Kwansei Gakuin University
Social Sciences Review
Vol. 11, 2006
Nishinomiya, Japan

Virtual Organization and Knowledge Management

FURUKAWA Yasuhiro*

Preface

Ten years or more have passed from burst of the economic bubble. Japanese economy hasn't necessarily shown signs of recovery yet. However, not all corporate performance is sluggish even though this period is often called the "Lost decade". So-called "Winner companies" are maintaining positive earnings by using unique original business strategies and management methods. As shown in Figure 1, the respective business objective shifted greatly from new product development to cost reduction. On the other hand, the number of companies that value "New product development" again increases after 2000. If those companies are doing backward management like the cost reduction and restructuring, the recovery of the performance might also be difficult, so they carried out the aggressive strategy at painful time.

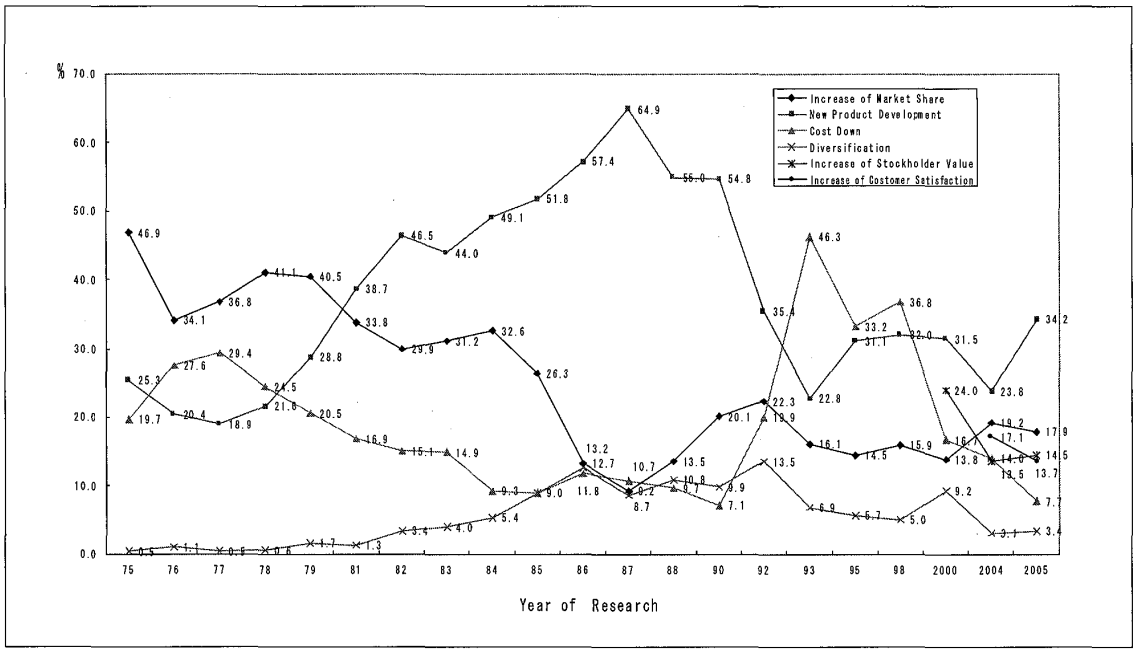
The base that supported the growth of Japanese economy was an improvement type or an adaptive market needs type value creation by companies. However, it is not possible to deal with an intense, now rapidly changing business environment by such value creation. Then, the requested new value creation is a creation of quite new product and service that doesn't exist at all up to now, and harvests of the obtained profit at the early stage[1]. Concretely, to secure a rapid competitive advantage by a novel technical improvement, to secure the business process by the e-commerce, to progress M&A and the strategic partnership to save the time for a new technology acquisition, and to save costs, companies are multiplying the many methods they use[2]. It is

* Professor of Management, Ph.D., School of Policy Studies, Kwansei Gakuin University, Japan.

1 KEIO Strategic Management Research Group [2002] pp.23-24.

2 Rothwell, W. J. *et al.* [2000] pp.173-182.

Figure 1 Important Management Object (Present)



MITI [1985-1996], METI [2002], Okamoto, D. *et al.* [2005]

necessary to always encourage employee's knowledge creation, the creation of ideas, and demonstrating creativity so that the company may positively advance. Especially, popularization employee's of higher education has advanced in recent years, and these employees are the foundation of the knowledge creation with a new tendency to work regardless of time or the place for a long time[3].

It is necessary for the knowledge that it be high quality, and the imitation by the other companies is difficult so that the original knowledge of the company may become a dominant source for the competition[4]. In addition, it is also necessary that it is difficult for the other companies to acquire the alternative knowledge. It is unquestioned that the difficulty of imitation is based on tacit knowledge, for example know-how that an individual has. Therefore, human resources are thought to be most important for the company[5].

However, if the company relied on only individual knowledge, the company would not be able to cause the knowledge creation and the innovation at a corporate level. To achieve that, we need a system where individual knowledge can be actualized and integrated as knowledge at a corporate level, as well as used at the corporate level.

Then, how does each company combine the knowledge of an individual employee? According to questionnaire survey of Sogawa *et al.*[6], in the company that had actively

3 Rothwell, W. J. *et al.* [2000] pp.182-187. Reich, R. [2002] pp.187-191.
4 von Krough, G. *et al.* [2001] p.127. Morishima, M. [2001] p.41.
5 Pfeffer, J. [1998] pp.314-322.
6 Sogawa, H. *et al.* [2002] pp.151-152.

used crossing project teams at the corporate level, new business and new product development tended to be done effectively. Moreover, Daft[7] described that cooperation between business units is necessary to make innovation. To integrate knowledge at an individual level, and to create novel knowledge and ideas at a corporate level, the company must not combine people who depend on a narrow area or work in similar areas. But, there is a necessity to combine people not related in common sense in various shapes.

However, it is time-wise and spatially difficult in an older organization forms for people who belong to various areas to combine in various ways. The more people come to have expertise of the expert class in each one's area, the more they come to be asked for various projects. Moreover, such people might be likely not to necessarily stay in the same building, or more, be likely to reside in a different country. It is in a virtual organization that such people combine, communicate each other, and finally produce new knowledge. Now, the internet is maintained all over the world and it is speeding up. Moreover, real time exchanging of information by not only the e-mail but also by electronic bulletin boards and video chat, etc. becomes possible. The use of the internet is advancing at a considerable speed in Japan[8]. Therefore, we are able to ignore time or spatial gaps, and to focus on communication. Through the positive use of various communications tools on the internet, the business organization where people don't face each other most of the time, becomes a virtual organization.

