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How to Design Active BA: The Interaction between Physical and Virtual Environments

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Abstract

In “the age of knowledge”, knowledge has become the main asset in solving issues and creating value in organizations. In this regard, “workplace reformation” actively participates in promoting knowledge creation. One of the key factors supporting knowledge creation is “the creation of BA”. In the workplace reformation process, when BA fosters the creation of knowledge, it is called “active BA”. In this paper, we propose a framework to design active BA. The workplace reformation is first segmented into virtual and physical environments; then, we consider the effects of each environment on active BA, as well as the interactions between each environment; finally, we analyze the synergistic and offset effects from both environments on active BA. Based on this framework, we introduce 2 case studies of workplace reformation. In the case of Company X, we describe the effective implementation of such workplace reformation. In the case of Company Y, we examine the results of a questionnaire survey carried out at three different stages of the implementation. Our results demonstrate the validity of our framework: (1) the effective implementation of workplace reformation in both Company X’s Sales Department and Company Y’s IT Department enabled the creation of active BA, and was consistent with our framework; (2) the influence of the physical and virtual environments onto the creation and activation of BA were different, thus justifying our assumption of the division of such environmental factors.

Keywords: Knowledge Creation, BA, Workplace, Office Layout, Intranet

1. Introduction

1.1 Background

The global social economy has shifted from “the age of information”, where the product manufactured at the factory is source of profit, to “the age of knowledge” where the knowledge of individuals and organizations is source of greater profit. In such a situation, the role of the white-collar worker should move from the indirect involvement of information-processing supporting manufacturing, to the direct contribution of knowledge creation producing value. Therefore, when arguing about the productivity of the white-collar worker, our interest is less on “how to reduce cost as a denominator” assuming information-processing to be invariable, than on “how to increase value as a numerator”. The problem is not mere “productivity” but “knowledge productivity”.

Researchers focusing on the knowledge productivity of white-collar workers have paid attention to the difference between information and knowledge. Practically thinking, the issue of “how to manage” makes this difference clear; it is possible to directly and uniquely manage information, but it is impossible to manage knowledge like information. Consequently, it is recommended to manage information and knowledge in two different ways, shared as the basic stance of knowledge management research. Knowledge

management is not about managing knowledge, but about promoting the process by which knowledge is created. It has been shown that some of the key factors promoting the knowledge-creation process are the “creation of BA” and “leadership”.

This paper focuses on the “creation of BA” through the process of “workplace reformation” as a major facilitator of knowledge creation, often recognized as an important issue of organization.

1.2 Research Objectives

The goal of this paper is to propose a practical framework for the creation of active BA. In this framework, the workplace is divided into “virtual environment” and “physical environment”. We consider the effects of each environment on active BA, the interactions between each environment as well as the synergistic and offset effects from both environments on active BA.

1.3 Structure

In section 2, we will introduce the knowledge-creation theory underlying the concept of BA, and present our framework. In section 3, we will demonstrate how our conceptual framework applies to the effective implementation of workplace reformation using the case study of Company X. In section 4, we report the results of a questionnaire survey with Company Y, which achieved the same type of workplace reformation. Finally, in section 5, we describe the findings from these two cases.

