Research Report No. 163
September 2003

Information Technology Development and Changes in Employment and Personnel Management: Effect on White-Collar Workers' Work and Workplaces

(Summary)

Japan Institute of Labour

Members of the Study Group and Authors

(in alphabetical order)

Name	Affiliation	Chapters
Kiyoshi Igarashi	Member of Central Executive Committee, Japanese Trade Union Confederation	
Naoto Ohmi	Permanent Member of Central Executive Committee and Director of Policy Bureau, Japanese Federation of Textile, Chemical, Food, Commercial, Service, and General Workers' Unions	
Oh Hak-Soo	Researcher, Japan Institute of Labour	Part 2: Chap.1, 2 Part 4
Sumio Egami	Assistant Research Director, Japan Institute of Labour	
Tomoyo Takagi	Doctor's Course, Graduate School of Social Sciences, Hitotsubashi University	Part 1 Part 2: Chap.1, 3, 4 Part 3, 4
Katsutoshi Suzuki	President, Japan Council of Metalworkers' Unions IMF-JC	Part 2: Chap.6
Tadashi Hanami (Chairman of the Study Group)	Chairman, Japan Institute of Labour	
Nobuhiko Maeda	Associate Professor, College of Social Sciences, Ritsumeikan University	
Yasuhiko Matsui	Advisor, National Union of General Workers	
Motohiro Morishima	Professor, Graduate School of Commerce and Management, Hitotsubashi University	Part 2: Chap.3, 5
Shinobu Wajima	Employment & Personnel Management Group Manager Nippon Keidanren	

(The titles of authors and the names of organizations are current as of the time of writing.)

Outline of the Survey and the Results

I. Introduction

During the 1990s, information technology (IT) rapidly spread in workplaces around the world. The IT-advanced U.S. ushered in the era of sustainable non-inflationary economic growth powered by IT, as the theory of new economy emerged as opposed to the old economy. On the other hand, the degradation of the occupational life of some segments of workers, as the result of the digital divide (gaps in incomes and employment opportunities based on IT skills) for instance, became evident as new social issues. Consequently, new labor union movement for improving worker life in the U.S. arose with the advance of IT.

A U.S. research institute prepared a report on the new trends of industrial relations in the U.S. in response to the expansion of IT. In Japan, a study group on the "industrial relation in the New Economy" was established within the Japan Institute of Labour (JIL) to elucidate the changes in work and workplaces and the situation related to labor relations in Japan. This report compiles the results of the study group's research.

II. Background and objective

The new information technology (IT) has had such an extensive influence on the industry that it is even sometimes called the "third industrial revolution." IT has created new demands by developing new products and pioneered the production frontier by bringing about changes in production technology and processes. But its influence has not been limited to that. The most significant feature of IT in comparison to other technology is the extensiveness and depth of its influence and the speed at which it is spreading. In a previous survey conducted in 1996 (Policy Planning and Research Department, Minister's Secretariat, Ministry of Labour, 1996), slightly more than 30 percent of the companies surveyed had installed a computer for every two to three employees. In the current survey, in contrast, the percentage was 80 percent. Moreover, whereas the percentage of companies that had a computer for every employee was less than 10 percent five years ago, the percentage in the current survey was close to 50 percent. As IT is spreading rapidly, there is a need to understand that the nature of its effect is also changing every moment.

Another important feature of IT is that it is not limited to the use of computers and other information devices. For example, it makes routine work more efficient by

digitizing information and through the use of in-house and external networks. It also enhances the quality of core jobs and creative jobs that directly influence business administration (Higuchi, 2001; JIL, 2001; Policy Planning and Research Department, Minister's Secretariat, Ministry of Labour, 1996). Furthermore, IT enables quick decision-making and communication not bound by time and space (JIL, 1997). It has already been pointed out in previous reports that these characteristics of IT have changed the corporate structure and had no small effect on the human relations at workplaces and on the quality and volume of employment and labor (Employment and Human Resources Development Organization of Japan and Employment Information Center, 2001; Sanwa Research Institute Corporation, 2001; Employment and Human Resources Development Organization of Japan and Fuji Research Institute Corporation).

One of the objectives of this survey is to clarify the impact of IT on work and workplaces. As it is indisputable that IT will continue to evolve further, the current survey, just as previous ones, can only capture the "current changes" in the development of IT (this was also pointed out by Tao, Yoshikawa, and Takagi, 1996). Nevertheless, understanding these changes is essential in considering what would be the ideal workplace, foreseeing the effect on employment and labor, and setting a direction for new labor-management relations.

In the current survey, analyses are also made from another angle. In the face of globalization, declining birthrate, ageing population, and prolonged recession in addition to the spread of IT, Japan is undergoing change of the economic and industrial structure. In this context, both companies and employees are looking at new ways of employment and work. For example, it was pointed out in the previous surveys that IT had led to reduction in clerical workers and increased utilization of non-regular employees (Sanwa Research Institute Corporation, 2001; Policy Planning and Research Department, Minister's Secretariat, Ministry of Labour, 1996). Also reported was that the sense of unity within a workplace declined and discretion of each employee increased in IT-advanced workplaces (Employment and Human Resources Development Organization of Japan and Employment Information Center, 2001; JIL, 1997). However, it may be possible to argue that these changes were not necessarily brought about by the advent of IT. It can also be surmised that these changes were caused by companies' personnel management policies adopted in response to the change in employment structure under the globalization, declining birthrate, ageing population, and prolonged recession mentioned above, or the changing economic and industrial structures undertaken within such context.

It is true that unprecedented changes are occurring to employment and labor in

today's Japanese companies. It is, however, difficult to determine whether such changes are the result of IT or changes in companies' personnel and employment management policies under the current economic environment. Nonetheless, we should, at least, strive to explain the current state of work and workplaces of Japanese companies and to distinguish between IT and companies' personnel and employment management policies as causes of the changes, in order to gain perspective. Therefore, we aim in this survey to obtain an overall picture of the changes in white-collar workers' work and workplaces and elucidate the factors affecting them as much as possible by trying to answer the questions set above through the analyses of the survey data.

In sum, the current survey has two objectives. The first is to explain in detail the degree to which IT has spread in the workplaces and the changes brought about to work and workplaces of white-collar workers, who are apparently most influenced by IT. This theme and the methodology used are the same as those in the previous surveys. Therefore, by comparing the results of the current and previous surveys, the reader will be able to chronologically grasp the spread of IT and the changes effected on labor.

The second is to carefully analyze the identified changes in white-collar workers' work and workplaces not only from the aspect of the advancement of IT, but also from the aspect of changes in companies' employment and personnel management policies. The analyses will be made to better understand the current state of affairs and to obtain an outlook for the future. The survey was designed to conduct a general analysis of the effect on white-collar workers' work and workplaces of changes in personnel management policies, such as introduction of personnel management based on individual employees' performance, and changes in the state of employment, such as an increase in the number of middle-aged and older workers and in the use of non-regular employees. As a result, some interesting findings were discovered that had not been noticed before.

III. Subject and method

1. Subject of the survey

Japanese companies, from all regions of the country, that had been established for more than 10 years and that had more than 100 employees were made the subject of this survey. From Teikoku Databank Ltd.'s company data files (COSMO2), 300 companies were randomly selected in five company size categories (companies with 100 to 299 employees, 300 to 499 employees, 500 to 599 employees, 1,000 to 2,999

employees, and 3,000 or more employees), bringing the total to 1,500 companies. Because one of the objectives of the survey is to comprehend the changes brought about by IT on work and workplaces, we considered that companies that had launched out of the early unstable period soon after their establishment should be targeted. As a result, a high percentage of respondent companies were large companies.

Seven copies of a questionnaire were sent to the personnel department of 1,500 companies, a total of 10,500 copies. The personnel department of each company was asked to distribute the questionnaires to seven departments within their company, namely (1) sales, (2) personnel, labor relations, and training, (3) management and planning, (4) general affairs, public relations, and secretarial, (5) accounting and finance, (6) R&D, design, and technology, and (7) information processing and systems, in order to ensure a balance between different job types. Employees in each department were requested to fill in the questionnaire and mail it back directly to JIL.

Prior to the questionnaire survey, an interview survey was conducted from July to August 2001. The interviews served as a preliminary survey for the development of the questionnaires as well as providing a qualitative viewpoint in the analysis of the collected data.

2. Period of the survey

Initially, the questionnaires were to be returned to JIL from March 4 to 11, 2002. Reminders were subsequently mailed to the companies, and the deadline was extended to March 16, 2002. Therefore, the final period of the survey was from March 4 to 16, 2002.

3. Effective response

Out of 10,500 questionnaires distributed, a total of 1,225 effective responses were collected. The response rate was 11.7 percent.

4. Respondents' profile

By industry, the largest percentage of respondents (25.4 percent) worked for companies in the manufacturing industry, followed by wholesale & retail trade and restaurants with 11.0 percent, construction 10.3 percent, transportation & communication 8.5 percent, finance & insurance and real estate 7.4 percent, information service 5.2 percent, and other services 19.5 percent. All other industries constituted less than 1 percent. (If a company was involved in more than one industry, the industry in which the company had the highest annual sales was considered relevant.)

By sex, men made up 78.9 percent of all respondents, and women 19.2 percent. Close to 80 percent of the respondents were men.

By age group, those under 29 made up 16.4 percent, those between 30 and 39 were 37.7 percent, between 40 and 49 were 26.9 percent, 50 and 59 were 15.2 percent, and 60 and above 1.5 percent. The middle-age group of between 30 and 49 constituted a majority of 64.6 percent. The average age was 39.1.

With respect to the length of service, the average was 13.2 years. Specifically, those with 1 to 4 years of service made up 16.5 percent, 5 to 9 years 22.0 percent, 15 to 19 years 14.6 percent, and 20 years or more 22.8 percent. The largest number of respondents had worked for 20 years or more, which suggests ageing of employees at white-collar workplaces.

By department, the largest number of respondents was in the personnel, labor relations, and training departments with 24.9 percent, followed by general affairs, public relations, and secretarial departments with 18.8 percent, accounting and finance departments 15.2 percent, sales departments 10.2 percent, information processing and systems departments 8.9 percent, strategic planning departments 6.3 percent, R&D, design, and technology departments 5.0 percent, and other departments 8.4 percent.