As described above, as long as the company neatly maintains the information network based on the internet, we think the company can create new knowledge, but it isn't easy. For instance, on the internet, there are many people who give some opinion even if it is somewhat strange. If people who have a similar opinion repeat an argument online, that opinion often goes in a more extreme direction[9]. The confrontation of the opinion can lead to slander on online. Moreover, the preservation of information confidentiality has caused many problems, too. If the frequency of communications through the internet and the knowledge exchange rise, democratic diffusion of information to the entire organization will happen, it will become impossible to deal with it gradually by using bureaucratic control[10]. And, companies are not experienced in non-programming control and decision making[11]. Therefore, the each person's behavior will have to be controlled by effective values for the company. Thus, in a virtual organization,

7 Daft, R. L. [2002] p.82.

8 For example, according to "*2003 WHITE PAPER information and Communications in Japan*", The rate of diffusion of the internet in the companies of 300 employees or more has reached 98.4%, and 100% in the companies of 1000 people or more. Moreover, the rate of diffusion of the internet over population reaches 54.5%. MIAC [2003] p.14 & p.199。

9 Wallace, P. M. [2001] p.105.

10 Daft, R. L. [2002] p.186.

11 Daft, R. L. [2002] p.259.

to create novel knowledge, management methods of knowledge exchange and communication style are needed.

This article focuses on the knowledge creation in a virtual organization and the many issues involved in the process. Where people mutually exchange knowledge, confirm the content of that, receive and integrate it as new knowledge, what media are suitable? And, what condition do we need to operate the process efficiently? This article will also discuss of control in a virtual organization. Next, it takes a general view of the psychology of people who belong to a virtual organizations where face to face communication is rarely used. Also, issues of the trust that combines people are covered. And, finally the role of the leader who influences the action of a virtual organization are discussed.

Ⅰ. Knowledge creation in virtual organization

1. Selection of media and knowledge creation

To develop a new business and a new product that the other companies can not easily imitate, it becomes more important that each unit and people who belong that unit combine different information, knowledge, and the know-how, etc. positively. To do that, it is necessary that not only workers communicate vertically in the same section, but across sections. However, people who communicate by such ways are not necessarily doing their jobs in the same place or same time. Therefore, it is necessary for workers to communicate each other on the internet with various communications tools. Kirkman *et al.*[12] define the virtual organization as an organization where people share the purpose of the organization while exceeding the boundaries of space and time, the boundary of work units, and work with each other using technology for communications and collaboration. Moreover, Lipnack & Stamps[13] explain the level of a virtual organization by the formation of organization members and the condition of time and the space (Figure 2). In Figure 2, in the case of organizations which relate to external organizations at a global level, the diversity of the organization is the highest. According to these definitions, knowledge creation by virtual organizations is required in companies that promote various relationships.

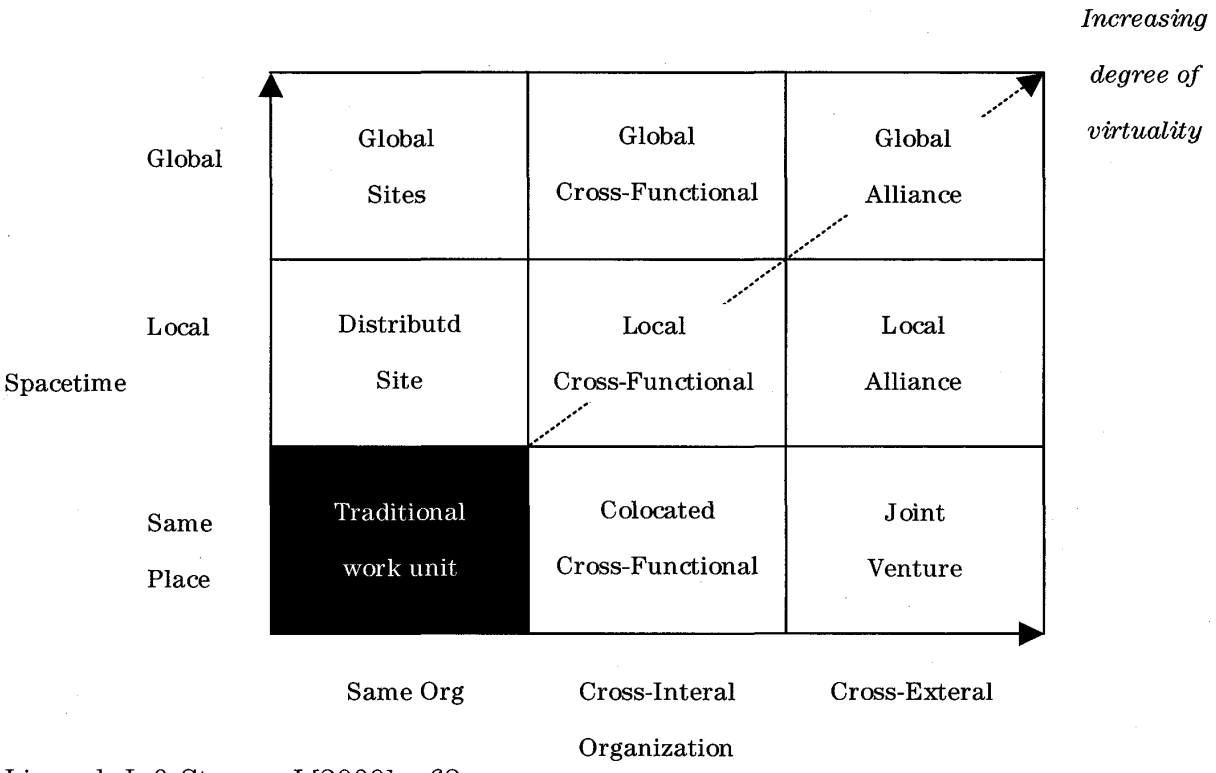
When people create communication, various knowledge is interchanged within the unit or between units. Nonaka *et al.*[14]said knowledge is composed of tacit knowledge and explicit knowledge, and each type of knowledge is interactive. That is, tacit knowledge, whose source is each person's knowledge, is transformed into explicit

12 Kirkman, B. L. *et al.* [2002] p.67.

13 Lipnack, J. & Stamps, J. [2000] p.62.

14 Nonaka, I. [1990] pp.56-57. Nonaka, I. & Takeuchi, H. [1996] pp.91-105.

Figure 2 Varieties of Virtuality



Lipnack,J. & Stamps,J.[2000] p.62

knowledge by the transform process of the SECI model, and that explicit knowledge is transformed into tacit knowledge again, so this transform process is repeated. It is each person's tacit knowledge that has value and is not imitable. And, the success or failure of the company is decided by how people transform tacit knowledge into explicit, integrate that explicit knowledge at the company level, and use it strategically. For integrated explicit knowledge to be difficult to imitate by other companies, tacit knowledge of different areas is preferable that of similar areas for the source of explicit knowledge. In that case, that explicit knowledge will be more novel and original knowledge. And, it is a virtual organization that being expected as a place where knowledge with such various sources is integrated.

However, it is not easy to think that a virtual organization works effectively in all stages in the SECI model. Furukawa,Y.[15] put together the relationship of the stage of the SECI model and proper media, the aptitude of telework that should be used at each stage (Table 1). That is, in the case of people communicating tacit knowledge that is difficult to express as sentences, as in the stage of socialization and/or externalization, rich media (for example face to face communication) is more proper. On the other hand, in the case of people communicating and integrating explicit knowledge, like in the stage of combination, poor media (for example documents or e-mail) are more

15 Furukawa, Y. [2002b] pp.29-33.

Table 1 Relation of the Stage of SECI model, media and the aptitude of telework

Stage of model	→Socialization→	→Externalization→	→Combination→	→Internalization→
Communicated knowledge	Tacit knowledge → Tacit knowledge	Tacit knowledge → Explicit knowledge	Explicit knowledge → Explicit knowledge	Explicit knowledge → Tacit knowledge
Purpose	·Removal of vagueness	·Removal of ambiguity	·Reduction of uncertainty ·Clarification of solution	·Preservation of solution
Proper media	Rich media (face to face etc.)	Rich media → Poor media	Poor media (documents, e-mail, and fax, etc.)	Poor Media → Rich media
Aptitude of telework	× However, it is useful to take contacting each other.	×→△ It becomes useful as tacit knowledge is transformed to explicit knowledge.	○	× It is useful only for the confirmation of an uncertain point.