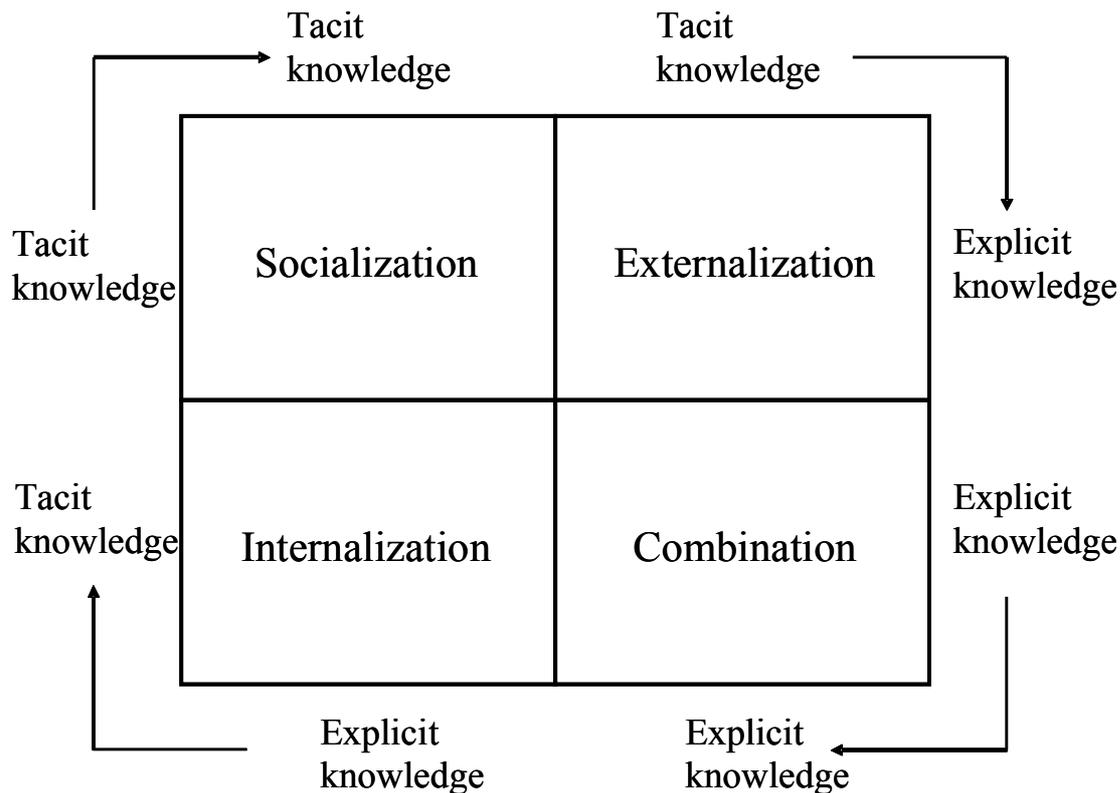
2. Existing Research and Framework

One of major factors promoting knowledge creation is the “creation of BA.” In the case of workplace reformation, the creation of BA that enables active knowledge creation is referred to as “active BA.”

2.1 Knowledge Creation Theory

In the field of Business Administration, the paradigm where organizations are regarded as centers of information processing has begun to shift to the paradigm where organizations are regarded as sources of knowledge creation. The premise of the "knowledge creation theory" based on this paradigm is the supposition that all knowledge can be classified in either "tacit knowledge" or “explicit knowledge”. On the one hand, tacit knowledge is cognitive knowledge and is hard to express with language or numbers; for example, beliefs, points of view, technical skills and know-how are all part of tacit knowledge. On the other hand, explicit knowledge is objective and rational knowledge and can be expressed with language or number; texts, equations, specifications and manuals are a few examples.

New knowledge is generated by coming and going between tacit and explicit knowledge. The essence of the knowledge creation theory is the model where the process of knowledge creation goes through 4 different conversion modes including socialization, externalization, combination and internalization. This model is called the “SECI model” (see Figure 1).



Source: Nonaka and Takeuchi (1995)

Figure 1: The SECI Model

Thus, when an organization is considered a source of knowledge creation, the promotion of the knowledge-creation process expressed by the SECI model becomes an important part of the organization’s management. The creation of BA, as the promoting factor of the knowledge-creation process, creates contexts such as time, place, relationship with others and situations for the appearance of knowledge. Leadership, similarly, shows the direction for the value sought by the knowledge-creation process and solves problems and contradictions, which happen through the organizational knowledge-creation process.

BA, defined as “shared context in motion”, is classified into 3 different categories such as “physical BA”, “virtual BA” and “mental BA”. Making the correspondence with the 4 modes of the SECI model, 4 processes are obtained: “originating BA”, “dialoguing BA”, “systemizing BA” and “exercising BA”.

2.2 Framework

Our conceptual framework consists, on the one hand of workplace reformation and on the other hand of the creation and activation of BA. Workplace reformation is further divided into the reformation of the physical environment and the reformation of the virtual environment. It is assumed that first, there is an interaction between the two environments, second, that each environment has an effect on the creation and activation of BA and third, that synergistic and offset effects on the creation and activation of BA exist (see Figure 2).

2.2.1 Physical and Virtual Environment

The framework assumes that the “workplace reformation” influences “the creation and activation of BA”. The workplace reformation efforts are segmented into “physical environment” and “virtual environment”: the former is tangible, mainly represented by the layout of people and objects; the latter is intangible, mainly characterized by the arrangement of information on a computer network.

According to existing research by Toyama and Nonaka (2000), the “elements which activate BA” are: (1) autonomy; (2) creative chaos; (3) minimum effective diversity; (4) redundancy; and (5) love, reliance and commitment. Despite such suggestion, our framework identifies only 2 factors, the physical environment and the virtual environment; however, this makes our framework more readily operational and easier to implement. Furthermore, as we will mention later (see 2.2.3), this framework was rigorously tested with Company X.