With regard to the number of years working in the currently placed section, the average was relatively long at 5.9 years. Specifically, those who had been working in the current section for less than a year comprised 17.6 percent, those working for 2 to 4 years 31.8 percent, 5 to 9 years 24.7 percent, and 10 or more years 18.1 percent. The relatively high percentage of respondents with 10 or more years of working in their current sections is particularly noticeable.

By job position, the largest number of respondents had "jobs at the general level" with 43.3 percent. Those "equivalent to chief clerk" were 19.9 percent, those "equivalent to section head" 23.0 percent, and those "equivalent to department director or deputy director" 11.6 percent. There were more section heads than chief clerks. Judging solely from these data, we can observe that the percentage of employees with higher job positions is increasing in white-collar workplaces.

On the question of how many times the respondents were subjected to internal transfers at their current companies, the average was 2.5 times. To be more precise, those who had never been transferred internally constituted 24.9 percent, those who had been moved once 17.7 percent, those moved twice 12.9 percent, three to four times 20.9 percent, and five or more 17.7 percent. The respondent with the highest number of internal transfers was as many as 20 times.

By number of employees, companies with less than 100 employees made up 2.4

percent, companies with 100 to 299 employees 19.3 percent, 300 to 499 employees 18.6 percent, 500 to 999 employees 21.7 percent, 1,000 to 2,999 employees 19.6 percent, and 3,000 or more employees 16.7 percent.

With respect to the changes in the number of employees in the previous three years (around 1999 to 2001), the number of employees increased in 25.4 percent of the companies, remained unchanged in 19.2 percent, and declined in 53.5 percent. The number of employees decreased at the majority of companies in the past three years. As regards changes in the number of new recruits, the number rose at 13.3 percent of the companies, was unchanged at 41.4 percent, and fell at 40.3 percent. The employment of new white-collar regular employees declined.

The percentage of respondents who answered that they have labor unions at their company was 56.3 percent, of which 50.5 percent replied that there is "one union" and 5.8 percent answered there are "more than one union." On the other hand, 41.9 percent responded that there are no labor unions. The unionization rate in Japan in 2002 was 20.2 percent. The unionization rate of the surveyed companies, therefore, was twice as high as the national average.

On the companies' business standing, those replying "very good" composed 2.1 percent, those with "good" standing 16.6 percent, those with "average" standing 31.3 percent, those with "difficult" standing 35.3 percent, and those with "very difficult" standing 12.8 percent. Close to half, or 48.1 percent, of the respondents said their companies' business was in difficulty ("difficult" + "very difficult").

IV. Outline of the results – 1: questionnaire survey

In this section, the results of the questionnaire survey are summarized centered particularly on the major findings. The summary is composed of (1) the extent of the spread of IT, followed by discussions on five topics of interest in relation to the spread of IT, namely, (2) personnel management, (3) response to ageing of the population, (4) employment of non-regular employees, (5) changes in work and working styles, and (6) industrial relations.

1. Spread of IT

In Japan, it can be said that IT has already spread to a large segment of workplaces. Generally speaking, the spread of IT accelerated dramatically after 1998. In addition to price reduction and improved versatility of personal computers at that time, companies' investment in IT, which essentially is a tool with high externality (meaning that its effectiveness can be enhanced when more people use it), was concentrated

during this period.

With respect to the PC penetration rate (number of PCs / number of regular employees x 100), workplaces with the penetration rate of 60 percent or above made up more than 70 percent of those surveyed. Of those, workplaces with 80 percent or higher composed slightly less than 65 percent, and with 100-percent for about 50 percent. For more than 60 percent of the workplaces, the penetration rate reached 80 percent after 1998.

Slightly less than 90 percent of all PCs used by white-collar workers were connected to a Local Area Network (LAN). Approximately 80 percent were also connected to the Internet and were given an e-mail address. For more than 50 percent of the workplaces, the PCs were networked after 1998.

With regard to IT education and training, many white-collar workers learned how to use IT through the support of their companies, which organize seminars on the basic operations of the computer and on the systems required for performance of particular jobs. The percentage of workers who obtained IT skills through the support of their companies was higher in IT-advanced workplaces. As regards to IT training as part of OJT at workplaces, there was a significant difference in the response of "full penetration" workplaces and "low penetration" workplaces.[1] White-collar workers at IT-advanced workplaces also had the option of acquiring IT skills on OJT, and a virtuous circle may be created at such workplaces. In fact, lack of IT competence was pointed out at a comparatively smaller percentage of IT-advanced workplaces as compared with low IT penetration workplaces.

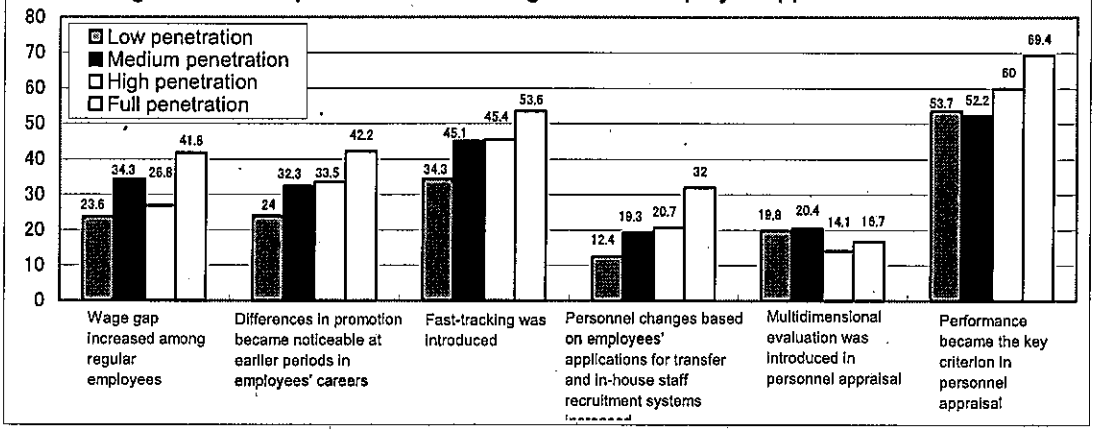
2. Personnel management

It was clearly observed that changes in personnel management were related to the spread of IT. Firstly, on the method of appraisal and treatment of employees, companies that were more IT-advanced tended to have introduced a method of assessing employees based on individual performance. Secondly, on the disclosure of personnel information, the more IT-advanced the company is, the more personnel information made available. The results show that IT is used in making changes to personnel management systems and that IT is playing a role in assisting in the design and implementation of new personnel policies. Regarding personnel information

[1] In the current survey, workplaces were categorized into four types depending on the spread of IT, which was determined based on the penetration rate of PCs, to examine the effect of IT on work and workplaces of white-collar workers. Workplaces with less than 40 percent penetration rate were classified as "low penetration," those with 40 to 79 percent penetration rate as "medium penetration," those with 80 to 99 percent penetration rate as "high penetration," and those with 100 percent rate as "full penetration." The distribution of workplaces for each class was 19.8 percent, 15.1 percent, 18.5 percent, and 45.6 percent, respectively.

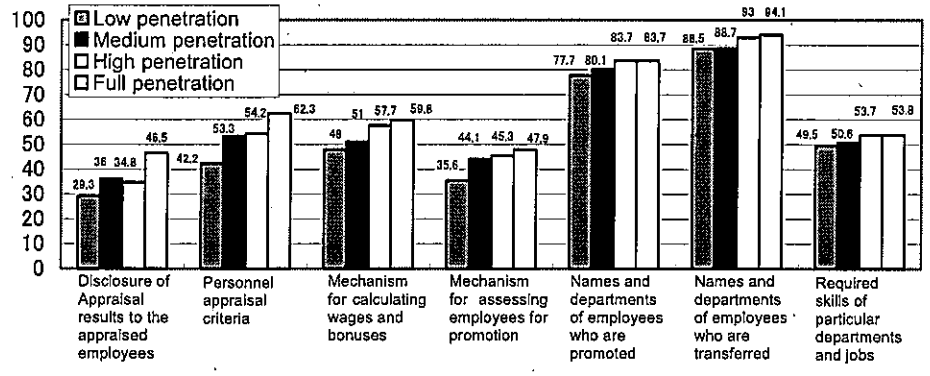
disclosure, the percentage of companies that revealed, directly through IT, information other than the names of those who were promoted or transferred (e.g. information on the results of personnel appraisal or the evaluation mechanism) was not high. The use of IT in collecting and organizing personnel-related data, however, may have helped in facilitating information disclosure in writing or verbally.

Figure 3-6: Four penetration-rate categories and employee appraisal and treatment



The more pertinent findings however are as follows: (1) an overview of the general trends for the past three years shows that in many workplaces, the policies remained unchanged for securing justness and fairness in the assessment and career development of individual white-collar workers in the methods of personnel appraisals and placement/transfer of employees (such as introduction of multidimensional assessment, systems of employees' application for transfer, and in-house staff recruitment systems). (2) Nonetheless, many workplaces are shifting to performance-based evaluation. Its effect was already reflected in the form of an increased wage gap, differentiating the promotion of employees at earlier stage of their career, and fast-track promotion. Probably as a result, (3) white-collar workers' approval of personnel appraisals and treatment tended to decline. (Approval only increased with respect to goal setting and declined for all other measures. In particular, satisfaction with current income and with the management's appraisal of employees' efforts that were not directly reflected on performance fell considerably.)