Furukawa,Y. [2002b] p.32.

proper. Konno[16] said that explicit knowledge that can be easily coded is communicated within non-redundant network, but tacit knowledge and secret information is communicated within tight network only, because that knowledge cannot be communicated without using direct contact repeatedly.

In an organization whose members are not always mutually in contact and performing their jobs, like a virtual organization[17], we cannot expect to create novel knowledge by using communication tools on internet (for example, e-mail etc.) at all stages of the SECI model. Even if it is a virtual organization, it is necessary to select proper media: at the socialization stage, use of rich media is better, while at the combination stage, use of poor media is better.

If we communicate and integrate knowledge (especially, tacit knowledge) by using communication tools on internet, will the results meet our expectations? Gallupe *et al.*[18] said that brain-storming that using electronic media is superior to face to face communication on the point of creation of non-redundant idea. However, it was the condition of that superiority that the idea that had been input to electronic media was displayed to other members immediately. Even if using electronic media, the lateness of display can cause a blocking effect as in face to face communication, and the communication process will be complicated, bring about forgetting and frustration that

16 Konno, Y. [2002] pp.11-13. According to Konno, non-redundant network is thin network, and strong connected network is thick network.

17 Wallace, P. M. [2001] p.79. Wallace, P. M. insisted that A virtual organization is abundant the variety, and can classify it into some groups. For example, the group that consists of acquaintance and uses network for contact, the group that had the same interest but don't think to meet each other in the real world etc.

18 Gallupe, R. B. [1994] pp.80-81.

lead to decline of knowledge creation. That is, the key success factor of electronic media based brain-storming is immediateness and simultaneity. But actually because there is little case which communications are done by always using the internet simultaneously, in the case of communication using electronic media, it is necessary to decide the methods and rules of communication in advance.

Lam & Schaubroeck[19] compared Group Decision Support System (GDSS) with the group discussion using face to face communication, to search condition of information sharing and quality of decision making. Specifically, in the case of selecting someone (at this time, A is an appropriate person), is there a difference between selection results under which member has shared information or not. They maintain that GDSS was superior in respect of the quality of the decision making compared with the face to face communication. But, even if GDSS is used, it doesn't become a qualitatively excellent decision making when information is being shared by all members beforehand. That is to say, when the group that doesn't share information uses GDSS, they discuss more time than the group that using face to face communication. This leads to a better result.

Moreover, McLeod *et al.*[20] considered the impact of GDSS for the decision making of minority group. Their research is similar to Lam & Schaubroeck's research, but differs in that they classified all members for three groups: the group whose members are using a face to face communication method, the group whose members are using an anonymous GDSS method and the group whose members are using a non-anonymous GDSS method. They maintain that in the anonymous GDSS group, the members of minorities often persistently described their opinions, but the members of the majority were skeptical of minority opinions, were not harmonized and objected to them. However, when the members of minorities described their opinions using face to face communication, the members of the majority felt that those minority opinions were worthy and wanted to get more detailed information. That is, when the anonymity of members is strong, minority opinions don't exert a large influence on the decision making of the entire group, even if they use electronic media like GDSS. According to Nemeth[21], the influence of minority group will urge the organization to consider alternative opinions in near future, because there is deep and hidden influence in the decision making process. If we undervalue minority opinions or suppress their actions and expressions, it leads to the decrease in the quality of decision making. So, if we use anonymous communication methods, it leads to less than satisfactory result for both the majority and minority.

When we aim to create novel knowledge using a virtual organization, people who have

19 Lam, S. S. K. & Schaubroeck, J. [2000] pp.565-573.

20 McLeod *et al.* [1998] pp.706-718.

21 Nemeth, C. J. [1986] pp.23-32.

diverse tacit knowledge and/or explicit knowledge may be located at different places. So, of course, there is a lot of knowledge that is not shared as well as shared knowledge. Generally, the more members of the group, the more discussion of shared knowledge over non-shared knowledge[22]. However, we need to discuss the content of non-shared knowledge to create novel knowledge. If we don't discuss non-shared knowledge for a long time, it obstructs learning within the organization, and there is a decline in organizational competence to solve new problems[23].

It is important to encourage knowledge sharing so that people have shared knowledge about the contents of shared knowledge and who has what knowledge within a virtual organization[24]. Even if some knowledge is unevenly distributed, by knowing there is some non-shared knowledge within organization, we recognize importance of communication and information sharing[25]. Dreyfus[26] said that one needs to understand common sense to understand relationships, one needs to feel relationships, like a mesh between the world and the body, and to understand common sense. That is, the organization which always tries to create novel knowledge will get unique information and knowledge naturally, as it tries to accomplish its purpose.

If we try to create new knowledge by integrating shared and non-shared knowledge, we think that a virtual organization is one of the effective organizational forms. However, to do high quality decision making, we need to consider some conditions describe above.

2. Management in Virtual Organization

The people who engage in their jobs to aim for knowledge creation are expected to show high sense and initiative every day. We can't decide details about performance of these jobs beforehand. Because of characteristics of these jobs, higher trust is given to them compared with a general employee. So, they can do their jobs under the environment which has less rigid management rules[27]. Baba[28] said that new ideas rely on independent and free personal action, so the orders of their bosses and corporate customs don't further personal knowledge creation and actually cause a decline corporate value creation competence. So, it is thought that a virtual organization where each member can act relatively freely is an organizational structure to create knowledge. But, if we entrust to them all knowledge creation, we can't necessarily get innovative

22 Stasser, S. [1992] p.54.
23 Sogawa, H. [2002] p.41.
24 Stasser, G. *et al.* [1995] pp.246-247.
25 Stasser, G. [1992] p.62.
26 Dreyfus, H. L. [2002] p.33.
27 Fukuyama, F. [1996] p.331.
28 Baba, S. [2001] p.62.

and creative results. Therefore, virtual organizations need to manage knowledge creation.

To create more novel and original knowledge, the organization members should have various kinds of expertise. But, if diverse expertise isn't integrated and the opinion and knowledge of the minority isn't considered, we can't get better results. We need a shared future vision or a common understanding about how to work to avoid that situation. In any organization structure, if organization member persist their opinions arbitrarily, that organization can't create novel knowledge. Hinds & Weisband[29] insist that if there is common understanding about order and job process among employee, they turn their attention to successful actions, they are motivated, and corporate performance improves. If the contents of organizational knowledge are more diverse, we must lead the organization in one direction and create new knowledge according to the united vision of top management. Common vision is the origin of focus and energy to learn in the organization[30]. Especially, as there are many cases in which members are separated physically in virtual organization, we need to prepare environments so that each member translates their tacit knowledge into explicit knowledge actively, and each member can access and use that explicit knowledge[31].

