

An Examination of the SECI Model in Nonaka's Theory in terms of the TEAM Linguistic Framework

ADACHI Yoshimichi

Abstract

This paper aims to examine the SECI model in Nonaka's theory of organizational knowledge creation in a theoretical context of organization studies in the West. In so doing, TEAM linguistic theory has been utilized as a framework. In addition, the SECI model has been examined and compared with the literature of organization studies in the West.

The analysis has revealed that the four linguistic meaning functions of the TEAM linguistic framework have been found in Nonaka's SECI model and the finding suggests that the theoretical premises of Nonaka's theory have been given a theoretical rationale by the TEAM linguistic theory. In addition, no literature deals with all the four modes of knowledge conversion in the West. It can be concluded that Nonaka's theory, and his SECI model in particular, may provide a comprehensive and integrative conceptual framework for organizational knowledge theory, even in the theoretical context of organization studies in the West.

Key words: Knowledge, Nonaka's theory, SECI model, TEAM linguistic theory

1. Introduction

This paper aims to examine the SECI model in Nonaka's theory of organizational knowledge creation in a theoretical context of organization studies in the West. In so doing, TEAM linguistic theory developed by Nishibe (1996) has been utilized as a framework. The TEAM linguistic theory and its notions have been introduced in the previous issue of Yamanashi Global Studies.

In addition, the SECI model has been examined and compared with the literature of organization studies in the West.

2. Introduction of the SECI model

Premised on his epistemology and ontology,¹⁾ Nonaka (1991, 1994; Nonaka & Takeuchi, 1995) places emphasis on the creative interaction of explicit and tacit knowledge as a social process and identifies the *four modes of knowledge conversion*

as organizational knowledge activities; namely, (1) the *Socialization* mode, (2) the *Externalization* mode, (3) the *Combination* mode and (4) the *Internalization* mode (see Figure 2-1), which he called the *SECI model*.

The following introduces and examines Nonaka's four modes of knowledge conversion respectively in terms of the TEAM linguistic framework and in relation to the theoretical arguments in organization studies in the West.

2.1 The socialization mode of knowledge conversion

According to Nonaka, *the socialization mode of knowledge conversion* is 'the knowledge-creating mode of converting tacit knowledge to tacit knowledge' (see Figure 2-1). The assumption that two dimensions of tacit knowledge; namely, cognitive and technical, exist, gives rise to two types of socialization

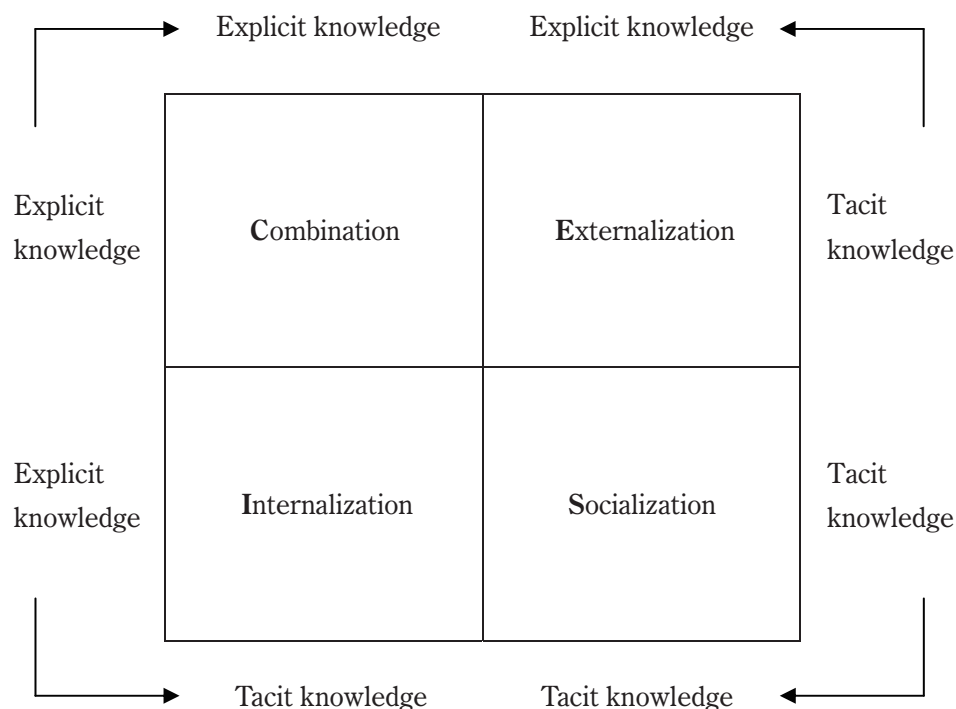


Figure2-1: Nonaka's SECI model: Four modes of knowledge conversion
(Source: Nonaka & Takeuchi, 1995, modified by author)

modes of knowledge conversion. In the former, the *socialization* mode of knowledge conversion is *a process of sharing experience and thereby creating common tacit knowledge* (such as shared mental models, including schemata, paradigms, perspectives, beliefs, and viewpoints). Informal activities (such as having a cup of tea or lunch with colleagues outside the workplace) are exemplified as this type of socialization mode because it promotes common understanding (such as perspectives and viewpoints or feelings), shares systems of meaning, teaches own roles and builds mutual trust in an organization through the sharing of experience. On these occasions, although language or dialogue is often effectively used, Nonaka pays more attention to *physical proximity*, rather than verbal communication of transmitting its language.

In the latter, the socialization mode of knowledge conversion is *a process of transferring or accumulating tacit knowledge* such as technical skills (e.g. how to ride a bicycle) from one to another through a mixture of observation, imitation,

narration, experimentation, and joint execution in an organization or beyond organizations (e.g. customers and suppliers) (von Krogh, Ichijo & Nonaka, 2000). As Nonaka argues, a traditional apprenticeship is exemplified as this type of socialization mode because apprentices work with their masters and can learn craftsmanship *not through language* (or written documents) but through observation, imitation, and practice. Nonaka calls knowledge created by a socialization process *sympathized knowledge*.