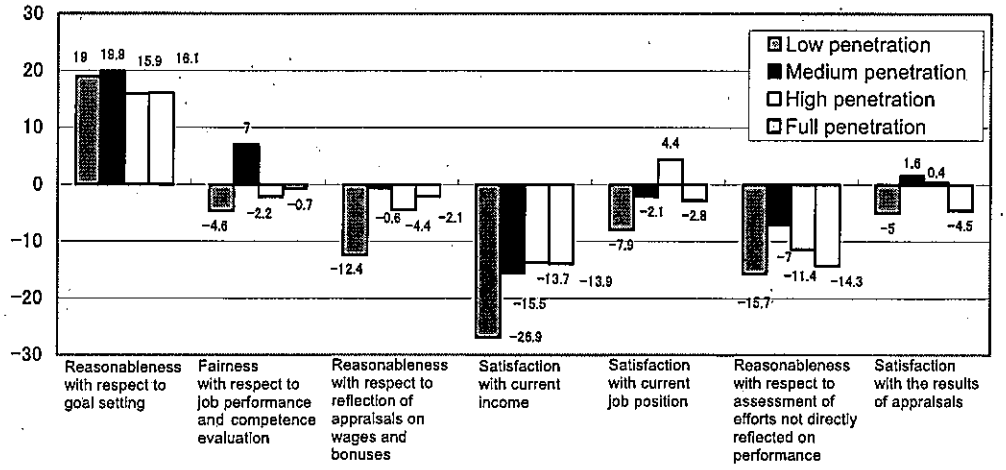
Figure 3-7: Four penetration-rate categories and personnel information disclosure



An analysis of the above findings based on IT penetration shows that although the shift to performance-based evaluation was progressing faster among IT-advanced workplaces, the decline in the workers' approval of personnel appraisals and treatment was relatively limited compared to less IT-advanced workplaces. The results were as follows: (1) The shift to performance-based evaluation, increased wage gap, differences in promotion earlier in employees' careers, and fast-track promotion were all more evident in IT-advanced workplaces. At the same time, however, (2) the tendency of such workplaces to introduce the system of employees' request for transfer or in-house staff recruitment was also strong. (3) IT-advanced workplaces also disclosed more personnel information (including results and criteria of appraisals and the mechanism of assessment). Probably as a result, (4) reduction in the workers' approval on personnel appraisals and treatment was relatively limited in IT-advanced workplaces (in particular, a decline in approval on how appraisals were reflected on wages and bonuses and in satisfaction with current income was restricted).

In sum, while a progress was being made at IT-advanced workplaces in shifting the focus of personnel evaluation on performance, such workplaces were also adopting policies for considering employees' wishes in internal transfers and making more personnel information available in building a mechanism in which justness and fairness was ensured in the evaluation and career development of white-collar workers. It is possible to infer that as a result, the decline in the approval of the performance-based system of evaluation and treatment was limited, albeit by a small margin.

Figure 3-8: Four penetration-rate categories and reasonableness of appraisals and treatment



However, the following remains unexplained. While a declining approval of personnel appraisal and treatment was checked at workplaces with higher IT penetration, contradicting results were observed in some respects. Specifically, "low penetration" and "medium penetration" workplaces had higher approval with respect to goal setting, and "medium penetration" and "high penetration" workplaces had higher affirmation of the management's evaluation of efforts that were not directly reflected on performance. Furthermore, on satisfaction with the results of appraisals, fairness with respect to work performance and competency evaluation, and satisfaction with current job position, "medium penetration" and "high penetration" workplaces, "medium penetration" workplaces, and "high penetration" workplaces, respectively, were higher than "full penetration" workplaces.

As seen above, a general decline in the approval of personnel appraisal and treatment was small at IT-advanced workplaces (which can also be considered as having made more progress with respect to changing personnel appraisal and treatment and disclosing personnel information) compared with less IT-advanced workplaces (which can be considered as having made less progress in changing personnel appraisal and treatment and personnel information disclosure). However, at "full penetration" workplaces, where the system of personnel appraisal and treatment was being reformed very rapidly or extensively, the approval of white-collar workers declined contrary to expectations. The probable causes are that white-collar workers had not been able to adapt to such a rapid change and that policies had not been implemented to raise workers' acceptance of the new methods of personnel evaluation and treatment. Moreover, the current survey indicates that while the

increased use of IT and greater disclosure of personnel information were effective in "checking" the decline in approval, they were not yet able to "increase" approval. For the new system of appraisal and treatment to be reasonably and positively accepted by employees and become fully established as a useful system, policies for ensuring fairness and other complementary policies need to be introduced.

As it will be discussed later, disapproval of the system of personnel assessment and treatment will manifest itself as complaints and dissatisfaction on employees' work and workplaces. It can be expected that such a tendency will promote employees' exit from the companies they belong to and expand the job transfers market. To address various issues that are anticipated to arise with the spread of IT and changes in personnel management, the industry, academia, and government have a major task of jointly considering what kind of policies, a personnel management framework, and complaint management methods are needed.

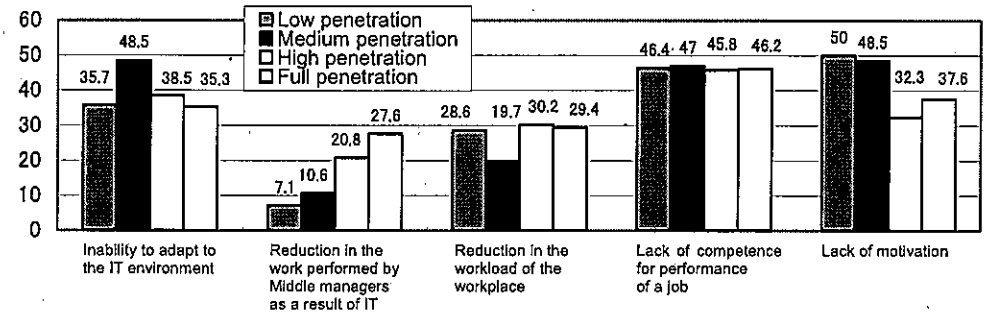
3. Response to ageing of the population

In previous surveys, it was pointed out that the spread of IT had not made middle managers dispensable. This observation is supported by the interpretation that even in IT-advanced workplaces, middle managers have a distinct role to play that is unrelated to their IT skills and that indispensability of middle managers is perpetual. The results of the current survey have shown, however, that while a lack of young employees was felt by about 50 percent of those surveyed, a lack of middle-aged and older workers was felt only by 8 percent. On the contrary, about 40 percent reported a surplus in middle-aged and older workers. The rate reporting a surplus was higher among more IT-advanced workplaces. It was also found that the higher the IT penetration of workplaces were, the more decrease of work for middle managers. Therefore, replacement of middle managers by IT was actually occurring to some extent. In other words, as with the work of non-management employees, the use of IT was reducing and streamlining some of the work performed by middle managers so that less labor was required in the performance of the same work.

At the same time, it should be noted that a higher percentage of those surveyed said that the lack of competence for the job is the major factor that made middle-aged and older workers excessive, compared with those who mentioned reduction in the work due to IT. The percentage of those who gave the former response was equally high irrespective of the IT penetration rate. It can also be pointed out that the percentage of those who remarked that inability to adapt to the IT environment as a surplus factor was higher among "medium penetration" workplaces than "high penetration" or "full penetration" workplaces. These results suggest that while the lack of IT skills may

result in a sense of excess of middle-aged and older workers during the transitional period of acquiring sufficient skills, the issue will be solved with further spread of IT and improvement in IT skills.

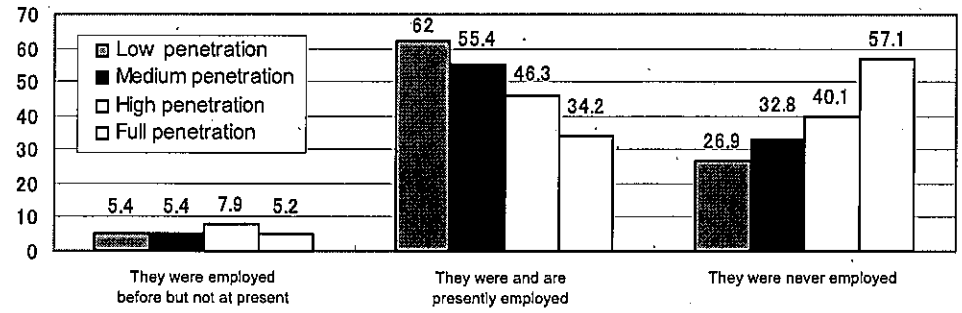
Figure 3-11: Four penetration-rate categories and factors that make middle-aged and elderly workers excessive



More crucial is the lack of essential competence of middle managers as pointed out in the survey. It is likely that this issue became more apparent because of the increasingly tough economic environment and regardless of the advancement of IT. Middle-aged and older employees need IT skills to serve as middle managers, but that is not enough. As long as they lack the basic competence required for a manager, the sense of excess of middle-aged and older employees will not be dispelled.

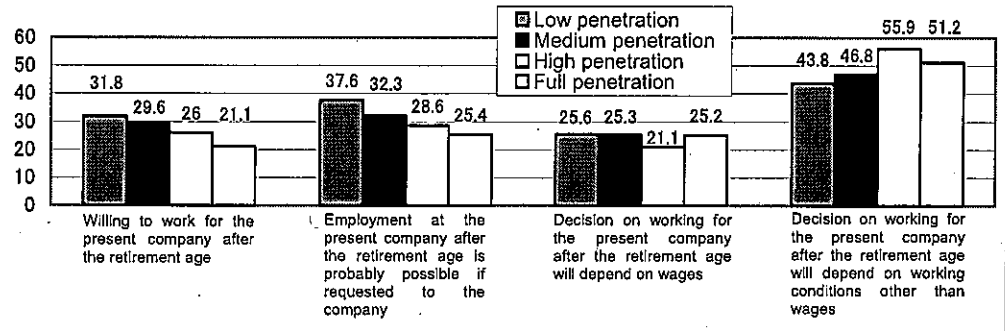
An inquiry into the relation between employment of older employees of 60 and above and the spread of IT revealed that the rate of employment of workers 60 and above was lower among more IT-advanced workplaces. Whereas the rate is more than 60 percent among "low penetration" workplaces, the rate is about half of that, or 34 percent, among "full penetration" workplaces. The results indicate that the spread of IT affects the employment of older white-collar workers in no small measure. It would be premature to conclude, however, that this had been caused simply by IT making older white-collar workers' skills and expertise unnecessary. A closer analysis of this issue will be required in the future.

Figure 3-13: Four penetration-rate categories and employment of employees of 60 and above



On the next question on how white-collar workers felt about employment after mandatory retirement age, some relevance with advancement of IT was recognized. More specifically, the percentage of those who wanted to work for their present company after their retirement age declined among more IT-advanced workplaces. The percentage of those who thought it was possible to work at their present company after the retirement age also declined among more IT-advanced workplaces, the figures for both of these measures being approximate to each other. Although a more detailed data analysis is necessary, it is likely that the respondents who thought employment after retirement age as possible were practically the same respondents who wished to continue employment after retirement age. It is, however, not sufficiently clear why the percentage of those who thought continued employment as possible fell at more IT-advanced workplaces. One explanation may be that IT had made more options available with respect to their lifestyles (for example, telecommuting using IT, interest in hobbies, community activities, etc.). It may also be possible that workers were not confident about their employment after the retirement age because of the rapid changes in the workplace as represented by the spread of IT. On the other hand, instead of IT being a direct cause, it may be that other factors connected to the penetration of IT, such as the changes in personnel management as discussed in the previous section, were affecting how white-collar workers felt about employment. Further examination of this issue will also be required.