Only after the shared vision of the future and the expertise of each member etc. are confirmed by face to face communication can virtual organizations kick over. In that case, each member needs to identify who has leadership in that organization. In the organization using networks like a virtual organization, each member can join equality, but it is rash to think that there is no hierarchy. Fukuyama[32] said that the community consists by the trust based on an ethical standard. But, no one thinks that it can control the organization only by these tacit ethics standards. So, hierarchical control is needed. And, after the organization starts that action, openness of the organizational process is needed[33]. If the flow of various information, the evaluation method and the reward system etc. are opened, there is no difference in manner among members, reactionss to customers, mutual reliance, coherence of action, and such. So, not only trust among members, but also personal trust for the corporation will strengthen more and more.

Thomson[34] found four problems that have a negative influence on decision making in organizations. They are social loafing, conformity, production blocking, and downward norm setting. For the production blocking problem, there is some research that suggests we can resolve this problem by using electronic media effectively. For other problems,

29 Hinds, P. J. & Weisband, S. P. [2003] p.22.
30 Sogawa, H. [2002] p.110.
31 Lipnack, J. & Stamps, J. [2000] p.84.
32 Fukuyama, F. [1996] pp.61-63.
33 Sogawa, H. [2002] p.17.
34 Thompson, L. [2003] p.100.

leaders must check whether there are signs of problems or not constantly. Especially in virtual organizations, leaders must confirm the conditions of problems earlier than usual because they can't manage each member of the group directly.

Moreover, in virtual organizations, leaders must manage the borders of the organization and each member's access conditions for the network, etc. According to Figure 2, if organizations move to the upper right area and the level of virtual reality builds up, various members come into the organization, so it makes it more difficult to control and manage each action of each member. Some researchers[35] insist that if more people will communicate with each other on the network freely and exchange each member's knowledge, human, social, and intellectual assets will increase. It is also necessary that organizations limit the number of members and restricts the right of access to databases to create novel knowledge and to connect new business and/or new product development. Even if on network, the place that has high security and privacy is the place where organization members communicate most important things. Even the network urges new uniting of information and the knowledge creation, if we communicate secrets and/or important knowledge on open BBS where many unspecified people have access, the problem of free riders arises, and competitive advantage over other corporations is not able to be established. So, in virtual organizations, leaders must check each member's access to the network. And, leaders must prevent the leak of secret and/or important knowledge to the outside. It is important that there is trust among members, because the human relationships in virtual organizations are easy to crash[36].

Ⅱ. Trust in Virtual Organizations

1. Virtual Organizations and Human Psychology

In virtual organizations, trust is a key success factor to manage and control members. Virtual organizations are different from non-virtual organizations; members don't share mutual time and space, but exchange information and knowledge by using communication tools on the internet. So, virtual organizations member's psychology in action is also different. This section describes various aspects of human psychology when people use the internet.

When we communicate on the internet, first of all, formation of impressions of other people is different. In usual face to face confrontations, the impression of the other party is formed in less than no time. However on a network, the process of the impression formation varies greatly depending on the communications tools used and

35 For example, Lipnack, J. & Stamps, J. [2000] p.84. Maruta, H. [2001]

36 Furukawa, Y. [2002b] pp.36-38.

the content[37]. For example, media that center on documents, such as e-mail, can't inform the contents adequately and a wrong impression can possibly be given according to the circumstances. Even using video chat or TV meetings, according to my experience, the atmosphere of face to face conversations or meetings doesn't come down. If impression formation among members will not successful, it will create distrust.

Next, when we communicate on the internet, one factor that exerts a big influence on people's behavior is anonymity. As mentioned above, when we deal with secret knowledge, leaders must check that members don't leak that knowledge, whether it is deliberate or not. Even if the members always think that they won't leak secret information outside, under the condition of anonymity, almost everyone will do unusual actions[38]. The more anonymity there is, the weaker the usual social sanctions for actions are and the less control over their actions[39]. So, in virtual organizations that deal with secret knowledge, it is necessary to exclude anonymity, and leaders must direct each member not to access anonymous BBS's. Especially, Japanese will enter highly anonymous places without skepticism. If they will not be able to agree each action or opinion, they will attack others relentlessly, and will be attacked by others[40]. Therefore, in highly anonymous places, true trust can not be built. For processes where members create novel knowledge together, if each member understands each other's views, they will trust each other gradually, and the integration of explicit knowledge will be advanced at the corporate level[41].

Moreover, even though the culture of Japan has gradually shifted towards individualism, it is still a high-context, group based culture. In the culture-based group, each person tends to support inner group[42]. In Japan, members need to harmonize actions and efficiency based on identification among members. So, shared social context is strongly needed[43]. And face to face communication in that culture is a psychology factor that joins other concepts like a respect, shame, obligation, etc.[44] In group-based cultures, sympathy for ones inner group is important; people that don't want to sympathize have sanctions imposed on them. Oppositely, if the cohesiveness of the inner group rises, the group can demonstrate maximum power[45]. So in Japanese corporations, whether it is a virtual organization or not, regular meetings or face to face

37 Wallace, P. M. [2001] p.40.
38 Wallace, P. M. [2001] p.8.
39 Wallace, P. M. [2001] pp.16-18.
40 Matsumoto, D. & Kudo, T. [1996] p.98. Kumon insited that in Japanese society, while people make appoint of inner-harmony, they have closed tendency for outside. Kumon, S. [1993] p.117.
41 Leonard, B. D. [2001] p.153.
42 Matsumoto, D. & Kudo, T. [1996] p.163.
43 Sato, Y. [2002] p.119.
44 Ting-Toomey, S. [1988] p.228.
45 Matsumoto, D. & Kudo, T. [1996] p.163.

communication can raise cohesiveness among people and build trust.

2. Importance of Trust and the Trust Building

Generally, in organizational behavior, trust among members is important, because this trust supports the matters that official control systems can't check[46]. In virtual organizations, basically how to do one's job has been entrusted to each member's discretion. However, according to above, as members of virtual organizations deal with secret information often, each member must take more responsibility for their own behavior than usual. As there is little chance that members can communicate with each other face to face, if members will not take responsibility for their own behavior, trust can't be built between them, and suspicion will raise bogies. If that condition happens, effective knowledge transfer and/or integration will not occur and be connected to novel knowledge creation. So, in virtual organizations, stronger trust is needed.

Fukuyama[47] insisted that to run a computer network more efficiently, there must be strong trust and a shared ethical code of conduct among members. And Daft[48] said that when there is high vagueness and/or uncertainness in an organization, associated control of that control member's behavior by corporate culture, shared value, trust, is suitable for managing that organization. It seems that virtual organizations are most suitable for the combination process in the SECI Model[49]. In that process, the main purpose is the decrease of uncertainty and clear definition of answers, but there is still vagueness and/or uncertainness in that process. So, associated control is suitable for that process. Moreover, Gruenfeld *et al.*[50] insisted that if there is closeness among members and diversity of information is at a high level, trust among members will lead to good results for decision making. When we started this argument about virtual organizations, we often emphasized about technological factors and use of communication tools[51]. But, for virtual organizations to succeed, technological factors are not so important, building trust at almost level of organizational development is more important[52].