It is interesting to link the socialization mode of knowledge conversion to the TEAM linguistic framework (see Figure 2-2).²⁾ It is apparent that the socialization mode of knowledge conversion approximately corresponds to the function of *accumulating* (A) language meaning (or the social language of *Role*) in the TEAM linguistic framework (see Figure 2-2). This is because it can be an *implicit* (tacit) activity, *accumulating differentiated* experience from others while sharing feelings. It is also because it can create order from chaos through repeated interactions, participants recognizing their

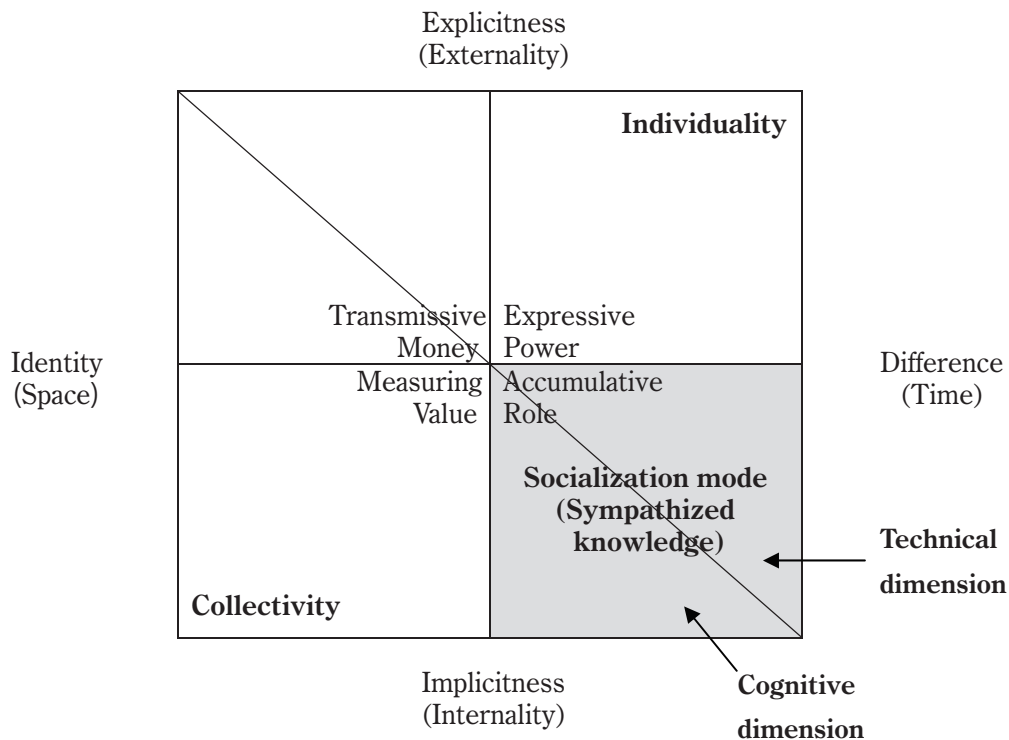


Figure2-2: Socialization mode within TEAM linguistic framework (Source: Author)

roles in a group (or an organization). Figure 2-2 also suggests that while the technical dimension of the socialization mode of knowledge conversion tends to be at the *individual* level, the cognitive dimension of the mode tends to be at the *collective* level because of its ontological nature, which is consistent with Nonaka's assumption (see Nonaka & Takeuchi, 1995).

Whilst Nonaka (Nonaka & Takeuchi, 1995) claims that socialization as the mode of knowledge conversion is strongly practised by Japanese firms, recognition of the importance of sharing experience in the face-to-face environment in business settings can be found in the literature on organization theory in the West. For example, Penrose (1959) in her classic work argued that the only way teamwork can be developed is through a collection of individuals who have had experience of working together. More recently, Swan et al. (1999) assert that without physical proximity, where people can have an opportunity to engage in face-to-face interaction, firms that focus on the use of Information and Communication Technologies (ICTs)

lose opportunities to share crucial knowledge. These discussions presented by western researchers implicitly or explicitly highlight the significance of the socialization mode of knowledge conversion in the form of face-to-face communication.

Interestingly enough, the emerging research topic of *social capital* in the West also seems consistent with the cognitive dimension of the socialization mode of knowledge conversion. For example, Fukuyama (1997, p4), defining *social capital* as 'the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them' suggests that social capital can be generated through *the repeated interactions* of individual agents (as well as exogenously through the introduction of a new set of moral norms). In their review on social capital in an organizational context, Nahapiet & Ghoshal (1998) also claim that norms of cooperation can establish a strong foundation for the creation of knowledge, regarding it as a degree of consensus in the social system. From these theoretical arguments, it is obvious that

the assertions made by western theorists related to social capital and knowledge in the theoretical context of organization studies are consistent with the socialization mode of knowledge conversion in Nonaka's terms.

Taking into consideration the recent increase in interest in social capital and the growing acknowledgement of the importance of the sharing of experience (therefore tacit knowledge) based on physical proximity and face-to-face communication environments within and between organizations, it can be concluded that the socialization mode of knowledge conversion has now become increasingly crucial in the theoretical context of organization studies in the West.

2.2 The externalization mode of knowledge conversion

Nonaka argues that the *externalization mode of knowledge conversion* is 'a process of making tacit knowledge explicit' (see Figure 2-1). This is typically characterized by *the concept creation*, which is an activity that generates an abstract principle, for

example, for making a new product or service. Nonaka claims that it is a quintessential process because it ultimately results in the advancement of a business through a new product, process, or service (Nonaka and Takeuchi, 1995; von Krogh, Ichijo & Nonaka, 2000). Nonaka (Nonaka & Takeuchi, 1995) calls the knowledge created by an externalization process *conceptual knowledge*.