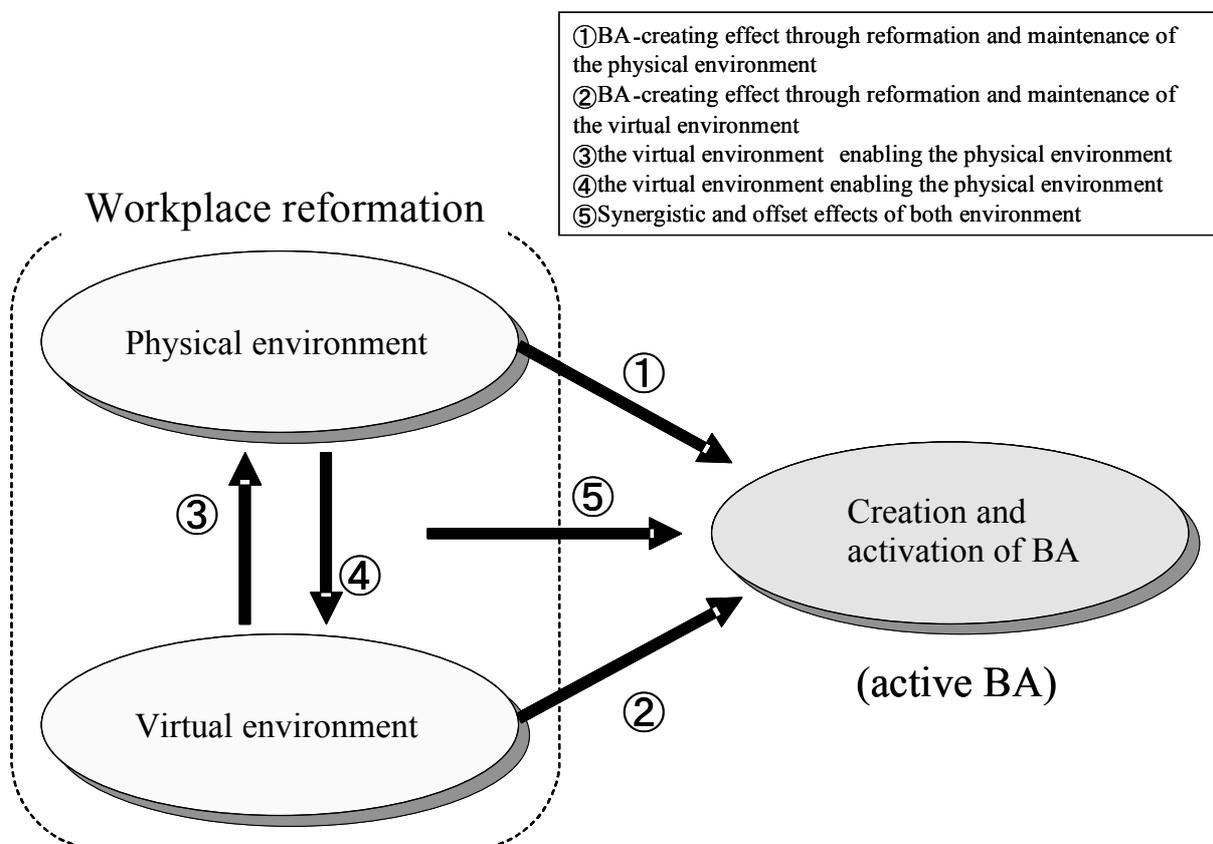


Figure 2: Proposed Framework

2.2.2 Active BA

The knowledge-creation process strengthens the “creation and activation of BA”; in other words, this phenomenon is described as the appearance of “active BA”.

In the same study, Toyama and Nonaka (2000) mentioned that “the conditions of a good BA” were: (1) personal intention; (2) commitment of participant; (3) view point from both inside and outside; (4) direct experience of participant; (5) dialog on the essence; (6) open boundary; (7) knowledge acquisition through experience; (8) mixture of different varieties; and (9) impromptu interaction.

Some of these conditions are found in the case study of Company X (see 3.3). However, in this framework and the subsequently-based questionnaires, we used the following 4 conditions to measure the active BA: (1) direct communication; (2) information sharing; (3) self assessment; and (4) overall BA assessment.

2.2.3 Framework's Development

Today's academic trend recognizing the workplace as a primary factor for knowledge creation, and the workplace reformation practices developed by Mr. Z., have both contributed to the development of this framework.

At one time, managers regarded the workplace as the setting where employees worked recurrently following orders as if working in a factory. Even if the office layout may ease the work of the staff, it is often only considered with the purpose of helping management and supervision. Information systems using computer networks have also significantly changed the workplace. Similarly, these factors are still only evaluated against management and supervision rationales or the efficiency of the information system itself.

But after the nineties, research on office layout and information system as supporting elements, as opposed to controlling elements, has become the main trend in the field. Furthermore, workplace research executed around the same time shows the importance of implementing information systems embedded in the collective activity.

In view of these findings, we have introduced in our framework the physical and virtual environments. At the same time, we are trying to identify the factors creating and activating BA considering the workplace from an integral perspective.

The central figure in this workplace reformation, Mr. Z, was assigned as Director of Sales in Company X in August 2000 (presently Company Y's Executive Director and CIO).

The workplace reformation at Company X stemmed from his experience at Company W where a workplace reformation was previously conducted. In November 1995, Mr. Z, then Deputy of Sales for the Kanto Region, provided each of the 400 Sales Department's staff workers with a laptop computer and instructed them to build a personal homepage on the Intranet. This project was started 1 month prior to the introduction of email usage and 2 months before they could access the Internet.

One month after the homepages of each section were established, the construction of the Sales Department employees' personal homepages started. At the beginning, it mostly contained a self-introduction and a photograph based on the template that was distributed, but gradually, the homepage was improved; links were created between colleagues, and each person tried to make its own design and content. After 3 months, Mr. Z added menus to his homepage: "My Home" presented a self-introduction; "Second House" offered personal expertise, work experience and records of past projects; "Resort House" provided information on personal matters such as interests and hobbies. Furthermore, as the members' IT skills improved, a category called "My Den" including day-to-day work records was added. As a result, the personal homepage was not only used for self-introduction, but also turned into a place to report daily work and share various data and manuals.

