Study on the storage system in the Japanese workplace

Elokla, Nermin

https://doi.org/10.15017/458904

出版情報：Kyushu University, 2004, 博士（芸術工学）, 課程博士
バージョン：
権利関係：

Part 4 Identify the Problems of the Storage Systems in the Workplace

4-1 Personal Storage System Problems

Part 4 - 1

Personal Storage System Problems

1. Introduction

Storage system in the accounting division's workplace has to be regarded and managed well, as the clerical workers use and need it more than the workers of another divisions (e.g. designers or salespersons) who spend a lot of their work-time with the customers outside a workplace. In the light of previous survey that was carried out inside the accounting and design divisions' workplaces, we found out that the storage systems in the accounting division's workplaces have some obstacles affect on the work performance. In many cases, storage units are full of enormous amounts of documents and therefore the mobile storage unit could not be able to move from one place to another due to its heaviness. Furthermore, this leads sometimes to accumulate the documents and other items in the aisle and on the machines, so that a worker finds difficulties to get what he/she wants. On the other hand, the worker's movement inside the work area might be restricted.

Hence, this study selected the accounting division's workplace to identify and discuss its storage systems' problems which impede the workers' productivity and impact on their comfort during the work-time.

1.1 Purpose

We aim firstly to determine which storage system inside the workplace (whether personal or communal storage system) the majority of workers complain about it. In addition, it obstructs their productivity. Second, we tried to find out its main problems and analyze the reasons that led to their occurrence. Third, solutions were recommended and tested in order to be sure of their suitability to overcome these problems.

1.2 Methods

This study was carried out as follows: first, five accounting division's workplaces of Japanese companies (the same companies we had previously visited in part 3-2) in Tokyo and Fukuoka were visited as a field survey. Observation, hearing and taking pictures were used in order to evaluate the storage systems (e.g. its types, ownership, location, size and capacity), furthermore the filing system (e.g. how the files are organized and managed in the storage units) inside the workplaces.

Second, a questionnaire was distributed among 72 persons (male and female) who work in these workplaces in order to determine the storage system's problems (either personal or communal use) and the reasons that generated them.

Based on the hearing and observation, some answers for each question within a questionnaire were suggested. Workers were requested to select the answer that accords with their complaints. From one to two weeks, we received the workers' answers.

Third, an experiment was conducted with 20 persons at laboratory in Kyushu University in order to test the effectiveness of the recommended solutions.

2. Research findings

2.1 Storage unit's features in the workplace

As it was mentioned in part 3-2 that the storage units in the accounting division's workplaces were classified into two types: storage units within the own workstation and the file cabinets (including low and wall units).

Workstation: it includes desktop surface and a pedestal. It is used individually. A storage space within the workstation is usually devoted for placing the personal file "a file of individual task". Since the retention term of file within an individual workstation is shorter than within the file cabinet, we called it "a placing unit" (Fig. 1).

Low unit: it is usually used for keeping the personal and group working files (a file that is used by group of individuals who have same works). A low unit is usually located among the workstations or in the center of workplace, as its low-height does not obstruct the communication between the workers as well as the visibility inside the workplace (Fig. 2).

Wall unit: it is usually used for keeping the communal files (files that are accessed by all the workers in one division) and sometimes the personal files. It is called wall unit because it is as high as the office walls and it is usually located next to the office walls (Fig. 3).

Low and wall units are used for keeping files which are expected to get to soon. Since the retention term of file within them compared to it within the personal workstation and archives is mid term, we called them "a keeping unit".

Archive: it is for the communal use and its location is usually outside the workplace. Its primary function is to save the files that are infrequently accessed by different people. Since the retention term of file within the archive is long term, we called it "a saving unit" (Fig. 4).

Fig. 1 "Placing Unit"

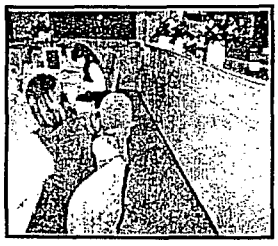


Fig. 2 "Keeping Unit"

Fig. 3

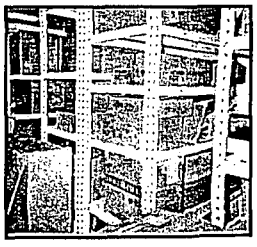


Fig. 4 "Saving Unit"

2.2 Storage unit capacity inside the workplace

As it was mentioned in part 3-1 that the capacity of storage unit to keep A4 paper size "the common size use in the Japanese companies" can be defined in term of file meter unit (Fm), 1000mm= 1Fm [1].

Based on the survey, we tried to estimate the available capacity of the workstation, furthermore the file cabinets:

1- Workstaion has two different sizes of the desktop and pedestal in the visited workplaces:

Desktop "A": its size is width 1200mm x depth 700mm and the available space for placing the files is about 300mm= 0.3Fm (Fig. 5).

Desktop "B": its size is width 1400mm x depth 700mm and the available space for placing the files is about 500mm= 0.5 FM (Fig. 6).

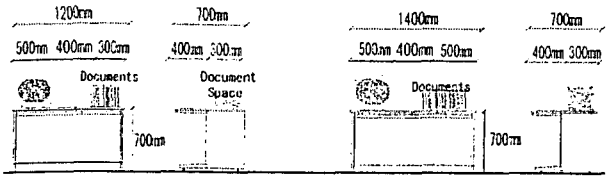
The mentioned capacity was defined according to the size of each desktop. For example, the desktop space is divided as follows: about 500mm is devoted for putting the personal computer (PCs) and about 400mm is to keep the stationery, telephone, etc. The remaining space of desktop could be used for placing the urgent documents.

Pedestal "1" has two drawers for keeping A4 paper size. Each drawer size is width 400mm~393mm x depth 600mm~580mm and its capacity is about 0.5 Fm. The capacity of unit is about 0.5 Fm x 2 shelves = 1 Fm (See part 3-2, p. 50).

Pedestal "2" has three drawers. First drawer is convenient for placing stationery. Second one is proper to place B5 paper size. Third drawer is suitable to place A4 paper size. Its size and capacity is same as one drawer of the pedestal type "1" (See part 3-2, p. 50).

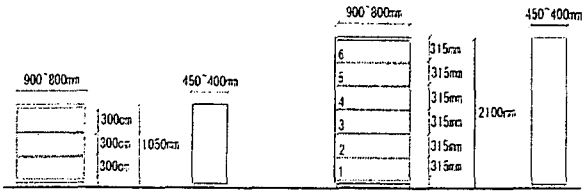
2- Low unit: the common used size are width 900mm~800mm x depth 450mm~400mm x height 1200mm, 1050 and 1040mm. The capacity of one shelf in the case of using width size 900mm is about 0.9 Fm and it is about 0.8Fm in the case of using width size 800mm. The capacity of low unit which includes, e.g. three shelves is about 0.9 Fm x 3 shelves = 2.7Fm or 0.8 Fm x 3 shelves = 2.4 Fm (Fig. 7).

3- Wall unit: its size is width 900mm~800mm x depth 450mm~400mm x height 2100mm. The capacity of one shelf in the case of using width size 900mm is about 0.9 Fm and it is about 0.8Fm in the case of using width size 800mm. In the visited workplaces, usually a wall unit consists of six shelves. The unit capacity in the case of using width 900mm and 800mm is about 0.9 Fm x 6 shelves = 5.4 Fm and about 0.8Fm x 6 shelves = 4.8 Fm respectively (Fig. 8).



Elevation Side View Elevation Side View

Fig. 5 Desktop Type A Fig. 6 Desktop Type B



Elevation Side View Elevation Side View

Fig. 7 Low Unit Fig. 8 Wall Unit

2.3 File classification and its home

Personal files were classified into three groups based on frequency of use:

First group is "alive file"- an immediate file which a worker is currently working on. In many cases, it is placed on the desktop.

Second group is "expected files"- the files which a worker plans to use them during this year. These files include both of new projects that a person does not work on them yet and the old projects that are already finished but the possibility to reuse them during this year is about 30%. Expected files are kept within a workstation and sometimes within the file cabinets. Their homes within the workstation space rely on the personal style of desk space organization (See personal style definition, p. 72). The retention term of file whether alive or expected file within a desk is usually ranging from four to six months. The retention term of the expected files within the file cabinets is usually ranging from six months to one and a half year.

Third group is "archival files"- the files that are used seldom. In other words, the possibility of using them during this year is less than 5%. These files are usually saved in the archive zone. The retention term of file within the archive is usually ranging from five to ten years.

3. Results of survey

The following questions were distributed among 72 persons "male and female" who work in the accounting division's workplaces of these companies to recognize which storage system inside the workplace they complain of whether the workstation or the file cabinet. About 62 persons answered the questions.

Actually, we concentrated firstly on determining the unit which has a majority of complaints, then we focused on its primary problems and the reasons that led to their occurrence.

Q1: Which storage system do you complain about it inside the workplace? (Fig. 9)
1- 63% of workers complained about the personal storage system within the workstation.
2- 37% of workers complained about the communal storage system regarding the file cabinets.

As the majority of complaints relate to the personal storage system, this chapter focused on defining its primary problems.

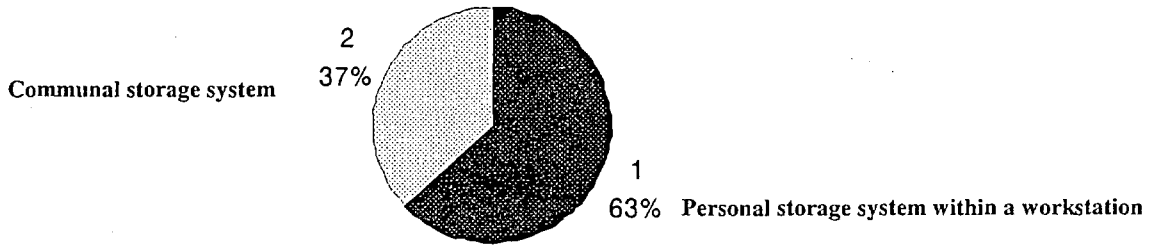


Fig. 9 Storage Systems' Complaints

Q2: What is the main problem of your personal storage system? (Fig. 10)
1- 38% of workers answered that there is not enough space available on the desktop for working because files are piled up on it.
2- 26% of workers could not find and access the files which they need easily.
3-16% of workers answered that the files are stacked under the desk, so they could not sit well.
4- 12% of workers remarked that there is not secure place on the desktop for keeping the important and confidential files.
5- 5% of workers selected "other".
6- 3% of workers answered that the quality of their desks' drawers is poor.

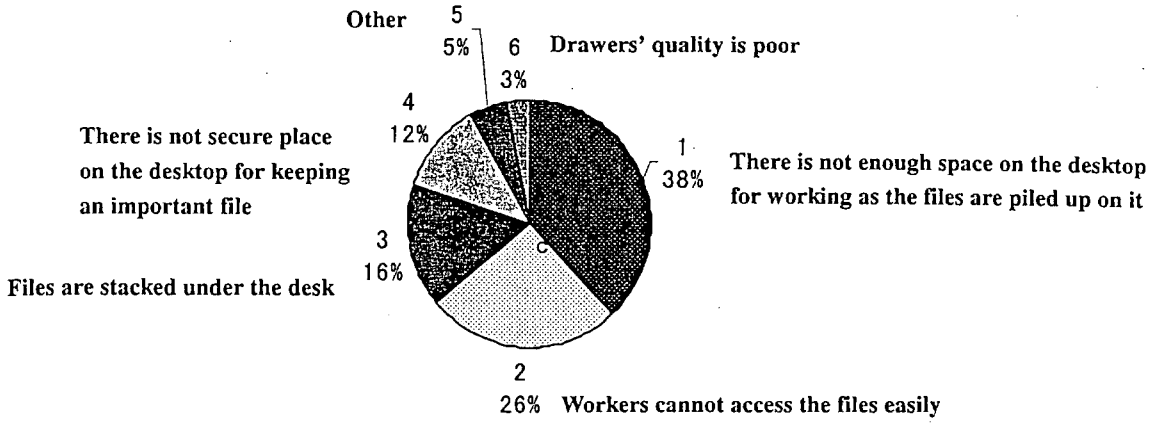


Fig. 10 Desk's Problems

Since we observed that the primary work surface was largely devoted to storing enormous quantities of papers, such as alive, expected files and daily references rather than a cleared area which needs to perform tasks, like reading and writing. On the other hand, some workers feel uncomfortable during the work-time, as the old projects are stacked under their desk and therefore there is not enough space for sitting well (Fig. 11). Furthermore, the questionnaire detected that both these problems and the problem of file accessibility have high percentage of complaints.

Hence, first, second and third problems of workstation are selected to determine the reasons that generate their happening.

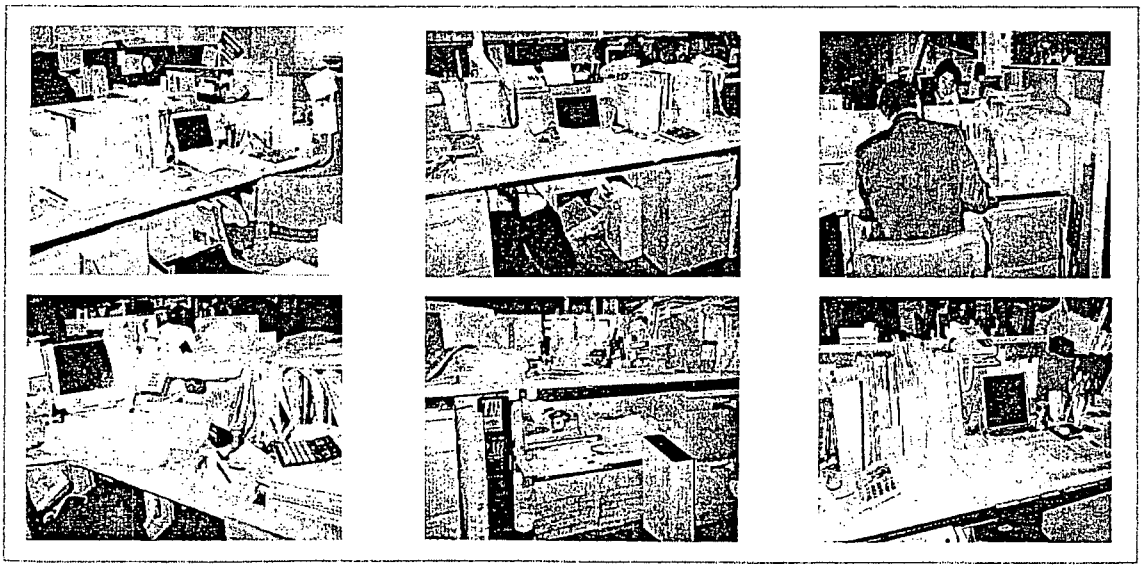


Fig. 11 Desk Space Organization

Q3: What is the reason that led to piling up the files on your desktop?
According to the survey, we identified that the files are piled up on the desktop because of the following reasons (Fig. 12):

1- 29% of workers answered that the filing management is not adequate.
2- 23% of workers selected "personal style".
3- 21% of workers answered that the capacity of personal storage within a workstation is inefficient.
4- 19% of workers answered that there is not enough time for organizing and maintaining the files within the workstation regularly.
5- 8% of workers complained that the file cabinets' location within the workplace is not convenient for the location of their workstations.

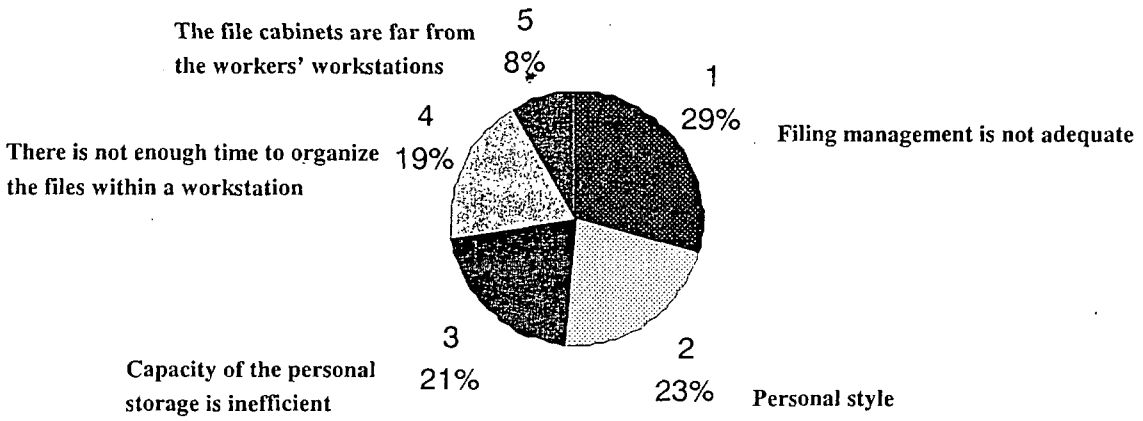


Fig. 12 Reasons of the Desktop's Problems

As for the second problem of finding difficulty to access the files, we found out that it is because the files are not organized and displayed well within the desk space.

Concerning the third problem of stacking the documents under the desk, the majority of workers who complain about this problem agree that the disadvantages of filing management are the main reason of its occurrence.

4. Discussions

The problems of personal storage system were divided into two parts:
First part includes two problems which refer to the storage capacity and the files' distribution within the workstation space. Second part concerns how the files are displayed on the desktop and within a pedestal.

On the other hand, the reasons that generated the previous problems were classified into three groups based on their subject: group A is "furniture category". It includes the personal storage unit capacity and the location of the file cabinets inside a workplace.

Group B is "workers' category". It includes the personal style and worker's time.

Group C is "filing system category". It includes the filing management concerning the file cycle and information recording, in addition to the files organization (Fig. 13).

The following points are the analysis and explanation of each mentioned reason.

4.1 Capacity of the personal storage space is inefficient

Since technology becomes cheaper and more powerful than before and the work speeds up, therefore the proliferation of information becomes easier and faster.

Workers need to keep greater quantities of information within their own work area but sometimes information increases more than the available personal storage space.

Based on the survey, some companies provide individuals with sufficient personal storage space by allowing them to use for example, one drawer of the communal file cabinet beside the pedestal. Another workers are provided with a pedestal which includes two drawers for placing A4 paper size. Hence, the file meter for one person is ranging from 1.9 Fm to 1 Fm within the own work area (Fig. 14). But usually the available personal storage space for placing A4 paper size is one drawer within a pedestal (0.5 Fm) and therefore workers are forced to distribute their documents through the workstation space (including desktop, pedestal and under the desk as well). In this study, we attempted to determine the actual status of the quantities of files that are usually placed in the personal workstation.

According to the measurements (by using a tapeline) that were carried out on 20 workstations (a pedestal of each workstation has one drawer for placing A4 paper size) in the visited workplaces, we detected that the average Fm of one workstation is about 1.1Fm as follows (Table 1):

- File meter of the desktop size width 1200mm x depth 700mm is about 0.3Fm.
- File meter of the pedestal size width 400 mm x depth 580 mm is about 0.5Fm.
- The average Fm under the desk is about 0.3Fm.

Available Personal Storage Unit		Average Fm
Pedestal	One Drawer (A4 paper size) Two Drawers (A4 paper size)	0.5 Fm 1 Fm
In some cases +		
File Cabinet	One Drawer	0.8 Fm ~ 0.9 Fm

Fig. 14 Allowed Fm for Keeping the Personal Documents

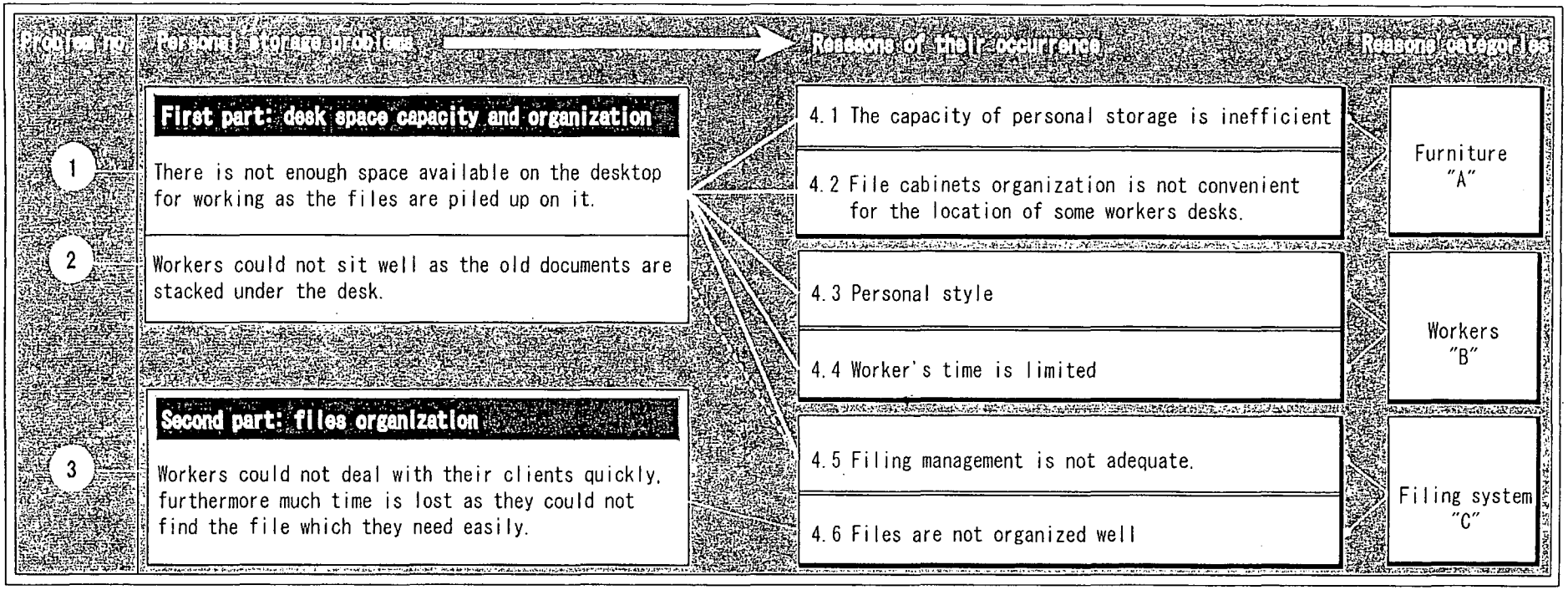


Fig. 13 Personal Storage System Problems and Their Reasons

Table 1 Average Fm of 20Workstations in the Accounting Division's Workplaces

Workers no.	Desktop Space W1200xD700	Pedestal W400xD600xH610mm	Space under the desk W800mm
1	210mm	500mm	500mm
2	250mm	500mm	300mm
3	320mm	500mm	300mm
4	350mm	400mm	100mm
5	270mm	500mm	000mm
6	300mm	500mm	400mm
7	350mm	500mm	600mm
8	320mm	500mm	500mm
9	400mm	300mm	000mm
10	210mm	500mm	200mm
11	300mm	500mm	600mm
12	230mm	500mm	300mm
13	260mm	500mm	400mm
14	500mm	500mm	300mm
15	290mm	400mm	000mm
16	250mm	500mm	100mm
17	400mm	500mm	000mm
18	210mm	500mm	400mm
19	150mm	500mm	500mm
20	500mm	300mm	200mm
Total	6070mm	9400mm	5700mm
Average	303.5mm	470mm	285mm
FM	0.3 FM	0.47 FM	0.29 FM

Actually, we agree that the personal storage capacity is somewhat limited and not enough for keeping all the workers' documents. But this problem might be happened when the workers do not use their storage rightly. They lose much of its space, for example, by using inconvenient file tools or by using unorganized way to place the documents inside the storage unit.