It is apparent that the externalization mode of knowledge conversion, which is an activity to make individuals explicitly express the desire or need to create concepts, approximately corresponds to the function of *expressing* language meaning (or the social language of *Power*) in the TEAM linguistic framework (see Figure 2-3). This is because it can be an *explicit* activity, *expressing* something based on ones own *differentiated* experience from those of others. It is also because it can create order from chaos in the name of 'future' using *individual* imagination. Indeed, Nonaka (Nonaka & Takeuchi, 1995) argues that when people try to conceptualize an image, that is, to make tacit knowledge explicit, they express its essence mostly in imaginative,

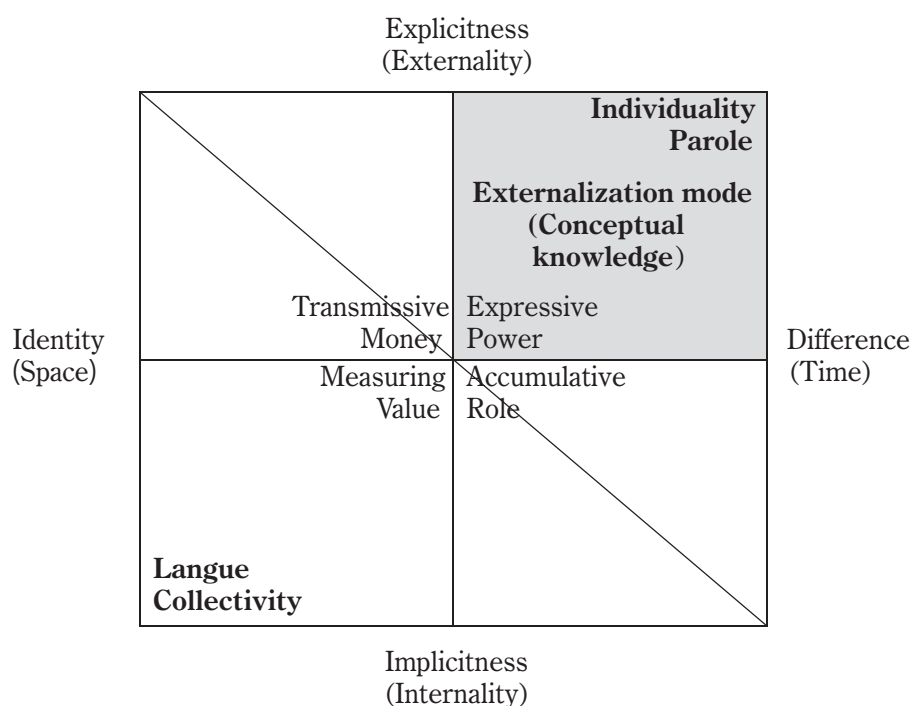


Figure2-3: Externalization mode within TEAM linguistic framework (Source: Author)

Table2-1: Metaphor and analogy for concept creation in product development
(Source: Nonaka & Takeuchi, 1995)

| Product (Company) | Metaphor/Analogy | Influence on Concept |
|---------------------------------|--|--|
| City (Honda) | Automobile evolution (metaphor) | Hint of maximizing passenger space as ultimate auto development, 'Man-maximum, machine-minimum' concept created |
| | The sphere (analogy) | Hint of achieving maximum passenger space through minimizing surface area, 'Tall and short car (Tall Boy)' concept created |
| Mini-Copier (Canon) | Aluminum beer can (analogy) | Hint of similarities between inexpensive aluminum beer can and photosensitive drum manufacture, 'Low-cost manufacturing process' concept created |
| Home Bakery (Matsushita) | Hotel bread (metaphor) Osaka International Hotel head baker (analogy) | Hint of more delicious bread, 'Twist dough' concept created |

rhetorical language such as *metaphors* and *analogy*.

Table 2-1 shows cases in which linguistic rhetoric is used when creating concepts for new products in Japanese companies.

Nonaka (Nonaka & Takeuchi, 1995) looks not only at an imaginative but also at a communicative aspect in the externalization mode of knowledge conversion. He assumes that this mode is *triggered* by a dialogue intended to create concepts from tacit knowledge, regarding dialogue as a collective, as opposed to individual, action. The aspect, however, should by nature be incorporated into the combination mode of knowledge conversion, which will be examined in the next sub-section.

Whilst the externalization mode of knowledge conversion leads an organization to the biggest 'bang' in organizational knowledge creation (Takeuchi, 2001), very little existing literature on organization studies related to knowledge in the West has addressed this dimension (see e.g. Blackler, 1995; Blackler, Crump & McDonald, 1998; Nahapiet & Ghoshal, 1998; Swan et al., 1999). For example, Nahapiet & Ghoshal (1998) set great store by *a shared language* within an organization, considering knowledge to be created and sustained through

ongoing relationships in social collectivities and regard language and discourse as a *mediator* of individual actions, which may fit into the category (of the cognitive dimension) of the socialization mode or the combination mode of knowledge conversion in Nonaka's terms. Blackler, Crump & McDonald (1998) stress that *organizationally systemized language* enables organizational members to operate within interpretive or discourse communities, which may fit into the category of the internalization mode. However, while the above suggests that Western theorists, such as Nahapiet & Ghoshal (1998) and Blackler, Crump & McDonald (1998), only pay attention to the collective and identified dimensions of language in relation to knowledge creation in an organization, what they fail to adequately acknowledge is another significant dimension of the expressive, individualistic, differentiated, creative dimensions of language. Therefore, the authors' theoretical frameworks cannot include the externalization mode of knowledge conversion in Nonaka's terms. This appears to be partly because they fail to carefully examine the multifaceted linguistic meaning functions in relation to knowledge in an organization, and partly because they pay scant

attention to the practical processes of knowledge creation in organizations.

2.3 The combination mode of knowledge conversion

According to Nonaka, the *combination* mode of knowledge conversion is 'a process of assembling new and existing explicit knowledge held by individuals into a knowledge system' (see Figure 2-1 and also see Nonaka et al., 1996, p207). It is also a process of exchanging, sorting, adding, disseminating, sharing and therefore reconfiguring different bodies of explicit knowledge among the organizational members through documents, meetings, telephone conversations, computerized communication methods and the like. Nonaka terms the knowledge created through a combination process *systemic knowledge*.