According to Floyd & Wooldrige[53], the following three levels exist in trust. There are Calculus-based Trust, Knowledge-based Trust, and Identification-based Trust. There is

46 Sato, Y. [2002] p.125.
47 Fukuyama, F. [1996] p.29.
48 Daft, R. L. [2002] p.186.
49 Furukawa, Y. [2002b] pp.29-31.
50 Gruenfeld *et al.* [1996] p.12.
51 For example, Okishio, S. *et al.* [1996] pp.11-38.
52 Furukawa, Y. [2002b] pp.36-38. Handy, C. [1995] p.44.
53 Floyd, S. W. & Wooldridge, B. [2000] pp.98-103. They said that "Calculus-based Trust" is the trust about the deterrent power, "Knowledge-based Trust" is the trust about the possibility of guess, and "Identification-based Trust" is the trust about the sharing of belief.

a stage in these three trusts; Calculus-based Trust is the weakest, Knowledge-based Trust is in the middle, and Identification-based Trust is the strongest. Identification-based Trust is needed for strategic renewal. In the organization that has this trust, members want to achieve the organization's purpose through autonomous behavior based on shared beliefs. As virtual organizations are formed based on the autonomous behavior of each member, there must be Identification-based Trust among members. Floyd & Wooldrige said that trust evolves from weak levels to strong levels in the long history of the organization. As virtual organizations is run up more than traditional organizations and their membership can be fluid, they can't have a long history. Therefore, there might be anxiety about a lack of strong mutual trust among members. But, in such a situation, we must consider influence factors for trust building and expand the atmosphere with which strong trust is built easily in the organizations. So we can make up for a short history to some degree. If such an atmosphere is not made deliberately, we can't build strong trust that is the key success factor in a virtual organization.

Therefore, in virtual organizations, how trust is built that is the foundation of organizational control. von Krogh *ea al.*[54] insist that in knowledge creation, the most important thing is human relationships in the organization. Most Japanese trust other people not by trust that relies on rational selection between individuals, but by trust that relies on the actions of other peoples and stable continuance of interpersonal relationships[55]. Therefore, we must select organization members that can carefully create good interpersonal relationships.

As in virtual organization, member isn't restricted by time and place, there might be cases where too many members are chosen, and members that don't have relevant knowledge are chosen. Even if knowledge of various areas is a source of novel knowledge creation, it is important that the corporation select members that have expertise for knowledge creation, and establish virtual organizations under the proper scale. Moreover, it is said that in the selection process, to select members that feel the treatment system is applied fairly is a prerequisite condition for organizational effectiveness[56].

Additionally, in the selection process, to aim for the creation of new knowledge at corporate level, selected members should be limited to people in that corporation, even if you somewhat expand the range to people of corporations where affiliations exist. Especially, when the main object is to transform tacit knowledge to explicit knowledge and to combine that explicit knowledge, as previously stated, it is needed that

54 von Krough, G. *et al.* [2001] p.iii.

55 Hamaguchi, E. [1996] p.6. He called this relation "Kanjin Syugi (Inter-personal Principle)".

56 Furukawa, H. [2003] p.300. Collins, J. C. [2001] pp.66-67.

membership is limited. If the organization is formed by people of each section in the corporation, people who have the background of the same corporate culture gather basically, the cohesiveness of the organization rises, and it is not necessary to think about the leak of secret knowledge so much. According to Dreyfus[57], we have physical trust for the reality of the cognitive world, only when we operate against that background, we can doubt the reality of a particular cognitive experience. He insisted that if there is no background trust in cyber-space, the trust in all social interactions is lost. Therefore, when we construct virtual organizations, if we don't select people who have the same background trust, virtual organizations won't work fully until that trust is built.

After the selection of appropriate members for the virtual organization, it is not a good method to put them in the knowledge creation job immediately. Even if each member can do their job without considering time and space from the beginning, it is important that all members gather at one place and confirm vision and direction of organization at the start-up of the organization. von Oetinger & Hansen[58] insisted that for virtual organizations to be forced to function, it is essential that trust be built among members through face to face communication. And that time, it is an important role of the T-shaped manager to build good give-and-take relationships with other business units.

Hamaguchi[59] said that in the Japanese company, networks are built not by individuals, but by human relationships. As the Japanese have the psychological characteristic that the ego is uncertain, they construct organizations through the interactions which include the relationships with other members. So, Japanese prefer face to face interpersonal relationships and a groupism tendency occurs[60]. Because there are these characteristics, when the Japanese company creates knowledge by using virtual organizations, each member must meet and confirm human relationships with each other before their job starts. And, it is an important factor that there is no rival relationships among members. If these things are neglected, we can not construct a higher level trust.

After some trust is built among members, if knowledge creating jobs are started in virtual organizations, as the business progresses, friendship among members strengthens, and recognition of each member's expertise strengthens, too. However, in

57 Dreyfus, H. L. [2002] p.93.

58 von Oetinger, B. & Hansen, B. M. T. [2001] p.64-73. They said that T-shaped manager is freely shared knowledge without being caught in a traditional hierarchy, at the same time, strive to highten the performance of their business unit. And an excellent T-shaped manager excels in not only the offer of advice to other business units but also giving.

59 Hamaguchi, E. [1996] pp.59-70.

60 Shimozaki, C. [2001] pp.6-7.

virtual organizations, there may be uncertainty of content and various misunderstandings. In that case, we don't need to persist in the virtual organization, but we can fill the gap of information or knowledge using face to face communication if necessary. Furukawa, H.[61] said that the generation of knowledge assets and intellectual assets is related to the memory of interpersonal exchanges within the team, and a passage of a fixed amount time is needed for that. If we select members who have similar cultural backgrounds, confirm the expertise and position of each member, and aim to create novel knowledge by using face to face communication and virtual communication dynamically, friendship among members will strengthen, and trust that is the foundation of the organization will move to a higher level. Though it will take some time, if these things go well, knowledge that other companies cannot imitate will be created.

Ⅲ. Role of virtual organizations and the leaders of organizations

When we have knowledge creating jobs in virtual organizations, trust among members is the foundation of good performance, and the leader of such organizations, who puts together the team and exercises leadership, is important. In this section, the role of leader in virtual organization from a standpoint of middle management on a company level is described.

von Krogh *et al.*[62] insisted that to function on the SECI Model, we must maintain organizational structure, systems, human resources, and corporate culture in order to advance knowledge creation. It is the role of top management to explain the importance of knowledge creation, direct the way to go, and make the decisions of organizational structure, etc. And it is the role of middle management to reveal personal tacit knowledge, to integrate them for corporate explicit knowledge, to use them strategically, according to the corporate direction.

While middle management understands the vision of the future of top management and has the authority to convey it to organization members, they also control the behavior of members in order to realize the vision[63]. Naturally, knowledge creation is a part of these various behaviors. In this process, organization members come to listen to other members' opinions, to become sympathetic to other members, and to find value in that[64]. And the philosophy of top management gradually penetrates the entire organization. As there is less chance that members perform their jobs in the same place

61 Furukawa, H. [2003] p.311.
62 von Krough, G. *et al.* [2001] pp.ii-iii.
63 Sogawa, H. [2002] p.44.
64 von Krough, G. *et al.* [2001] pp.108-109.

in virtual organizations than in other organizations, it is difficult to share the vision of the future, etc. Therefore, in virtual organizations, leaders who perform the role of a middle manager are greatly needed.