When the personal homepage was gradually completed in the spring of 1996, Mr. Z started to take on the task of reforming the office layout. Assigned seating was eliminated and the concept of free-seating was introduced. Nobody had a designated desk, so when an employee arrived in the office, he brought his portable phone and laptop computer from a locker, and

chose an available seat. The central part of the office, where the desks were arranged, was named the “Office Zone”. Furthermore, Mr. Z transformed the managers’ seats previously located near the window, into the “Creative Zone”. This area, cornered off by plants, was converted into a conference space. This increased the meeting place tenfold. Managers and general employees alike were now seated in the free-seating seats. Moreover, a “Concentration Zone” was created, where individuals could concentrate and work on recording new ideas. Also, drinking and smoking corners were provided to relieve stress. Sofas, tables and fish tanks located near copy machines promoted conversation and communication in a relaxed environment.

Company W expanded its workplace reformation and grew from 400 to 1,600 people; in 1999, it won “The 12th Nikkei New Office Prize”. Consequently, Company X, which will be introduced in the next passage, won the same prize in 2002.

3. First Implementation: The Case of Company X

Company X’s workplace reformation started in the summer 2000, when Mr. Z was assigned as executive director. The two main pillars of this workplace reformation were the workplace layout reformation named “mobile office” and the building of their Intranet named “personal homepage”. With the building of the Intranet first undertaken, the digitization of documents was thoroughly performed. With the workplace reformation, they started out eliminating assigned seating, and took various measures to promote interaction and communication.

In the following paragraphs, the case study of this workplace reformation will be introduced using existing literature, Company X’s internal data, records from the interview of Mr. Z, and field notes from observation at Company X’s head office; then, the case study will be analyzed using the framework previously presented.

3.1 Digitization of Documents: The Virtual Environment

First, he started with the digitization of documents directly based on to his experience at Company W. In addition, he focused on increasing the scope of the information shared on the Intranet: when someone was copying documents in large numbers, he asked about its content and sources and said “why don’t you put it on the homepage?”; when someone was talking on the phone for a long time or received calls frequently, he asked its purpose and suggested “isn’t it easier if you put it on the homepage?”. Furthermore, by including the author’s name and update date with the data, people became more responsible for the content and revision of the shared information.

Mr. Z pushed the employees to publish their homepage as soon as possible. He prepared a template where they could easily fill out the blanks; by doing so, even inexperienced workers could quickly publish their homepage, even incomplete, and update it gradually. Since training employees to create a homepage was expensive, he encouraged them to teach each other and learn by themselves.

In order to encourage the further development of the published homepage, he often checked and praised the staff’s work: after looking at some of the homepages, he intentionally sent emails saying “I saw your homepage. Keep up the good work”; the next day, rumors spread that he was actually observing the creation of the homepage. He also actively welcomed journalists and TV reporters and promoted his personal homepage program with visitors. Consequently, employees realized that their efforts in developing their homepage was noticed and acknowledged, not only by Mr. Z., but also by people outside the company. After the

creation of the personal homepage, Mr. Z. didn't just let it go; he believed it was important to keep motivating his people.

3.2 Office Layout Reformation: The Physical Environment

The basic principle of the office layout followed the free-seating system: employees could choose their own seat; when leaving the office, they were required to clean their desk and put their belongings back in the locker; during the first 2 months, Mr. Z. made sure to check everyday that it was properly observed. For everyone to see the whole floor, documents previously piled on desks were stored in lockers located along the walls, bookshelves used as partitions between departments were removed and replaced by short foliage plants. "If you see any vacant seat, just sit there", Mr. Z warned them. Moreover, the removal of wheeled file drawers between desks and the replacement of 240cm-width desks with 210cm ones promoted dialogue, reduced the distance between individuals and enabled workers to look at each other's computer screen when having a conversation.

These desks, previously arranged in a straight line were now positioned diagonally. Since employees' movements became more complicated, they had an opportunity to interact with more people. From the questionnaires collected, the number of people who answered "diagonal is better" versus "previous was better" was 50% 2 weeks after the reformation; but 3 months later, this number increased to 80%; so it was decided to keep the diagonal arrangement.

Near the office space entrance, a place for interaction was created; it also doubled as a meeting area. This interaction space spanned across 4 floors and each was given a name: "Forest of Knowledge"; "Spring of Knowledge"; "Plaza of Knowledge"; and "Harbor of Knowledge". Product samples, demos and art works were exhibited in these spaces, and each member had to take part in the decoration process, using only movable furniture; the foliage plant replacing partitions is one example.

3.3 Changes Resulting From Workplace Reformation

According to Mr. Z, the workplace reformation at Company X resulted not only in workers' improved performance, but also changes in their awareness. These changes, both quantitative and qualitative, are divided into two categories: "intentional changes" and "unintentional changes".