It is apparent that the combination mode of knowledge conversion approximately corresponds to the function of *transmitting* language meaning (or

the social language of *Money*) in the TEAM linguistic framework (see Figure 2-4). This is simply because combining various types of explicit knowledge does not occur without the *transmissive* nature of knowledge in the *explicit* form, which enables people to share and *identify* with others.

With reference to Nonaka's combination mode of knowledge conversion and apart from the emphasis on the communicative aspect of language, which has already been mentioned, a thread can be identified which focuses on the concept of *combination* in the theoretical context of organization studies in the West. This emphasis seems rooted in Schumpeter (1951) who developed a dynamic theory of economic change and viewed 'new combination' as the foundation for economic development. The author indicated that the new combination of knowledge leads to creating new products, production methods, markets, materials, and organizations. More recently, this argument has been taken up by Nahapiet & Ghoshal (1998), who regard combination

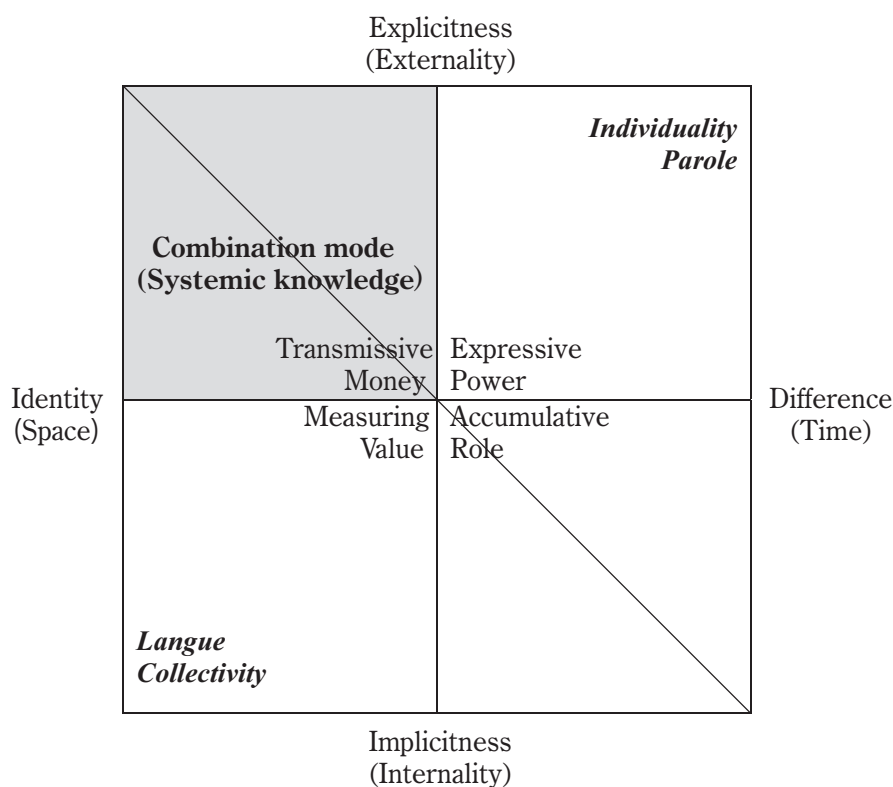


Figure2-4: Combination mode within TEAM linguistic framework (Source: Author)

as a starting point for research on organizational knowledge, and assume that combination, as well as exchange, of knowledge is the key mechanism for creating social knowledge. Whilst Nahapiet & Ghoshal clearly identify two combinations that generate knowledge in an organization; namely, *the incremental and the radical ways*³⁾, seen from the TEAM linguistic framework (or Nonaka's theory), the combination mode is related only to a linguistic meaning function (or only one mode of knowledge creation). In other words, compared with Nonaka's theory, Western researchers such as Schumpeter and Nahapiet & Ghoshal (1998) seem to have narrow and limited perspectives of knowledge activities in the organizational context.

Because of the explicit nature of knowledge in the combination mode of knowledge conversion, which allows information to be processed easily, Information Technology (IT) can play a crucial role. Many researchers in Europe including Scarbrough et al. (1999) and Swan et al. (2001) draw attention to substantial research that claims that computerized communication networks and large-scale databases (such as digging, mining and extracting) can facilitate the combination of knowledge in an organization. Nahapiet & Ghoshal (1998) also point out that recent advances of technology, such as Lotus Notes and the Intranet, have vastly increased the opportunities for knowledge combination. It can be noted from the perspective of linguistic theory, that IT can contribute only to the speed-up of transmitting (combining) explicit knowledge (information). In other words, too much emphasis on IT leads one to ignore the importance of other meaning functions of language (other types of knowledge activities) in an organization.

2.4 The internalization mode of knowledge conversion

The *internalization mode of knowledge conversion* is 'a process of embodying explicit knowledge into tacit

knowledge' (see Figure 2-1 and Nonaka et al., 1996, p208) and will include know-how and technical skills. Nonaka (Nonaka & Takeuchi, 1995) suggests that the quintessential tool of the internalization mode is through documentation and manuals that enable other people to indirectly *embody* what the members of a project experienced. Any other kinds of explicit knowledge such as text, sound, video formats, or oral stories can facilitate the internalization process. Training programmes also help trainees to understand the organization and themselves. Moreover, in relation to other modes of knowledge conversion, Nonaka assumes that the internalization mode comprises the new and (probably) creative experience assembled by members who have been engaged in a project through other knowledge conversion modes of socialization, externalization and combination, which in turn are embodied as organizationally internalized latent value systems or knowledge bases. Nonaka calls the knowledge created by an internalization process *operational knowledge*.

The internalization mode of knowledge conversion is approximately consistent with the function of *measuring* (M) language meaning (maintaining latent value) (or the social language of *Value*) in the TEAM linguistic framework (see Figure 2-5). This is because the process enables the members in an organization to *internalize* shared knowledge in an *implicit* (tacit) form, which has a horizon of *identification*, maintaining and developing the latent value of the organization.