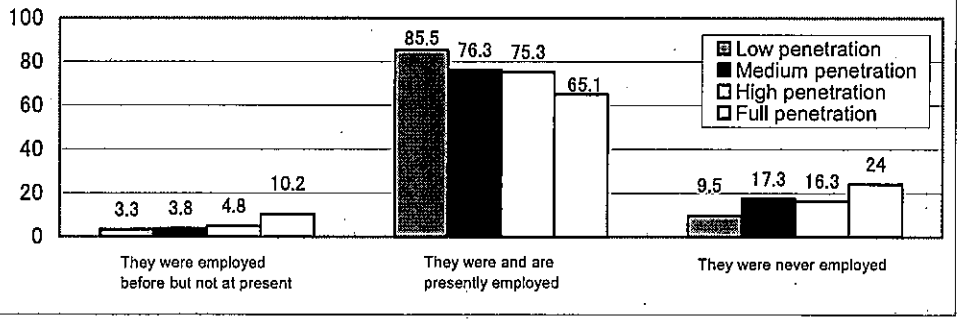
Figure 3-14: Four penetration-rate categories and employment after retirement age



4. Employment of non-regular employees

As far as the general trends of employment of non-regular employees are concerned, many non-regular employees were working at white-collar workplaces. Non-regular employees as percentage of regular employees had been increasing in the last three years. The rate of increase, however, was not necessarily uniform in all IT penetration categories. More non-regular employees were working at less IT-advanced workplaces, and their number had been growing at such workplaces in recent years. On the other hand, the number of non-regular employees at more IT-advanced workplaces was small and declining.

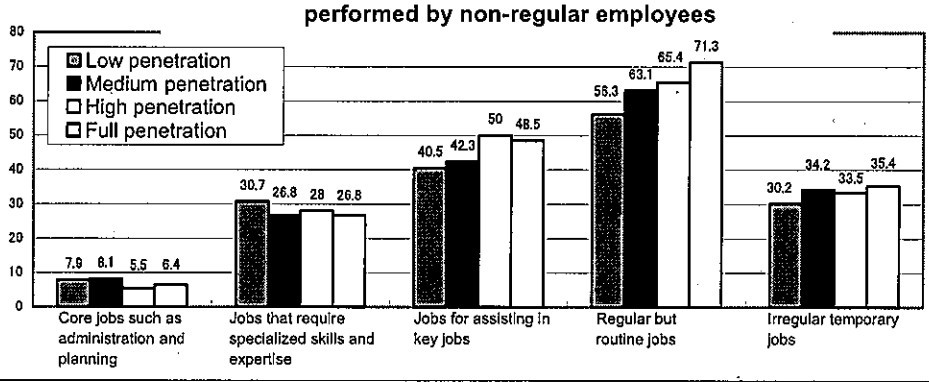
Figure 3-18: Four penetration-rate categories and employment of non-regular employees



On jobs performed by non-regular employees, the more IT-advanced the workplaces were, the more involved they were in routine jobs and other marginal jobs such as assistance in the performance of core jobs. On the other hand, about 30 percent were engaged in jobs that required specialized skills and expertise and in core jobs such as administration and planning. On the question of which types of jobs companies

wished to increase non-regular employees, the need for employees performing specialized jobs was most prominent. This was probably due to the fact that with the progress of IT and globalization and in response to the structural reform of the economy and industry necessitated by ageing of the population and severe recession, companies needed non-regular employees with specialized competence to achieve new vision. In parenthesis, the need for specialized non-regular employees was particularly pronounced among "low penetration" and "medium penetration" workplaces.

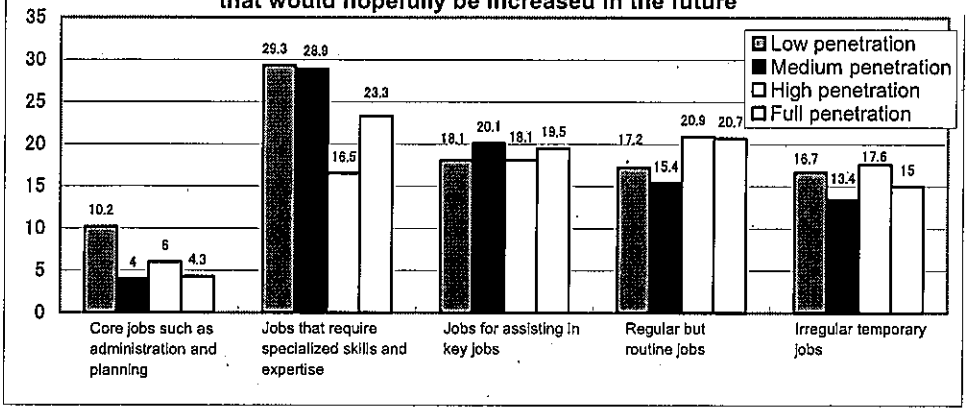
Figure 3-19: Four penetration-rate categories and jobs performed by non-regular employees



It can be considered from the above that as IT was introduced into the workplace, the way in which non-regular employees were employed by companies changed significantly. At "full penetration" workplaces, jobs were routinized and streamlined with the introduction of IT and some of the jobs for regular employees were altered by non-regular employees sooner than in other categories. As IT fully spread in the workplace and quantitative and qualitative job adjustment was completed, companies gradually began to cut the number of non-regular employees. It was also likely that because there were already a large number of non-regular employees working at "full penetration" workplaces when it came time to cut back the workforce under the prolonged recession, they were made subject to the cutback and this might have accelerated the reduction in the number of non-regular employees. On the other hand, as "low penetration" and "medium penetration" workplaces are now in a transition phase to introducing IT, employment of non-regular employees at such workplaces is just beginning to increase.

As discussed under the next section "5. Changes in work and working styles," it is conceivable that by routinizing a part of regular employees' jobs and transferring it to non-regular employees, regular employees can concentrate more on specialized and core jobs than before.

Figure 3-20: Four penetration-rate categories and jobs of non-regular employees that would hopefully be increased in the future

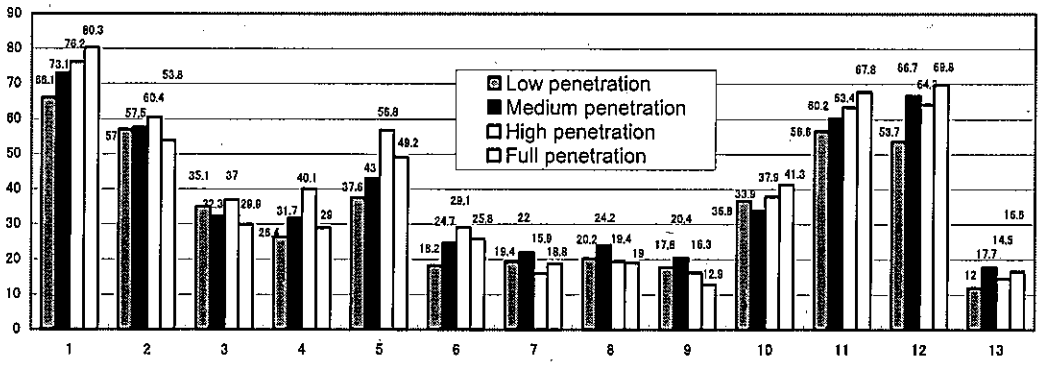


5. Changes in work and working styles

The results of an inquiry into how white-collar workers' jobs and working styles changed after IT began to rapidly spread after 1998 clearly show that jobs and working styles did change as a result of IT. The following points were noticeably linked with the progress of IT: (1) the higher the IT penetration rate in the workplaces were, the more white-collar workers felt that advanced competence and knowledge were required; (2) the higher the IT penetration rate in the workplaces were, the more it was felt that the workload was increasing; and at the same time, (3) the higher the IT penetration rate in the workplaces were, the more they felt that efficiency increased in doing one's job. Therefore, it is considered that while white-collar workers felt their workload was increasing, they were using IT to manage the increased workload.

On the other hand, it is also interesting to note that for the points shown below, the positive response was higher among more IT-advanced workplaces in general, yet the percentage of positive response was higher among "high penetration" workplaces than "full penetration" workplaces. These points were, namely, (1) the need for more advanced levels of specialization, (2) an increase in the number of subordinates and non-regular employees to supervise and manage, (3) an increase in the number and hours of meetings with other employees, and (4) an increase in the number and hours of meetings with non-regular employees and other companies' employees. One way of explaining this is that whereas "high penetration" workplaces were still in the transition phase of IT, "full penetration" workplaces had already made adjustments to the above points or they were not reflected on the response because such issues had existed from three years ago.

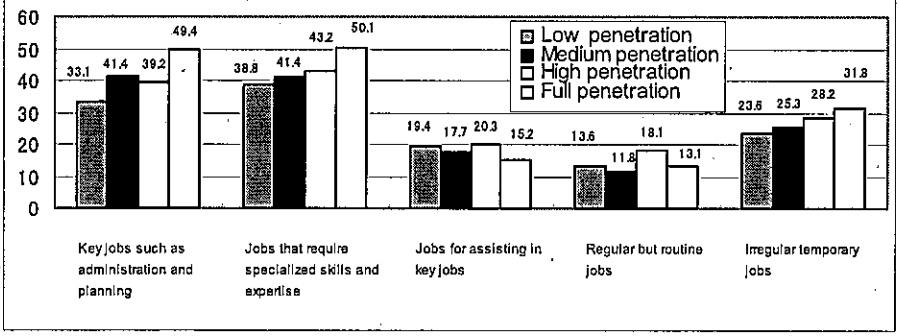
Figure 3-21: Four penetration-rate categories and changes in work and attitude towards work



1. Higher levels of competence and knowledge required in the performance of job
2. Advanced levels of specialization required
3. Clearer division of labor and roles
4. The number of subordinates and non-regular employees to manage and supervise increased
5. The number and hours of meetings with other employees increased
6. The number and hours of meetings with non-regular employees and with other firms' employees increased
7. Routine work increased
8. The number of times attending in-house training programs and seminars increased
9. The motivation to continue working for the present firm increased
10. Discretion in the performance of work increased
11. The work load increased
12. IT improved efficiency
13. The motivation to change jobs or start one's own business increased