As it is shown in fig. 15, a worker uses a file box on the desktop however he/she keeps small quantities of information. This leads to shrink somewhat the desktop space which is needed for working.

Another sight was observed that a worker arranges the files without using dividers, so that the diagonal status of files occupies large space of the storage unit (Fig. 16).

Basically, as the office space standard continue to decrease in response to real estate costs and a tight economy – and as the proliferation of technological hardware takes up a greater percentage of the desk space available [2]. Therefore, office workers must use the own storage space more efficiently than ever before.

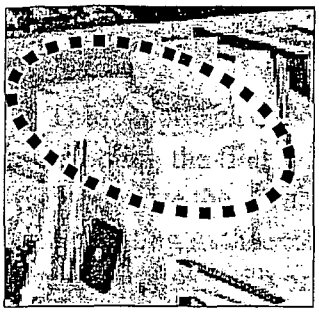


Fig. 15 Unsuitable File Tools

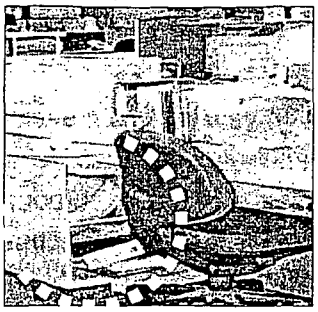


Fig. 16 Files' Organization

4.2 File cabinets' locations are not convenient for the workers

Inside the workplaces, we observed in some cases that the file cabinets' location is far from the worker's workstation. They are not facile to reach and therefore a worker is forced to keep the expected files within the own work area for easy access.

4.3 Personal style

The survey revealed that there are three approaches of distributing the documents within the space of the workstation (Fig. 17):

First approach depends on keeping alive and expected files visible – arranging them in plain view throughout the desktop space. When the desktop is overloaded, a worker keeps the remaining files in the pedestal. Workers use this pattern to recall them what are in these folders, furthermore for helping them to keep track of what works they should do. As it was mentioned in part 3-1 (p. 33) that there are two types of the file arrangement inside the drawer storage unit, front to back and side - to - side.

We classified people who apply the previous approach into two types based on their way of arranging the files, liner and piler.

Liner: worker who arranges line of folders- place one beside another "horizontal arrangement". Some of liners set up filing system which helps them to find the files easily (Fig. 18).

Piler: worker who arranges pile of folders- place one upon another "vertical arrangement" (Fig. 19). Usually, piler does not use any filing system in which guides him/her to find the files quickly.

Second approach depends on keeping the paper out of sight "hidden". Workers who use this approach are also called liner as they arrange their files horizontally. But they prefer to place the files within the storage units "pedestal" (Fig. 20).

For example, a worker places the current work "alive file" only on the desktop. On the other hand, he/she puts the documents that are not working on within the drawers.

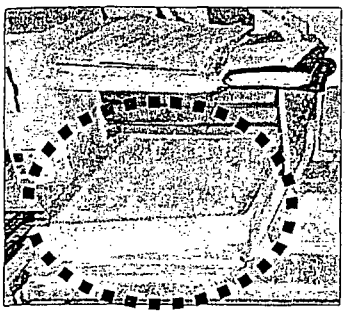


Fig. 19 Piler

Fig. 20 Liner "a pedestal user"

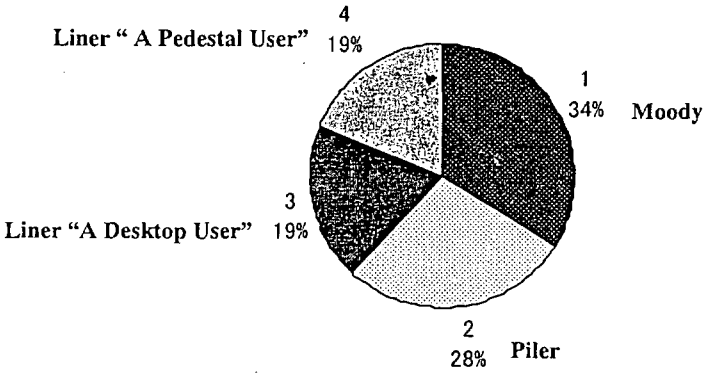


Fig. 21 How Japanese Workers Described Themselves

4.4 Workers have not enough time to organize the documents regularly

Some workers organize their documents within the workstation weekly and others monthly. Today, as the office work is going faster, workers have more responsibility, more tasks to do in less time. They work on several projects, doing variety of functions while working solo or in groups. This multi-tasking may be created a mess, they have more information to process and less time to file or otherwise organize it regularly.

4.5 Filing management is not adequate

According to the survey, we found out that the information is usually passed by four stages before the workers toss it as follows (Fig. 22):

- First stage of the file cycle is "Occur":

Information took place within a workplace.

- Second stage is "Process":

Useless information that is obtained, e.g. from the Internet articles, e-mail notes, etc. is usually disposed of.

Concerning the needed information, a worker records it whether on the paper media or in the digital media. The selection of storage media is according to the status of information. By the end of last decade, 92% of the information was kept on paper, 3% on microfilm and 5% in digital form [3].

In the today's workplace, the digital storage is used for recording information which does not have seals, stamps, etc. Concerning the paper storage, it is required for saving the original documents, such as invoices, contracts, confidential data, etc.

According to the survey, we found that the common retention period of document (by using paper storage) in a workstation space is ranging from four to six months.

- Third stage is "Keep":

In this stage, a document that was placed within a workstation space is transferred to a file cabinet in order to keep it for next use. The common retention period of document within a file cabinet is ranging from six months to one and a half year (in some cases are two years).

- Forth stage is "Save":

Next, the needed documents for using in the future are transferred from the workplace to the archive in order to save them there from five to ten years. Then they are tossed.

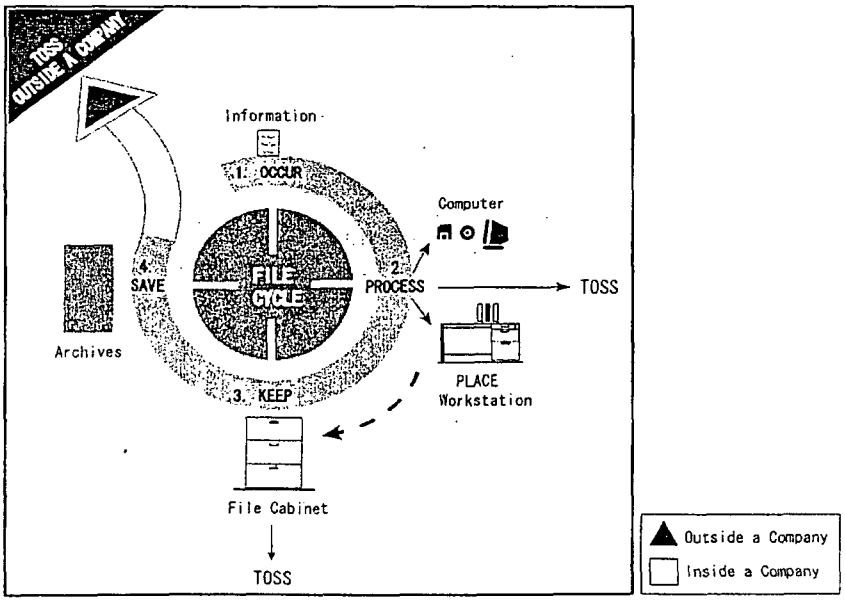


Fig. 22 Files' Management Cycle

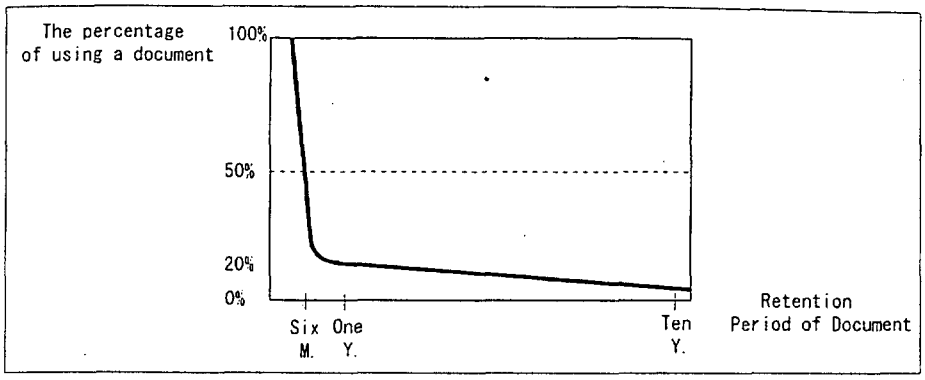


Fig. 23 Retention Period of File Inside the Storage Units (Uchida Yoko-1998) [4]

According to the workers' answers (See a question no.5, p.155), we detected that the negative points of filing management which lead to proliferate the papers over than the available storage space and therefore the workers stacked them under the desk or on the desktop are: first, about 40% of workers answered that the retention period of file inside a storage unit is long. Many files are kept inside the storage units for a long time however they are used infrequently. Actually, the results of other studies concerning the filing management revealed that the frequency of using a document is about 100% in the first month. After six months, it is about 50% and after one year the need to use this document is usually decreased to become about 20%. After ten years, a document is not usually needed at all (Fig. 23)[4, 5]. Second, about 20% of workers answered that the electronic storage is not often used. Regarding the third point, 17% of workers answered that sometime an original file has many copies "duplicated files" are kept within the workers' desks. On the other hand, about 23% of workers did not mention their opinion and they selected "other" (Fig. 24).

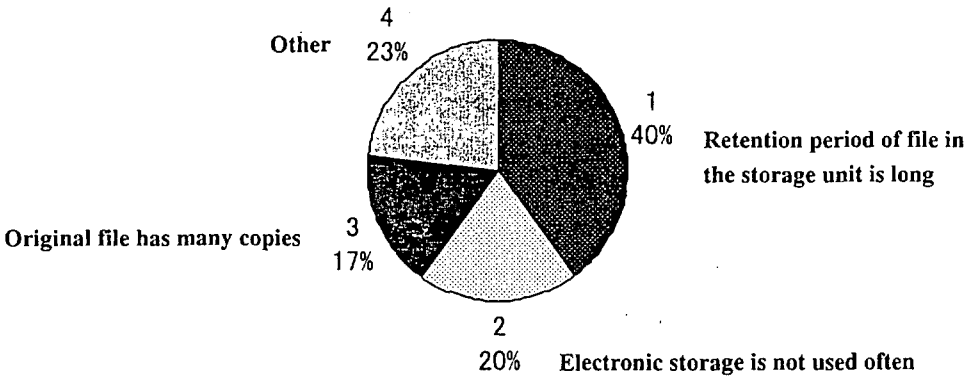


Fig. 24 The Disadvantages of Filing Management

4.6 Files are not organized and displayed well

Based on the survey, we detected that there are some faults concerning file organization within a workstation might obstruct the workers to pick up the file easily.

Q.6 What is the reason that makes you finding a difficulty to get a file? (Fig. 25)

1. 32% of workers answered that they do not use code and label systems, as they rely on their memory to find the files.
2. 23% of workers answered that they arrange the files within the workstation as a pile.
3. 18% of workers answered that some files have similar titles.
4. 27% of workers selected "other".

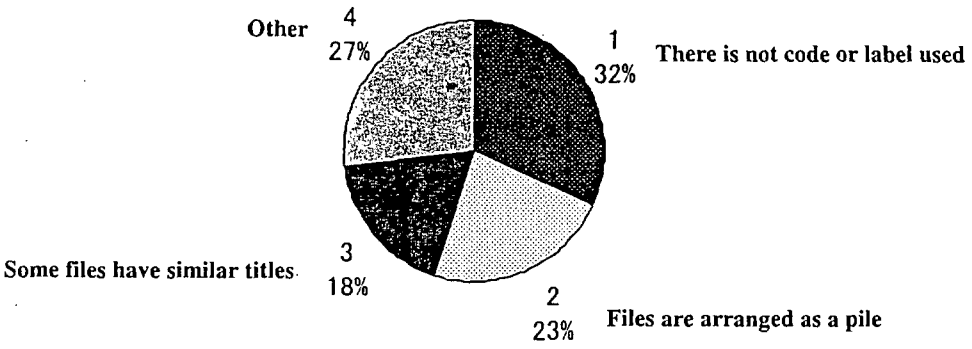


Fig. 25 File Organization Within the Personal Storage Space

Actually, workers who find difficulties to access the files usually do not set up a certain filing system, e.g. coding and labeling system or classifying their files to find them easily (Fig. 26). Those workers have no track in which guides them to the location of the required document. They rely on their memory to remember where information is.

The results of a questionnaire (See a question no.7, p.156) revealed that about 49% of workers rely on their memory, and 27% of them set up a filing system. In addition, about 24% of workers answered that they apply the filing system with the essential documents. Concerning the other documents, they rely on their memory to find them (Fig. 27). In fact, mapping works well in two states: first, if a worker is the only one who needs to get the information, and his/her mental map reaches him/her to the information he/she needs. Second, when the amounts of folders within the storage space are limited. But mapping has its limitation because it is hidden. Today, the great quantities of paper challenge people's ability to remember where everything is without a visual sign. Furthermore, if other persons need to access information from that desk when its owner absents, how do they know the place of the required information?

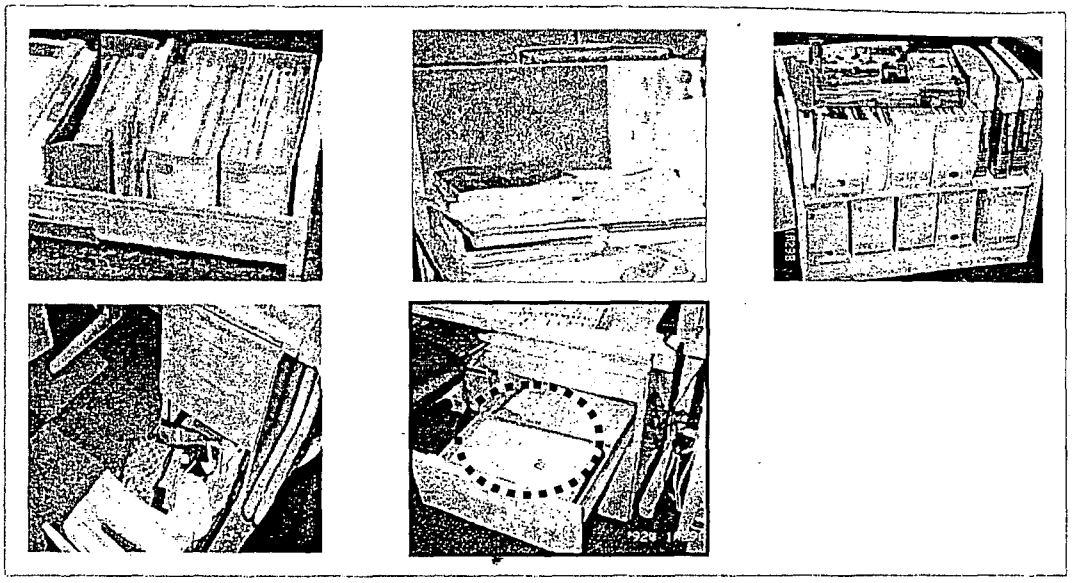


Fig. 26 There Is Not a Visual Key for Helping a Worker To Access the Files Easily

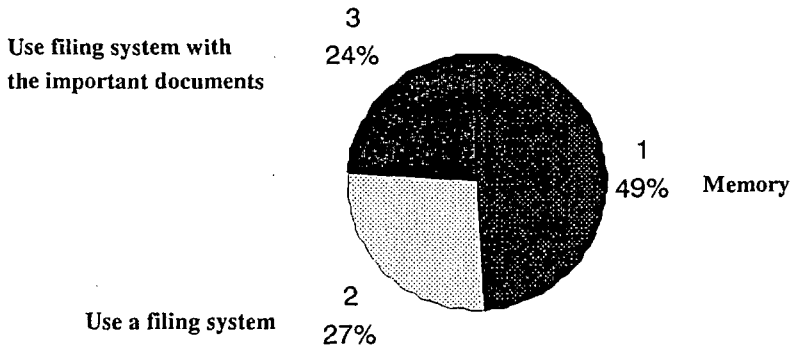


Fig. 27 The Used Way for Finding the Documents

On the other hand, we observed other faults concerning the files' display within a workstation. For example, some workers use neither a visual sign nor an adequate file tools and therefore they lose a lot of time to access what they need.

Based on the survey, we sorted the ways of storing papers in the file tools into eight types. In the visited workplaces, numbers three and six of these categories are the common types used to save the papers within a desk space (Fig. 28). The pervious common types obstruct a person to know the papers' contents when a visual sign is not used, as the files' contents are hidden by the tools' cover.

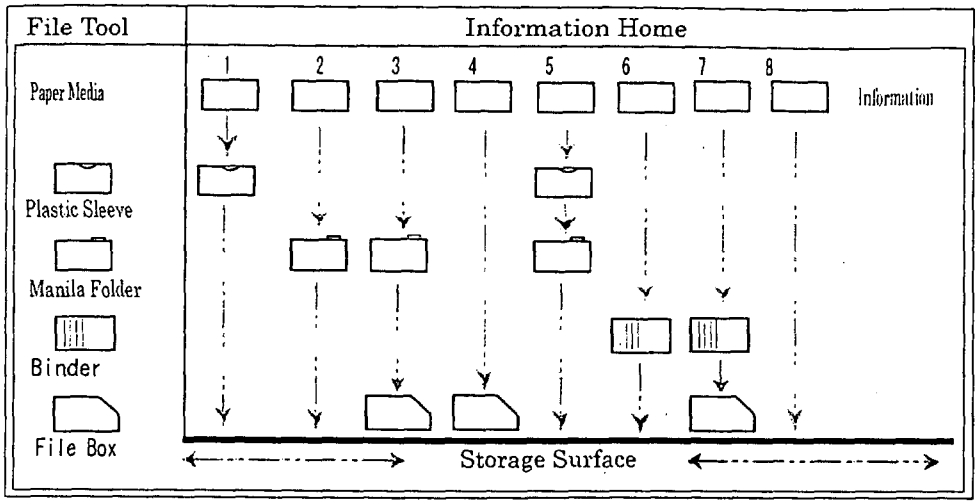


Fig. 28 How the workers Save the Papers By the File Tools

Another example, the file ordering within the pedestal does not enable a person to see simply the folder's title. As it was mentioned before in part 3-1 that there are two ways of folder arrangement within a storage unit, front to back and side - to - side.

We observed that the former arrangement way is used more than the latter way. Although front to back way is not adequate, as a person needs to turn his/her body in order to see the folder's tab.

In the light of the previous analysis of each reason that causes the personal storage problems within the visited workplaces, this study recommends several tips and solutions to overcome each problem.

5. Recommended steps for reorganizing the storage space within the workstation

Clutter is emotionally draining. It makes the amount of work you have to do appear greater than it actually is [6]. When a worker cannot access what he/she needs easily, productivity is severely reduced [7].

To overcome the personal storage problems, we recommend reorganizing the desk space and its documents. Workers need the opportunity to learn strategies for organizing their work to save their time of retrieval documents and to be comfortable during the work-time. Therefore, four steps are suggested for helping a worker to overcome the personal storage system's problems (Fig. 29):

Step - 1

Reduce as much as of clutter which delays the work and causes stress. Actually, a desktop is supposed to be a work space- not a display or storage space. Papers can be at a minimum within the desk space by conforming the following:

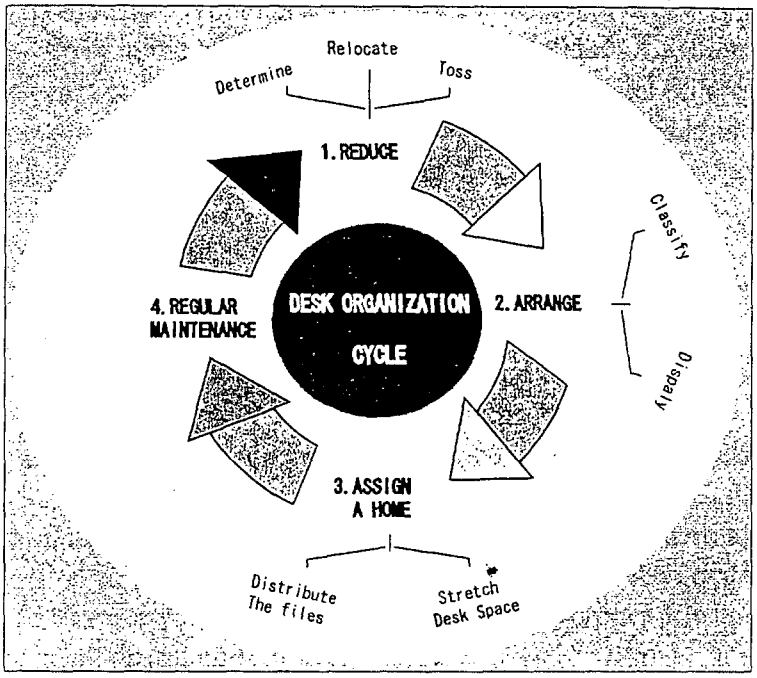


Fig. 29 The Cycle of Desk Organization

a. Determine which information is necessary to be placed within a desk based on frequency of use, moreover its importance and relevance to the work. A worker needs to reduce the retention period of file within the personal storage unit as much as possible in order to keep sufficient space for the new documents when they come in [8]. On the other hand, a worker has to determine the adequate storage media to save his/her information, whether on the paper media or in digital one. In order to reduce the papers amount that is placed within the desk space, try to use the digital storage as much as possible.

Computer storage will never take up as much space as all the paper we keep. The actual cost of storage space for paper is huge compared with digital storage. To store two million paper documents, an organization can expect to spend between $40,000 and $60,000 on filing cabinets alone. This does not include the cost of floor space for the cabinets. This many paper documents can fit on fewer than ten CD-ROMs. An optical disc storage "jukebox" for CDs is less than the size a small refrigerator and can replace about six hundred four-drawer filing cabinets. In addition, electronic documents don't require physical delivery: they can be transmitted rather than carried. With electronic documents a worker can easily edit, rearrange, reformat, or replicate a document. Furthermore, he/she can do all this to a document at the same time someone else can [9].

b. Relocate the papers that are used infrequently, shared files from the desk space and keep them in the file cabinets (inside a workplace- if they are expected to be used during this year) or in the archive. A little known fact is that 95% of papers have been saved for over one year is usually trash. The exception to this rule is tax papers, legal documents, and anything you are required by law to keep [8].

c. Toss the needless papers [10].