When Nonaka argues that operational knowledge embodied through the internalization mode of knowledge conversion takes the form of shared mental models or technical know-how, it appears that there is confusion in his conceptualization and this can be seen between the internalization and socialization modes. However, if the axis of identity (the internalization mode) / difference (the socialization mode) propounded in the TEAM

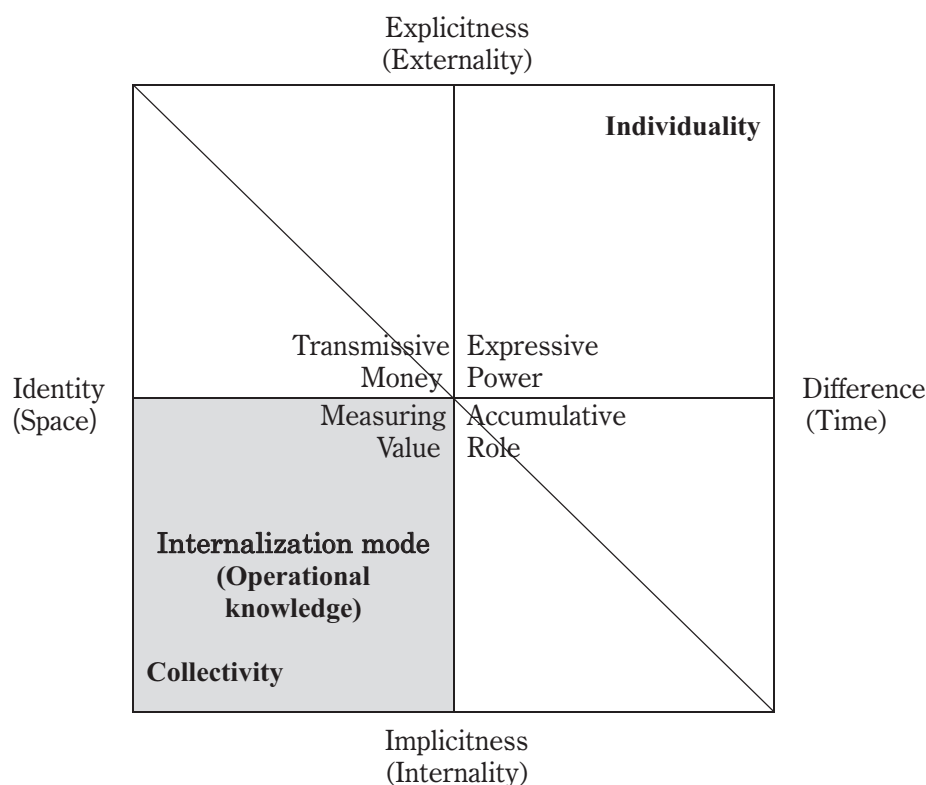


Figure2-5: Internalization mode within TEAM linguistic framework (Source: Author)

linguistic framework is recognized, they can be conceptually differentiated.

Nonaka's internalization mode of knowledge conversion has been clearly identified in the existing literature of organization studies and in the theoretical context in the West and it seems primarily rooted in the concept of *organizational learning*, which was propounded by Argyris and Schön (1978). Their pioneering work on the subject viewed an organization as continuous learning processes that internalize knowledge and adapt to changing environments. This assertion is followed by Cohen & Levinthal (1990) who in their research on innovation and organizational learning emphasize the importance of (organizational) *absorptive capacity*, which is the ability of a firm to *internalize* new knowledge (and information), as well as clearly recognizing knowledge value and its utilization. More recently, in an attempt to integrate both organizational learning and information technology, Robey et al. (2000) suggest that the internalization of

new information into an organization may not only be enhanced through formal activities such as training and action research, but also through activities that are closely related to informal work practices. These arguments are obviously consistent with the claim made by Nonaka for the internalization mode of knowledge conversion that highlights the importance of the linkage of internalization processes and the other processes needed in order to develop and expand the knowledge base of an organization.

3. Examining the knowledge spiral in terms of the TEAM linguistic framework

3.1 The knowledge spiral

Whilst Nonaka's four modes of knowledge conversion have already been outlined and considered in terms of the TEAM linguistic framework and then examined in the theoretical context of organization studies in the West, Nonaka