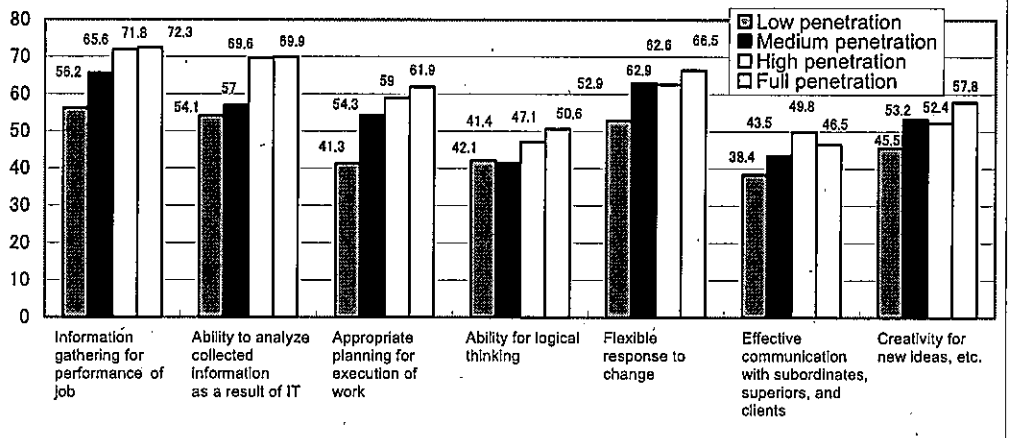
An overview of how the progress in IT changed the jobs performed by white-collar workers clearly indicates that in a link with the progress in IT, the weight on key jobs of administration and planning as well as jobs requiring specialized skills and expertise rose. This is in contrast to the increase in routine assistance work for non-regular employees at more IT-advanced workplaces as discussed in the previous section. It can be observed that while the energies of regular white-collar workers were being concentrated on core and specialized jobs that were more essential to business administration, non-regular employees' labor was used to assist in those jobs.

Figure 3-24: Four penetration-rate categories and changes in jobs



How then are white-collar workers' capabilities expected to change in the future? Here, we made an overview of the changes in the abilities that white-collar workers considered important. As a result, it was found that changes in almost all capabilities were linked with the penetration of IT. In other words, it became evident that the importance of abilities related directly to IT, such as the ability to collect information and to analyze the information, as well as abilities for planning, logical thinking, flexible response, communication, and creativity increased more at more IT-advanced workplaces. It is likely that the advance of IT led to concentration of regular white-collar workers on the performance of companies' key and specialized jobs, and as a result, changes were also brought about in white-collar workers' awareness. In workplaces where such awareness on the importance of the capabilities is pervasive, it can be anticipated that the white-collar workers' job competence will be further enhanced in the future to become a driving force in supporting companies' business activities under a new economic and industrial structure.

Figure 3-23: Four penetration-rate categories and changes in the importance of specific abilities



6. Industrial relations

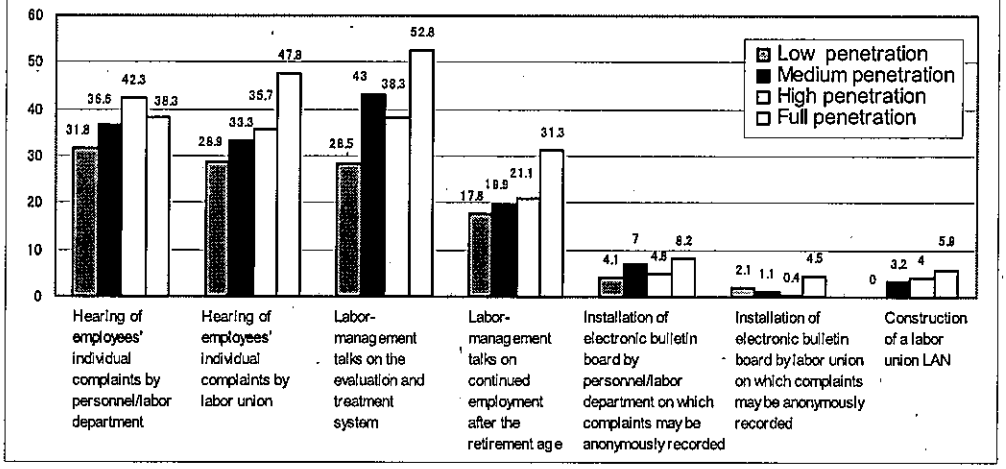
The following points became apparent with respect to the relation between IT and industrial relations: (1) a general increase in complaints and dissatisfaction with work and workplaces in the last three years, particularly with respect to employee appraisal and treatment and to the given job and the amount of job, and (2) by IT penetration, complaints and dissatisfaction tended to be more mitigated at more IT-advanced

workplaces. These findings were consistent with the results of "2. Personnel management," above. In other words, as more IT-advanced companies had adopted policies that reflected each worker's intention through such personnel management methods as a system of employees' application for transfer and information disclosure, resentment and discontent were alleviated. It was also observed, however, that contrary to the above, there tended to be more complaints and resentment among "full penetration" workplaces than "high penetration" workplaces. (The tendency was particularly noticeable with respect to employee appraisal and treatment and to given job and amount of job. Similar tendency was found for other items including personnel transfer and placement, concerns over job security, contents of and opportunities for education and training, and non-regular employees.)

On the other hand, the results of a survey on in-house systems for complaint procedures clearly indicated that the more IT-advanced the workplace, the more in-house systems for complaint procedures were implemented. The reasons for this may be that IT-advanced companies were required to set up systems for responding to complaints and dissatisfaction because changes in the system of employee appraisal and treatment, as discussed above, were more significant at such companies and that the use of IT might have facilitated implementation of such procedures (ex. complaints by e-mail, use of the IT for collection of information, etc.).

Nonetheless, most white-collar workers sought the advice of their superiors and seniors in dealing with their complaints and dissatisfaction in the last three years. The use of external offices for receiving and dealing with complaints (labor bureaus, labor administration offices, Japanese Trade Union Confederation, counsels, etc.) was extremely limited, although some white-collar workers intended to use such offices in the future. It remains that about 50 percent of white-collar workers believe complaints and discontent should be solved within their companies and that their view was unlikely to change in the future. This tendency was observed regardless of IT penetration.

Figure 3-26: Four penetration-rate categories and various labor-management systems



In sum, it is conceivable that systems of complaint procedures are important at "full penetration" workplaces where a rapid change in employee appraisal and treatment can be expected, but establishment of such systems is not enough. Not all white-collar workers may be able to adapt to such changes, and in addition to systems of complaint procedures, new policies designed to check the declining approval on the new employee appraisal and treatment methods should be introduced at the same time. In other words, while development of measures for alleviating complaints and dissatisfaction with the advance of IT do mitigate them, they may be not effective enough in dealing with significant changes in the system of employee appraisal and treatment. Therefore, revision of personnel management systems should not be limited to implementation of systems for complaint procedures and should be carried out in stages through execution of policies for enhancing the fairness and justness of employee appraisal and disclosing personnel information.

As shown above, some of the findings of the current survey confirmed the results of prior surveys. On the other hand, some of the results contradicted preceding results. These contradicting results will need to be carefully examined in future analysis. In addition, there were also some new interesting findings. Our next task in the current research is to undertake more detailed analysis based on the results of the survey.

V. Outline of the results – 2: thematic reanalysis

Theme-specific reanalysis was carried out with the purpose of more closely analyzing and deepening discussions on some of the issues identified for each theme in the

questionnaire survey.

1. Progress in IT and individualized personnel management and response of employees

With the advance of IT, individualized personnel management having an emphasis on each employee's performance is spreading. At the same time, personnel policies, such as disclosure of personnel information, which are designed to enhance the fairness of the processes of employee appraisal and treatment (policies for securing fairness of the processes) are beginning to be implemented in a link with the progress in IT. In this section, we examined the effect of these changes in personnel management on employees' work incentives and their thinking on changing jobs. Previous surveys pointed out that with the spread of IT, motivation for work declined for those workers who were unable to adapt to IT. It was also pointed out that the expansion of individualized personnel management generally strengthened employees' orientation towards changing jobs. The objective of this section is to find, from the standpoint of human resources management, the viewpoints that will be required in the future personnel management in drawing employees' contribution in corporate activities and promoting their retention in their organization.

In the analysis, we investigated on how the spread of individualized personnel management as well as policies for securing fair processes (disclosure of personnel information and employees' participation in career decisions) and complementary personnel policies (clarification of jobs and roles, opportunities for competency development, and greater discretion in the performance of work) were affecting employees' approval of the new personnel systems, their satisfaction on employee appraisals, their thinking on job change, and a sense of unity within the workplace. In particular, the analysis was conducted by categorizing those surveyed into a group who considered themselves as being on the winning side and a group who considered themselves to be on the losing side.

The main findings were as follows: Whereas the spread of individualized personnel management was effective in raising both employees' approval on the new systems and their satisfaction with the results of appraisals, policies for fair processes were effective only with respect to improving employees' approval on the new systems and were not significantly effective with respect to employees' satisfaction with the results of appraisals and treatment. Complementary personnel policies, namely, clarification of jobs and roles, more opportunities for competency development, and greater discretion in work, were effective for both approval on the new systems and satisfaction with appraisals and treatment. For low-wage group, however, approval

on the systems and satisfaction with appraisals and treatment could not be improved using any methods. Moreover, whereas individualized personnel management advanced employees' orientation towards job change, implementation of policies for fair processes and complimentary personnel policies was significantly effective in retaining employees. This was particularly true for the high-wage group. In addition, expansion in wage gaps and competency gaps and employees' participation in career decisions weakened unity within the workplace, but disclosure of personnel information, clarification of jobs and roles, and increased discretion in work were effective in strengthening unity.

The above results suggest that for companies that introduced the individualized personnel management, with the progress in IT, to stop the outflow of necessary human resources, it is important to introduce, at the same time, policies for fair processes and changes in working styles.