Step - 2

Arrange the papers for better display and retrieval as follows:

a. Classify the documents into groups based on their subject "place like subjects together" [8], e.g. financial group, marketing group, administrative group, etc.

b. Display the documents of each group clearly. There are some tips, we recommend a worker to follow them, so that he/she can access the documents easily.

- Select the file tools: the selection of the proper file tools is based on an available space and the quantity of papers.

Based on the survey, we found that the common use types of the file tools in the Japanese companies for keeping documents are: a binder, folder and a file box. After the documents have been sorted into groups, use the convenient tools which enable a worker to see the documents' titles obviously. A binder and file box are suitable as they have big size label. On the other hand, information that is needed to be always visible, plastic sleeve is a recommended file tool to save it.

- Apply the filing system with each file tools: coding system can be used effectively to assist in identification [8, 10]. For example, use different materials of files "e.g. plastic sleeve, paper folder" or different design of file tools in order to distinguish between several groups. Another idea, use a cue "e.g. red clips for a confidential file" or tab coding- a worker can alter tab position to communicate important information to himself, e.g. normal information is in folder with a right tab, confidential information is in folder with a left tab. Also, he/she can select for the confidential, urgent, or important files a certain color tab, as for another files they use another colors. Actually color tabs work well and extremely useful, in order to mark each group of folders [11].

Concerning the labeling system, it is required to write a simple and clear title on the tab for easy searching [10]. The title of file has to be selected carefully in order to avoid a confusion that might be happened by using similar titles. Furthermore, bold and black lettering on the white labels are adequate for clearest reading [11].

Overall, the previous systems are necessary and effective to display the documents within the workstation space clearly.

● Consider the arrangement types of documents: basically, we strongly recommended a worker to ignore the using of vertical arrangement of documents. Piles impede a person to get the required document easily [10].

Concerning the horizontal arrangement, files should be turned to face a person, so that their tabs can be seen easily [6]. In the pedestal and on the desktop, we recommend side - to - side arrangement type of file in order to display the files' tabs clearly.

As the depth of pedestal does not allow for placing five file boxes from side - to - side, therefore we suggested to place the frequently/moderate used files in the front of the drawer, then the infrequently used files are placed from front to back (Fig. 30).

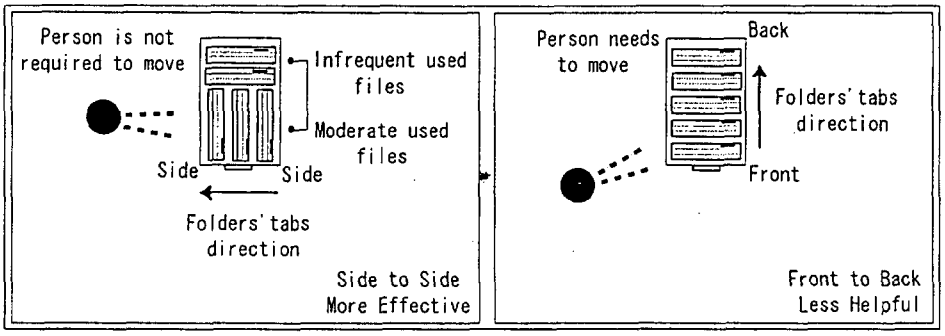


Fig . 30 File Arrangement in a Pedestal

On the other hand, use a divider to separate the several groups of folders, so that a worker can recognize the needed file quickly [10].

Step - 3

Assign a proper home for each document within the workstation space.

a. Stretch the personal storage space in order to be adapted with the quantity of information. There are many effective options for increasing and saving the storage space within the workstation.

● Go vertically: a vertical unit upon the desktop works well for increasing the personal storage space, such as using a shelf (Fig. 31), overhead bin (Fig. 32)[12], diagonal tray (Fig. 33), vertical tray (Fig. 34), file holder [13] (Fig. 35), file stand or vertical bin on the desktop.

● Regard a divider: in order to save the storage space, a divider is important. It holds folders and binders from falling over [6]. This study found that the space that is occupied by keeping a binder vertically (e.g. its thickness is 15mm) within a storage unit is about 15mm. But when the same binder is kept diagonally (without using a divider) - the space will be about 40mm. This means that a divider saves about 63% of the storage space.

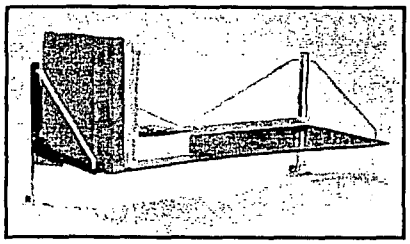


Fig. 31 A Shelf

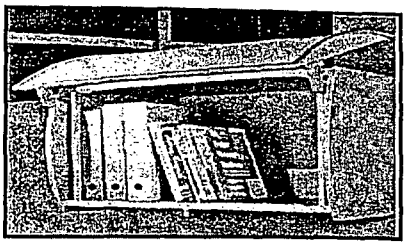


Fig. 32 An Overhead Bin

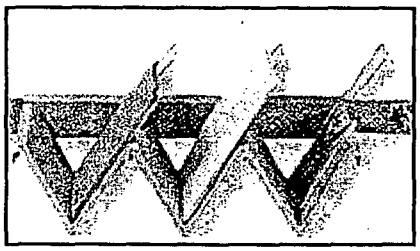


Fig. 33 A Diagonal Tray

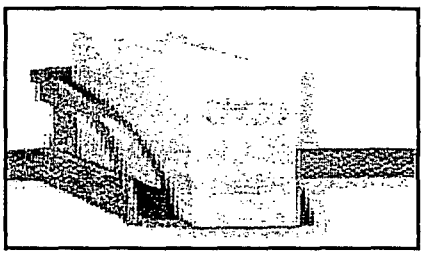


Fig. 34 A Vertical Tray

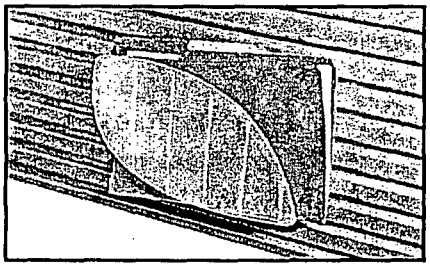


Fig. 35 A File Holder

- Consider the file tools' thickness: file tools have great effect on saving the storage space. We recommend a pedestal, overhead bin and a shelf for placing the file box, big size binder and other bulky items. Since the desktop space is limited, it is convenient to place a small binder, a folder or a plastic sleeve -if it is needed.

b. Distribute the files within a desk. Frequency of use is the key to their locations, the more you use it- the closer it should be to you [6]. Think about what you need to be kept visible and what can be put away, out of sight. In the light of this point, it is convenient to devote the desktop space for placing the files that you are currently working on [8].

Place the new projects and daily references which require easy accessibility and visibility within the pervious additional vertical surfaces which they are located upon the desktop - in front of a person.

On the other hand, devote a pedestal for placing the old projects. As the desk drawers' numbers are limited, a worker could put many categories in a single drawer.

The distribution of files within a drawer relies on frequency of use. In order to access the frequently used file easily, place it in the front of drawer [6]. When the amounts of projects are more than the desk drawers' capacity, keep them within the file cabinet which is better to be close to the workstation. Eliminating excessive movement makes workers more productive and comfortable [14]. We recommend that a worker keeps the floor clear to prevent tripping. In other words, do not overload electrical outlets.

Step - 4

Finally, regular maintenance is important for keeping organized system works well. We recommend that a worker devotes from five to ten minutes for cleaning up his/her desk at the end of each workday. Daily maintenance is better for saving his/her time and effort than weekly or monthly purification.

In order to be sure that the recommended tips concerning how to arrange the files and assign a home for each paper are effective for saving the workers' time and effort, we carried out the following experiment.

6. Recommended steps' tests

6.1 Purpose of experiment

We aimed to prove that the organization of files within an individual workstation has great influence on the person's comfort during the work-time as well as the time of file accessibility.

This experiment focused on two critical points: first one is the importance of arranging and displaying the files within a workstation clearly in order to find them quickly. Second point is concerning how to distribute the files well within a workstation in order to be handy reach. We regarded the case of having big amount of information with limited storage space to place it. For example, when a pedestal includes only one drawer for placing A4 paper size.

6.2 Methods of experiment

The following experiment was conducted with 20 persons (Table 2) (15 men and five women - their ages ranging from 23 to 40 years old) at a laboratory in Kyushu University. Those persons were asked to access the files from two workstations (each workstation consisted of desk and a separated pedestal).

The size of each desk unit and pedestal are width 1200mm x depth 700mm x height 700mm, and width 400mm x depth 600mm x height 610mm respectively. Files' organization within the first workstation accorded somewhat with the current situation which is used by many workers (concerning filing display and distribution). But second workstation accorded with the recommended situation of files' organization. In the second workstation, a person is provided with a pedestal and, e.g. a vertical unit to stretch its storage space. The selection of an added storage unit to the second workstation is determined according to the persons' evaluations of three suggested units, e.g. low- height, high- height shelves and wagon.

Since the average Fm of one personal workstation is about 1.1 Fm (Table 1). As the size of file box is width 310mm x height 260mm x thickness 102mm. Therefore, about 12 file boxes were placed within each tested workstation.

Next, we classified the tested files into two groups based on their subject, such as groups A (e.g. financial group) and B (e.g. design group). Each group included two topics. The folders of group A were kept in five file boxes (e.g. three file boxes of invoices and two boxes of assessments). Regarding the folders of group B, they were kept in the remaining six file boxes (e.g. three boxes of interior folders and other three of public folders).

6.3 Results of experiment

In the beginning, three storage units were evaluated by asking 20 persons to use them. The intention was to select the most convenient one to be used through the second workstation (Table 2).

The tested storage units were: low- height, high- height shelves (their heights from the desktop are 200mm and 500 mm respectively) and a wagon as well.

However the convenient height for the Japanese human size to access the document from a shelf is 500mm from the desktop (Fig. 36) [15, 16]. The persons' evaluations revealed that low- height shelf (its size is width 700mm x depth 200mm x height 200 mm) is the most convenient storage unit to access the folders quickly, as its height and location upon the desktop enable a person to reach to the file box and see its contents easily. Their evaluations' results are as follows: about 75% of persons selected a low-height shelf firstly, about 45% of them selected a pedestal secondly and about 70% of them selected a high- height shelf thirdly (Fig. 37).

Next, the former recommended tips were tested in the following stages:

Table 2 Persons' Gender and Height

Person	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Gender	Male	Male	Male	Male	Male	Female	Male	Female	Male	Male	Male	Male	Male	Male	Male	Male	Male	Female	Female	Female
Height	180cm	177cm	176cm	172cm	171cm	170cm	170cm	169cm	167cm	166cm	166cm	165cm	165cm	165cm	163cm	160cm	160cm	158cm	158cm	155cm

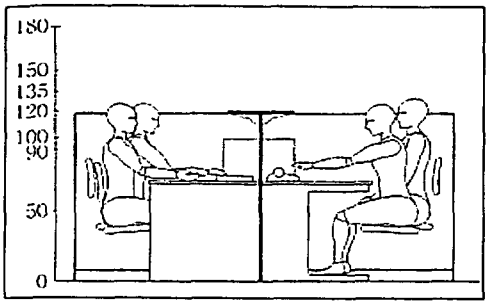


Fig. 36 The Convenient Height of Shelf to Access the Documents [15]

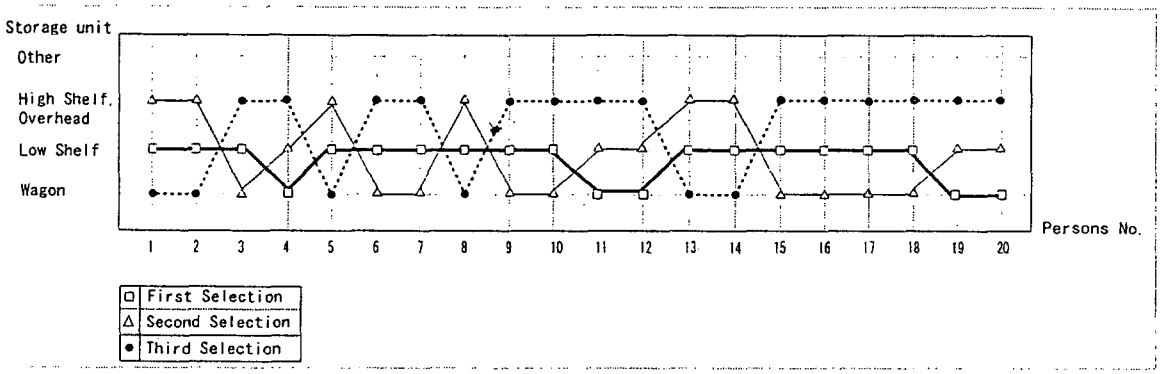


Fig. 37 Persons' Selections of the Most Convenient Storage Unit to Access the Files Easily

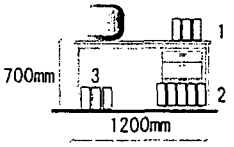
6.3.1 Effect of the workstation's space organization on the person's comfort.

We distributed 12 file boxes within each workstation based on its available space. Basically in the first workstation (current situation), there were three spaces for placing those boxes, desktop space, pedestal, and under the desk (on the floor). The numbers of the file boxes in each space accorded with the mentioned Fm previously (Table 1).

For example, three file boxes were placed on the desktop (e.g. two boxes from group A and one from group B). Concerning the pedestal, five file boxes (e.g. two boxes from group A and three from group B) were placed in its third drawer as its size is suitable for A4 paper size. The remaining three boxes were placed under the desk (e.g. one box from group A and two boxes from groups B) (Fig. 38, 39).

On the other hand, two storage spaces were available in the second workstation, pedestal and low height shelf upon the desktop. The file boxes were distributed through the second workstation as follows: six file boxes (e.g. three boxes from group A and three boxes from group B) were placed on the shelf. Moreover, the third drawer of pedestal is devoted to keep five file boxes (e.g. two boxes from group A and three boxes from group B) (Fig. 40, 41).

Next, each person was asked about his/her opinion of an available space on the desktop for working in both of the first and second workstations (Fig. 42).

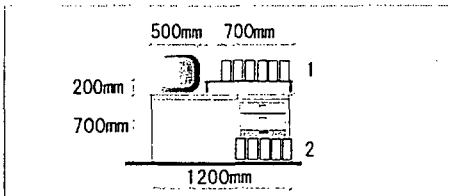


Home	Space definition	File meter
1. Desktop	Working space	0.3 Fm
2. Pedestal	Storage space	0.5 Fm
3. Under a desk	Footing space	0.3 Fm

Fig. 38 Available Storage Space in the First Workstation

Group		File box no.	Location		
Main title	Subtitle		Desktop	Pedestal	Under a desk
(A) Financial	Invoice				
	Assessment				
(B) Design	Interior				
	Public				

Fig. 39 File Boxes' Locations Within the First Workstation



Home	Space definition	File meter
1. Shelf	Storage space	0.7 Fm
2. Pedestal	Storage space	0.5 Fm

Fig. 40 Available Storage Space in the Second Workstation

Group		File box no.	Location	
Main title	Subtitle		Shelf	Pedestal
(A) Financial	Invoice			
	Assessment			
(B) Design	Interior			
	Public			

Fig. 41 File Boxes' Locations Within the Second Workstation

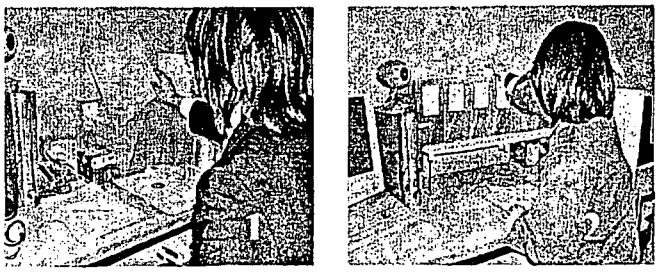


Fig. 42 Desktop Organization

1. Current Situation 2. Proposal

a. Results of desktop space (Fig. 43)

- First workstation:

About 40% of persons said that the available desktop space was inconvenient and 30% of them said that it was acceptable. In addition, about 20% of persons remarked that a desktop space was between acceptable and inconvenient levels and about 10% said that it was between convenient and acceptable levels.

- Second workstation:

About 80% of persons said that the desktop space was spacious for working. About 15% of them found the desktop space acceptable and about 5% of them said that it was between convenient and acceptable levels.

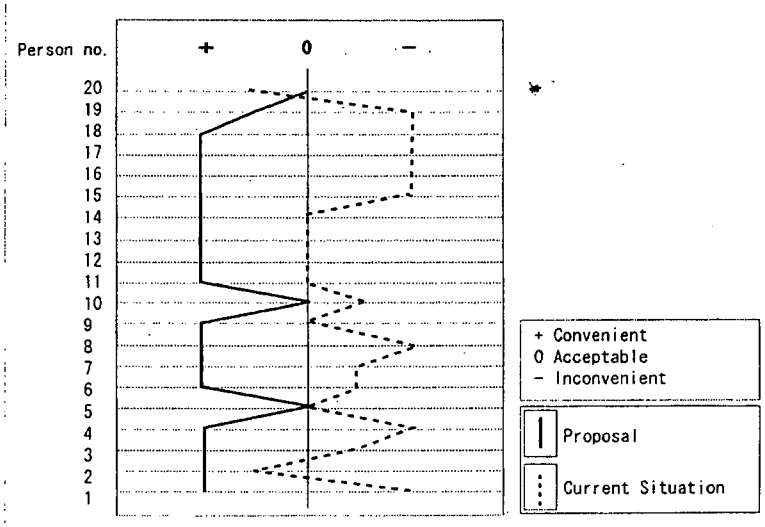


Fig. 43 Persons' Opinions about the Available Space on the Desktop for Working

Moreover, their opinions were required so as to know the suitability of an available leg space under the first and second workstations.

b. Results of leg space (Fig. 44)

- First workstation:

About 65% of persons mentioned that the space under the workstation was acceptable, about 20% of them said that it was between acceptable and inconvenient levels, and 15% found a space inconvenient for their legs.

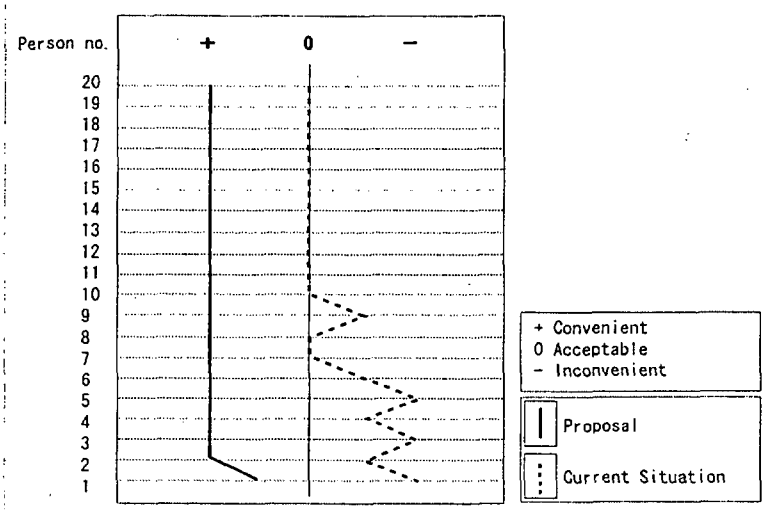


Fig. 44 Persons' Opinions about the Available Space Under the Desk for Footing

- Second workstation:

About 90% of persons mentioned that the leg space under the workstation was convenient for sitting well and 10% of them said that it was between convenient and acceptable levels.

6.3.2 Effect of displaying the files clearly on the time of file accessibility

a. Filing system test

We tested the time for file accessibility -which means the time that is spent to access the required file, by placing, e.g. five file boxes within each workstation in the same place, e.g. on the shelf but in different status of display (Fig. 45). For example, in the first workstation, a person relied on the folders' tabs only to find the needed file. As for the second workstation, a clear filing system was applied by labeling each file box. The contents of each file box were written on its label, such as the main title, subtitle of subject as well as the folders' names. Moreover, we used different color tabs with each group to differentiate between the folders of each group, such as the tab's color of the folders of group A was orange, and the tab's color of the folders of group B was blue (Fig. 46, 47).

Next, each person was asked to access a certain file of groups A and B from the first workstation, then from the second one. While each person was searching for the required file, we measured the time that was spent to access it by using a stopwatch. We pressed the button of the stopwatch when a person started to search for the required file and we stopped it when the file was accessed.

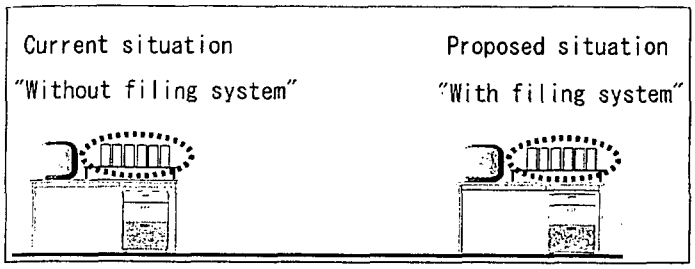


Fig. 45 Information Display Within the Current and Proposed Workstations

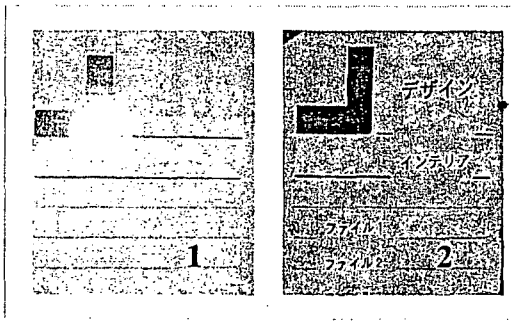


Fig. 46 Boxes' Display

1. Current Situation 2. Proposed Situation

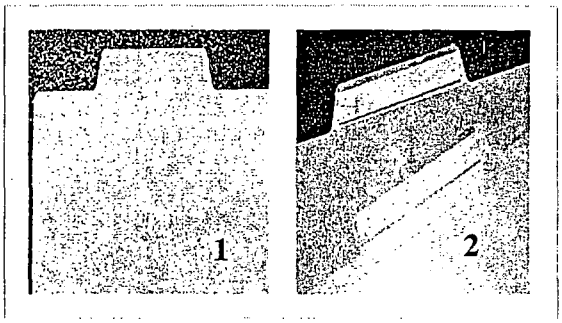


Fig. 47 Folders' Display

The result of this test revealed that the average time of file accessibility in the current situation was about 14 seconds and in the proposed one was about 9 seconds (Fig. 48 - Test 1). According to this test and the persons' opinions, we identified that both labeling and coding systems enable each person to find and retrieve the information quickly.

b. Filing arrangement test

The following test aims to identify how the filing arrangement within a pedestal affects on the time of file accessibility.