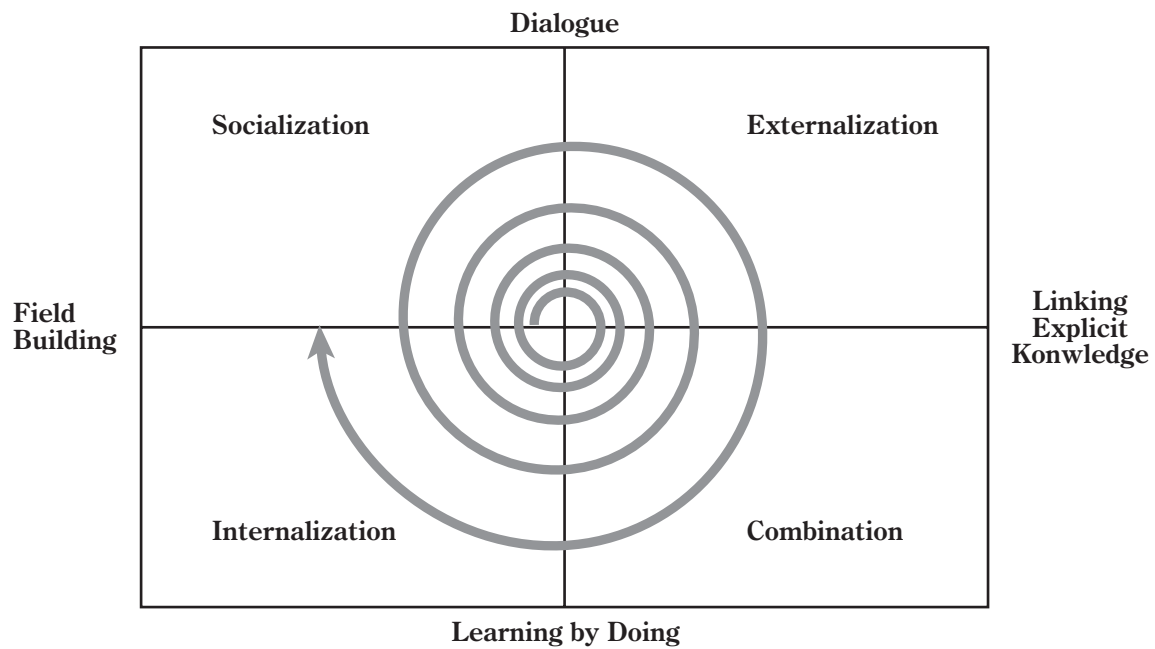


Figure3-1: Knowledge spiral (Source: Nonaka & Takeuchi, 1995)

also assumes that these four modes of knowledge conversion should be linked as *sequential processes in a spiral*. This regards knowledge activities in an organization epistemologically as a continuous and dynamic interaction between tacit and explicit knowledge (see Figure 3-1) and ontologically as a communicative amplification and crystallization,

as well as organizational internalization and enhancement of individuals' tacit knowledge at different levels or entities (such as individual, group, organization and inter-organization) (see Figure 3-2).

For example, Nonaka (Nonaka & Takeuchi, 1995; von Krogh, Ichijo & Nonaka, 2000) argues that, because of the contextual, situated nature of tacit

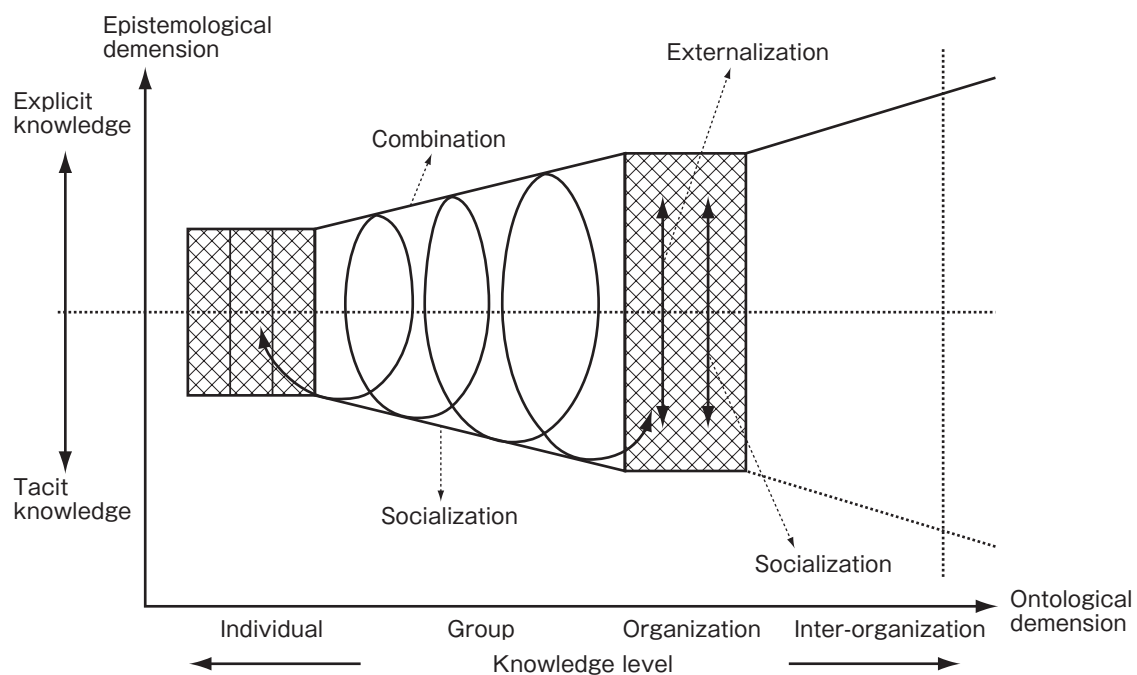


Figure3-2: Spiral of organizational knowledge creation (Source: Nonaka & Takeuchi, 1995)

knowledge, the socialization mode of knowledge conversion, without the externalization and internalization modes of knowledge conversion, remains limited up to the point when it expands as a form of organizational knowledge. In the same way, the combination mode of knowledge conversion, without the externalization mode, is restricted to expand the organizational knowledge base because there is the danger of only gathering ‘existing’ explicit knowledge in the organization. In short, knowledge creation in an organization does not emerge with any degree of success if only one of the four modes of knowledge conversion arises at one of the ontological levels, but emerges by interacting across the four modes of knowledge conversion *in a spiral way* and if amplified at higher ontological levels.

3.2 Examining the knowledge spiral in term of the TEAM linguistic framework

Such assumptions of the knowledge spiral made by Nonaka seem valid if the TEAM linguistic framework is applied. According to Nishibe (1996), when the four meaning functions of language are sustained in a balanced way, language is sustained. If this assumption about Nishibe’s TEAM theory is applied, a successful organization should constitute all Nonaka’s four modes of knowledge conversion in a balanced way, which corresponds to the four linguistic meaning functions. This, however, leads to the assertion that it is not always the case that the four modes of knowledge conversion simply occur in a separate form because the four linguistic meaning functions might be found in one action. Therefore, seen from the TEAM linguistic theory, it could be claimed that in the actual context, the four modes of knowledge conversion can be found, in the form of, say, the socialization-‘dominated’ activity or the mixture of the socialization and externalization modes, rather than the pure socialization mode. It

should be also noted that the limited data available in the theoretical context of organization studies in the West reinforces the idea that a spiral perspective includes the four types of knowledge conversion. In practice however, the focus of attention given by western researchers in organization studies is on only one or two aspects which utilize the concepts of *social capital*, *combination activity*, *absorptive capacity* and *organizational learning*.