3.3.1 Intentional Changes

(1) Cost reduction: The workplace reformation led to various cost reductions. First, thanks to the free-seating system, the needed number of desks decreased to only 70%. Expenses for chairs and desks were reduced by 30%, as well as the associated office space. Second, through the digitization of documents, the utilization of paper, copy machines and bookshelves sharply decreased by 50%. Third, by making phones and computers wireless, expenses needed to set up phone lines and computer wiring became unnecessary. The whole cost reduction represented between 30 and 40%, Mr. Z said.

(2) Reduction of formal meetings: The layout reformation enabled workers to hold meetings near their desks and exchange information or documents during their daily communication. Since the whole floor was visible, what and where one was doing also became visible. Moreover, before a meeting, one could now visit the personal homepages of meeting participants and get updates on the work in progress. Thus, the frequency of formal meetings decreased, and meeting time also shortened.

(3) Speed up in document writing; increase in number of proposals: Since everyone had access to information from anywhere through the Intranet, meetings became more efficient, and the time needed to write a document shortened. Previously, if some unavailable data was needed during a meeting, the discussion had to be interrupted and postponed. They could now access information in real time during meetings. Moreover, workers could look at each other's computer screen and write a report while working together. Increases in interactions with workers from other departments and companies had a beneficial influence on creating ideas; as a result, the number of idea proposals rapidly rose.

(4) Acceleration in Human Resource Development: The new layout enabled members to share information and skills without difficulty. Highly-skilled people became easier to find and consult for newcomers. As a result, project members' skills improved in a short period of time.

3.3.2. Unintentional Changes (Side-Effects)

(1) Increase in problem awareness: Choosing a seat meant choosing a person to sit next to; everyday, before coming to the office, one had to think of the day's tasks and choose which person to sit with, making individuals proactive and aware of current issues.

(2) Stress reduction: Changing seats enabled employees to change their surroundings if needed. More control gave people a greater sense of responsibility and self-confidence, and prevented stress. Thanks to the transparency of the office layout and the Intranet, workers could now accept the evaluation of their work without feeling discriminated. In addition, a person recently transferred could get information about his new office, job and colleagues through the Intranet beforehand, thus reducing the stress due to the transfer.

(3) Manager's popularity and actions: The free-seating system enabled workers to clearly distinguish which manager was popular to consult with and which one was not. Two types of managers appeared in the case of Company X: one who sits in the middle of a group and one who sits close to windows and looks away from the group. Thus, information networks became visible inside the office.

(4) Other: In addition to unintentional changes, the plants used for partition happened to control the humidity level in the room, so less people caught a cold in winter because of dry air. Another example is the worker who now has a new opportunity to make an appeal.

3.4 Findings from the Case of Company X

The case study of Company X yielded 3 main findings:

(1) The implementation of the workplace reformation at Company X positively influenced the creation of active BA.

(2) The physical and virtual environmental dimensions should be considered separately.

(3) The workplace reformation process should rather be gradually implemented, closely monitoring risks.

4. Second Implementation with Questionnaire Surveys: The Case of Company Y

The workplace reformation was gradually implemented at Company Y over a 7 month-period (from June 2004 to February 2005). The profiles of Company X and Company Y are introduced in Table 1.

	Company X	Company Y
Capital	JPY 950 billions	JPY 31 billions
Number of Employees	5,876 (03/2004)	4,646 (03/2004)
Business	Cellular phone carrier	Information infrastructure construction
Sales	JPY 4,685 billions (03/2000)	JPY 206 billions (03/2004)
Department	Sales Department	IT Department
<i>Office Reformation</i> start	Summer 2000	Summer 2004

Table 1: Overview of Company X and Y

4.1 Outline of Survey

The questionnaire survey started in June 2004, when the IT Department of Company Y had just begun its workplace reformation; the IT Department counted about 70 employees. Table 2 shows the schedule of workplace reformation execution for each physical and virtual dimension.

	Time	Physical reformation	Virtual reformation
	06/2004	<ul style="list-style-type: none"> ▪ Introduction of laptop computers and 4 people-desks (mobile seats) 	
	07/2004	<ul style="list-style-type: none"> ▪ Utilization of unused large computer displays (for personal homepage exposure) 	<ul style="list-style-type: none"> ▪ Creation of personal homepages with pictures and archives in chronological order
First Survey →	08/2004	<ul style="list-style-type: none"> ▪ Introduction of free seating for managers ▪ Another row of fixed seats is changed to free seats. 	<ul style="list-style-type: none"> ▪ Creation of the member's list with pictures on the homepage of each department ▪ Installation of webpage visitor's counter ▪ Installation of a Bulletin Board System
	09-10/2004	<ul style="list-style-type: none"> ▪ Installation additional of laptops ▪ Removal of side cabinets 	<ul style="list-style-type: none"> ▪ Intercommunication of different establishments using web-cameras
Second Survey →	11/2004	<ul style="list-style-type: none"> ▪ Installation of additional large displays 	
	12/2004	<ul style="list-style-type: none"> ▪ About half the seats are now free seating 	
Third Survey →	01/2005	<ul style="list-style-type: none"> ▪ Nameplates on desks ▪ Sharing of stationery (both are self-generated) 	

Table 2: Workplace Reformation Execution Schedule

Data was collected from questionnaire surveys, interviews with people involved in the workplace reformation, and observations made on location. Each questionnaire bore the name of its respondent; surveys were conducted at three different stages of the workplace reformation process, in August 2004, November 2004, and January 2005, with 64, 63, and 61

respondents respectively; the same questionnaire was used in the three occurrences (see Table 3).