According to the internal depth size of the pedestal (580mm) and the width size of the file box (310mm), three boxes were arranged from front to back in the pedestal of the first workstation. On the other hand, another three boxes were arranged from one side to the other side in the pedestal of the second workstation. The tested boxes in both these situations were applied the same filing system (including labeling and coding systems). Then, each person was asked to access a certain file from these workstations. While each person was searching for the required file, we measured the time that was spent to get a file by using a stopwatch.

The result of this test showed that the average time of file accessibility in the current situation was about 11 seconds and in the proposed one it was about 9 seconds.

According to this test and the persons' opinions, we detected that a person can find the required file easily when the files' tabs are directed to his/her sight (Fig. 48 – Test 2).

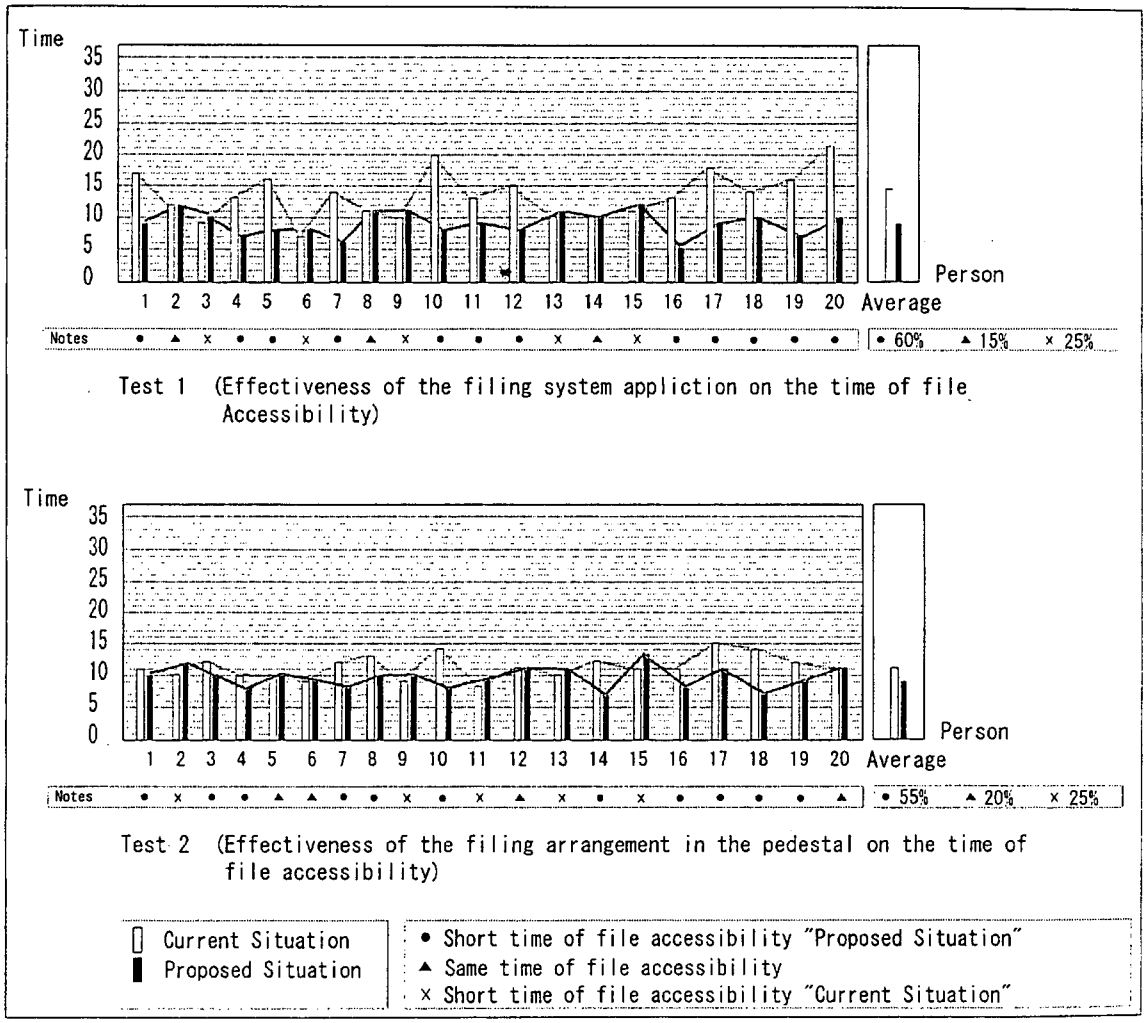


Fig. 48 Effectiveness of Displaying the Files Clearly on the Time of File Accessibility.

6.3.3 Effect of the file's location within the workstation on the time of file accessibility and the person's comfort

We aim to identify whether the location of files within the workstation space affects the time for file accessibility. This stage accomplished as follows: five file boxes were placed within a pedestal of the first workstation. On the other hand, five boxes were placed on the added shelf within the second workstation. Both the file boxes of those workstations were subject to the same filing system - including labeling and coding systems (Fig. 49 - Test 3).

Then each person was asked to access a certain file in these situations. While each person was searching a required file, we measured the time that was spent to access a file by using a stopwatch. The result of this test showed that the average time for file accessibility in the current situation was about 12 seconds and in the proposed situation it was about 9 seconds (Fig. 50 - Test 3).

Persons mentioned that the location of files on the shelf enables them to see the contents of each file box quicker than the current situation in which files are hidden in the pedestal.

Next, the location of the file boxes within those workstations was shifted as follows: five file boxes were placed under the first workstation (on the floor). On the other hand, five file boxes were placed within a pedestal of the second workstation. Boxes in these two situations (whether on the floor or in the pedestal) had the same filing system-including labeling and coding systems (Fig. 49 - Test 4). Then, each person was asked to access a certain file in both of these situations. While each person was searching a required file, we measured the time that was spent to access it.

The result of this test showed that the average time for file accessibility in the first workstation was about 15 seconds and in the proposed workstation was about 11 seconds (Fig. 50 - Test 4). In the current situation, a lot of effort is required to see and access a file because a person has to bend forward to search and pick up what he/she needs.

Based on the results of the previous stage, we recommend that a worker uses a shelf upon the desktop for placing the frequently used files. Regarding the pedestal, it is devoted to placing the files that are not used continuously.

Generally, the former tests demonstrated that the organization of files within the workstation space concerning the distribution of files and their display is an important influence on the person's comfort, as well as the time of file accessibility during the work-time.

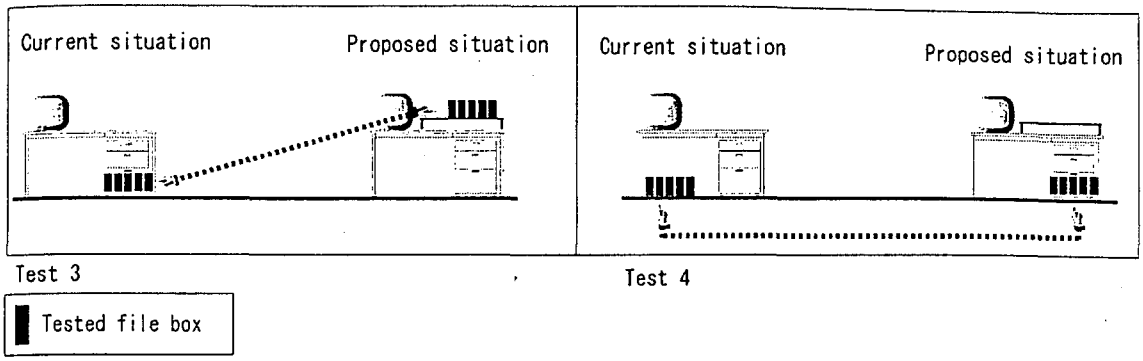


Fig. 49 Files' Locations Within the Current and Proposed Workstations

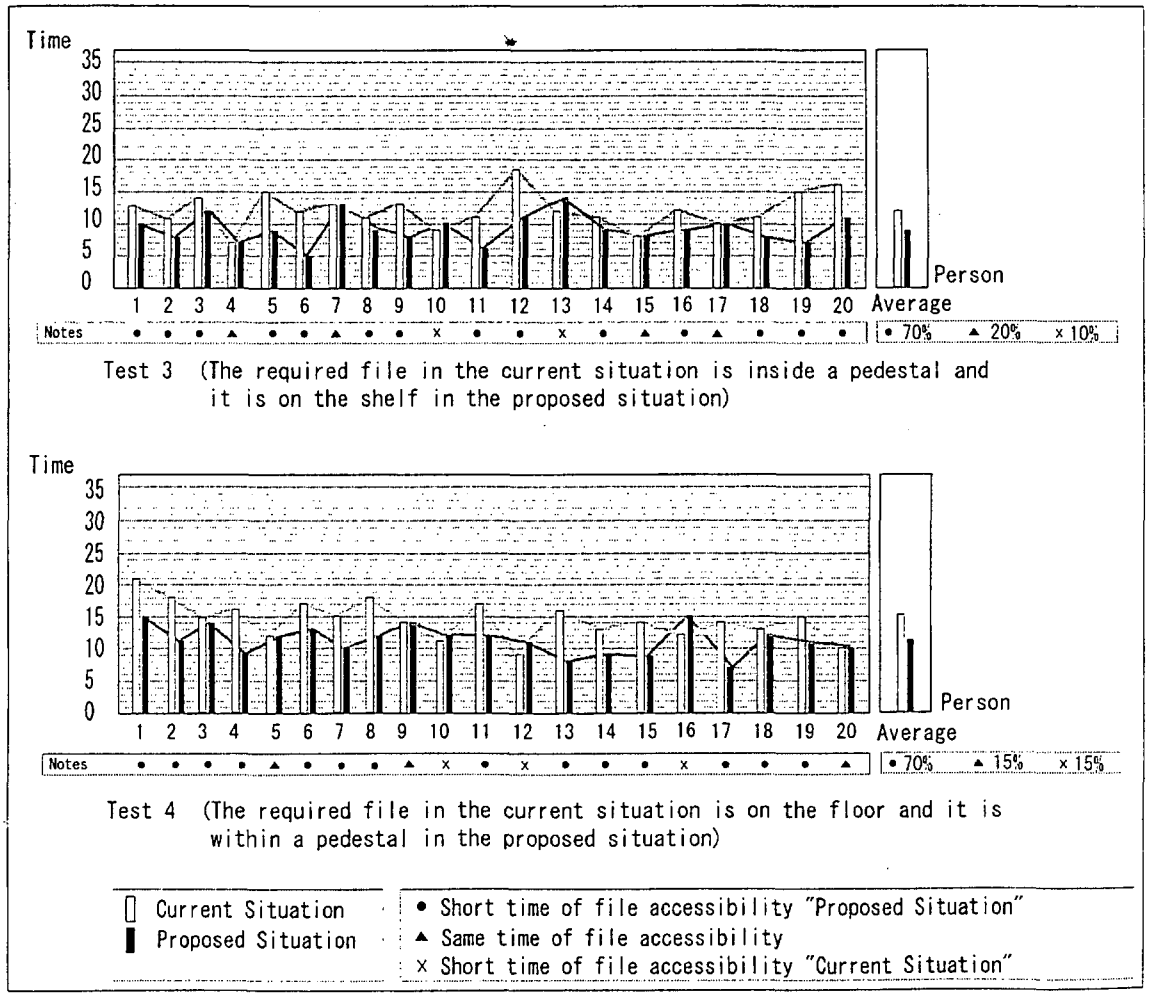


Fig. 50 Effectiveness of the Files' Locations Within the Workstations on the Time of File Accessibility

7. Conclusion

Based on the series of surveys and examinations that were carried out within five accounting division's workplaces, this study concludes that the main problems of the storage system inside these workplaces refers to the personal storage space and its file organization within the own workstation:

A- Documents are piled up on the desktop and therefore there is not enough space available for working on it. This problem generates because of the following reasons: filing management is not adequate, personal style, the capacity of available personal storage is not sufficient, the file cabinets organization within the workplace is not convenient for the desk's location, as well as the worker's time is limited for organizing and maintaining the documents regularly within the workstation.

B- Workers cannot find the files which they need easily because the files are not organized well within the workstation space.

C- Documents are stacked under the desk and therefore workers cannot sit well during the work-time. This problem happens because the filing management is not adequate.

Therefore, four steps are suggested to overcome the previous problems. These steps and their main purposes are as follows:

First step "reduce the quantity of the papers within the workstation space" helps a worker to defeat the disadvantages of filing management.

Second step "arrange the files" is important for better accessibility and visibility by classifying the files into groups and displaying them clearly.

Third step "assign a proper home for each paper" is required to solve the problem of desk's capacity and the personal style. By stretching the desk space in order to be adapted with the quantity of information, then distributing the documents based on frequency of use.

Fourth step "regular maintenance" is essential to keep the previous system works well.

The former recommended steps were tested to prove their adequacy to overcome the personal storage system's problems.

The experiments' results revealed that the recommended steps are effective for increasing the worker productivity as follows:

1. Stretching the personal storage space puts somewhat end of accommodating the documents on the desktop and under the desk as each paper has a home. Therefore, a worker could sit and perform his/her job well.
2. Displaying the documents clearly helps a person to pick up simply what he/she needs, so that much time is saved for performing more works.
3. Distributing the documents within the workstation space based on frequency of use is important so as to save the worker's time and effort as well.

8. Summary

The purpose of the present study is to determine the main problems of storage system in the Japanese workplace whether they relate to the file cabinets or the storage space within a workstation and analyze the reasons that led to their occurrence. In addition, we recommend solutions in order to solve these problems.

For case studies, we visited five accounting division's workplaces of Japanese companies in Tokyo and Fukuoka to evaluate the current storage systems in their workplaces. Based on the observation, hearing, taking pictures of storage systems and making a questionnaire for workers, the following are the major findings resulting from this study. The main problems of storage systems relate to the storage space within the own workstation and its files organization:

1- There is not enough space available for working on the desktop because files are piled up on it.

2- Workers cannot deal with their client quickly. Furthermore, they lose a lot of time to pick up the required file.

3- Workers cannot sit well because the files are stacked under their desks.

The first problem is attributable to the following reasons:

A- File management is not adequate, as it is restricted by following a certain rule for keeping files.

B- Personal style that means the way of thinking for organizing the documents within the personal storage space is different from one worker to another.

C- Storage space within the own workstation is inefficient for an excess number of documents.

D-Workers have not enough time for organizing and maintaining their documents regularly.

E- The organization of file cabinets within a workplace is not convenient for the location of some workers' workstations.

As for the second problem, it happened because the files are not organized well within the workstation.

Concerning the reason of the third problem, we detected that the filing management is the main factor of its occurrence.

This study recommends four steps to reorganize the storage space within the workstation and its files: first step is concerning how to reduce the amounts of paper that are placed in the desk to keep a space for the next information. Second step is regarding how a worker arranges and displays his documents clearly, so that he/she can get a file quickly. Third step is concerning how a worker assigns a home for each paper and distributes them within the available storage space well in order to be easy accessed.

As for fourth step, we advise a worker to maintain his/her files' organization within a workstation regularly for keeping the filing system works well.

We examined the previous steps in order to be sure that they are adequate and effective for solving the personal storage problems.

The results of the experiment which was conducted with 20 persons at laboratory in Kyushu University revealed that the recommended steps are effective for saving the worker's time and effort. In addition, these steps keep the personal work area clear from the piles, so that a person could sit and perform his/her work without obstacles.

References

1. Itoki Filing System Catalog, 08 (2004). Homepage: www. itoki-filing.com
2. Herman Miller Research. The Effect of Storage Methods on Job Performance, USA 1-2 (1992).
3. Don M. Avedon. New Information Processing, Storage and Transfer Techniques. Office Workspace For Tomorrow DOT Workshop, Contributed Papers, 156 (November 13, 14- 1991).
4. Uchida Yoko,Co., LTD. Record Management Report, 20 (1998).
5. Tsutomu Kato, Shingo Ando, Jyunichi Seike, Kiyonori Okura, Kouji Yanafu. The Planning & Design of Office Interior, KBI, Japan, 69 (1992).
6. Odette Pollar. Organizing Your Work Space, Crisp, USA, 3, 46, 29 (1999).
7. American Society of Interior Designer (ASID). Workplace Values- How Employees Want to Work, 15 (2002).
8. Liz Davenport. Order from Chaos, Three River Press, USA, 207, 25, 39, 32, 53 (2001).
9. Abigail J. Sellen and Richard H. R. Harper. The Myth of the Paperless Office, Massachusetts Institute of Technology, 28, 32 (2002).
10. Ronni Eisenberg with Kate Kelly. Organizing Your Office, Hyperion, USA, 64, 77, 127, 119 (1998).
11. Julie Morgenstern. Organizing From the Inside Out, Henry Holt and Company, USA, 85, 86 (1998).
12. Steelcase. "Stages" Catalog, 12 (December- 2002).
13. Steelcase. Asia Pacific Catalog, 97 (2001).
14. Steelcase Report. Designing an Ergonomically-Correct Workstation, paper_ ergo4.asp, 1 (1996 - 2001). www.steelcase.co.jp/en/knowhow
15. Architectural Institute of Japan (AIJ). Handbook of Environmental Design, Murata Seishiro, Japan, 024 (January- 2003).
16. Noro Kageyu. Illustrated Ergonomics, Japanese Standards Association (JIS), Japan, 421 (February- 1990).

4-2 Communal Storage System Problems

Part 4 - 2

Communal Storage System Problems

1. Introduction

In the previous chapter of this part, we discussed and analyzed the personal storage problems within the accounting division workplace, as the majority of complaints concerned the storage system within the own work area. Furthermore, we tried to solve those problems in order to help the workers to perform their business effectively. On the other hand, the results of the questionnaire that was carried out in that chapter (4-1) revealed that about 37% of workers complained about the communal storage system – regarding wall and low units.

Therefore, this chapter (4-2) focused on examining the efficiency of the communal storage and how it is managed and organized within the workplaces which we had previously visited in the previous chapter (4-1). We attempted to evaluate the current situation of using the file cabinets. In addition, we argued how to promote the storage system, so that it could support and provide workers with their requirements appropriately.

1.1 Purpose

The present study aims to define the main problems of the communal storage system in the accounting division's workplace and introduce the reasons that lead to their occurrence. Moreover, we aim to recommend some points/solutions and test them to be sure of their suitability and effectiveness for overcoming these problems. Basically, we intend to establish the storage system that could save the worker's time and effort as well.

1.2 Methods

This study was carried out as follows: first, we visited again the accounting division workplaces which were examined in the previous chapter of this part (4-1) as a field survey. Observation, hearing, and taking pictures were used in order to evaluate communal storage system regarding file display and the file's location within the file cabinet shelves. On the other hand, the file cabinets' locations were observed to understand how they are organized within the workplace. In addition, we examined the move line of some individuals who work in the visited workplaces and how often they use the file cabinets per a day so as to identify the obstacles that meet them for getting the required file. This examination is a new method, as it is not used before in the academic studies concerning office design and it was accomplished inside the visited workplaces for two days according to the organizations' permissions.

Second, a questionnaire was carried out on 72 persons (male and female) who work in these workplaces in order to identify the main problems of the communal storage system that affect on the workers' comfort and their productivity. Based on the hearing and observation, some answers for each question within a questionnaire were suggested. We received the workers' answers from five days to one week.

Third, several points were suggested and tested to overcome these problems.

2. Results and discussions

The following questions were distributed among 72 persons (clerical staff) who work in the accounting division workplace to recognize firstly the main problems of the file cabinets "whether low or wall units" inside their workplaces. Second, we attempted to determine and analyze the reasons that generated their occurrence. About 62 persons answered the questions.

First question belongs to the first part of a questionnaire.

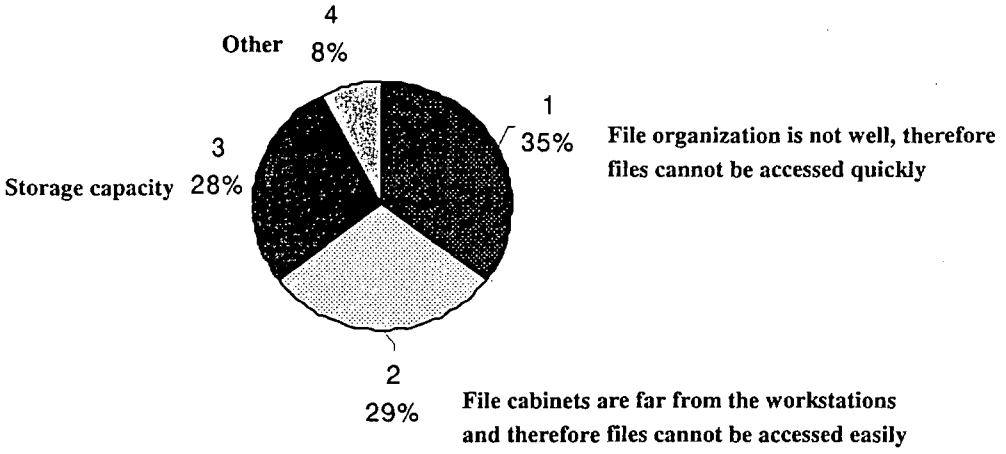


Fig. 1 File Cabinets' Problems

Q.1 What is the main problem of the file cabinet in your workplace? (Fig. 1)

1- 35% of workers answered that they cannot access the required files quickly, as file organization within the storage unit space is not well. Some workers complained of finding difficulties to get what they need because some documents are sometimes misfiled, mislabeled, or lost.

2- 29% of workers answered that the location of the file cabinets within a workplace is far from their workstations and therefore they cannot simply access the needed file.

3- 28% of workers replied that the storage units are overloaded with the files.

4- 8% of workers selected "other".

Based on the results of a questionnaire, we found out that the first and second problems concern file accessibility. This study nearly focused on the problems of file accessibility, as they have high percentage of complaints.

In the beginning, we discussed and analyzed the first problem concerning file organization and display within the cabinet's shelves.

2.1 File organization within the storage unit shelves

As for the second part of the questionnaire, workers were asked about the reasons that generated difficulties to access the files from the storage units.

