among them unfold.

However, building, finding and connecting *ba* is not enough for a firm to manage the dynamic knowledge-creating process. *Ba* should be 'energized' to give energy and quality to the SECI process. For that, knowledge producers have to supply the necessary conditions, such as autonomy, creative chaos, redundancy, requisite variety, and love, care, trust and commitment.

Autonomy Autonomy increases the chances of finding valuable information and motivating organization members to create new knowledge. Not only does self-organization increase the commitment of individuals, but it can also be a source of unexpected knowledge. By allowing the members of the organization to act autonomously, the organization may increase the chances of accessing and utilizing the knowledge held by its members.[35]

A knowledge-creating organization with autonomy can be depicted as an 'autopoietic system'.[36] Living organic systems are composed of various organs, which are made up of numerous cells. The relationship between system and organs, and between organ and cells, is neither dominant–subordinate nor whole–part. Each unit, like an autonomous cell, controls all of the changes occurring continuously within itself, and each unit determines its boundary through self-reproduction. Similarly, autonomous individuals and groups in knowledge-creating organizations set their task boundaries for themselves in pursuit of the ultimate goal expressed by the organization.

In the business organization, a powerful tool for creating autonomy is provided by the self-organizing team. An autonomous team can perform many functions, thereby amplifying and sublimating individual perspectives to higher levels. Researchers have found that the use of cross-functional teams that involve members from a broad cross-section of different organizational activities is very effective in the innovation process.[37] NEC has used autonomous teams to foster the expansion of its technology programme. Sharp uses its 'Urgent Project System' to develop strategically important products. The team leader is endowed by the president with responsibility for the project and the power to select his or her team members from any unit in Sharp.

Creative Chaos Creative chaos stimulates the interaction between the organization and the external environment. Creative chaos is different from complete disorder; it is intentional chaos introduced to the organization by its leaders to evoke a sense of crisis among its members by proposing challenging goals or ambiguous visions. Creative chaos helps to focus members' attention and encourages them to transcend existing boundaries to define a problem and resolve it. Facing chaos, organization members experience a breakdown of routines, habits and cognitive frameworks. Periodic breakdowns or 'unlearning' provide important opportunities for them to reconsider their fundamental thinking and perspectives.[38] The continuous process of questioning and re-evaluating existing premises energizes *ba*, and hence fosters organizational knowledge creation. Some have called this phenomenon creating 'order out of noise' or 'order out of chaos'.[39] It is important for leaders to read the situation in order to introduce creative chaos into *ba* in the right place at

the right time, and to lead the creation of order out of chaos so that the organization does not fall into complete disorder.

For example, when the development team of the Toyota Prius came up with a plan to improve fuel efficiency by 50%, which was ambitious enough, the top management rejected the plan and set a new goal to increase it by 100% instead. This threw the team into turmoil; it eventually discarded its original plan to use the direct injection engine, and developed the world's first commercially available hybrid car.

Redundancy 'Redundancy' refers to the intentional overlapping of information about business activities, management responsibilities and the company as a whole. Redundancy of information speeds up the knowledge-creating process in two ways. First, sharing redundant information promotes the sharing of tacit knowledge, because individuals can sense what others are trying to articulate. Redundant information enables individuals to transcend functional boundaries to offer advice or provide new information from different perspectives. Second, redundancy of information helps organizational members understand their role in the organization, which in turn functions to control their direction of thinking and action. Thus it provides the organization with a self-control mechanism for achieving a certain direction and consistency.

Redundancy of information is also necessary to realize the 'principle of redundancy of potential command' – that is, the principle whereby each part of an entire system carries the same degree of importance and has the potential to become its leader.[40] At Maekawa Seisakusho, different people take leadership in turn during the course of a project, from research and prototype building to implementation. The person whose abilities can best address the issues or problems at hand takes the leadership role to drive the project forward, guaranteeing 'the right man in the right place' in each phase of the project. Redundancy of information makes such a style of management possible, and allows team members to recognize the strengths of their colleagues. By the rotation of specialists in different positions and roles within the team, such as leader, support and so on, specialists gain additional knowledge in related fields as well as management skills and knowledge. In short, redundancy facilitates transcendence between leaders and subordinates, generalists and specialists, and creators and users of knowledge.

Redundancy of information, however, does increase the amount of information to be processed and can lead to information overload. It also increases the cost of knowledge creation, at least in the short run. Leaders have to read the situation to deal with the possible downside of redundancy by making it clear where information can be located and where knowledge is stored within the organization.

Requisite Variety Creation lies at the edge between order and chaos. Requisite variety helps a knowledge-creating organization to maintain the balance between order and chaos. An organization's internal diversity has to match the variety and complexity of the environment in order to deal with challenges posed by that environment.[41] To cope with many contingencies, an organization has to possess requisite variety,

which should be at a minimum for organizational integration and a maximum for effective adaptation to environmental changes.

Requisite variety can be enhanced by combining information differently, flexibly and quickly, and by providing equal access to information throughout the organization. When an information differential exists within the organization, organization members cannot interact on equal terms, which hinders the search for different interpretations of new information. An organization's members should know where information is located, where knowledge is accumulated, and how information and knowledge can be accessed at the highest speed. Kao Corporation, Japan's leading manufacturer of household products, utilizes a computerized information network to give every employee equal access to corporate information as the basis for opinion exchanges amongst various organizational units with different viewpoints.