People were divided into group A and group B; group A1 was the first one to undergo the reformation, followed by A2 and then A3. At the time of the survey, group B did not undergo the reformation process. The number in parentheses is the size of each sample.

	First Survey 08/2004	Second Survey 11/2004	Third Survey 01/2005
Group A1	○ (2)	○ (3)	○ (3)
Group A2	× (6)	○ (6)	○ (12)
Group A3	× (3)	× (6)	○ (4)
Group B	× (53)	× (48)	× (42)
Total (respondents)	64	63	61

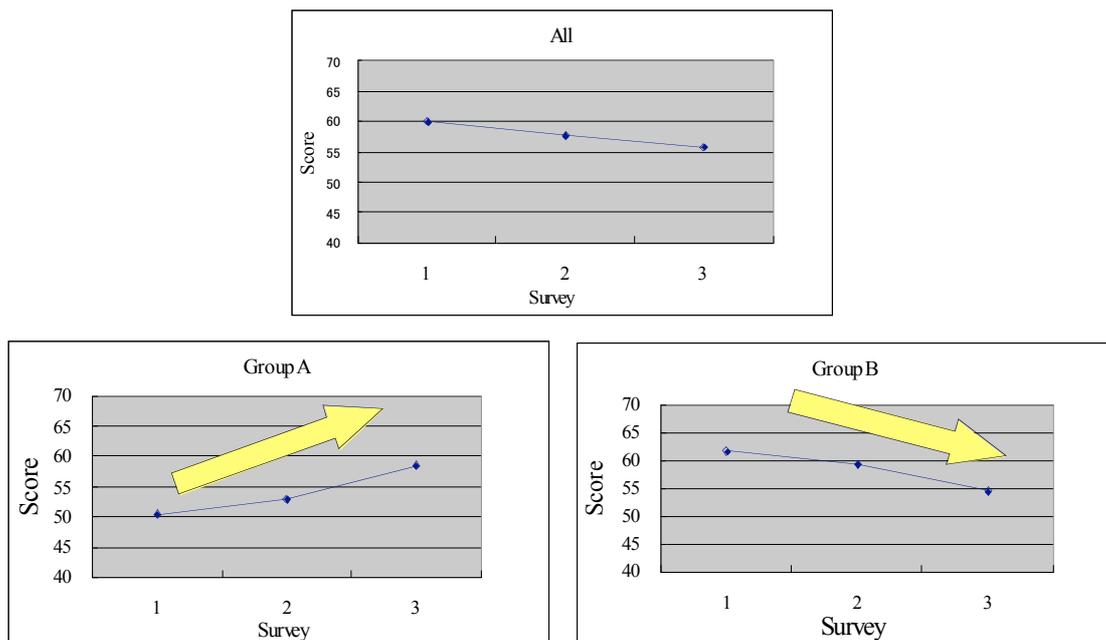
※ physical reformation already done : ○ not yet : ×

Table 3: Sample Distribution

The purpose of the questionnaire survey was to collect data on the “creation and activation of BA.” The questionnaire was named “Questionnaire on Office Environment” and consisted of 4 parts: “Communication”; “Information Acquisition and Sharing”; “Subject and Place of Work”; and “Evaluation of Work”; the questionnaire had 54 questions, out of which 22 significant variables were extracted for statistical analysis.

4.2 Is BA Really Activated?

According to the collected data with Company Y, the workplace reformation positively impacted the satisfaction of those experiencing such reformation, as long as it was undergone under both virtual (Intranet) and physical (free-seating) environments (see Graph 1 and 2).