4. Conclusions

In this paper, the SECI model in Nonaka’s theory of organizational knowledge creation has been examined using the TEAM linguistic framework as criteria. One of the major findings in the preceding analysis is that the four linguistic meaning functions have been found in Nonaka’s SECI model. That is, the linguistic functions of (1) *transmitting*, (2) *expressing*, (3) *accumulating* and (4) *measuring* meaning correspond to the four knowledge conversion modes of (1) *combination*, (2) *externalization*, (3) *socialization* and (4) *internalization* in Nonaka’s SECI model (see Figure 4-1).

There are some significant implications of this finding. Firstly, the finding suggests that the theoretical *premises* of Nonaka’s theory in his SECI model have been given a theoretical rationale by the TEAM linguistic theory. In other words, Nonaka’s theory is based on the firm and comprehensive ground of the social sciences, which may enable one to transcend the problems that are attributed to the different premises, if the TEAM linguistic approach provides the common theoretical base of the social sciences. Secondly, the linguistic rationale of the premises of Nonaka’s theory suggests that Nonaka’s SECI model itself can be utilized as *criteria* by which knowledge activities in an organization can be examined and give a reasonable framework for finding relationships between theories which posit different premises in the organizational context.

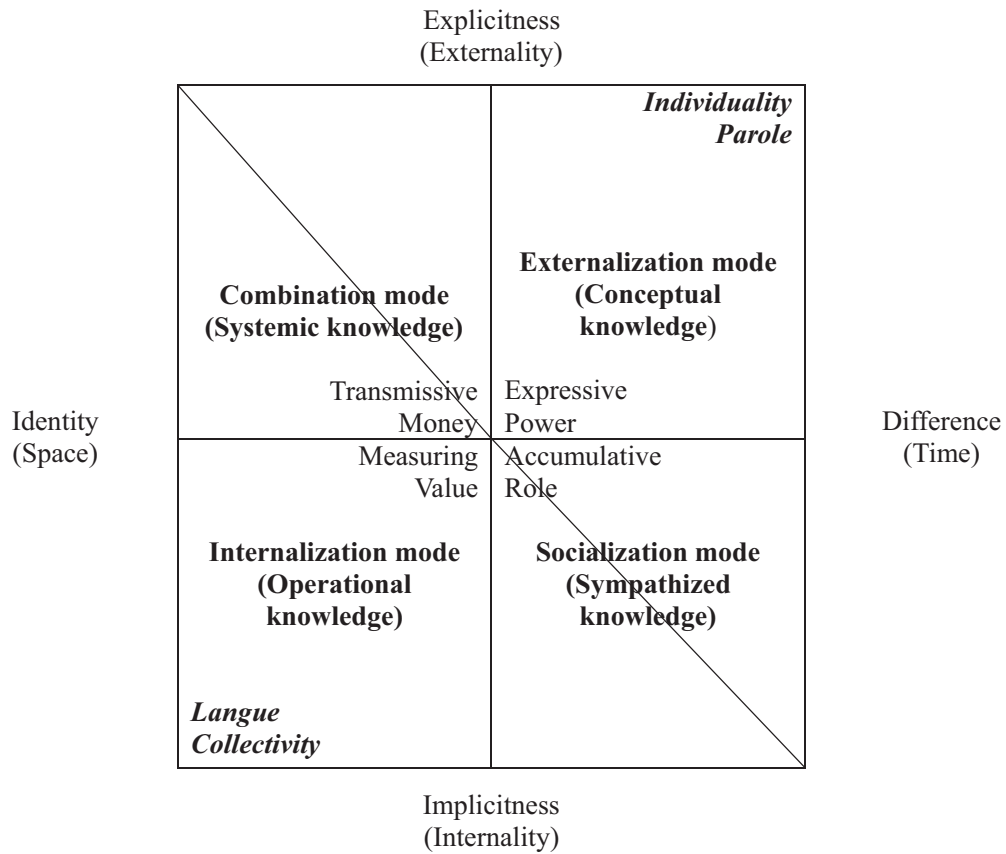


Figure4-1: Relationship between Nonaka's SECI model and the TEAM linguistic structure (Source: Author)

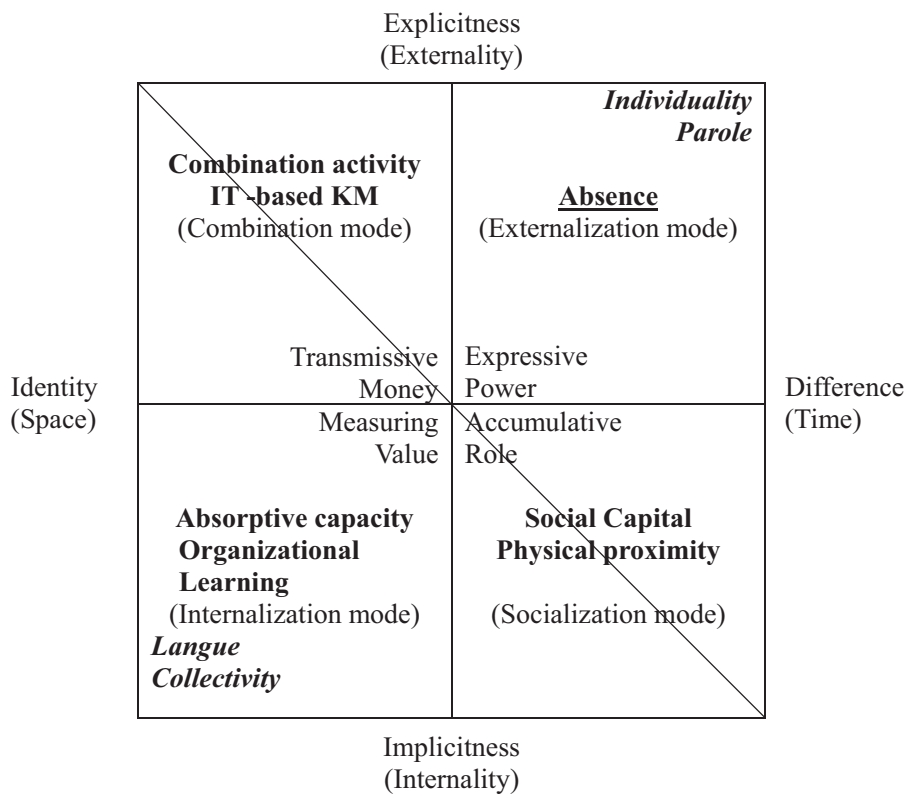


Figure4-2: Relationship between Nonaka's SECI model and arguments related to Nonaka's theory in the West (Source: Author)