People who can integrate the opinions and knowledge of various members are middle management who can understand the philosophy of top management, and convey it to the members. Therefore, if there is cooperation between top and middle about presentation and penetration of the vision of the future, the SECI Model can function. So, it is necessary that the middle management at the corporate level takes the initiative in exercising leadership in virtual organizations. As described above, in virtual organizations, each member's position isn't equal at all, and some hierarchy is required for control. In virtual organizations, it is the leader of the organization that has the role to inform members of the view of top management, promote that view, and move them towards the creation of novel knowledge according to a shared vision. And to create knowledge connected to new business and/or new product development, it is not necessary to establish cooperative relationships based on uniformity, but the structure must be able to realize unity in the diverse conditions in a virtual organization[65].

Moreover middle management must strive to inform other members of the existence of experts in the organization and roles and knowledge other members have. By informing the organization's members of each member's role and expertise in the organization, each member can understand other member's expertise, so the volume of non-shared information and opinion of minorities increase during discussions. As a result, the possibility that this organization will be able to make better decisions also increases[66]. It is not easy for each member to appropriately describe each role and knowledge in a form that everyone understands. Therefore, it is an important role of middle management that they inform the members of the various roles and diverse knowledge using a standard format.

In addition, middle management must play the role of contact with other areas and business units. That is, middle managers must not only communicate vertically: informing subordinates of the strategic direction of top management and listen to the reaction, but also communicate horizontally: exchanging information with other areas of the corporation. By doing so, they can restrain the enclosure of information within their own area, and promote new unification of information in the company. Actually, according to Sogawa *et al.*[67], when companies develop new business and/or new products, the more frequent the company has contacts across different areas, the higher the correlation coefficient with the degree of new business and/or new product

65 Sogawa, H. [2002] p.7.
66 Stasser, G. *et al.* [1995] pp.257-259.
67 Sogawa, H. *et al.* [2002] pp.149-150.

development, production technology development.

Because in virtual organizations there is little direct contact with other members and they mainly communicate with each other by documents, the contents of communications might lack feelings. Therefore, there are often people who worries because of a feeling of isolation. Moreover, because of the discrepancy between various member's information, problems might be likely to develop. Leaders of virtual organizations must check the behavior of each member so that this does not happen, and use appropriate communications tools properly according to the situation, holding face to face meetings if necessary. In that process, they play the role of making members participate in planning and decision making, sharing the common vision and building trust. They play an important role as coordinators.

While the leader of a virtual organization must aim at the connection of knowledge in an organization, they must keep a close connection with other areas and units in the corporation, bringing new information and knowledge into the virtual organization if necessary. Moreover, to transform new knowledge into specific new products, the positive announcement of new knowledge to other area is one of their roles. It is said that novel knowledge creation is promoted by the contact with people who are the source of diverse information, however this does not apply to virtual organizations from the point of preservation of secrecy. So, like the same as middle management at the corporate level, it is the leader of the virtual organization that plays the role of finding new knowledge in other areas, bringing it into the organization, and announcing new knowledge to other areas. In this sense, they play the role of the gatekeeper and/or the product champion in virtual organizations, too.

In virtual organizations, in order to create novel knowledge and to transform it to new business and/or new product development at the corporate level, we must integrate each member's knowledge to create explicit knowledge, and then internalize that explicit knowledge to convert it back into tacit knowledge again[68]. Therefore, the leader of the virtual organization plays the role of finding new knowledge in other areas, bringing it into the organization, and announcing new knowledge to other areas all at once. While the human mind is very flexible in a certain respects and can make surprising leaps in the process of trying to do a new thing, it often persists in very trifling things and past traditions[69]. As these situations always happen not just in virtual organizations but in the larger corporation, it is necessary to train flexible middle management and allocate them to virtual organizations as the leaders to create novel knowledge.

---

68 von Krough, G. *et al.* [2001] p.404.

69 Leonard, B. D. [2001] p.312.

Ⅳ. Summary

In this article, I have argued that the virtual organization is one of the places where we create novel knowledge as a source of new business and/or new product development. With the enhancement of various communications tools on the internet and the development of the information technology in recent years, experts can build virtual organizations which don't share time and place, and they can do intellectual work there.

While the use of a virtual organization becomes technically possible and there is a trend to use it positively for knowledge creation, there is a possibility that various problems are caused because it has been rarely used up to now. In this article, from past documents, I suggested that the brainstorming and the decision support system that uses electronic media can be successful, and examined applications of virtual organizations. Moreover, with the view that virtual organizations are made up of loose connections among members and some discretion for each member's behavior leads to good results, I also insisted that in a virtual organization that aims to create knowledge, hierarchical control is needed, because there are many chances of using secret information and a need to complement control with ethical codes.

In virtual organizations, there are many problems, for example less contact between and conflict among members, etc., because each member does their job in time and the space at their own convenience. I considered problems from the point of human psychology, and insisted that trust building is needed to hold back the outbreak of problems to the minimum level. To build trust, I suggested that at the start time of virtual organization, all members gather in one place and confirm and share the corporate vision and expertise of members, and then do their jobs. Moreover, I suggested that if there is a difference of views among member about their jobs, correction of the difference is needed as soon as possible. Through these processes, trust among members can move to higher levels.

Moreover, I insisted that it is the leader of the virtual organization that plays the role of providing the basis of trust building among members. Besides this role, the leader of a virtual organization plays the roles that integrates diverse knowledge within the organization and announces new knowledge to other areas, checks the source of new knowledge from the outside, and if necessary, brings it back to organization. So, it might be desirable that middle managers are placed in position as the leaders of the virtual organization to play the roles of vitalization of communication, connection information, and use of new knowledge for new business and/or new product development.

When we discuss knowledge creation using virtual organization, there are a lot of discussions where only the technical side is stressed and, as the diversity of human connections increases through the use of virtual organizations, the SECI model

circulates naturally in a good way. According to von Krogh *et al.*[70], the place where people make relations, grow them, and create knowledge, can be a physical place, a virtual place, a mental place, or a combination of all three. And this place is an interactive network based on care and trust among members. Therefore, whatever the form of the place is, in order to create knowledge, it is not necessary to prepare the place, but to build trust among members of the organization. In the future, the information technology will develop more and more, and the movement to try to use IT for knowledge creation in business will continue, too. In that case, if we not only focus on technology, machines, and computer system, but also the correct connection between machines and humans, and the establishment of human relationships based on trust, novel knowledge creation will be promoted.

【Reference】

Adler, P. S., "Building Better Bureaucracies," *Academy of Management Executives*, Vol.13, No.4, pp.36-47, 1999.

Akashi, Y., *Background of Ggradual Improvement Type Innovation*, Yuhikaku, 2002. (in Japanse)

Amar, A. D., *Managing Knowledge Workers*, Quorum, 2002.