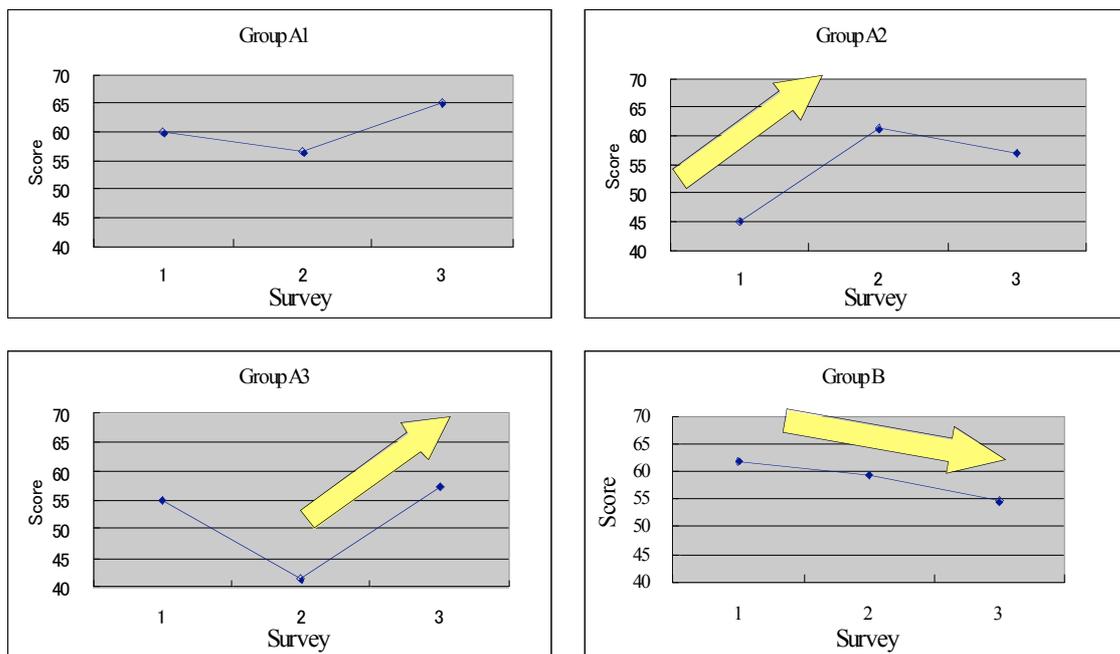


Graph 1: Satisfaction with Workplace Reformation

Group A belongs to the category of people who went through the reformation process, either in the first, second or third wave, while coexisting with other groups (A2, A3 and B, then A3 and B, finally only B) still arranged under the “old” fixed seating system. The graph clearly shows that, as the reformation was gradually implemented, their satisfaction rose.

Group B belongs to the category of people who did not experience the physical reformation, at the time the survey was conducted. As the workplace reformation progressively continued, they only underwent the virtual changes (Intranet) without the associated benefits of the physical changes (free seating). As a result, since more and more people experienced the reformation, group B started to feel a divide in work practices and atmosphere since it was not given the same autonomy. This difference in work rhythm and work style progressively eroded their satisfaction in the new system. Also, they may have felt left out of the whole initiative.

The general graph shows that overall, the level of satisfaction decreased over time. This is easily explained by the 2 previously-explained graphs and the size of the associated samples. Group B always remained a majority compared to group A. At the time of the first survey, there were 11 people in group A and 53 in group B; during the second survey, 15 and 48 respectively; and during the third survey, 19 and 42 respectively.



Graph 2: Satisfaction with Workplace Reformation

Group A1 can be qualified of first movers; after the implementation of the workplace reformation, their satisfaction slightly decreased before subsequently increasing above the original level. This may be explained by the sudden change in their physical work environment or the time needed to adapt to such new conditions; also as first movers, even after the second wave (A1+A2) of reformation, very few seating options (9 people concerned) meant that the perceived value of the physical reformation may have been first difficult to grasp.

Group A2's satisfaction sharply rose after the reformation occurred; however, satisfaction decreased later on; we may hypothesize that in the midst of change, it needed some time to adapt to its new work environment and work style, and as for group A1, its satisfaction level may rise once it becomes settled.

Group A3, similarly to group B, experienced a sharp drop in satisfaction following the workplace reformation of group A1 and A2. This may have been caused by the subsequent gap in work styles coming from 2 coexisting work environments. Its satisfaction level eventually rose after it underwent its own reformation process. Similarly to group B, as the workplace reformation progressively continued, they only underwent the virtual changes (Intranet) without the associated benefits of the physical changes (free seating) (see Figure 3).

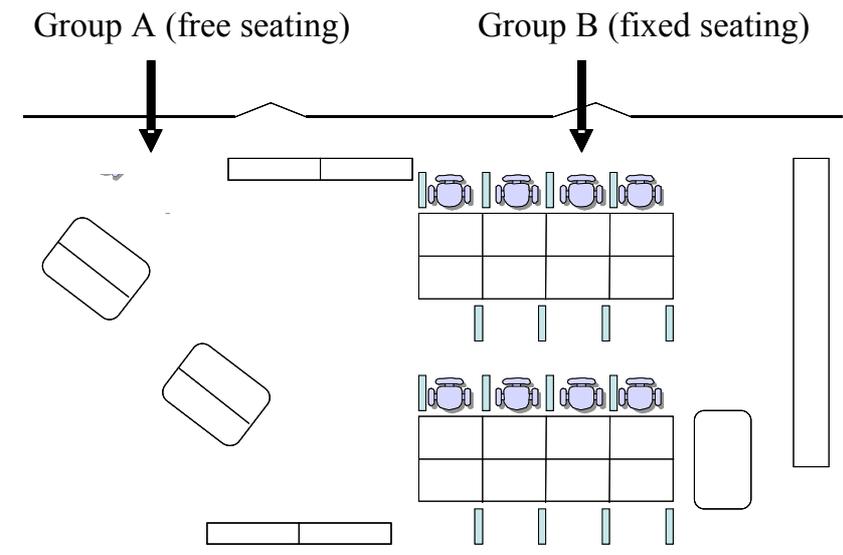


Figure 3: Physical Environmental Changes

4.3 What is the Influence of the Change in Virtual Environment?

From the questionnaires conducted with group B, the significant ($p < .10$) variables from the virtual environment reformation were identified and are presented in Table 4.3. These 16 variables showed that the virtual environment had a direct impact on the creation and activation of BA; out of those 16 significant variables, 9 of them increased over the administration of the 3 surveys, and 7 of them decreased at the same time (see Table 4).