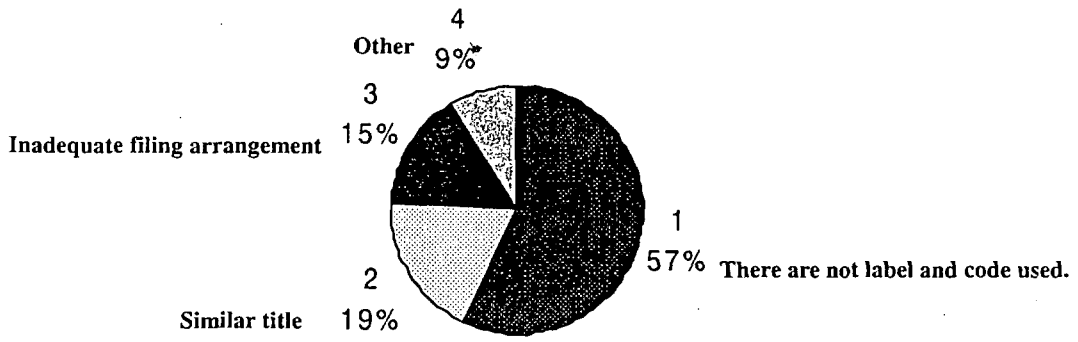


Fig. 2 Errors of the Files' Organization

Q.2 Why do you find difficulty to access a file from a cabinet? (Fig. 2)

1- 57% of workers answered that sometimes the file tool (either folder, binder, or file box) has neither label nor code which might enable them to know its contents quickly.

2- 19% of workers answered that some files have similar titles.

3- 15% of workers answered that the filing arrangement within a cabinet is not well. For example, sometimes the files are arranged as piles-place file upon another one "vertical arrangement". In other case, the place of the file within the unit space is difficult to reach, as it is kept on, e.g. a high shelf.

4- 9% of workers selected "other". For example, the list of the files' contents is not renewed regularly. Others answered that the font size of the folder's tab is slightly small to read comfortably.

According to the former answers, this study identified that the workers cannot access the files easily due to two reasons: first one concerns the files' display inside the file cabinet.

Second reason relates to the files' location within the cabinet space. In other words, the distribution of files inside the file cabinet is not adequate for some workers.

Concerning the first reason, the following are some recommended tips in order to display the documents inside the cabinet space clearly.

2.1.1 Revamping the filing organization within the storage unit

According to the survey, we detected that the workers cannot access the files quickly because the filing system is not applied well. For example, in some cases the contents of the file boxes are not written and sometimes are not clear to be observed (Fig. 3, 4). In other cases, the main title of one file box overlaps with another one so that it might cause confusion for the workers (Fig. 5). There are several another faults related to the files' organization within the file cabinets (Fig. 6, 7).

In order to revamp the filing system and display the documents clearly, this chapter recommends the following tips:

a. Filing system application

Actually the most important point to find the files easily is by using a visual sign (including labeling and coding systems) with the file tool, e.g. file box, folder, and binders. As well as the shelves and drawers should be labeled too (Fig. 8).

- Labeling system recommendations:

1. It is important to write or type the label format clearly [1]. Point 11 is the recommended font size for better visibility [2]. Surprisingly, handwriting sometimes makes for a more accessible system since the typewritten letters give a similar appearance [3].
2. Use a straight line of letters not a dotty line for writing the title clearly on the label [4].
3. Use a bold and black lettering on white labels for clearest reading [1].
4. It is better to write the title of folder on the label horizontally than vertically for reading it easily [5].
5. A label is needed on the edges of shelves and on the drawers' surfaces to get the information always present [3, 6].

- Coding system recommendations:

1. Consider that a large number of colors in a display will increase search times so the minimum number should be employed [7].
2. Color tabs work well and extremely useful in order to differentiate between the documents of several groups [1].
3. Alphanumeric codes are best and color coding next best for recognition and identification of information [8].

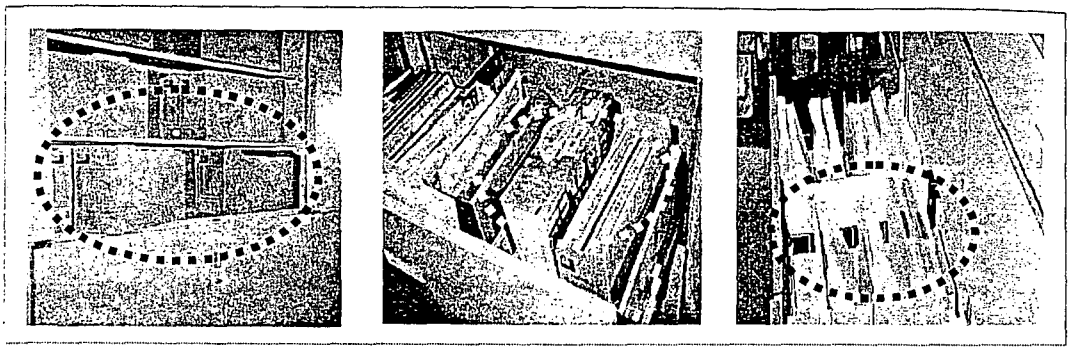


Fig. 3 No Titles and Label

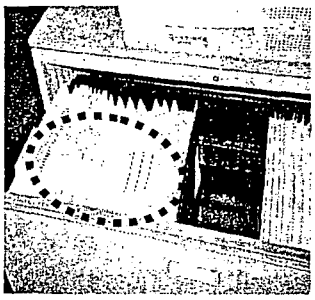


Fig. 4 Small Size of Font

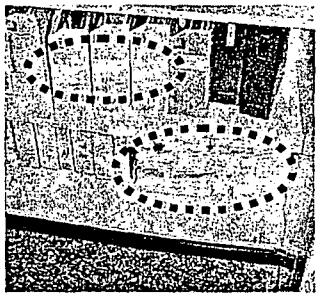


Fig. 5 Similar Titles

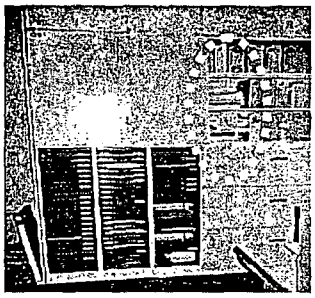


Fig. 6 Piles of Files

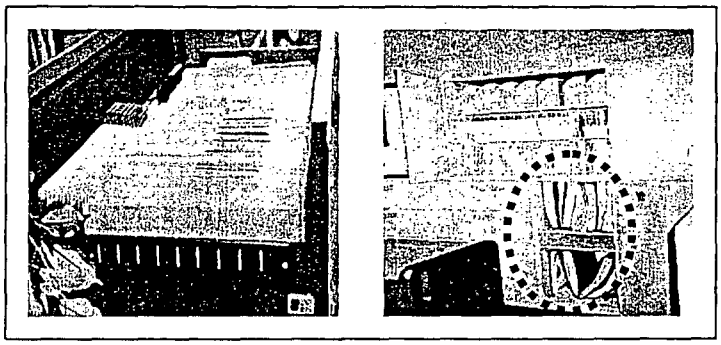


Fig. 7 A Divider Is Not Used

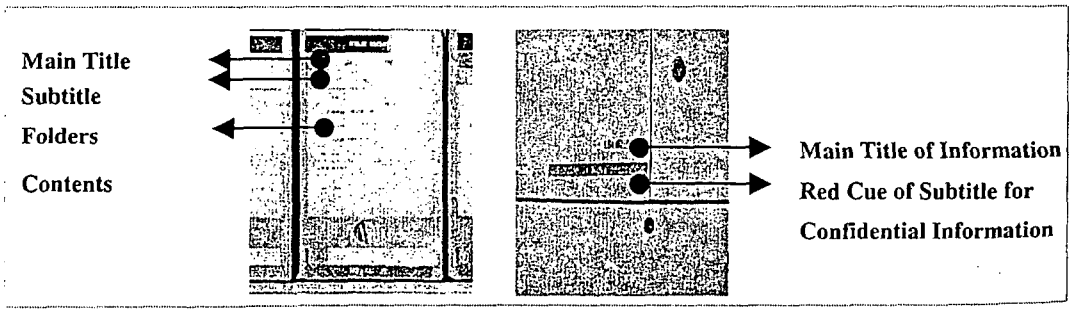


Fig. 8 Use Labeling System with the File Tools and the Storage Unit Too

Basically, labeling and coding systems are required for defining the folder's location quickly. These systems enable a person to differentiate one group of files from another and between several like subjects in one group. Furthermore, they help a worker to return the information to its place easily [6, 9].

b. Filing arrangement

Filing arrangement within the storage unit has great effect on displaying the documents well. The survey found out that the files are usually arranged within the storage units horizontally and sometimes vertically as piles inside these workplaces. Vertical arrangement of documents is not recommended for two reasons:

1. It is not adequate to display the documents obviously within any storage unit as the folder's tab is usually hidden by another folders which are placed upon it. As a result, a worker loses a lot of time to access what he/she needs.
2. It might decrease the storage unit capacity. For example, we detected that about 50 binders (its size is width 242mm x height 307mm x thickness 15mm) can be kept on one shelf of the file cabinet (width 800mm x depth 450mm x height 1200mm) when they are arranged horizontally. On the other hand, about 49 binders (same size) can be kept on another shelf of the same file cabinet when they are arranged vertically and horizontally as well. This means that the horizontal arrangement of files is better than another type, as it could increase the capacity of each drawer within the file cabinet about 2% (Fig. 9).

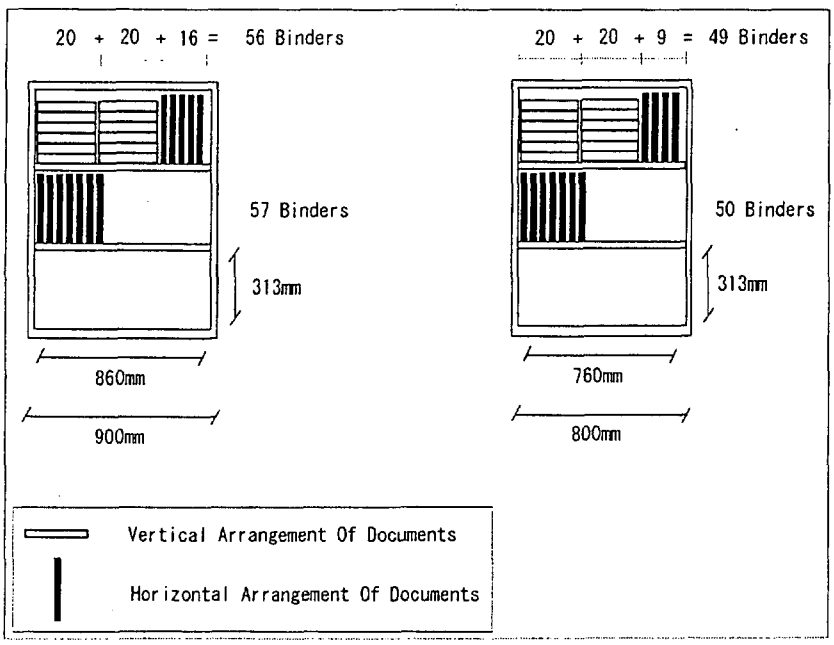


Fig. 9 Filing Arrangement in the Storage Unit

On the other hand, in the lateral files, use cross rails to turn files to face from front to back rather than side to side. This way enables a person to see the folders' tabs easily. In addition, it can increase the filing capacity in the same drawer by 14%, giving user another foot of file storage in the same space [1].

c. Select the file tools

This study recommends a file box and binder to save the papers, as their labels are adequate for clear visibility. On the other hand, the recommended points that were mentioned in part 2 concerning the amount of papers and the storage type have to be considered before using them.

d. Use a divider

A divider is important for displaying the documents well. In the case of keeping folders in the drawer cabinet, a divider is required in order to separate the several groups of folders [3].

e. Create a filing index

Another recommended point for accessing the files quickly is by creating a simple index /list of the files' titles which have been kept within the storage unit and store it, e.g. on the top of unit. List of the files' titles is helpful to remind a person what contains each storage unit. When a worker is unsure of where to find a piece of paper, a glance at the index of each storage unit is more speeder and precise than rifling through an entire drawer [1].

f. Select the storage unit type

Inside the workplace, select the convenient type of storage unit to display the documents well. Based on the survey, frequently used files are required to be kept in the open or glass door cabinets rather than the drawer or metal door cabinets in order to keep their contents present [6].

The recommended points are critical so as to help a person to find a file quickly.

Next, we will discuss the second reason that concerns how the workers find difficulties to access the files from a tall file cabinet, e.g. the unit's height is 2100mm (Fig. 10).

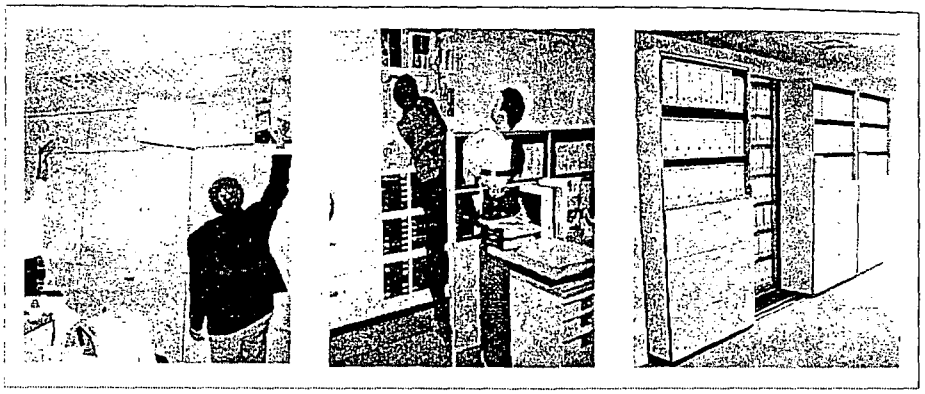


Fig. 10 A File Is Kept in a High Shelf

2.1.2 Filing distribution in the storage unit

Based on the hearing and observation, we identified that some companies are distributed their files among the shelves according to the files' classification, and others do not use any certain rule.

There are several types of the files' classifications. For example, the files are sorted according to their subject, date, importance, urgency, alphabet, and file size [5].

As shown in fig. 11, first and second companies distribute the documents through the shelves of the file cabinet based on frequency of use. For example, frequently used files are kept on the shelves that are easy to reach. The third and fourth companies do not use a certain rule for distributing the files inside a cabinet. Regarding the fifth company, the documents are distributed among the shelves of a file cabinet according to their topics and date. In this company, each shelf is devoted to keeping a certain group of files.

Company No.	Files' classification												Frequency of use	No rule	Other
	Subject							Date	Import-ance	Urgency	Alphabet	File size			
	Topics	Clients Name	Projects Name	Company Name	City Name	Worker Name	Other								
1											●		●		
2	●												●		●
3														●	
4														●	
5	●							●							●

Fig. 11 Different Ways for Distributing the Files Within a Cabinet

● Selected Way

Actually, office workers need to set up the storage unit space based on frequency of use, not how important things are. The selection of the file's place within a storage unit should be determined according to how often it is used [6].

This study examined the former recommended concept to prove its rightness and effectiveness for saving the workers' time and effort.

a. Purpose of experiment

This experiment aims to prove that the selection of suitable shelf within a file cabinet to keep the files is not only essential for the ergonomics factor which concerns the worker's comfort, but also for saving the time of file accessibility.

b. Methods of experiment

The following experiment was conducted with 20 persons (15 men and five women- their ages ranging from 23 to 40 years old) at a laboratory in Kyushu University (Table 1). These persons were asked to access the files from two file cabinets (Fig. 12). Each cabinet included six shelves and its size was width 800mm x depth 450mm x height 2100mm. About three file boxes (A4 paper size) were kept on each shelf as examples. The file box size was width 310mm x height 260mm x thickness 102mm. In each file box, six folders (A4 size) were put as examples. The folders' contents that were kept in the file boxes were divided into three groups based on their subject. The folders of each group had, e.g. two status of using: folders of group "A" included folders "A-1" (frequently used) and folders "A-2" (infrequently used). Folders of group "B" included folders "B-1" (frequently used) and folders "B-2" (infrequently used). Concerning the folders of third group "C", they included folders "C-1" (frequently used) and folders "C-2" (infrequently used).

As for displaying the documents, each file box was labeled well (including, main title of each box, e.g. design, subtitle e.g. interior design, and the name of each folder) and the font size was point 11. In addition, color tabs were used to differentiate between these groups. For example, the tab's color of folders of group "A" was red. Tab's color of folders of group "B" was green. Regarding the folders of group "C", their tab's color was blue.

On the other hand, file distribution in the first cabinet accorded with the current situation that is used in some companies. Folders were distributed within the first cabinet based on their subject. For example, the first and second shelves were devoted to keeping the folders of group A or e.g. commercial group (including A-1 and A-2). The third and fourth shelves were devoted to keeping folders of group B or e.g. financial group (including B-1 and B-2). Concerning fifth and sixth shelves, they were devoted to keeping the folders of group C or e.g. design group (including C-1 and C-2).

In the second cabinet (proposed situation), the files were distributed among its shelves according to the recommended concept. The selection of convenient shelf that enables a person to access the frequently used files easily was determined according to the following points:

1. The standard height of shelf within a file cabinet that accommodates Japanese human size (Fig. 13) [10- 12].
2. The persons' selection of the suitable shelves to their height.

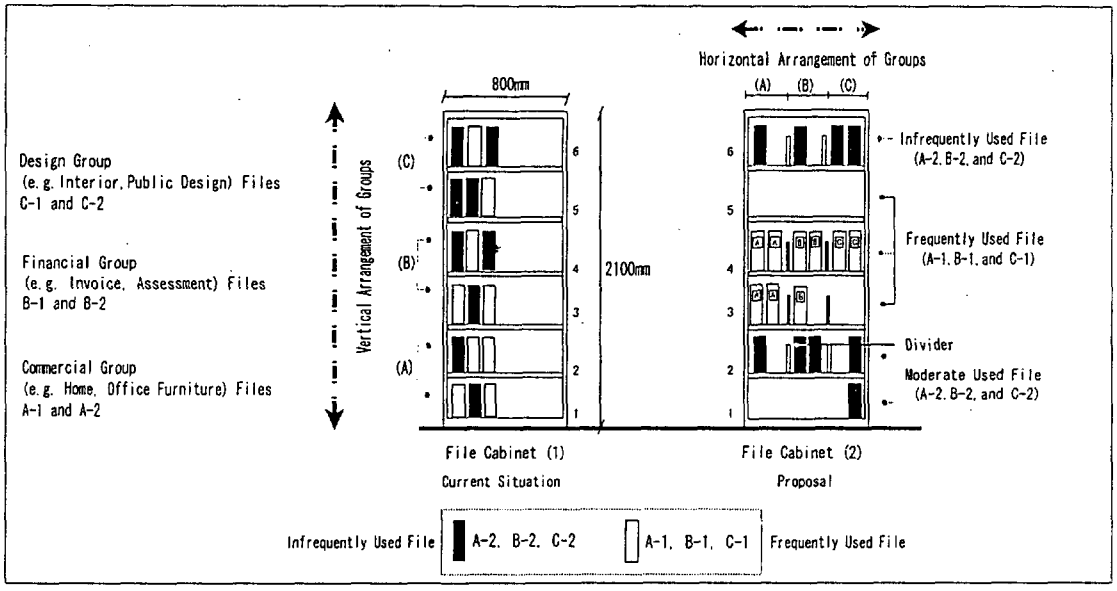
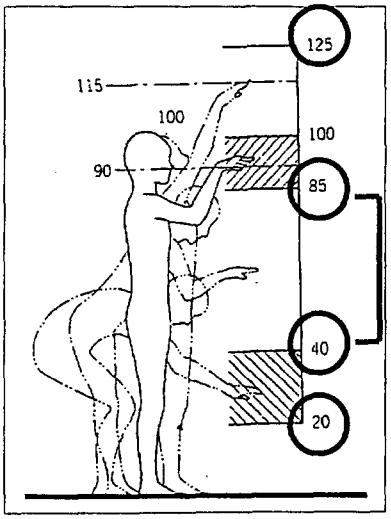


Fig. 12 Current and Suggested Situations of File Distribution in the File Cabinet



The Maxim Percentage of Height to Put and to Retrieve Supplies

An Average Percentage of Height to Put and to Retrieve Supplies

The Minim Percentage of Height to Put and to Retrieve Supplies

Fig. 13 Height of the Storage Unit Shelves [10- 12]

c. Results and discussions of experiment

In the beginning, each person was asked about the most convenient shelf to access and retrieve the folders easily. Based on the standard height of storage unit's shelves (Table 1) and the persons' answers, we detected the following results:

Table 1 The Relationship Between the Person's Height and the Height of the Storage Unit's Shelves

Person no.	Gender	Human Height size	85% ~ 40%	Shelf no.	125%	Shelf no.	20%	Shelf no.
1	Male	180	153cm ~ 72cm	5-2	225cm	6, 7	36cm	1
2	Male	177	150cm ~ 71cm	5-2	221cm	6, 7	35cm	1
3	Male	175	149cm ~ 70cm	5-2	219cm	6, 7	35cm	1
4	Male	172	146cm ~ 69cm	4-2	215cm	6, 7	34cm	1
5	Male	171	145cm ~ 68cm	4-2	214cm	6, 7	34cm	1
6	Female	170	145cm ~ 68cm	4-2	213cm	6, 7	34cm	1
7	Male	170	145cm ~ 68cm	4-2	213cm	6, 7	34cm	1
8	Female	169	144cm ~ 68cm	4-2	211cm	6, 7	34cm	1
9	Male	167	142cm ~ 67cm	4-2	209cm	6	33cm	1
10	Male	166	141cm ~ 66cm	4-2	208cm	6	33cm	1
11	Male	166	141cm ~ 66cm	4-2	208cm	6	33cm	1
12	Male	165	140cm ~ 66cm	4-2	206cm	6	33cm	1
13	Male	165	140cm ~ 66cm	4-2	206cm	6	33cm	1
14	Male	165	140cm ~ 66cm	4-2	206cm	6	33cm	1
15	Male	163	139cm ~ 65cm	4-2	204cm	6	33cm	1
16	Male	160	136cm ~ 64cm	4-2	200cm	6	32cm	1
17	Male	160	136cm ~ 64cm	4-2	200cm	6	32cm	1
18	Female	158	134cm ~ 63cm	4-2	198cm	6	32cm	1
19	Female	155	132cm ~ 62cm	4-2	194cm	6	31cm	1
20	Female	155	132cm ~ 62cm	4-2	194cm	6	31cm	1

1. Handy reach shelf:

About 60% of persons mentioned that the fourth shelf is convenient to get a file easily. About 20% of persons mentioned that the third shelf is convenient to get a file and 20% of persons said that the fifth shelf is convenient to get a file easily (Fig. 14).