Figure 3-10: Results of analysis on "effect on system approval and satisfaction with appraisals and treatment" (2)

Explanatory variable		Explained variable: More approval on systems			Explained variable: Higher satisfaction with appraisal and treatment (Satisfaction with appraisal)			(Satisfaction with income & position)		
		(1) All samples	(2) High wages	(3) Low wages	(4) All samples	(5) High wages	(6) Low wages	(7) All samples	(8) High wages	(9) Low wages
Progress in individualized personnel system	· Wage gap: expanded	0.435***	1.099***	−0.125	0.08035	0.242***	−0.171*	0.113	0.192	−0.164
		(0.143)	(0.237)	(0.245)	(0.058)	(0.091)	(0.102)	(0.103)	(0.157)	(0.176)
	· Promotion: difference in promotion earlier in career	0.06607	0.447*	−0.407	0.03974	0.141	−0.0956	0.00789	0.06499	−0.188
		(0.151)	(0.257)	(0.258)	(0.062)	(0.099)	(0.107)	(0.108)	(0.170)	(0.185)
	· Fast tracking: introduced	0.08718	0.294	−0.0564	−0.00836	0.271***	−0.145	−0.00198	0.464***	−0.168
		(0.151)	(0.229)	(0.220)	(0.053)	(0.088)	(0.091)	(0.093)	(0.151)	(0.159)
	· Meritocracy: emphasized	0.03788	−1.66	−0.0382	0.02874	−0.144	0.07735	−0.0348	−0.238	0.01978
		(0.131)	(0.253)	(0.211)	(0.053)	(0.097)	(0.088)	(0.094)	(0.168)	(0.152)
	· Competency gap: expanded	−0.0424	0.234	−0.00195	−0.0343	0.06816	−0.0483	−0.122*	0.004667	−0.0564
		(0.103)	(0.190)	(0.168)	(0.042)	(0.073)	(0.070)	(0.074)	(0.126)	(0.122)
Policy for fair processes	· Disclosure of personnel information: introduced	0.110***	0.130**	0.04945	0.02540**	0.02354	0.01050	0.02634	0.04283	−0.0109
		(0.028)	(0.052)	(0.050)	(0.011)	(0.020)	(0.021)	(0.020)	(0.034)	(0.036)
	· Participation in career decision: increased	0.302**	0.195	0.325	0.07572	−0.0939	−0.00166	0.262***	0.139	0.261
		(0.130)	(0.221)	(0.224)	(0.053)	(0.085)	(0.093)	(0.093)	(0.146)	(0.163)
	· Multidimensional assessment: introduced	0.08181	0.06438	0.350	0.05690	0.07729	0.160	−0.0430	0.02238	0.170
		(0.142)	(0.240)	(0.240)	(0.057)	(0.093)	(0.100)	(0.101)	(0.159)	(0.173)
	· Complaint management by personnel department: Yes	0.108	0.512**	−0.0273	−1.02	0.09292	−0.0113	−0.0825	−0.134	−0.0027
		(0.111)	(0.200)	(0.184)	(0.045)	(0.077)	(0.077)	(0.079)	(0.132)	(0.133)
	· Complaint management by labor union: Yes	−0.00875	−0.09032	−0.0378	0.01679	−0.0645	0.03447	−0.0107	−0.0686	0.08765
		(0.129)	(0.239)	(0.222)	(0.052)	(0.092)	(0.092)	(0.092)	(0.158)	(0.162)
Complementary policies	· Clarification of jobs and roles: clarified	0.328***	0.392***	0.229*	0.06469**	0.04202	0.02630	0.208***	0.177	0.201**
		(0.078)	(0.149)	(0.125)	(0.032)	(0.057)	(0.052)	(0.056)	(0.099)	(0.090)
	· Opportunities for competency development: increased	0.234***	0.359***	0.117	0.0929***	0.143***	0.05648	0.160***	0.180**	0.101
		(0.074)	(0.134)	(0.122)	(0.030)	(0.051)	(0.051)	(0.053)	(0.088)	(0.088)
	· Discretion in performance of work: increased	0.280***	0.09913	0.06317	0.0998***	0.07115	0.02822	0.145**	0.190*	0.05821
		(0.083)	(0.157)	(0.129)	(0.034)	(0.061)	(0.054)	(0.034)	(0.190)	(0.094)
	Constant term	3.180***	3.220***	4.037***	1.244***	1.214***	4.037***	2.228***	3.204***	2.030***
		(0.489)	(0.908)	(0.803)	(0.197)	(0.350)	(0.803)	(0.349)	(0.600)	(0.582)
	Number of samples	675	221	269	676	221	269	674	220	269
	Adjusted R squared	0.189	0.301	0.110	0.084	0.218	−0.019	0.144	0.205	0.060

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **p<.05, *p<.10
2) The personal attributes of age, years of service, affiliated department, position, industry of the affiliated company, company size, business conditions, and existence of labor unions are controlled. The reference group of the affiliated department is "sales department," of the industry is "manufacturing industry," and of the company size is "companies with 3,000 or more employees."

Figure 3-12: Results of analysis on "effect on employees' attitude on job change"

Explanatory variable		Explained variable: Increased orientation for job change						
		(1) All samples	(2) High wages	(3) Low wages	(4) All samples	(5) High wages	(6) Low wages	(7) All samples
Progress in Individualized Personnel system	· Wage gap: expanded	0.207***	0.281**	0.273**	0.228***	0.265**	0.289**	
		(0.070)	(0.110)	(0.118)	(0.071)	(0.110)	(0.126)	
	· Promotion: difference in promotion earlier in career	0.07023	0.03640	0.106	0.01293	−0.0008	0.01309	
		(0.073)	(0.114)	(0.122)	(0.075)	(0.120)	(0.133)	
	· Fast tracking: introduced	0.03989	−0.0471	0.02132	0.05466	0.04168	0.03121	
		(0.064)	(0.107)	(0.106)	(0.065)	(0.106)	(0.114)	
	· Meritocracy: emphasized	−0.0601	−0.160	−0.0458	−0.0311	−0.180	0.02939	
		(0.061)	(0.113)	(0.098)	(0.065)	(0.118)	(0.109)	
	· Competency gap: expanded	0.143***	0.222**	0.163**	0.155***	0.229***	0.194**	
		(0.050)	*(0.087)	(0.083)	(0.051)	(0.088)	(0.087)	
	· Individualized personnel index (five variables): changed							0.178**
								(0.083)
Policy for fair processes	· Disclosure of personnel information: introduced				−0.030**	−0.0266	−0.056**	−0.0387*
					(0.014)	(0.024)	(0.026)	(0.020)
	· Participation in career decision: increased				0.01641	0.05213	−0.125	−0.0742
					(0.065)	(0.102)	(0.116)	(0.133)
	· Multidimensional assessment: introduced				−0.0407	−0.204*	−0.0502	−0.214
					(0.071)	(0.112)	(0.124)	(0.147)
	· Complaint management by personnel department: Yes				0.01634	−0.0003	−0.0027	0.00937
					(0.055)	(0.093)	(0.095)	(0.090)
	· Complaint management by labor union: Yes				−0.0781	−0.185*	0.110	0.03416
					(0.064)	(0.111)	(0.114)	(0.092)
Complementary policies	· Clarification of jobs and roles: clarified				−0.0550	−0.0913	−0.066	0.00164
					(0.039)	(0.069)	(0.065)	(0.063)
	· Opportunities for competency development: increased				0.01698	−0.0037	−0.0039	−0.0156
					(0.037)	(0.062)	(0.063)	(0.057)
	· Discretion in performance of work: increased				−0.126***	−0.148**	−0.064***	−0.0778
					*(0.042)	(0.073)	*(0.067)	(0.065)

(cross term)	・Individualized personnel index* Disclosure of personnel information							0.00250 (0.008)
	・Individualized personnel index* Participation in career decision							0.03417 (0.042)
	・Individualized personnel index* Multidimensional assessment							0.05193 (0.047)
	・Individualized personnel index* Complaint management by personnel department							−0.0067 (0.033)
	・Individualized personnel index* Complaint management by labor union							−0.0506 (0.032)
	・Individualized personnel index* Clarification of jobs and roles							−0.0317 (0.024)
	・Individualized personnel index* Opportunities for competency development							0.01385 (0.022)
	・Personalized personnel index* Discretion in performance of work							−0.0255 (0.025)
	Constant term	1.924*** (0.209)	1.656*** (0.355)	2.250*** (0.358)	2.441*** (0.242)	2.361*** (0.422)	2.658*** (0.415)	2.261*** (0.274)
	Number of samples	723	236	292	681	222	272	680
	Adjusted R squared	0.068	0.128	0.043	0.087	0.196	0.027	0.081

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **p<.05, *p<.10

2) The personal attributes of age, years of service, affiliated department, position, industry of the affiliated company, company size, business conditions, and existence of labor unions are controlled. The reference group of the affiliated department is "sales department," of the industry is "manufacturing industry," and of the company size is "companies with 3,000 or more employees."

Figure 3-13: Results of analysis on "effect on a workplace's unity"

		Explained variable: Lower workplace unity and stronger individualism	
Explanatory variable		(1) All samples	(2) All samples
Progress in individualized personnel system	・Wage gap: expanded	0.111*	0.06049
		(0.067)	(0.068)
	・Promotion: difference in promotion earlier in career	−0.0270	−0.0998
		(0.070)	(0.071)
	・Fast tracking: introduced	−0.0258	−0.0145
		(0.061)	(0.062)
	・Meritocracy: emphasized	−0.104	−0.0388
		(0.058)	(0.062)
	・Competency gap: expanded	0.289***	0.307***
		(0.048)	(0.049)
	・Individualized personnel index (five variables): changed		
Policy for fair processes	・Disclosure of personnel information: introduced		−0.0328**
			(0.013)
	・Participation in career decision: increased		0.151**
			(0.061)
	・Multidimensional assessment: introduced		−0.0928
			(0.067)
	・Complaint management by personnel department: Yes		−0.0669
			(0.052)
	・Complaint management by labor union: Yes		−0.0133
			(0.061)
Complementary personnel policies	・Clarification of jobs and roles: clarified		−0.150***
			(0.037)
	・Opportunities for competency development: increased		−0.00900
			(0.035)
	・Discretion in performance of work: increased		−0.101**
			(0.040)
	Constant term	1.941***	2.659***
		(0.201)	(0.231)
	Number of samples	722	680
	Adjusted R squared	0.055	0.109

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **p<.05, *p<.10

2) The personal attributes of age, years of service, affiliated department, position, industry of the affiliated company, company size, business conditions, and existence of labor unions are controlled. The reference group of the affiliated department is "sales department," of the industry is "manufacturing industry," and of the company size is "companies with 3,000 or more employees."