	Question: significant variables for group B	%
1	How many colleagues from the same department do you usually greet in one day?	♂
2	How many colleagues from a different department do you usually greet in one day?	♂
3	How many persons from other companies do you usually greet in one day?	♂
6	How many persons from other companies do you usually speak with in one day?	♂
7	How many times a week do you usually have lunch with your colleagues to have a conversation?	♂
20	How many times did you check personal homepages on the intranet last week?	♂
21	How many people's personal homepages did you check for work on the intranet last week?	♂
22	How many times did you check personal homepages for work on the intranet last week?	♂
28	Do you prepare handouts for each person at meetings?	♂
29	Do you use a PC or a big screen display at meetings?	♂
32	How many times did you have to wait for other people to finish their tasks in order to start your own?	♂
37	Do you try new things even if it may be risky?	♂
39	Do you cooperate with your colleagues, from a holistic perspective, to maximize the benefits of your entire group?	♂
41	Do you always accumulate knowledge by getting knowledge from outside in order to improve your business skills?	♂
43	Are you satisfied with the way you communicate with colleagues from the same department?	♂
49	Are you satisfied with the instructions and directions in your work?	♂

Table 4: Significant Variables for Group B

4.4 What is the Influence of the Change in Physical Environment and Synergistic Effects?

From the questionnaires conducted with group A, the significant variables from both the physical and virtual environments reformation and synergistic effects were identified and are presented in Table 4.4. These 6 variables showed that the changes in both physical and virtual environments had a direct impact on the creation and activation of BA; out of those 6 significant variables, all of them increased during the second and third surveys.

Also, when compared with the variables from Table 4, 4 key significant variables (1; 2; 7; and 28) are identified as the true factors creating and activating BA from the physical environment, the virtual environment and their combined synergistic effects. 3 of these variables are direct factors of direct communication (1; 2; and 7), our first measure of BA presented in 2.2.2, while the last one deals with self-assessment (28), our third measure of BA also presented in 2.2.2 (see Table 5).

	Question: significant variables for group A	%
1	How many colleagues from the same department do you usually greet in one day?	♂
2	How many colleagues from a different department do you usually greet in one day?	♂
7	How many times a week do you usually have lunch with your colleagues to have a conversation?	♂
11	How many colleagues can you speak with to solve even small problems in the same department?	♂
28	Do you prepare handouts for each person at meetings?	♂
53	Are you satisfied with the explanations given about workplace reformation?	♂

Table 5: Significant Variables for Group A

Focusing on direct communication, in the case of group B, variables 1, 2, and 7 decrease over the 3 stages of the survey, while, at the same time, these same variables increase in the case of group A. As a result, these 3 variables prevent the creation of active BA in group B, while they support its creation and activation in group A; they have opposite effects.

5. Conclusion

An effective workplace reformation achieved in the Sales Department at Company X was also successfully implemented in the IT Department of Company Y (creating active BA) and these two examples are both consistent with our proposed framework.

It should be noted that Company X and Company Y belonged to the same group of companies. Both companies tended to be rather bureaucratic; however, they also seemed to be willing to fight this bureaucracy in order to cope with rapid environmental changes.

In both cases, Mr. Z. demonstrated strong leadership. As the performance of Company X was widely known among the group companies, Company Y may be more representative of general organizations; employees may have believed from the beginning that the workplace reformation would succeed, creating the conditions of a self-fulfilling prophecy.

References

- Konnno, N., and Nonaka, I. *Souzo Keiei no Senryaku*, Chikuma Shobou, Tokyo, 2004, p.248.
- Konnno, N., and Nonaka, I. *Tiryoku Keiei*, Nihon Keizai Shimbun-sya, Tokyo, 1995, p.360.
- Nonaka, I., Umemoto, K., and Senoo, D. "From Information Processing to Knowledge Creation," *Technology in Society* (18:2), 1996, pp.203-218.
- Shien Kisoron Kenkyu-kai. *Shien Gaku*, Touhou Shuppan, Tokyo, 2000, p.242.
- Senoo, D. "The New Software Development : Situated Leadership," *Soshiki Kagaku* (35:2), 2001, pp.65-80.
- Toyama, R., and Nonaka, I. "What Is a Good Ba? - The Role of Leadership in Organizational Knowledge Creation," *Hitotsubashi Business Review* (48:1), 2000, pp. 4-17.
- Ueno, N., and Tamaru, E. "Jouhou ecology ni motoduita system no design," *Journal of the Center for Information Studies in Musashi Institute of Technology* (4:3), 2002, pp.2-9.