There are two ways to realize requisite variety. One is to develop a flat and flexible organizational structure in which the different units are interlinked with an information network, thereby giving organization members fast and equal access to the broadest variety of information. Another approach is to change organizational structure frequently or rotate personnel frequently, thereby enabling employees to acquire interdisciplinary knowledge to deal with the complexity of the environment.

Love, Care, Trust and Commitment Fostering love, care, trust and commitment among organizational members is important as it forms the foundation of knowledge creation.[42] For knowledge (especially tacit knowledge) to be shared and for the self-transcending process of knowledge creation to occur, there should be strong love, caring and trust among organization members. As information creates power, an individual might be motivated to monopolize it, hiding it even from his or her colleagues. However, as knowledge needs to be shared to be created and exploited, it is important for leaders to create an atmosphere in which organization members feel safe sharing their knowledge. It is also important for leaders to cultivate commitment among organization members to motivate the sharing and creation of knowledge, based on the knowledge vision.

To foster love, care, trust and commitment, knowledge producers need to be highly inspired and committed to their goal. They also need to be selfless and altruistic. They should not try to monopolize the knowledge created by the organization, or take credit for other members' achievements. Also, knowledge producers need to be positive thinkers. They should try to avoid having or expressing negative thoughts and feelings. Instead, they should have creative and positive thoughts, imagination, and the drive to act.

Promoting the SECI Process

The leadership should also promote the SECI process. Following the direction given by the knowledge vision, knowledge producers promote organizational knowledge creation by facilitating all four modes of knowledge conversion, although their

most significant contribution is made in externalization. They synthesize the tacit knowledge of front-line employees, top management and outside constituents such as customers and suppliers, to make it explicit and incorporate it into new concepts, technologies, products or systems. To do so, knowledge producers should be able to reflect upon their actions. As Schon states, when one reflects while in action, one becomes independent of established theory and technique, and is able to construct a new theory of the unique case.[43]

Another important task for knowledge producers is to facilitate the knowledge spiral across the different conversion modes, and on different organizational levels. To facilitate the knowledge-creating process effectively, knowledge producers need to read the situation, in terms of where the spiral is heading and what kind of knowledge is available to be converted, both inside and outside the organization. With this reading, knowledge producers need to improvize to incorporate necessary changes in the knowledge-creating process. Improvization is an important factor in dynamic knowledge creation, especially when dealing with tacit knowledge.[44] Knowledge producers should be able to improvize and facilitate improvization by the participants in the knowledge-creating process.

Knowledge producers need to be able to create their own concepts and express them in their own words and thus should be able to use language effectively. Language here includes tropes (such as metaphor, metonymy, synecdoche), 'grammar' and 'context for knowledge, and non-verbal visual language such as design. Each mode of knowledge conversion requires different kinds of language for knowledge to be created and shared effectively. For example, non-verbal language, such as body language, is essential in the socialization process, as tacit knowledge cannot be expressed in articulated language. In contrast, clear, articulated language is essential in the combination process, as knowledge has to be disseminated and understood by many people. In externalization, tropes such as metaphor, metonymy and synecdoche are effective in creating concepts out of vast amounts of tacit knowledge. Therefore, knowledge producers should carefully choose and design language according to the process of knowledge creation.

Conclusion

In this chapter we have discussed how organizations manage the dynamic process of knowledge creation, which is characterized by dynamic interactions among organizational members, and between organizational members and the environment. We have proposed a new model of the knowledge-creating process to understand the dynamic nature of knowledge creation and to manage such a process effectively. Three elements, the SECI process, *ba* and knowledge assets, have to interact with each other organically and dynamically. The knowledge assets of a firm are mobilized and shared in *ba,* where tacit knowledge held by individuals is converted and amplified by the spiral of knowledge through socialization, externalization, combination and internalization.

We have also discussed the role of leadership in facilitating the knowledge-creating process. Creating and understanding the knowledge vision of the company, understanding the knowledge assets of the company, facilitating and utilizing *ba* effectively, and managing the knowledge spiral are the important roles that managers have to play. Especially important is the role of knowledge producers, the middle managers who are at the centre of the dynamic knowledge-creating process.

All three elements of the knowledge-creating process should be integrated under clear leadership so that a firm can create knowledge continuously and dynamically. The knowledge-creating process should become a *discipline* for organization members, in terms of how they think and act in finding, defining and solving problems.

In this chapter we have focused primarily on the organizational knowledge-creating process that takes place within a company. We have described the knowledge-creating process as the dynamic interaction between organizational members, and between organizational members and the environment. However, the knowledge-creating process is not confined within the boundaries of a single company. The market, where the knowledge held by companies interacts with that held by customers, is also a place for knowledge creation. It is also possible for groups of companies to create knowledge. If we further raise the level of analysis, we arrive at a discussion of how so-called national systems of innovation can be built. For the immediate future, it will be important to examine how companies, governments and universities can work together to make knowledge creation possible.

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