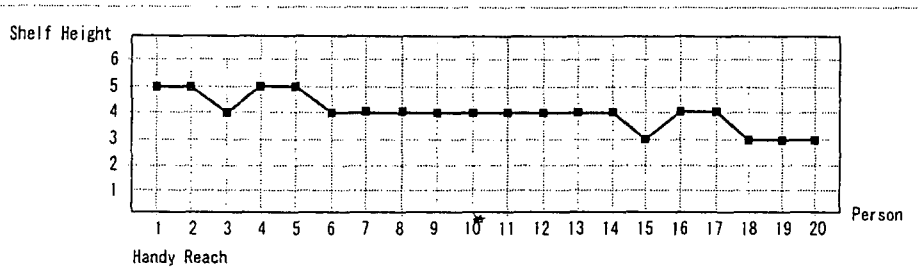
2. Easy visibility of the files' contents:

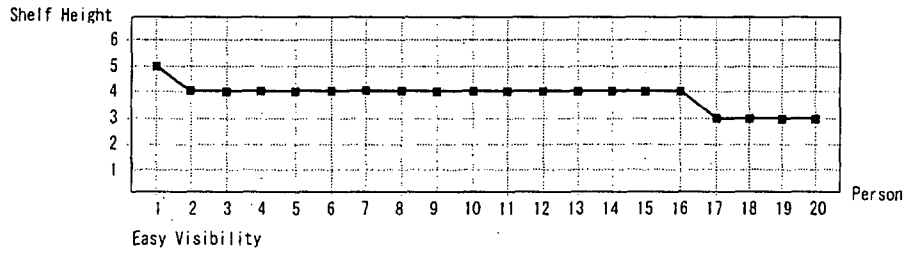
About 75% of persons said that the fourth shelf is convenient to see simply the folders' tabs. In addition, about 20% of persons agreed that the third shelf is the most suitable shelf to observe the files' tabs easily and 5% of persons said that the fifth shelf is fit to see the files' tabs well (Fig. 14).

Based on the evaluations of 20 persons, we detected that the most convenient shelves to keep the frequently used files are numbers four, three and five respectively (Fig. 15).

In the light of the former results, the fourth and third shelves within the second file cabinet were selected to keep frequently used files (both of A-1, B-1 and C-1). As for infrequently used files (both of A-2, B-2 and C-2), they were kept on the first, second, fifth and sixth shelves.

In the next step, each person was asked to access a certain file of the frequently used only (e.g. A-1, B-1 and C-1) from the first cabinet, then from the second one as well (Fig. 16).





Shelf no.	1	2	3	4	5	6
Height	15cm~48cm	48cm~81cm	81cm~115cm	115cm~148cm	148cm~182cm	182cm~210cm

Fig. 14 Persons' Selections of the Convenient Shelf

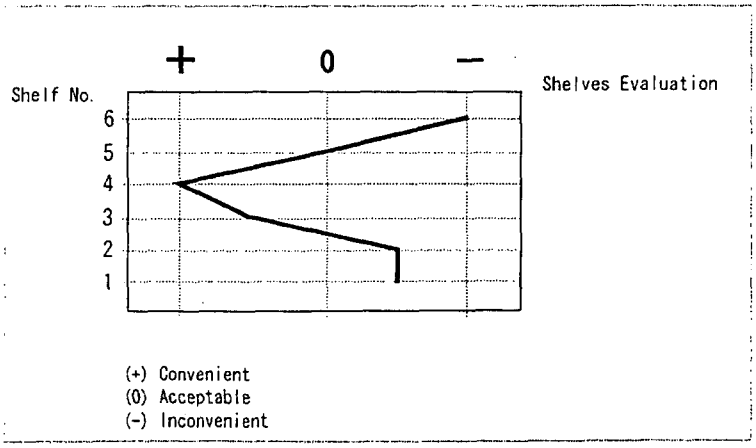


Fig. 15 Persons' Evaluations of Each Shelf Using

Fig. 16 Test of the File Cabinet

On the other hand, by using a stopwatch, we measured the time that was spent to access the required file from each cabinet. We pressed the button of the stopwatch when a person started to search for the required file and we stopped it when a file was accessed. The following are the results of this test (Fig. 17).

Test 1: the required file was placed on the sixth shelf of the first cabinet and it was placed on the fourth shelf of the second cabinet. We found out that the average time of file accessibility in the former situation was about 13 seconds and in the latter one was about 10 seconds.

Test 2: the required file was placed on the fifth shelf of the first cabinet and it was placed in the third shelf of the second cabinet. We found out that the average time of file accessibility was about 11 seconds in the former situation and it was about 9 seconds in the letter one.

Test 3: the required file was placed on the second shelf of the first cabinet and it was placed on the fourth shelf of the second cabinet. We found out that the average time of file accessibility was about 11 seconds in the former situation and it was about 8 seconds in the latter cabinet.

Test 4: the required file was placed on the first shelf of the first cabinet and it was placed on the third shelf of the second cabinet. We found out the average time of file accessibility was about 12 seconds in the former situation and it was about 9 seconds in the latter one.

Consequently, this experiment demonstrated that the majority of persons spent more time to access the required file from the first cabinet than the second one.

Based on those persons' viewpoints, there are two factors have great influences on the time of file accessibility (Fig. 18): first one is the file's location inside a file cabinet related to the depth of shelf and the weight of file box.

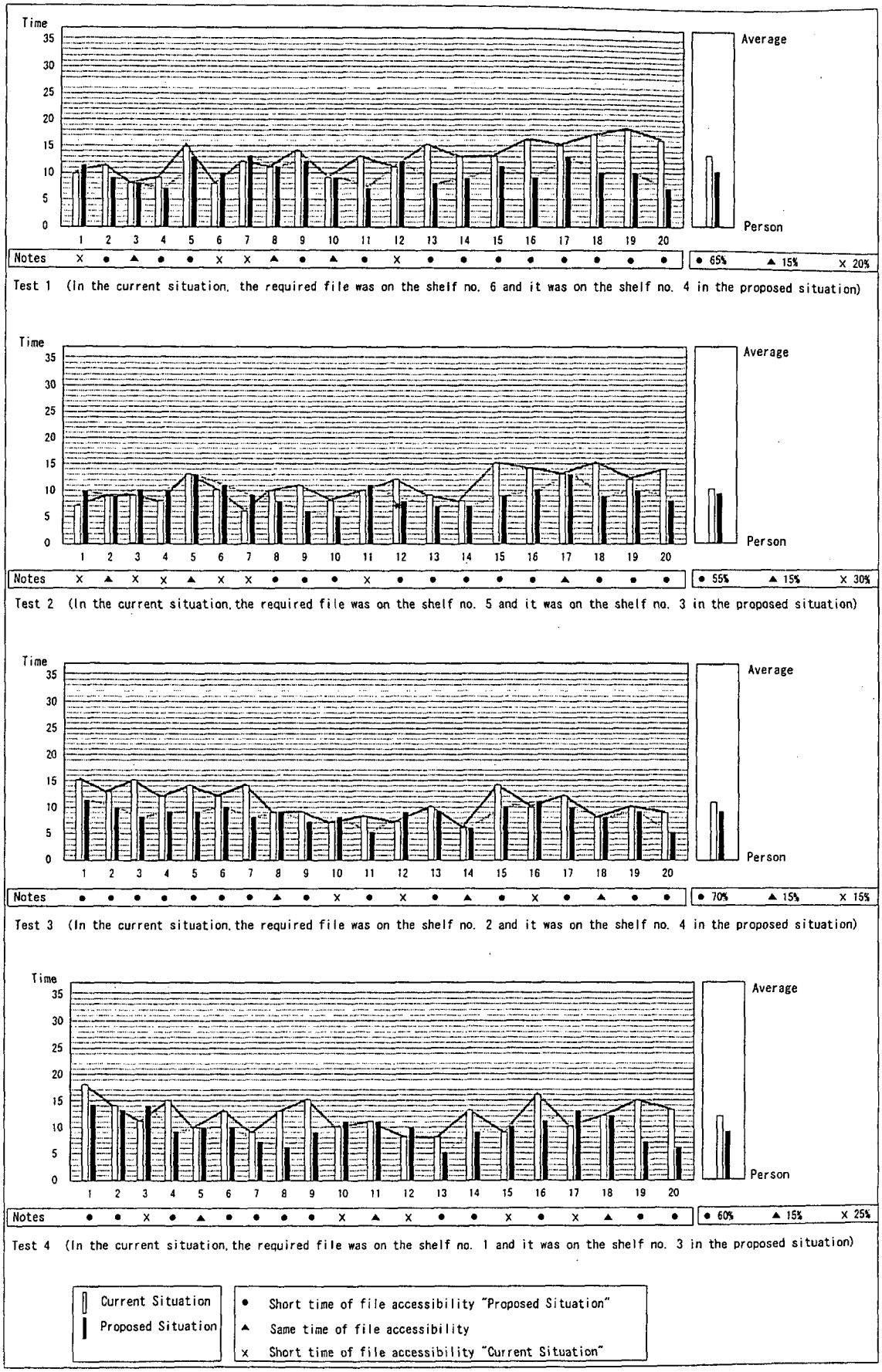


Fig. 17 Time of File Accessibility Related to File Distribution Within a File Cabinet

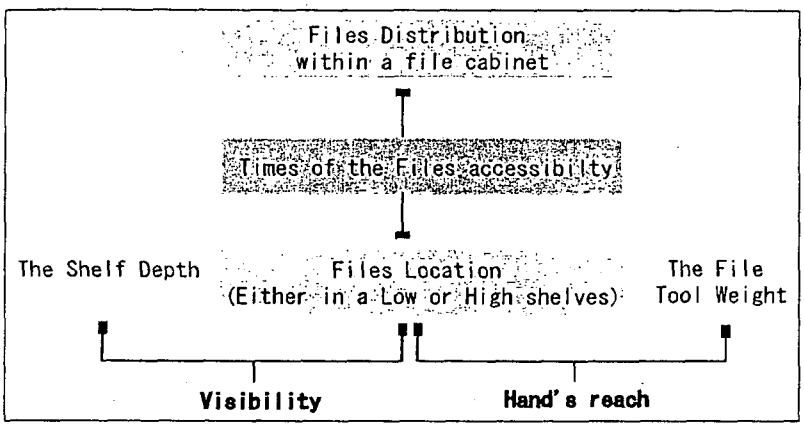


Fig. 18 Main Factors of Finding Difficulty to Access the Files from the Storage Unit

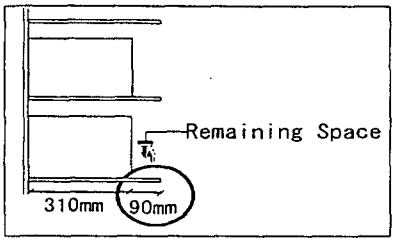


Fig. 19 Visibility of Folder

Regarding the relationship between the files' location and the file cabinet depth, since the depth of shelf (an internal size) is 400mm and a file box occupies about 310mm, the remaining space (about 90mm) obstructed a person to see the folder's tab - especially when a folder was kept on the first and sixth shelves (Fig. 19).

Concerning the relationship between the files' location and the weight of file box, about 50% of persons mentioned that they found a little difficulties to access a bulky file box from the sixth shelf of the first cabinet due to its heaviness.

As for the second factor, persons mentioned that they spent more time in the first status of test (current situation) than the second one (proposed situation) because in the former one they searched for a file through the whole shelves, however each shelf had a label of its contents. On the other side, in the latter status they focused on the fourth and third shelves to find the needed file.

According to the former results of experiment, this study detected that the distribution of files within a file cabinet has to be considered the status of information. In other words, it is used frequently, moderate or seldom.

Therefore, the suitable place in the tall unit (e.g. its height is 2100mm) for keeping frequently used files is the fourth, third and fifth shelves respectively, as their heights fit well for the Japanese human height. On the other hand, the bottom shelves (e.g. second and first shelves) are devoted to keeping the files that are not used continuously - especially the bulky file tools. As for the top shelves of file cabinet (e.g. sixth shelf), it is convenient for keeping the files which are used seldom.

The same recommended concept could be used for the low file cabinet (e.g. its height 1200mm). The difference here is that the upper shelves are fit for keeping frequently used files. Middle and bottom shelves are appropriate for keeping infrequently used files.

In a tall file cabinet, the recommended ways for keeping the frequently used files on the fourth, third and fifth shelves are as follows: when each group of folders are kept in a few file boxes, we suggested that the boxes are arranged horizontally within the storage unit same as in the proposed cabinet (Fig. 12). On the other hand, when each group of folders are kept for example in six file boxes, we recommend that each group takes up one shelf (e.g. the boxes of group A are kept on the third shelf, boxes of group B are kept on the fourth one and file boxes of group C are kept on the fifth shelf).

Generally, high efficiency of storage system for file accessibility demands two essential points:

1- Files should be displayed clearly within a file cabinet.

2- Files have to be distributed within a file cabinet based on frequency of use.

Next, we discussed and analyzed the second problem of communal storage system which concerns the organization of the file cabinets within a workplace and the difficulties of getting the files from them.

2.2 File cabinets' organization within the workplace

The results of the survey that was carried out within 50 Japanese offices by New Office Promotion Association (NOPA) in 1992 so as to identify the division of office space revealed that about 54.1% of the office space was devoted for the working area. Furthermore, about 6.3% was devoted for the aisle. Meeting area occupied about 10.9% of the office space and about 15.9% of the office space was kept for another activities.

As for the working area, the same survey demonstrated that about 51.9% of space is devoted for the office furniture, such as desks, chairs, and storage units. About 48.1% of space is dedicated for the passage [13] (Fig. 20).

In the light of this survey, we attempted to identify how the storage units are usually organized in the available office space. Based on our survey within five accounting division's workplaces, we found that the file cabinets' organization is strongly influenced by the workers' number relative to the office space.

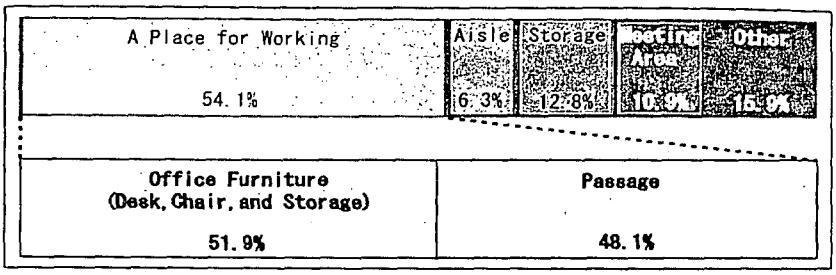


Fig. 20 Office Space's Divisions [NOPA - 1992]

The following are the types of the file cabinets' organization within the visited workplaces (Fig. 21).

Type A: the wall and low units are located next to the walls when the office space is almost full up with the workers' workstations.

Type B: the file cabinets are located next to the walls. Furthermore, the low units (width 900mm~800mm x depth 450mm~400mm x height 1200mm, 1050mm and 1040mm) are distributed separately among the workstations as the office space is occupied by several workstations.

Type C: we found that rows of low units are arranged between the workstations in the wide office space to serve each group of people. In addition, the wall units are located next to the office's walls.

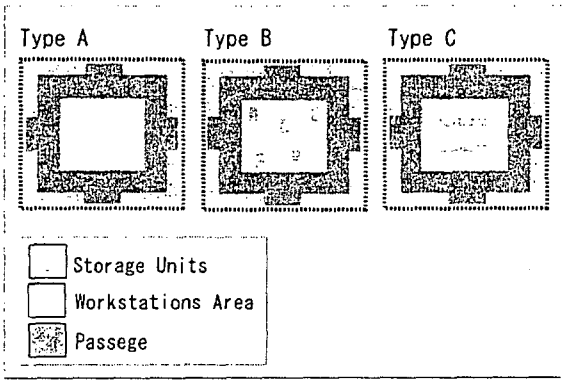


Fig. 21 File Cabinets' Organization Within a Workplace

2.2.1 File reservation in the workplace

In the visited workplaces, there are three areas used for reserving the documents. These areas are classified according to the distance between the storage unit and the worker's workstation. This study calls them: hand's reach, arm's reach and walking distance areas (Fig. 22). Files are distributed among these areas according to their ownership. Hand's reach area concerns the storage units which locate within the own workstation, e.g. a pedestal. They are devoted to placing the personal files.

Arm's reach area concerns the nearest file cabinet whether low or wall units to the worker's workstation (e.g. the distance between cabinet and desk is usually about 1000mm). In many cases, this area is devoted to keep the personal and group working files (files which are used by group of indiviuals who have similar work processes).

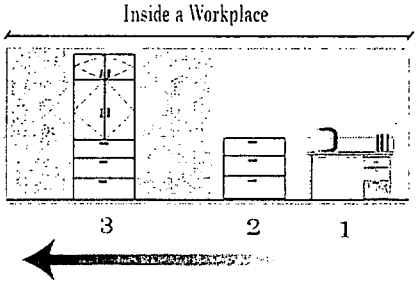
Walking distance area concerns the file cabinets that are located far from the worker's workstation (e.g. the distance between a cabinet and a worker's workstation is starting from 1000mm and more) and the communal files are usually kept within their spaces.

Based on the survey, we found that the types of file (whether personal, group or communal) inside the file cabinets are different from one office to another. In the visited workplaces, both wall and low units are usually devoted for keeping various types of files (Fig. 23).

According to the workers' complaints, there are two problems related to file accessibility from the arm's reach and walking distance zones:

1- There is not enough space to open and use the drawers of some file cabinets comfortably, as they are located so close to some workers' workstations.

2- However the communal files are used more than two times per a day, workers find difficulty to access them as they are kept far from their workstations.



Storage Unit	Zone	Location
1 Workstation 2 File Cabinet 3 File Cabinet	Hand's Reach Arm's Reach Walking Distance	Inside a Workplace

Fig. 22 Storage's Zone Classifications

File cabinet Type	Information Type			No.
	Personal	Group	Communal	
Wall Unit	●		●	1
	●	●		2
			●	3
	●	●	●	4
Low Unit	●		●	5
	●	●	●	6
	●	●		7

Fig. 23 Files' Types in the File Cabinets

2.2.2 File cabinets' locations in three workplaces

We presented and examined three cases of the visited workplaces as examples in order to show the file cabinets' organization and how the workers reach to them somewhat hardly.

The file cabinets' organization within the first workplace accords with type "A" (Fig. 24). In this workplace, there are three file cabinets "a","a.1" and "b".

First and second cabinets are tall units (the height of each unit is 2100mm). Third cabinet is a low unit (its height is 1200mm). Based on the mentioned files' classification, the files' types within both units "a" and "b" accord with types' numbers 1 and 5 (Fig. 23). Regarding the unit "a.1", some drawers are used to save infrequently used files and other items for a long time (as archive). Other drawers are used for keeping the communal files. The available space in front of units "a" and "b" is not adequate to use them comfortably due to its narrowness (the space in front of each unit is about 400mm). According to the observation and examinations during two days, we presented the move line of one worker inside this workplace as example, in order to know how he reaches to the cabinets and how often he uses them per a day (Fig. 25 – case 1).

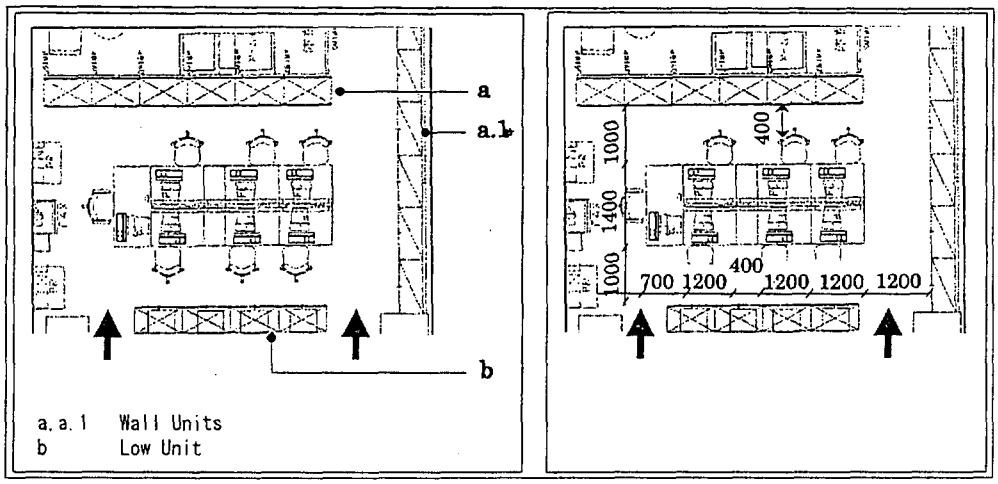


Fig. 24 Storage Units' Locations in the First Workplace

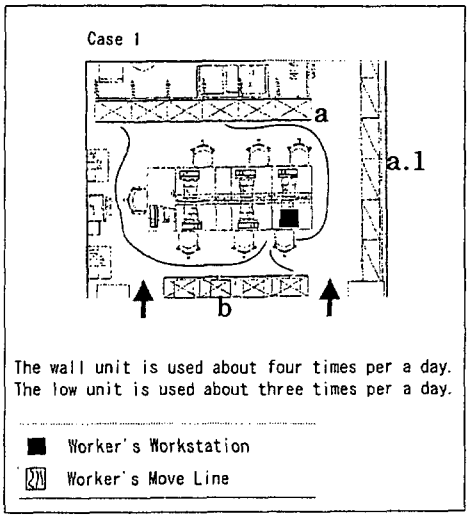


Fig. 25 Worker's Move Line – Case 1

In case 1, a worker mentioned two complaints:

1. The available space in front of "a" and "b" units is limited to use it easily.
2. Unit "a" is somewhat far from his workstation and therefore he keeps frequently used files within his workstation.

The file cabinets' organization within the second workplace accords with type "C" (Fig. 26). There are three lines of the file cabinets "a", "b" and "b.1": first one is a tall unit (its height is 2400mm). Second and third cabinets are low units (the height of each unit is 1200mm). Based on the files' classifications within the file cabinets (Fig. 23), both units "b" and "b.1" are kept the files' types no. 7. Concerning unit "a", its files' types accord with the files' types number 4. Usually the shelves of unit "b" and some of unit "a" are used by the workers of the first group. Workers of the second group use the shelves of unit "b.1" and some drawers of unit "b". The location of unit "a" is inconvenient for the workers of the second group as it is far from their workstations (Fig. 27). Furthermore, an available space in front of it (about 600mm) does not allow them somewhat to use its drawers easily.