2. Effect of IT and individualized personnel management on the employment of older workers

The relation between advancement of IT and employment of elderly persons was often discussed in previous surveys. The discussions, however, are currently broadly divided into 1) the delay in adapting to IT and changes in the nature of one's jobs brought about by IT are making employment of older workers, including both middle-aged and older workers, difficult and 2) because more important elements of middle-management, which many middle-aged and older workers are engaged in, are work that is unrelated to IT skills, the advancement of IT has not brought about a critical effect on employment of middle-aged and older workers. In this section, therefore, we focused on older people, as it was possible to clearly see the effect of IT on employment, analyzed both the direct and indirect effect of IT, and attempted to explain a general picture of the effect of IT on employment of older workers.

Firstly, we analyzed the relation between individualized and performance-based personnel management systems, which is being introduced with the spread of IT, and employment of older workers in understanding the indirect effect of IT. In researches done in the past, it was pointed that introduction of the individualized personnel management systems were promoting the establishment of continued employment systems, which were essentially measures for expanding employment of older workers. However, our analysis revealed that while individualized personnel management systems did have a positive effect on the institution of the continued employment systems, they also had a substantially negative effect on actually promoting the employment of senior workers. It also became evident that the presence of a labor union, with the exception of those conducting labor consultations, also had a negative impact on employment of older workers.

Secondly, we analyzed the relation between changes in work, workplaces, and required capabilities brought about by IT and employment of older workers in examining the direct effect of IT. As a result, it was found that IT did not significantly affect employment of older workers.

From the above results, it can be interpreted that the penetration of individualized personnel management in the workplace in connection with IT caused workers to anticipate a harsher labor environment than today's, which diminished their willingness to continue working, and that the demand of labor unions for employment security until the mandatory retirement age had, on the other hand, a negative impact on promotion of employment after the mandatory retirement age.

It is argued that introduction of individualized, performance-based personnel

management is necessary in order to improve business results and maintain competitiveness. It is also asserted that individualized personnel management is effective in expanding future employment of older workers. However, our analysis made clear that while the new personnel management methods had positive relation with establishment of continued employment systems, they had a significantly negative effect on the actual employment of older workers. It has also been pointed out that as IT and individualized personnel management spread, the role of labor unions declines. Our analysis, on the other hand, showed that labor unions had a strong negative effect on actual employment of elderly workers, in what was essentially paradoxical to labor unions' purpose. This suggests that we will be required to address the issue of the employment of older workers, which is expected to become an increasingly more important issue in the future, from a new standpoint on how personnel management and industrial relations should be.

3. Effect of IT technology and an increase in non-regular employees on workers' jobs

In this section, we looked at two aspects of the new economy, namely, the advancement of IT and the increase in the number of non-regular employees in workplaces. We then analyzed how these changes were affecting workers' working conditions, the nature of their work, and their workplaces.

The number of non-regular employees is currently increasing with the spread of IT. The jobs they are required to undertake and their roles in their company are also gradually changing. It has been reported in recent years that an increasing number of non-regular employees are employed specifically to perform more sophisticated jobs. It is conceivable that these changes also have an impact on the work and working styles of regular employees. On the other hand, the effect of the progress of IT on wage gap expansion in Japan had not been elucidated. In this section, we tried to empirically explain these questions.

The following points were illustrated from the results of our analysis. The use of IT for the performance of work led to expansion in wage gaps, while the employment of non-regular employees in a company's core jobs tended to reduce concerns over job security. With respect to the nature of work, in support of researchers' claims, IT technology advanced the level of skills and knowledge required in the performance of work. Moreover, it was suggested that employment of non-regular employees, either in core jobs or in subordinate jobs for assisting regular workers, resulted in the reorganization of work and consequently, regular employees' work became more sophisticated in nature. With respect to changes in the workplace, the introduction of

IT technology tended to facilitate identification of capabilities for performing work among members of the workplace. The introduction of IT and increased employment of non-regular employees also tended to give rise to the need for holding more meetings, making adjustments for management of work, and having more communication at workplaces.

The above results suggest that IT technology and changes in the employment structure, such as an increase in non-regular employees, as a result of the advancement of the new economy, were changing work and the workplace, as 1) the gap between individual employees regarding their competency and treatment was expanding, 2) the nature of work of regular employees was becoming more sophisticated through work reorganization, and 3) more effort was required for coordinating work through supervision and meetings.

Figure 4-7: Results of analysis on "the effect of the progress of IT and individualized personnel management on employment of older people" (effect on establishment of continued employment system)

Explanatory variable		Explained variable: A continued employment system is introduced					
		Plug in "individualized personnel index (four variables)"		Plug in "wage gap"	Plug in "time of promotion"	Plug in "fast tracking"	Plug in "meritocracy"
		(1)	(2)	(3)	(4)	(5)	(6)
Corporate attribute	· Business standing: favorable	0.021	0.038	0.040	0.007	0.036	0.025
		(0.085)	(0.086)	(0.084)	(0.084)	(0.083)	(0.083)
	· Number of employees: increased	0.309***	0.329***	0.270***	0.298***	0.277***	0.278***
		(0.103)	(0.104)	(0.102)	(0.103)	(0.102)	(0.102)
Employment security	· Sense of employment security: strong	0.247***	0.241***	0.247***	0.267***	0.261***	0.262***
		(0.093)	(0.093)	(0.092)	(0.092)	(0.092)	(0.091)
Industrial relations	· Labor union: Yes	0.179		0.146	0.180	0.198	0.225
		(0.169)		(0.167)	(0.167)	(0.167)	(0.166)
	· Labor conference on continued employment: Yes		0.870***				
			(0.183)				
Progress in IT	· Progress in IT: advancing	−0.238***	−0.250***	−0.229***	−0.225***	−0.239***	−0.232***
		(0.073)	(0.074)	(0.072)	(0.072)	(0.072)	(0.072)
	· Requirement of IT skills: high	−0.147*	−0.155*	−0.145*	−0.152*	−0.131	−0.125
		(0.090)	(0.090)	(0.088)	(0.089)	(0.088)	(0.087)
Progress in Individualized personnel system	· Individualized personnel index (four variables)	0.069	0.058				
		(0.053)	(0.054)				
	· Wage gap: expanded			0.131			
				(0.154)			
	· Promotion: difference in promotion earlier in career				0.264*		
					(0.156)		
	· Fast tracking: introduced					0.033	
						(0.152)	
	· Meritocracy: emphasized						0.071
							(0.163)
	Constant term	0.849	0.589	0.906	0.846	0.795	0.723
		(0.717)	(0.716)	(0.710)	(0.709)	(0.702)	(0.703)
	Number of samples	917	918	929	927	934	938
	Chi-square	86.245***	108.005***	81.881***	84.471***	85.397***	84.002***
	Log likelihood	1119.818	1098.973	1140.604	1135.096	1145.978	1153.195

Note: 1) The analysis is logistic regression analysis. Figures in bracket are standard error. ***p<.01, **p<.05, *p<.10

2) Industry, company size, and respondent's affiliated department are controlled. The reference group is "manufacturing," "companies with 3,000 or more employees," and "sales department," respectively.

Figure 4-8: Results of analysis on "the effect of the progress of IT and individualized personnel management on employment of older people" (effect on employees who are 60 years and over)

Explanatory variable		Explained variable: There are employees who are 60 years old or above					
		Plug in "individualized personnel index (four variables)" (1)	Plug in "individualized personnel index (four variables)" (2)	Plug in "wage gap" (3)	Plug in "time of promotion" (4)	Plug in "fast tracking" (5)	Plug in "meritocracy" (6)
Corporate attribute	· Business standing: favorable	0.127	0.143*	0.126	0.115	0.132*	0.108
		(0.081)	(0.080)	(0.080)	(0.080)	(0.080)	(0.079)
	· Number of employees: increased	−0.018	0.013	−0.027	−0.031	−0.014	−0.014
		(0.096)	(0.095)	(0.095)	(0.096)	(0.095)	(0.095)
Employment security	· Sense of employment security: strong	0.047	0.020	0.031	0.037	0.040	0.062
		(0.087)	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)
Industrial relations	· Labor union: Yes	−0.429***		−0.424***	−0.448***	−0.421***	−0.436***
		(0.158)		(0.156)	(0.156)	(0.156)	(0.155)
	· Labor conference on continued employment: Yes		0.096				
			(0.167)				
Progress in IT	· Progress in IT: advancing	−0.421***	−0.438***	−0.422***	−0.415***	−0.428***	−0.424***
		(0.070)	(0.069)	(0.069)	(0.069)	(0.069)	(0.068)
	· Requirement of IT skills: high	0.120	0.114	0.113	0.126	0.103	0.090
		(0.084)	(0.084)	(0.083)	(0.083)	(0.082)	(0.082)
Progress in individualized personnel system	· Individualized personnel index (four variables)	−0.110**	−0.109**				
		(0.050)	(0.049)				
	· Wage gap: expanded			−0.304**			
				(0.147)			
	· Promotion: difference in promotion earlier in career				−0.408***		
					(0.149)		
	· Fast tracking: introduced					−0.270*	
						(0.145)	
	· Meritocracy: emphasized						−0.061
							(0.152)
	Constant term	−0.192	−0.571	−0.198	−0.177	−0.197	−0.225
		(0.684)	(0.672)	(0.677)	(0.675)	(0.672)	(0.673)
	Number of samples	1009	1010	1025	1022	1030	1031
	Chi-square	164.366***	156.846***	164.599***	165.902***	169.766***	162.841***
	Log likelihood	1230.215	1239.253	1252.228	1246.881	1253.356	1262.071

Note: 1) The analysis is logistic regression analysis. Figures in bracket are standard error. ***p<.01, **p<.05, *p<.10

2) Industry, company size, and respondent's affiliated department are controlled. The reference group is "manufacturing," "companies with 3,000 or more employees," and "sales department," respectively.