Baba, S., "Remodeling Employment for Competitive Advantage: What will follow Japan's 'Lifetime employment'?," *Journal of Business Management*, No.7, pp.59-70, 2001. (in Japanse)

Collins, J. C., *Good to Great*, Yamaoka, Y. (Translate), Nikkei BP, 2001. (in Japanse)

Constant, D., Sproull, L., & Kiesler, S., "The Kindness of Strangers : On the Usefulness of Electronic Weak Ties for Technical Advice," in *Culture of the Internet*, Kiesler, S. (ed.), Lawlence Earlbaum Associates Publishers, pp.303-322, 1997.

Daft, R. L., *Essentials of Organization Theory & Design, 2nd Edition*, Takagi, H. (translation), Diamond-sha, 2002. (in Japanse)

Daft, R. L. & Lengel, R. H., "Organizational Requirements, Media Richness and Structural Design," *Management Science*, Vol.32, No.5, pp.554-571, 1986.

Dreyfus, H. L., *On the Internet*, Ishihara, K. (Translation), Sangyo Tosho, 2002. (in Japanse)

Floyd, S. W. & Wooldridge, B., *Building Strategy from the Middle Reconceptualizing Strategy Process*, SAGE, 2000.

Fukuyama, F., *Trust*, Kato, H. (Translation), Mikasa-shobo, 1996. (in Japanse)

Furukawa, H., *Making Main Shaft (New Edition)*, JMA Management Center, 2003. (in Japanse)

70 von Krough, G. *et al.* [2001] p.84.

Furukawa, Y., *Creative Office*, Chikura Shobo, 2002a. (in Japanse)
Furukawa, Y., "Success Factors of Telework in Japan," *Journal of Policy Studies*, No.13, pp.25-40, 2002b. (in Japanse)
Gallupe, R. B., Cooper, W. H., Grise, M. L., & Bastianutti, L. M., "Blocking Electronic Brainstorming," *Journal of Applied Psychology*, Vol.79, No.1, pp.77-86, 1994.
Gibson, C. B. & Cohen, S. G. (ed.), *Virtual Teams That Work*, Jossey-Bass, 2003.
Griffith, T. L., Mannix, E. A. & Neale, M. A., "Conflict and Virtual Teams," in *Virtual Teams That Work*, Gibson, C. B. & Cohen, S. G. (ed.), Jossey-Bass, pp.336-352, 2003.
Gruenfeld, D., Mannix, E. A., Williams, K. Y., & Neale, M. A., "Group Composition and Decision Making : How Member Familiarity and Information Distribution Affect Process and Performance," *Organizational Behavior and Human Decision Processes*, Vol.67, No.1, pp.1-15, 1996.
Hamaguchi, E. (ed.), *What is Japanese Mode? -Merit and Demerit in International Age-*, Shinyo-sha, 1993. (in Japanse)
Hamaguchi, E. *Rehabilitation of Japanese Trust Society*, Toyokeizai, 1996. (in Japanse)
Hamel, G., Leading the revolution, Suzuki, C. & Fukushima, T. (Translation), Nihon Keizai Shinbun-sha, 2001. (in Japanse)
Handy, C., "Trust and the Virtual Organization," *Harvard Business Review*, May-June, pp.40-50, 1995.
Hinds, P. J. & Weisband, S. P., "Knowledge Sharing and Shared Understanding in Virtual Teams," in *Virtual Teams That Work*, Gibson, C. B. & Cohen, S. G. (ed.), Jossey-Bass, pp.21-36, 2003.
Hofsteede, G., *Cultures and Organization*, Iwai, N & Iwai, H. (translate), Yuhikaku, 1995. (in Japanse)
Imai, K. (ed.), *Information Technology and Economic Culture*, NTT-publishers, 2002. (in Japanse)
Inoue, T., "Interdependency of the EDI Standard and the Forms of Inter-corporate Transaction," *Organizational Science*, Vol.36, No.3, 2003, pp.74-91. (in Japanse)
Kambayashi, N., *Information Technology System of Different Culture*, Chikura shobo, 2001. (in Japanse)
KEIO Strategic Management Research Group, Management of "Organizational Power", Chuokeizai, 2002. (in Japanse)
Kiesler, S. (ed.), *Culture of the Internet*, Lawlence Earlbaum Associates Publishers, 1997.
Kim, Y. Y. & Gudykunst, W. B. (ed.), *Theories in Intercultural Communication*, SAGE, 1988.
Kirkman, B. L., Rpsen, B., Gibson, C. B., Tesluk, P. E., & McPherson, S. O., "Five

Challenges to Virtual Team Successs : Lessons from Sabre, Inc.," *Academy of Management Executive*, Vol.16, No.3, 2002, pp.67-79.

Kobashi, T., "Vagueness, Ambiguity, and Uncertainty," *Journal of Business Management*, No.8, pp.43-53. (in Japanse)

Kokuryo, J., "Organization Collaboration in the Net Work Age," *Organizational Science*, Vol.34, No.4, pp.4-14, 2001. (in Japanse)

Kono, T. & Clegg, S., *Trends in Japanese management : continuing strengths, current problems and changing priorities*, Yuhikaku, 2002. (in Japanse)

Konno, Y., " New trends in the theory of 'Corporate strategy', 'corporate relationship', and 'structural embeddeness (2)," *Akamon managemet Review*, Vol.1, No.6, 2002, pp.1-23. (in Japanse)

Kraut, R. E. & Attewell, P., "Media Use in a Global Corporations : Electronic Mail and Organizational Knowledge," in *Culture of the Internet*, Kiesler, S. (ed.), Lawlence Earlbaum Associates Publishers, pp.323-342, 1997.

Kronig, J., *Do Incentive Systems for Knowledge Management Work?*, PETER LANG, 2001.

Kumon, S., The Network Approach: the case of Japanese Model, "*What is Japanese Mode? -Merit and Demerit in International Age-*," Hamaguchi, E. (ed.), Shinyo-sha, 1993, pp.105-118. (in Japanse)

Kurland N. B. & Bailey, n. B., "The Advantage and Challenges of Working Here, There, Anywhere, and Anytime," *Organizational Dynamics*, Vol.28, No.2, pp.53-67, 1999.

Lam, S. S. K. & Schaubroeck, J., "Improving Group Decisions by Better Pooling Information : A Competitive Advantage of Group Decision Support Systems," *Journal of Applied Psychology*, Vol.85, No.4, pp.565-573, 2000.

Leonard, B. D., *Wellsprings of knowledge*, Abe, K. & Tabata, A. (Translation), Diamond-sha, 2001. (in Japanse)

Lipnack, J. & Stamps, J., *Virtual Teams People Working Across Boundaries with Technology*, John Wiley & Sons, 2000.

Matsumoto, D. & Kudo, T., *Feeling World of the Japanese*, Seishin Shobo, 1996. (in Japanse)

Maruta, H., *Evolution System of Knowledge Creation*, Toyokeizai, 2001. (in Japanse)

Mcleod, P. L., Barton, R. S., Marti, M., Yoon, K., "The Eyes Have It : Influence in Face-To-Face and Computer-Mediated Group Discussion," *Journal of Applied Psychology*, Vol.82, No.5, pp.706-718, 1997.

McGrath, J. E., *Groups : Interaction and Performance*, Prentice-Hall, 1984.