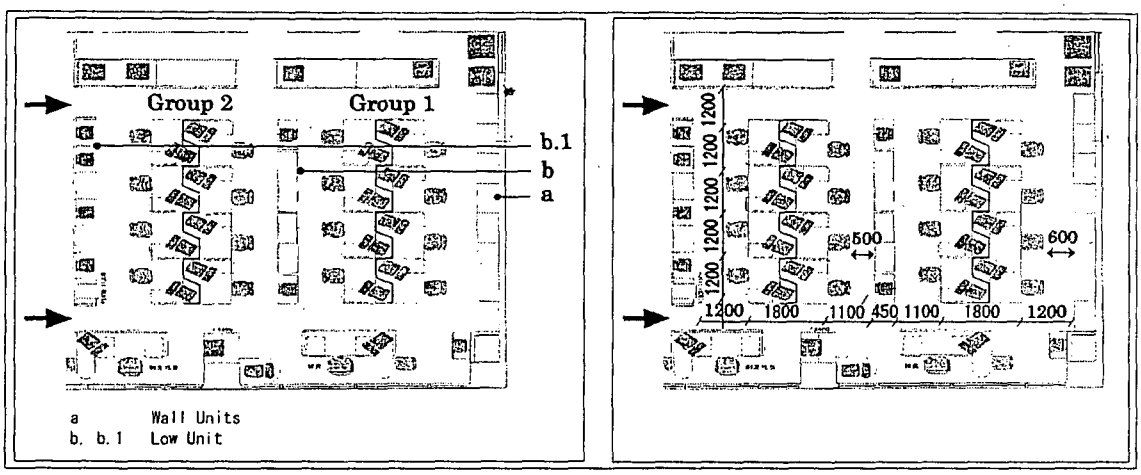


Fig. 26 Storage Units' Locations in the Second Workplace

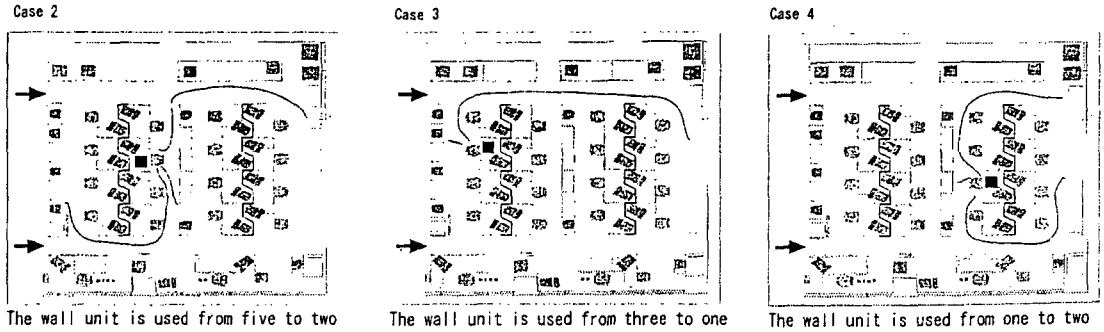


Fig. 27 Workers' Move Line – Cases 2, 3 and 4

The file cabinets' organization within the third workplace accords with type "B" (Fig. 28). There are two tall units, e.g. "A" and "a". The height of each unit is 2400mm. In addition, cabinets "B" and "b" are low units. In the light of the files' classifications (Fig. 23), the files' types inside units "A" and "a" accord with types' numbers 4 and 3 respectively. About units "B and b", their files' types accord with no.7.

In this workplace, we observed that there is another problem related to the location of the file cabinet beside the problems of its space requirements. As it is shown in fig. 29- cases' numbers 5, 6 and 7, the location of the cabinet "a" is not suitable for some

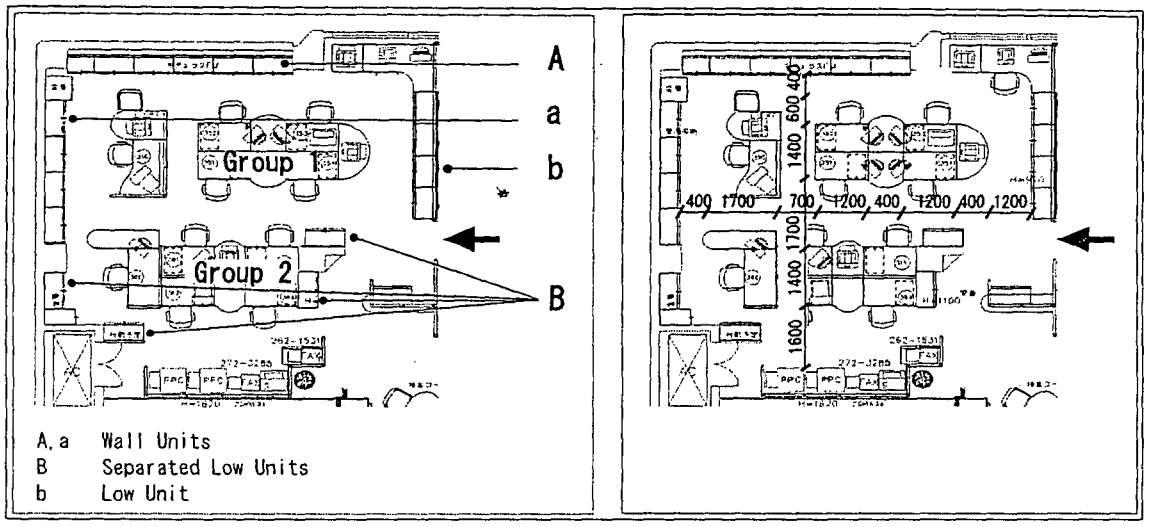


Fig. 28 Storage Units' Locations in the Third Workplace

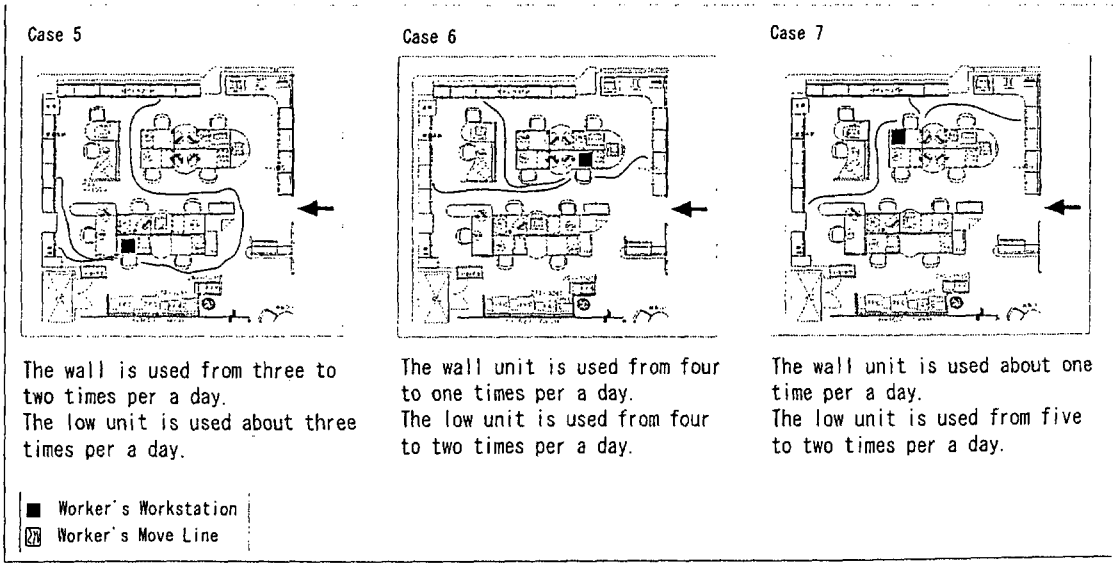


Fig. 29 Workers' Move Line – Cases 5, 6 and 7

workers, as it is located so close to the manger's workstation and therefore they feel somewhat embarrassed during accessing the files.

From the former cases of workplaces and others, we realized that there are two problems related to the file cabinets' location:

1. Distance issue that concerns how far the file cabinet is to the worker's workstation, e.g. close or far.
2. Surrounded area which means the occupied space around the file cabinet.

In order to overcome the previous problems, we recommend some points that might help organizations to select the convenient location for keeping the communal files which are used frequently inside a workplace, so that it could be accessed easily.

2.2.3 Requirements for selecting the location of the communal files

The storage and distribution of office materials is a function of office management policy. It should be considered at an early stage in the planning of the office building [14]. Basically, furnishings and the way they are arranged affect the functionality of the space, the quality of the physical and social environment, individual comfort, and health. Workers are greatly influenced by their physical surroundings inside the workplace [15].

Actually, two factors are important for deciding on an office layout- which means the arrangement of desks, filing cabinets or electromechanical devices for communications, storing or sending documents [16]:

a. The amount of space needed for the number of workers and the tasks performed.
b. Where to put workstations, equipment and storage areas in order to accommodate the workers' needs, so that we might maximize productivity [17].

As the storage units' location has an important effect on the workers' comfort, this study recommends three points for keeping the communal files in a suitable location within a workplace in order to be accessed easily:

1. Distance: fundamentally, the files' distribution among the storage units should be considered frequency of use [18]. We need to keep the frequently used communal file in the closest cabinet to the majority of the workers' workstations so that it can be accessed with no big effort. Office workers need a setting that provides the resources to accomplish their mind's best work- the equipment, information and physical comfort to do their jobs well [15].
2. Space requirement for the file cabinet: the available space in front of the file cabinet has to be regarded for using a cabinet easily.

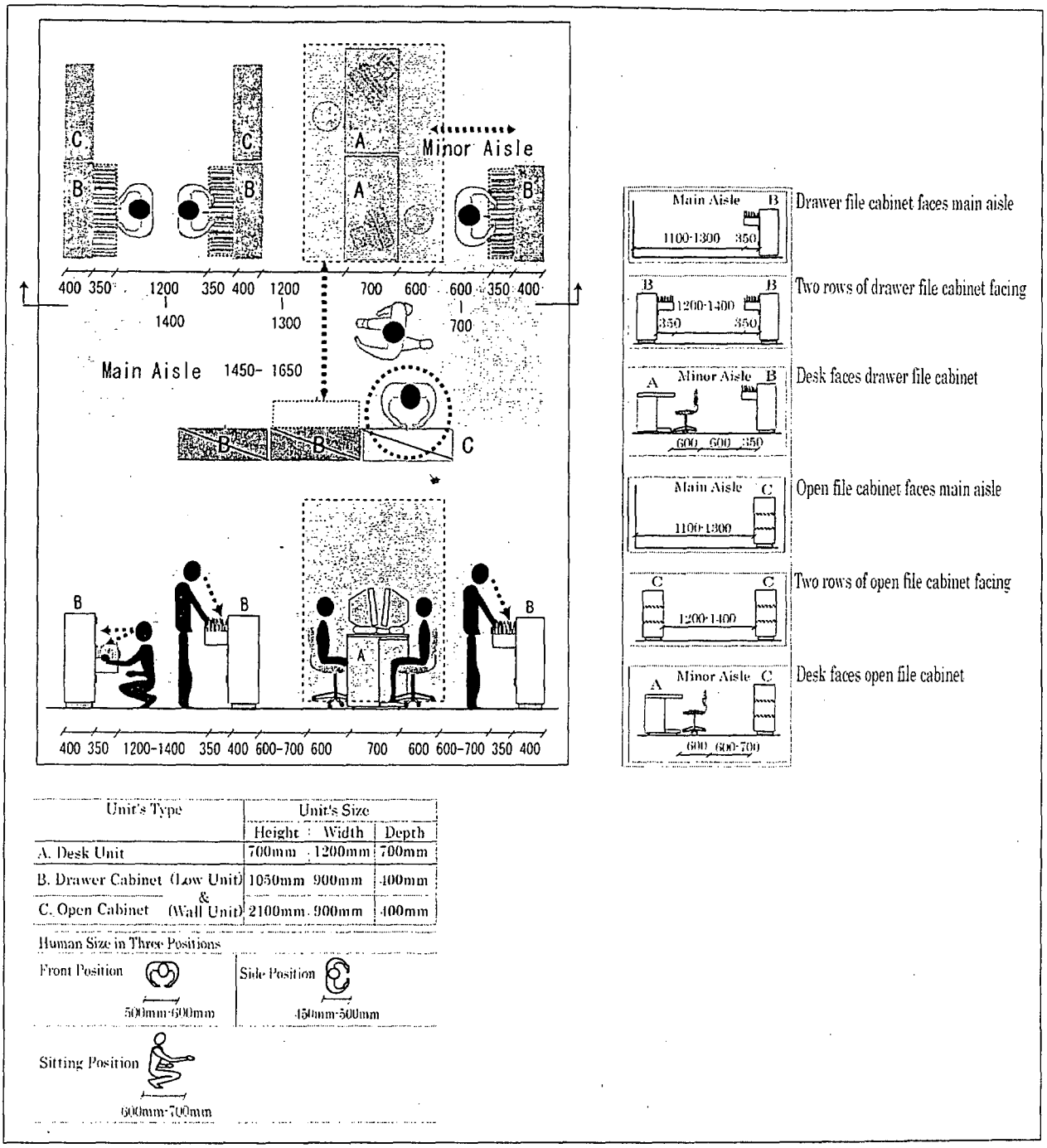
The following are the space requirements for the storage units inside a workplace:
a. The space requirements for a drawer cabinet when it faces a main aisle are ranging from 1450mm to 1650mm. This distance is convenient for using the storage unit well and the main passage too [19, 20].
b. The required distance between two rows of drawer file cabinets facing is ranging from 1900mm to 2100mm. This distance is adequate for using two file cabinets easily in the same time [14].
c. The required distance between a desk and drawer file cabinet is about 1550mm. This distance is adequate for the space requirements of storage unit as well as the worker's chair [10, 19].
d. Either open or slide cabinet faces the main aisle, the space requirements are ranging from 1100mm to 1300mm. This distance is required for using the file cabinet and the main passage comfortably [14].
e. Two rows of open file cabinet facing, the space requirements are ranging from 1200mm to 1400mm. This distance is convenient for using both file cabinets in the same time freely [14, 19].
f. The required distance between a desk and either open or slide cabinet is ranging from 1100mm to 1300mm. This distance is suitable for the space requirements of the file cabinet and the worker's chair [14].

The recommended distance of each previous case considers the file cabinet type and its location inside a workplace (Fig. 30).

3. The surrounded area: it concerns the file cabinet's location in relation for example to the manager's desk. Based on the opinions of about thirty workers, we found that the communal file cabinets' places are not required to be close to the managers' workstations for avoiding the workers from the feeling of tension and stress which generates when they meet their directors.

The advised three points have been used in the visited workplaces so as to determine the convenient location for keeping frequently used communal files. The workplaces that were previously presented in this study (part 4-2) are used again as examples.

In the first workplace (Fig. 31), the file cabinets are located in the front, back and right side of the workplace. The left side is excluded, as it is devoted for another purpose. The selection of convenient cabinet's location for keeping frequently used communal files has been determined by measuring the distance between each cabinet and the workers' workstations - the distance was measured from the workplace's plan. In the light of these measurements, we detected that however the units "a" and "b" are closer to the workstations' numbers 5, 4, 3 and 2 than unit "a.1" which is close to the



Unit's Type	Unit's Size		
	Height	Width	Depth
A. Desk Unit	700mm	1200mm	700mm
B. Drawer Cabinet (Low Unit) & C. Open Cabinet (Wall Unit)	1050mm	900mm	400mm
	2100mm	900mm	400mm

Human Size in Three Positions

Front Position 500mm-600mm

Side Position 450mm-500mm

Sitting Position 600mm-700mm

Fig. 30 Space Requirements for the File Cabinet

workstations' numbers 6, 7 and 1 (Fig. 32). The latter cabinet is suitable for keeping the communal files than the former one because the available space in front of it (1200mm) is somewhat adequate to be used comfortably (Fig.33). The following are examples of the distance between some workstations and the cabinets "a" and "a.1".

1. The distance between the workstation number 5 and the central point (●) of unit "a" is about 4400mm. But it is about 4600mm between the same workstation and the central point (○) of unit "a.1".
2. The distance between the workstation number 6 and the central point (●) of unit "a" is about 5800mm. But it is about 3300mm between the same workstation and the central point (○) of unit "a.1".
3. The distance between the workstation number 7 and the point (●) of unit "a" is about 4600mm. But it is about 2200mm between the same workstation and the central point (○) of unit "a.1".

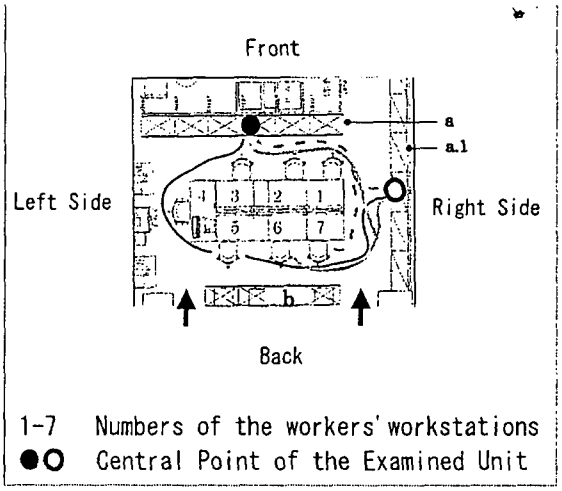


Fig. 31 Examination Concerning the Distance Between the File Cabinets and the Workers' Workstations

Desk No.	Distance from the desk to the Point ●	Distance from the desk to the Point ○	Best Location
1	1000+ 900+ 900= 2800mm	1200mm	○
2	1200+ 450= 1650mm	1200+ 1200= 2400mm	●
3	1000mm	1200+ 1200+ 1200= 3600mm	●
4	1000+ 900= 1900mm	1200+ 1200+ 1200+ 1200= 4800mm	●
5	700+ 1400+ 1000+ 900+ 400= 4400mm	1200+ 1200+ 1200+ 1000= 4600mm	●
6	1200+ 1400+ 1000+ 1800+ 400= 5800mm	1200+ 1200+ 900= 3300mm	○
7	1400+ 1000+ 1800+ 400= 4600mm	1200+ 1000= 2200mm	○

● ○ Examined Cabinet

Fig. 32 The Distance Between Each Workstation and the File Cabinets Inside the First Workplace

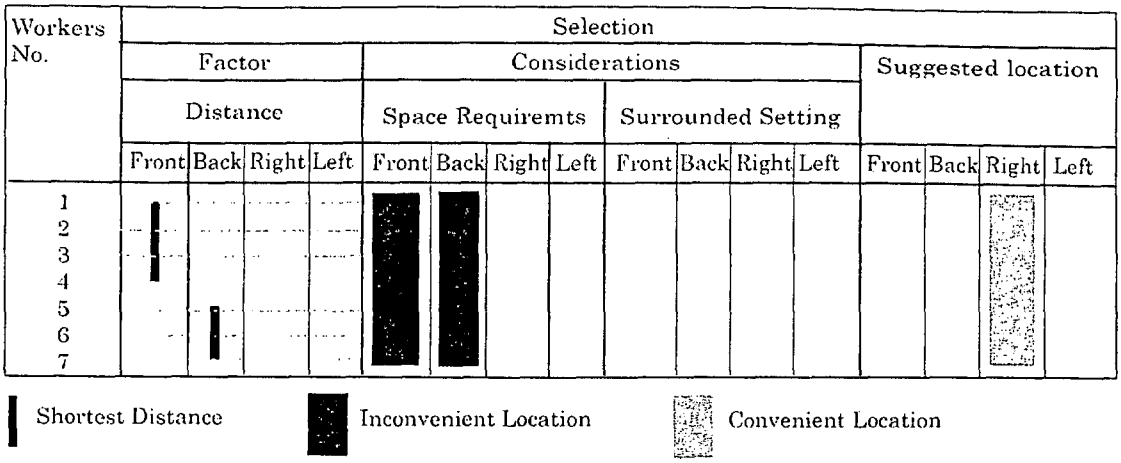


Fig. 33 Suggestion Concerning the Communal Files' Location in the First Workplace

In the second workplace (Fig. 34), the file cabinets are located in the front, center and back of the workplace. The left and right sides are excluded because they are devoted for other purposes. The selection of convenient cabinet location for keeping frequently used communal files has been determined by measuring the distance between each cabinet and the workers' workstations - the distance was measured from the plan of the workplace (Fig. 35). In this workplace, both left and right sides are the most convenient locations for placing a storage unit as they are close to 69% of the workers' workstations. The following are examples of the distance between some workstations and the central points (●) and (○) of units "a" and "a.1" respectively in the suggested location.

1. The distance between the workstation number 1 and the central point (●) of unit "a" is about 10150mm. But it is about 4550mm between the same workstation and the central point (○) of unit "a.1".
2. The distance between the workstation number 8 and the central point (●) of unit "a" is about 7450mm. But it is about 6350mm between the same workstation and the central point (○) of unit "a.1".
3. The distance between the workstation number 12 and the point (●) of unit "a" is about 4800mm. But it is about 5900mm between the same workstation and the central point (○) of unit "a.1".

Since, the storage units in the front and back of the workplace are far from the majority of the workers for accessing the files, furthermore both left and right sides are not available to be used, this study suggests that the frequently used files are kept in the cabinet which is located in the center (Fig. 36).