Thirdly, because of the comprehensiveness of the premises, which look at multifaceted dimensions of knowledge activity in an organization involving all four linguistic meaning functions, Nonaka's theory may reduce the gap between the theory and practice in its theoretical hypothesis. Fourthly, it can be deduced that Nonaka's theory may be trans-national and highly applicable to the theory of knowledge and knowledge creation in any organizational context (including business management in the West) in its hypotheses because of its perfect correspondence to the TEAM linguistic theory.

The preceding sections have also examined the literature associated with knowledge in the theoretical context of organization studies in the West in relation to Nonaka's theory, using the TEAM framework as criteria. Figure 4-2 provides a summary finding of the research.

Although the socialization mode of knowledge conversion advocated by Nonaka is characterized in the context of Japan, the emergent interest of the concepts of *social capital* and physical proximity in the theoretical context of organization studies in the West has been identified, and this is consistent with the socialization mode presented by Nonaka. The preceding analysis has also identified a gap in the existing literature of organization studies related to knowledge in the West, and this is that there is no consideration of the externalization mode. This may reflect the influence of Western (Cartesian-like) rationalist epistemology because the externalization mode is highly related to non-logical dimensions such as imagination, expression and metaphor as opposed to a rationalist perspective. Identification has been made of the recent literature which focuses on the combination mode in the West. The internalization mode of knowledge conversion has become popular in the West, especially in relation to the argument on implementation of IT in an organizational context. No literature, however, deals with all the four modes of knowledge conversion in

the West. It can be concluded that Nonaka's theory may provide a comprehensive and integrative conceptual framework for organizational knowledge creation, even in the theoretical context of organization studies in the West.

Notes

- 1) See Adachi (2010) pp103-106.
- 2) Regarding the TEAM linguistic framework, see Nishibe (1996) p87. Also see Adachi (2010) p99-101.
- 3) The incremental way is achieved by combining elements previously unconnected, while the radical way is achieved by developing novel ways of combining elements not previously associated.

References

- Adachi, Y. (2010), 'An Examination of Knowledge in Nonaka's theory in terms of the TEAM Linguistic Framework and in relation to Organization Studies in the West', *Yamanashi Global Studies*, 5, 99-108.
- Argyris, C. & Schön, D. A. (1978), *Organizational Learning*, Reading, MA: Addison-Wesley.
- Blackler, F. (1995), 'Knowledge, knowledge work and organization: An overview and interpretation', *Organization Studies*, 16, 6, 1021.
- Blackler, F., Crump, N. & McDonald, S. (1998), 'Knowledge, organizations and competition' in von Krogh, G., Roos, J. & Kleine, D. (eds.) (1998), *Knowing in Firms*, London: Sage.
- Cohen, W. & Levinthal, D. (1990), 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, 35, 1, 128-152.
- Fukuyama, F. (1997), *The End of Order*, London: Social Market Foundation.
- Nahapiet, J. & Ghoshal, S. (1998), 'Social capital, intellectual capital and the organizational advantage', *Academy of Management Review*, 23, 2, 242-266.
- Nishibe, S. (1996), *Structure of Intelligence*, Tokyo: Kadokawa Haruki jimusyo.
- Nonaka, I. (1991), 'The knowledge-creating company' *Harvard Business Review*, November-December, 96-104.
- Nonaka, I. (1994), 'A dynamic theory of organizational knowledge creation' *Organization Science*, 5, 1, 14-37.
- Nonaka, I. & Takeuchi, H. (1995), *The Knowledge Creating Company*, Oxford: Oxford University Press.
- Nonaka, I., Umemoto, K. & Senoo, D. (1996), 'From information processing to knowledge creation: A

- paradigm shift in business management', *Technology in Society*, 18, 2, 203-218.
- Penrose, E. T. (1959), *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.
- Robey, D., Boudreau, M-C. & Rose, G.M. (2000), 'Information technology and organizational learning: A review and assessment of research' *Accounting, Management and Information Technologies*, 10, 2, 125-155.
- Scarbrough, H., Swan, J. & Preston, J. (1999), *Knowledge Management: A Review of the Literature*, London: Institute of Personnel and Development.
- Schön, D. A. (1995), *The Reflective Practitioner: How Professionals Think in Action*, Hants: Arena (orig. 1983).
- Schumpeter, J. A. (1951), *The Theory of Economic Development*, Cambridge, MA: Harvard University Press.
- Spender, J-C. (1996), 'Making knowledge the basis of a dynamic theory of the firm', *Strategic Management Journal*, 17 (Winter Special Issue), 45-62.
- Spender, J-C. (1998), 'Pluralist epistemology and the knowledge-based theory of the firm', *Organization*, 5, 2, 233-256.
- Swan, J., Newell, S., Scarbrough, H. & Hislop, D. (1999), 'Knowledge management and innovation: Networks and networking' *Journal of Knowledge Management*, 3, 4, 262-275.
- Swan, J., Robertson, M. & Bresnen, M. (2001), 'Knowledge management and colonization of knowledge', *Electronic Journal of Radical Organization Theory*, 7, 2.
- Takeuchi, H. (2001), 'Towards a universal management concept of knowledge' in Nonaka, I. & Teece, D. (eds.) (2001), *Managing Industrial Knowledge: Creation, Transfer and Utilization*, London: Sage.
- von Krogh, G., Ichijo, K. & Nonaka, I. (2000), *Enabling Knowledge Creation*, New York: Oxford University Press.