Ministry of Economy, Trade and Industry (METI), *Management Ability Indices, (Manufacturing Section)*, Ministries of Finance Printers, 2002. (in Japanse)

Ministry of Internal Affairs and Communications (MIAC), *2003 WHITE PAPER*

information and Communications in Japan, Gyousei, 2003. (in Japanse)

Ministry of International Trade and Industry (MITI), *Management Ability Indices, (Manufacturing Section)*, Ministries of Finance Printers, 1985-1996. (in Japanse)

Montoya-Weiss, M. M., Massey, A. P. & Song, M., "Getting It Together Temporal Coordination and Conflict management in Global Virtual Teams," *Academy of management Journal*, Vol. 44, No.6, pp.1251-1262, 2001.

Nemeth, C. J., "Differential Contributions of Majority and Minority Influence," *Psychological Review*, Vol.93, No.1, pp.23-32, 1986.

Nonaka, I., *Management of Knowledge Creation*, Nihon Keizai Shinbun-sha, 1990. (in Japanse)

Nonaka, I., & Konno, N., *Methodology of Knowledge Creation*, Toyokeizai, 2003. (in Japanse)

Nonaka, I., & Takeuchi, H., *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Umemoto, K. (translation), Toyokeizai, 1996. (in Japanse)

Okamoto, D., Furukawa, Y., Oyanagi, K., Ahn, K. H., Sekiguchi, R., & Tao, Z., "The Effects of Corporate Governance on Corporate Performance," *Mita Business Review*, Vol.44, No.4, 2001, pp.223-254. (in Japanse)

Okamoto, D., Furukawa, Y., Sato, Y., Umezu, M., Yamada, T., & Oyanagi, K., "Sequel to the Top Management Ability Indices –The Effects of Corporate Governance and Management Factors on Corporate Performance 2004-(1)," *Mita Business Review*, Vol.47, No.6, 2005, pp.99-120. (in Japanse)

Okishio, S., Yoshida, K., & Naka, R., *Changing Office*, Maruzen, 1996. (in Japanse)

Perry-Smith, J. E. & Shalley, C. E., "The Social Side of Creativity : A Static and Dynamic Social Network Perspective," *Academy of Management Review*, Vol.28, No.1, pp.89-106, 2003.

Pfeffer, J., *The Human Equation*, Sato, Y. (Translation), Toppan, 1998. (in Japanse)

Probst, G. J. B., & Buchel, B. S. T., *Organizational Learning the competitive advantage of the future*, Prentice Hall, 1997.

Rao, V. P. & Jarvenpaa, S. L.," Computer Support of Groups : Theory-Based Models for GDSS Research," *Management Science*, Vol.37, No.10, pp.1347-1362, 1991.

Reich, R. B., *The Future of Success*, Seike, A. (Translation), Toyokeizai, 2002. (in Japanse)

Rothwell, W. J., Hohne, C. K. & King, S. B., *Human Performance Improvement*, Gulf Publishing Company, 2000.

Sato, Y., "Hybrid Culture: Future Features of Japanese Management," *Mita Business Reveiew*, Vol.45, No.5, 2002, pp.113-134. (in Japanse)

Shimozaki, C., "Compatibility and Contradiction between Telework and the Restructure of Japanese Human Resource Management," *Journal of economics and business*

administration, Vol.184, No.1, pp.1-17, 2001. (in Japanse)

Smidts, A., Pruyn, A. T., & van Riel, C. B. M., "The Impact of Employee Communication and Perceived External Prestige on Organizational Identification," *Academy of Management Journal*, Vol.49, No.5, pp.1051-1062, 2001.

Sogawa, H., *New Strategic Management: Changing Roles of Middle Management*, Bunshindo, 2002. (in Japanse)

Sogawa, H., Aoki, M., Endo, T., Baba, S., Shimizu, K., Konno, Y., Sakamoto, Y., Yamasaki, H., Yamada, T., Hsu, H. C., Choo, H., & Yokoo, H., "*Questionnaire Survey about Strategic Management of Japanese Manufacturing Companies*," Mita Business Review, Vol.44, No.6, 2002, pp.145-179. (in Japanse)

Straus, S. G. & McGrath, J. E.," Does the Medium Matter ? The Interaction of Task Type and Technology on Group Performance and Member Reactions," *Journal of Applied Psychology*, Vol.79, No.1, pp.87-97, 1994.

Stasser, G., "Pooling of Unshared Information During Group Discussion," in *Group Process and Productivity*, Worchel, S., Wood, W., & Simpson, J. A. (ed.), SAGE, pp.48-67, 1992.

Stasser, G., Stewart, D. D. & Wittenbaum, G. M., "Expert Roles and Information Exchange during Discussion : The Importance of Knowing Who Knows What," *Journal of Experimental Social Psychology*, Vol.31, pp.244-265, 1995.

Stasser, G. & Stewart, D. D., "Discovery of Hidden Profile by Decision-making Groups : Solving a Problem Versus Making a Judgment," *Journal of Personal and Social Psychology*, Vol.63, pp.426-432, 1992.

Stasser, G. & Tintus, W., "Pooling of Unshared Information in Group Decision Making : Biased Information Sampling During Discussion," *Journal of Personal and Social Psychology*, Vol.48, pp.1467-1478, 1985.

Sugita, S., "Japanese System in the High Information Society," "*What is Japanese Mode? -Merit and Demerit in International Age-*," Hamaguchi, E. (ed.), Shinyo-sha, 1993, pp.317-329. (in Japanse)

Taggar, S., "Individual Creativity and Group Ability to Utilize Individual Creative Resources : Multilevel Model," *Academy of Management Journal*," Vol.45, No.2, pp.315-330, 2002.

Thompson, L., "Improving the creativity of organizational work groups," *Academy of Management Executive*, Vol.17, No.1, pp.96-109, 2003.

Ting-Toomey, S., "Intercultural Conflict Styles," *Theories in Intercultural Communication*, Kim, Y. Y. & Gudykunst, W. B. (ed.), SAGE, pp.213-235, 1988.

Tyran, K. L., Tyran, C. K. & Shepherd, M., "Exploring Emerging Leadership in Virtual Teams," in *Virtual Teams That Work*, Gibson, C. B. & Cohen, S. G. (ed.), Jossey-Bass, pp.183-195, 2003.

von Krough, G., Ichijo, K. & Nonaka, I., *Enabling Knowledge Creation: How to Unlock*

the Mystery of Tacit Knowledge and Release the Power of Innovation, Toyokeizai, 2001. (in Japanse)

von Oetinger, B. & Hansen, M. T., "Introducing T-shaped Managers: Knowledge Management's Next Generation," *Diamond Harvard Business Review*, August, 2001, pp.62-77. (in Japanse)

Wallace, P. M., *The psychology of the internet*, Kawaura, Y. & Kaizuka, I. (Translation), NTT-publishers, 2001. (in Japanse)

Wenger, E. C., & Snyder, W. M., "Communities of Practice: The Organizational Frontier," Nishimura, H. (translation), *Diamond Harvard Business Review*, August, 2001, pp.120-129. (in Japanse)

Worchel, S., Wood, W., & Simpson, J. A. (ed.), *Group Process and Productivity*, SAGE, 1992.