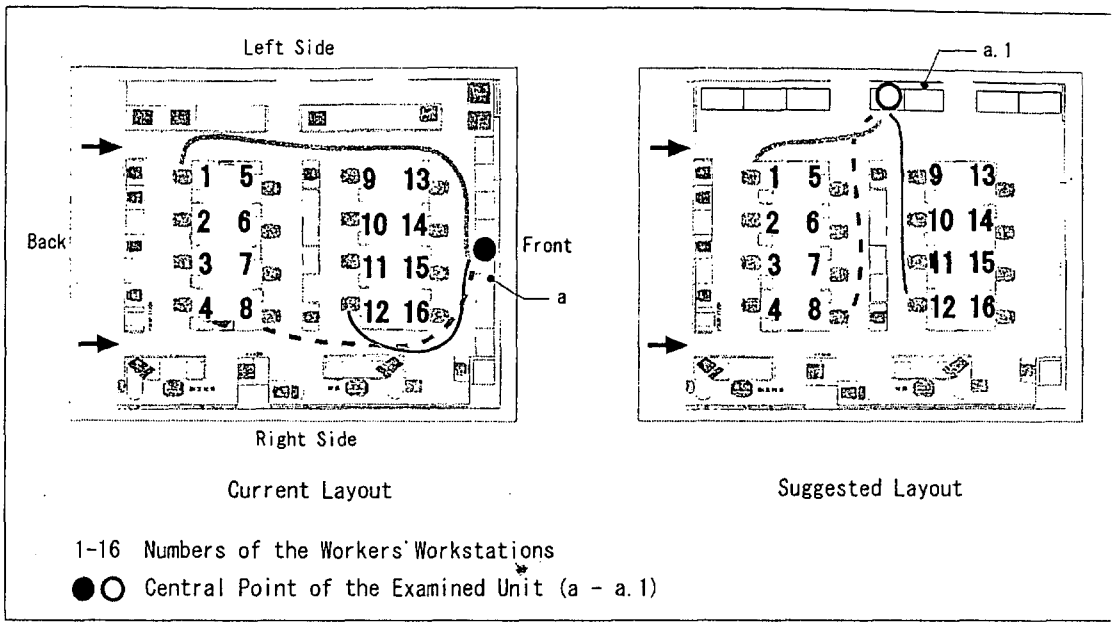


Fig. 34 Examination of the Distance Between the File Cabinets and the Workers' Workstations

Desk No.	Distance from the desk to the Point ●	Distance from the desk to the Point ○	Best Location
1	1800+ 1100+ 450+ 1100+ 1800+ 1200+ 900+ 900+ 900= 10150mm	1800+ 1100+ 450+ 1200= 4550mm	○
2	1200+ 1800+ 1100+ 450+ 1100+ 1800+ 1200+ 900+ 900+ 900= 11350mm	1200+ 1800+ 1100+ 450+ 1200= 5750mm	○
3	1200+ 1800+ 1100+ 450+ 1100+ 1800+ 1200+ 1800 = 10450mm	1200+ 1200+ 1200+ 1800+ 450+ 1100= 6950mm	○
4	1800+ 1100+ 450+ 1100+ 1800+ 1200+ 900+ 900= 9250mm	1200+ 1200+ 1200+ 1800+ 1100+ 450+ 1200= 8150mm	○
5	1100+ 450+ 1100+ 1800+ 1200+ 900+ 900+ 900= 8350mm	1100+ 450+ 1200= 2750mm	○
6	1200+ 1100+ 450+ 1100+ 1800+ 1200+ 1800+ 900= 9550mm	1200+ 1100+ 450+ 1200= 3950mm	○
7	1200+ 1100+ 450+ 1100+ 1800+ 1200+ 900+ 900= 8650mm	1200+ 1200+ 1100+ 450+ 1200= 5150mm	○
8	1100+ 450+ 1100+ 1800+ 1200+ 900+ 900= 7450mm	1200+ 1200+ 1200+ 1100+ 450+ 1200= 6350mm	○
9	1800+ 1200+ 900+ 900+ 900= 5700mm	1100+ 1200= 2300mm	○
10	1200+ 1800+ 1200+ 1800+ 900= 6900mm	1200+ 1200+ 1100= 3500mm	○
11	1200+ 1800+ 1200+ 900+ 900= 6000mm	1200+ 1200+ 1100+ 1200= 4700mm	○
12	1800+ 1200+ 900+ 900= 4800mm	1200+ 1200+ 1200+ 1100+ 1200= 5900mm	●
13	1200+ 900+ 900+ 900= 3900mm	1800+ 1100+ 1200= 4100mm	●
14	1200+ 900= 2100mm	1200+ 1800+ 1100+ 1200= 5300mm	●
15	1200mm	1200+ 1200+ 1800+ 1100+ 1200= 6500mm	●
16	1200+ 900+ 900= 3000mm	1200+ 1200+ 1200+ 1800+ 1100+ 1200= 7700mm	●

● ○ Examined Cabinet

Fig. 35 The Distance Between Each Workstation and the File Cabinets Inside the Second Workplace

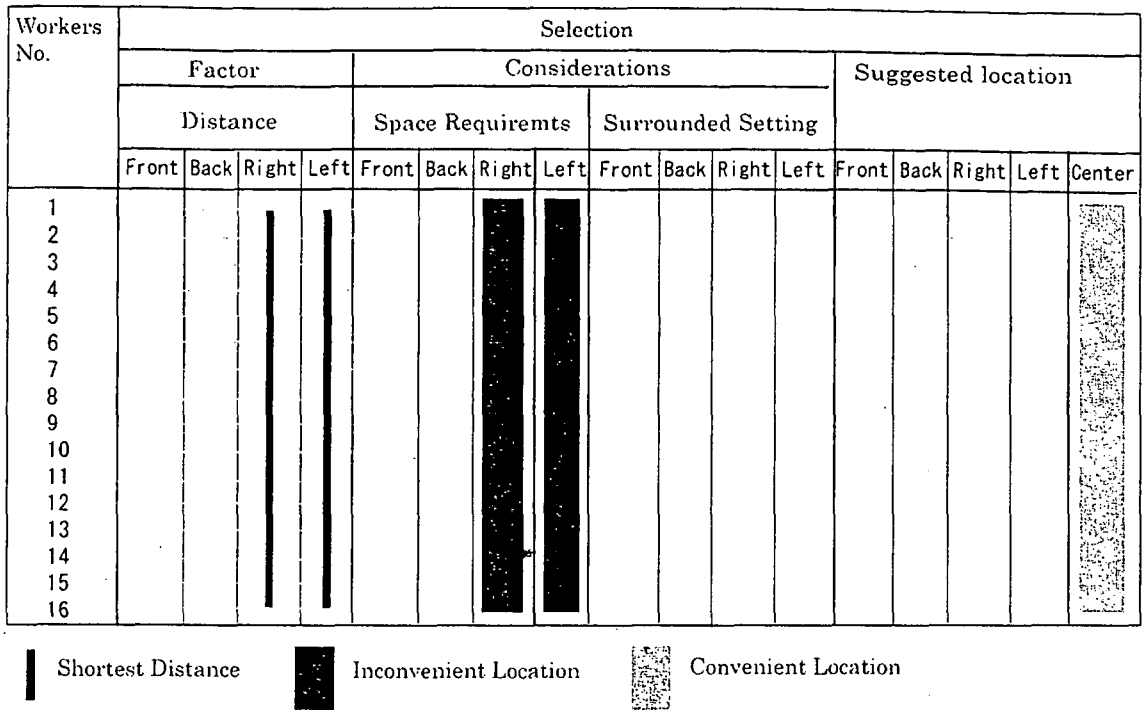


Fig. 36 Suggestion Concerning the Communal Files' Location Inside the Second Workplace

In the third workplace (Fig. 37), we suggest separating the manager's workstation of group 2 from the workers' workstations to offer this group with a minor aisle for moving around freely. In this workplace, the file cabinets are located in the front, back and right sides. The left side is not available to be used (Fig. 38). As the cabinet "a" is too close to the managers' workstations, furthermore the space requirements for using it are not convenient. Therefore, it is not the recommended storage unit to keep frequently used communal files. Based on measuring the distance between the cabinets "A", "b" and the workstations from this workplace's plan, we found that the location of cabinet "A" is suitable for the workstations' numbers 7, 5, 3 and 1 to access the files easily. For the same purpose, the location of cabinet "b" is proper for the workstations' numbers 8, 6, 4 and 2 (Fig. 39). The following are examples of the distance between the previous cabinets and some workstations.

1. The distance between the workstation number 1 and the central point (●) of unit "b" is about 7000mm. But it is about 5500mm between the same workstation and the central point (○) of unit "A".
2. The distance between the workstation number 4 and the central point (●) of unit "b" is about 4000mm. But it is about 5700mm between the same workstation and the central point (○) of unit "A".

3. The distance between the workstation number 8 and the point (●) is about 2300mm. But it is about 2800mm between the same workstation and the point (○).

In the light of the previous measurements, we recommend unit "b" rather than unit "A" for keeping frequently used communal files, as the space requirements for the former unit are better than the latter one (Fig. 40).

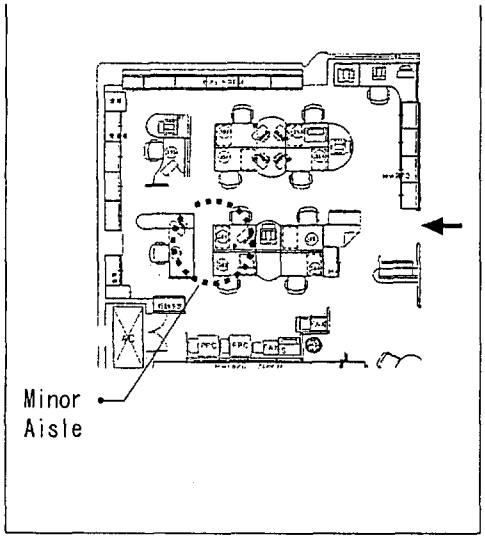


Fig. 37 **Suggested Layout for the Third Workplace**

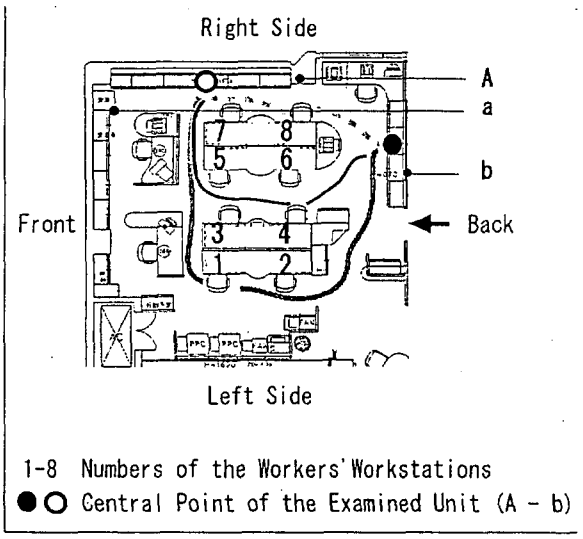


Fig. 38 **Examination of the Distance Between the File Cabinets and the Workers' Workstations**

Desk No.	Distance from the desk to the Point ●	Distance from the desk to the Point ○	Best Location
1	400+ 1200+ 1400+ 1700+ 700+ 400+ 1200= 7000mm	1400+ 1700+ 1400+ 1000= 5500mm	○
2	1400+ 1700+ 700+ 400+1200= 5400mm	1200+ 1400+ 1700+ 1400+ 1000= 6700mm	●
3	400+ 1200+ 1700+ 700+ 400+ 1200= 5600mm	1700+ 1400+ 1000= 4100m	○
4	1700+ 700+ 400+ 1200= 4000mm	400+ 1200+ 1700+ 1400+ 1000= 5700mm	●
5	400+ 1200+ 700+ 400+ 1200= 3900mm	700+ 1000= 1700mm	○
6	700+ 400+ 1200= 2300mm	400+ 1200+ 1400+ 1000= 4000mm	●
7	400+ 1200+ 400+ 1200+ 700= 3900mm	1000mm	○
8	400+ 700+ 1200= 2300mm	1000+ 900+ 900= 2800mm	●

● ○ Examined Cabinet

Fig. 39 **The Distance Between Each Workstation and the File Cabinets Inside the Third Workplace**

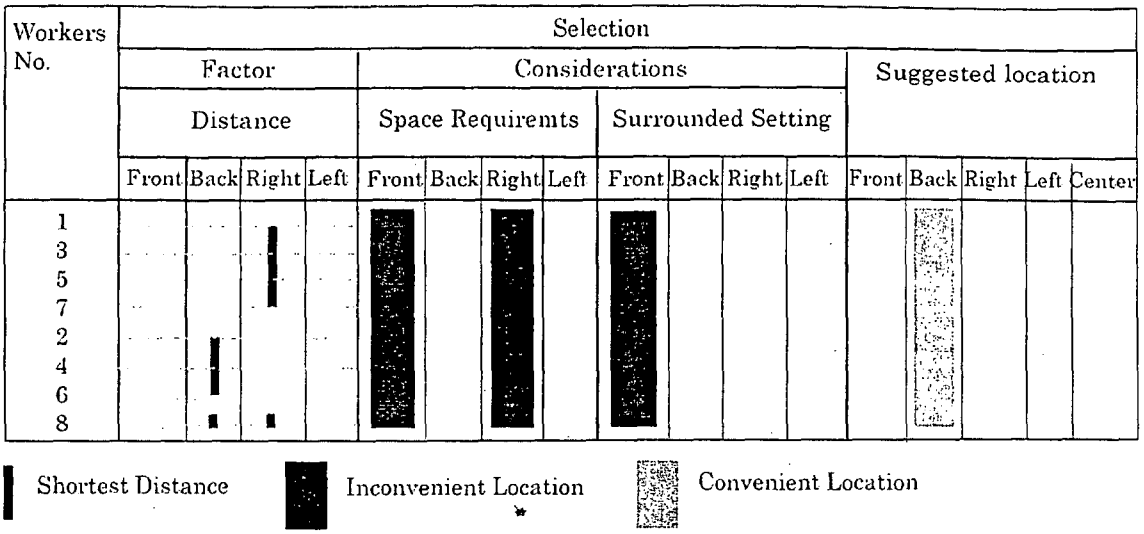


Fig. 40 Suggestion Concerning the Communal Files' Location Inside the Third Workplace

The results of the survey within five workplaces in Tokyo and Fukuoka revealed that the files' distribution among the storage units has to regard frequency of use in addition to the ownership of file. On the other hand, the selection of the convenient location of the file cabinets for keeping frequently used communal files should not only consider its vicinity to the majority of the workers' workstations but also the space requirements for the filing cabinets as well as the surrounded area have to be regarded.

The following are concerning the third problem of the communal storage system in the visited workplaces.

2.3 Storage unit capacity

According the results of the surveys that were accomplished through the previous parts of this research, we recommend the following points so as to reduce the paper amounts inside a workplace and increase the storage space as well.

a. Reduce the retention period of files inside the file cabinets: as it was mentioned in the previous chapter of this part that the files are kept long time within a file cabinet (from six months to one and a half year) and therefore there is not sometimes enough space for keeping the next documents. In order to decrease the retention period of files in the storage unit, we have to consider how often the files are used [6]. For example, frequently used file could be kept inside the workplace until its employment is decreased regularly. As for infrequently used files, they should be transferred to the archives.

b. Promote the use of electronic storage: digital media has strong effect for reducing the paper amounts inside a workplace [21] (See the previous chapter of this part, p. 80).

c. Encourage sharing information: actually, it is becoming more and more important to share information in the workspace, in team spaces and in the group storage areas for promoting human interaction as well as for reducing the papers' amounts [9, 22].

There are different ways to share the information inside the workplace. Organizations are required to encourage both acoustic and visual means to transfer the information to the workers rather than using a paper for each worker.

As for acoustic information, sound is one of the many ways we communicate [23]. In the workplace, information could be transferred to the workers by face - to - face communication. This means is often the medium that supports information sharing, creativity, and problem solving. Moreover, it helps building trust, closer relationships, and a sense of community [24].

Concerning the visual display, information could be transferred to the workers by using, e.g. a white board and poster. Visual display is important to help workers to develop a shared mind and shared memory [25].

d. Select a convenient file tool: based on the results of the competitive studies between the file tools, e.g. a binder, folder and file box (See part 2, p.13), we recommend a file box rather than a binder to keep the big amounts of documents within a storage unit. The results of survey revealed that the storage capacity might increase about 27% by using a file box.

e. Use a divider: it is essential to use a divider in order to save and stretch the storage space. As it was mentioned in the previous chapter of this part (See p.82) that a divider could save about 63% of the storage unit space.

Generally, the former points are necessarily required in order to find a home for each paper inside a workplace.

3. Conclusion

It can be concluded from this chapter that the problems of the file cabinets in five accounting division's workplaces concern the files' accessibility and the capacity of storage unit:

1. Files are not displayed and distributed well within the storage units and therefore workers lose a lot of time to find what they need.
2. The cabinets' locations inside the workplaces are not adequate for some workers to access frequently used files as the cabinets are far from their workstations.
3. Storage units are overloaded by documents.

This chapter focused almost on the first and second problems, as they are identified as the main problems of the communal file cabinets in these workplaces.

Basically, organizing the files in the workplace aims to find a place for each paper and each paper in its place. Consequently, we might save our time and effort.

For overcoming the first problem, this chapter recommends six tips to display the documents well, so that a person can find what he/she wants quickly. First one is applying the filing system clearly with each folder by using labeling and coding systems. Moreover, labeling each drawer is required as well. Second tip is by arranging the files well. For displaying the files clearly and saving the storage capacity, place the files horizontally within a cabinet and arrange them from front to back. Third tip is by selecting the file tools carefully. The label size of the file tools has played an important part for displaying the document's contents well. Fourth tip is by using a divider in order to differentiate between several groups of folders. Fifth tip concerns creating a list of the files' titles, so that a worker can determine the location of file without searching inside a drawer. Sixth tip is by selecting the convenient storage unit type that makes the frequently used files in sight.

On the other hand, we recommend that the distribution of the files among the shelves of the storage unit must consider how often the files are used. This chapter demonstrated that the fourth, third and fifth shelves respectively are convenient for keeping frequently used files in order to be accessed easily.

For overcoming the second problem, we detected according to the survey that the storage units' organization within the workplace (space planning) is not only the main reason that generates the problem of locating the files far from the workers, but also the files' distribution among the storage units (filing management) considers an important reason for its occurrence. We recommend that the files should be kept in a convenient place within the workplace. To determine this place, there are three points have to be kept in mind:

a. The distance between the file cabinet and the majority of the workers' workstations.
b. The space requirements for the file cabinet, in other words the available space in front of the file cabinet for opening and using its drawers comfortably.

c. Surrounded settings relate to the location of a file cabinet inside the workplace. For example, psychologically, the location of the communal file cabinet is not required to be close to the manager's workstation to prevent the feeling of tension and stress which generates when the workers meet their mangers.

To overcome the third problem that regards the storage capacity, we recommend six points:

A. Reduce the retention period of files inside the cabinet according to how often a file is used.
B. Promote the usage of digital storage.
C. Encourage sharing information that could be transferred to the workers acoustically and visually.
D. Select convenient file tools.
E. Arrange the files horizontally as the capacity of one shelf within the file cabinet could be increased about 2% by using this arrangement type. Moreover, in the drawer cabinet, arrange the file boxes from front to back in order to increase the capacity of each drawer about 14%.
F. Use a divider, so as to save about 63% of the storage unit space.

4. Summary

The purpose of this study is to identify the main problems of the communal storage system in the workplace and introduce the reasons that led to their occurrence. Furthermore, we aim to recommend solutions in order to overcome these problems. For case studies, we visited five accounting division workplaces within Japanese companies in Tokyo and Fukuoka to evaluate the communal storage system concerning types, size, capacity and locations. In addition, the files' organization and their display through the storage units were examined as well. Based on the observation, hearing and making a questionnaire, the following are the major findings resulting from this study:

The communal storage system has three problems in the visited workplaces. The main problems that have high percentage of complaints are related to file accessibility: first one refers to file organization and display inside a cabinet. Second problem concerns the organization of the file cabinets within a workplace. As for the third problem, it relates to the storage capacity.

First problem of finding difficulties to access the files from the file cabinets generates because of two reasons:

1. The display of the files is not well to find the needed file quickly.
2. The distribution of the files among the storage shelves is not somewhat adequate for the workers.

Therefore, six tips are firstly recommended in order to display the files clearly within a storage unit:

A. Apply clear labeling and coding systems with each document.
B. Arrange the files in the drawer cabinet from front to back according to frequency of use. In addition, keep them within a storage unit horizontally for a clear display as well as increasing the storage capacity about 2%.
C. Select file tools carefully.
D. Use a divider to distinguish between several groups of folders.
E. Make a list of files which are kept in each storage unit in order to help a worker to know the location of required file without searching in all the drawers.
F. Select a suitable storage unit type that might display the documents' contents clearly.

Secondly, in order to distribute the files among the shelves within a storage unit well, the results of the experiment that was carried out on 20 persons revealed that the frequently used files are required to be kept on the fourth, third and fifth shelves respectively, as their heights are appropriate for the Japanese human height.

As for the second problem of the communal storage system which concerns the cabinets' organization and the files' location within a workplace, three points have to be considered for overcoming this problem:

a. The distance between the file cabinet and the workstations. The frequently used communal file should be kept within the closest cabinet to the majority of the workers, so that it could be accessed comfortably.
b. The available space in front of the cabinet is a critical factor for employing it with ease.
c. The area around the file cabinet has to suit for the workers. This study detects that the communal storage units are not preferable to be located close to the mangers' areas due to psychological factor.

Regarding the third problem of the communal storage system which concerns how to find a space for each paper, six points are recommended as follows: first, the reduction of the paper amounts inside the workplace, in order to save enough space for the next papers is by decreasing the retention period of the documents inside the file cabinet. Frequency of use is an important key to reduce this period. Second, encourage workers to record the information in the digital storage. Third, encourage sharing information to decrease the amounts of papers inside a workplace. Fourth, select convenient file tools. Fifth, arrange the files horizontally within the storage unit. Sixth, use a divider to keep the folders always standing vertically as the diagonal status of folder takes up a large space within a storage unit.

References

1. Julie Morgenstern. Organizing From the Inside Out, Henry Holt and Company, USA, 85, 86, 87, 77, 108 (1998).
2. Michael S. Wogalter, William J. Vigilante. Effects of Label Format on Knowledge Acquisition and Perceived Readability by Younger and Older Adults, An International Journal of Research and Practice in Human Factors and Ergonomics, Vol. 46, No. 4, 342 (March - 2003).
3. Ronni Eisenberg with Kate Kelly. Organizing your office, Hyperion, USA, 77, 119, 134 (1998).
4. Itoki Filing Lab. Practical Filing System- Information Organizing Technique, Yuhikako Business, 75 (1986).
5. Odette Pollar. Organizing Your Work Space, Crisp, USA, 22, 38 (1999).
6. Liz Davenport. Order From Chaos, Three River Press, USA, 30, 32, 41, 47, 207 (2001).
7. Jules Davidoff. The Role of Color in Visual Displays International Reviews of Ergonomics, Vol. 1, 36 (1987).
8. Toni Ivergard. Handbook of Control Room Design and Ergonomics, Taylor & Francis, 57 (1989).
9. Steelcase Report. Creating Order Out of Chaos, USA, 17 (2000).
10. Architectural Institute of Japan (AIJ). Handbook of Environmental Design, Murata Seishiro, Japan, 024, 056 (January- 2003).
11. Noro Kageyu. Illustrated Ergonomics, Japanese Standards Association (JIS), Japan, 103 (February- 1990).
12. Kohara Jiro, Kato Tsutomu, Ando Masao. Planning and Design of Interior, Shokokusha, Japan, 46 (April- 1986).
13. Okamura Catalog- Office Filing, 9 (January- 1996).
14. Francis Duffy, Colin Cave, John Worthington. Planning Office Space, Architectural Press, UK, 164, 94, 95 (1979).
15. Stan Aronoff, Audrey Kaplan. Total Workplace Performance- Rethinking the Office Environment, WDL Publications - Ottawa, Canada, 127, 360 (April- 1995).
16. James H. Stramler, Jr. The Dictionary for Human Factors/ Ergonomics, CRC Press, 232 (1993).
17. Queensland Government. Office Layout, Workplace Health and Safety Queensland – Ergonomics Safety Link, 2 (March- 1998).
18. Pamela Brenner. Motivating Knowledge Workers- the Role of the Workplace, 3, 4 (January- 1999).
19. Facility Management Promotion and Communication Associations. Facility Management Guidebook, Nikkan Kogyou Newspaper, Japan, 363 (2001).

20. Kato Tsutomu, Shingo Ando, Jyunichi Seike, Kiyonori Okura, Kouji Yanafu. The Planning & Design of Office Interior, KBI, Japan, 77 (1992).
21. Tim Ostler. The Office, Design, Issue 542, 42, 43 (February- 1994).
22. New Office Promotion Association (NOPA). Case studies of new offices of 13th Nikkei Office Award, 10 (March- 2001).
23. Victoria Jordan. The Organization of the 21st Century, Lessons in Protactive Management, Design, Issue 541, 10 (January- 1994).
24. Steelcase Report. The Power of Sound, Workplace Acoustic, USA (2000).
25. Steelcase Report. Collaboration- the Culture of Teams, USA (1996).