Figure 4-14: Logical flow between "progress in IT and individualized personnel" and "employment of elderly people"

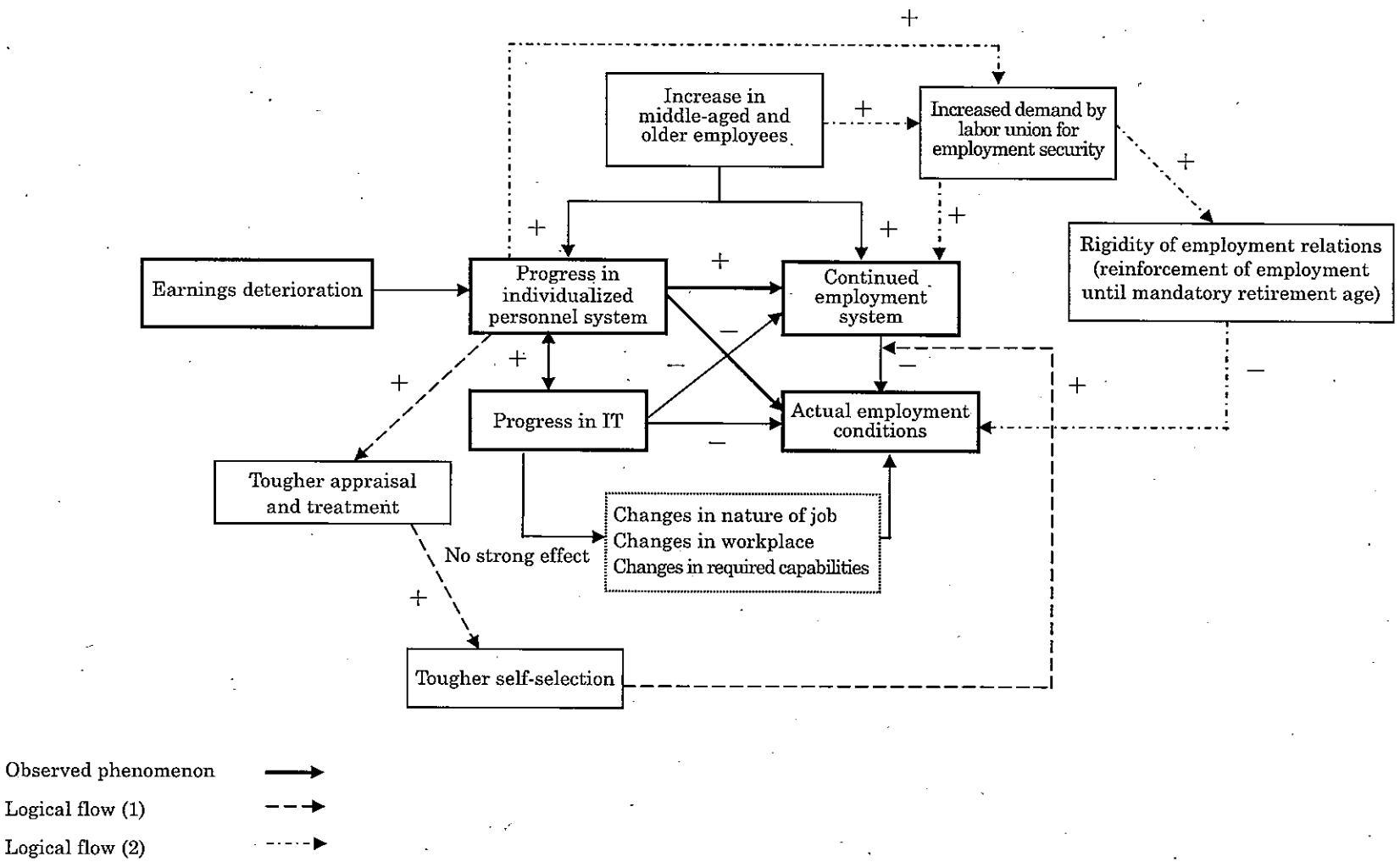


Figure 5-3: Results of analysis on "changes in working conditions"

Explanatory variable		Changes in working conditions		
		Increased wage gap	Job insecurity	Satisfaction with income
Advance of IT technology	Penetration of IT technology in the workplace	0.021 (0.105)	-0.021 (0.021)	0.049** (0.023)
	Allocation of PCs at the company	0.363 (0.256)	-0.035 (0.052)	-0.057 (0.056)
	Degree of Use of IT for work (low)	0.200* (0.105)	-0.002 (0.021)	0.007 (0.023)
	Degree of Use of IT for work (high)	-0.020 (0.141)	0.007 (0.030)	0.059* (0.032)
Increase in the number of non-regular employees	Changes in the number of non-regular employees at workplace	0.062 (0.110)	-0.023 (0.023)	0.006 (0.025)
	Non-regular employees performing core jobs	0.806** (0.317)	-0.120* (0.072)	-0.041 (0.078)
	Non-regular employees performing subordinate jobs	0.141 (0.177)	-0.016 (0.036)	0.031 (0.040)
	Non-regular employees performing routine jobs	0.114 (0.194)	-0.045 (0.039)	0.004 (0.043)
	Non-regular employees performing irregular jobs	0.237** (0.185)	-0.025 (0.039)	0.043 (0.042)
	Constant term	0.779 (1.056)	2.694 (0.213)	1.400 (0.231)
	Number of samples	815	778	778
	Adjusted R squared	0.106	0.114	0.208

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **.01<p<.05, *.05<p<.10
2) Control variables are industry, company size, business conditions, and labor union for corporate attributes and sex, age, years of service, affiliated department, and job position for personal attributes. More details on the results are available by contacting the author.

Figure 5-4: Results of analysis on "changes in nature of jobs"

Explanatory variable		Changes in nature of jobs			
		The level of required capabilities and knowledge	Clarification of roles	Changes in key jobs	Changes in discretion in work
Advance of IT technology	Penetration of IT technology in the workplace	-0.017 (0.019)	-0.035 (0.028)	0.004 (0.022)	-0.015 (0.027)
	Allocation of PCs at the company	0.082* (0.046)	0.087 (0.068)	0.033 (0.054)	0.078 (0.064)
	Degree of Use of IT for work (low)	0.052*** (0.019)	0.001 (0.027)	0.055** (0.022)	0.024 (0.026)
	Degree of Use of IT for work (high)	0.034 (0.027)	0.048 (0.039)	0.047 (0.031)	-0.009 (0.037)
Increase in the number of non-regular employees	Changes in the number of non-regular employees at workplace	0.000 (0.021)	0.011 (0.030)	0.008 (0.024)	0.010 (0.029)
	Non-regular employees performing key jobs	0.083 (0.065)	0.290*** (0.095)	0.196** (0.076)	0.116 (0.090)
	Non-regular employees performing subordinate jobs	0.035 (0.033)	0.072 (0.048)	0.085** (0.038)	-0.019 (0.046)
	Non-regular employees performing routine jobs	0.028 (0.035)	0.031 (0.052)	0.013 (0.041)	0.037 (0.049)
	Non-regular employees performing irregular jobs	-0.025 (0.035)	-0.055 (0.051)	-0.055 (0.041)	-0.014 (0.049)
	Constant term	2.692 (0.187)	2.167 (0.275)	2.004 (0.220)	2.402 (0.262)
	Number of samples	807	807	807	807
	Adjusted R squared	0.105	0.089	0.098	0.095

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **.01<p<.05, *.05<p<.1

2) Control variables are industry, company size, business condition, and labor union for corporate attributes and sex, age, years of service, affiliated department, and job position for personal attributes. More details on the results are available by contacting the author.

Figure 5-5: Results of analysis on "changes in workplace"

Explanatory variable		Changes in workplace			
		Concentration of work	Distinction of capabilities	Changes in the hours spent in meetings	Changes in the amount of administrative job
Advance of IT technology	Penetration of IT technology in the workplace	-0.061**	-0.039	0.041	0.017
		(0.027)	(0.025)	(0.048)	(0.030)
	Allocation of PCs at the company	0.113*	0.071	0.022	0.065
		(0.064)	(0.059)	(0.115)	(0.073)
	Degree of Use of IT for work (low)	0.043*	0.067***	0.170***	-0.017
		(0.026)	(0.024)	(0.046)	(0.029)
	Degree of Use of IT for work (high)	-0.014	0.028	0.044	0.000
		(0.037)	(0.034)	(0.066)	(0.042)
Increase in the number of non-regular employees	Changes in the number of non-regular employees at workplace	0.025	0.052**	0.045	0.086***
		(0.029)	(0.027)	(0.052)	(0.033)
	Non-regular employees performing key jobs	-0.027	-0.010	0.040	-0.115
		(0.088)	(0.082)	(0.159)	(0.100)
	Non-regular employees performing subordinate jobs	0.077*	0.026	0.282***	0.072
		(0.045)	(0.042)	(0.082)	(0.052)
	Non-regular employees performing routine jobs	-0.045	-0.052	-0.087	0.099*
		(0.049)	(0.045)	(0.088)	(0.056)
	Non-regular employees performing irregular jobs	0.004	0.087*	-0.059	0.020
		(0.048)	(0.045)	(0.087)	(0.055)
	Constant term	2.784	2.465	3.552	1.930
		(0.259)	(0.240)	(0.468)	(0.295)
	Number of samples	809	809	809	809
	Adjusted R squared	0.077	0.067	0.126	0.115

Note: 1) The analysis is multiple linear regression analysis. Figures in bracket are standard error. ***p<.01, **.01<p<.05, *.05<p<.10
2) Control variables are industry, company size, business condition, and labor union for corporate attributes and sex, age, years of service, affiliated department, and job position for personal attributes. More details on the results are available by contacting the author

4. Industrial relations in the era of IT

As business administration as well as employees' working styles and treatment are changing in the era of the new economy, we examined, in this section, the kind of reform that is needed in labor union movement and industrial relations.

To meet the rapidly changing market needs of the new economy, the companies providing the products must be flexible in their business administration. Obviously, there are administrative risks involved, and companies' personnel and labor management systems, as a means of avoiding risk, cannot be rigid lest they stagnate. In other words, employment must be flexible. In this context, the existing in-house systems will not be able to match the capabilities required by a company with individual employees' working conditions. This is likely to give rise to increased criticism against the existing personnel and labor systems that are based on groupism and to promote disinterest in labor union movement.

On the other hand, with respect to business administration, proposals will be made, one after another, on the personnel and labor systems that would replace the existing systems. Labor and management will be required to form their views from their respective standpoints. It should be noted that even though the existing systems are out of place in the modern age, the systems have their strong points, and order had been maintained by such systems. On the other hand, if management' policies and union's movement were limited to simply accepting the status quo, it would certainly lead to breakdown of order and risk the company's survival. As differences in the treatment of employees tend to expand within a company, a strict examination on these differences will also be necessary. While the importance of ability rating is voiced, whatever system of employee treatment is constructed, the system framework must be made transparent through labor-management consultations, and the operation of the system will require fairness and objectivity. Furthermore, labor unions will be required to have the capacity for dealing with complaints about the results of employee appraisals.

In industries with declining international competitiveness and industries of the new economy, labor and management cannot afford to be confronting each other on various issues within the company. At least on issues related to industrial policies, all information pertaining to business administration should be supplied to the labor union, and business administrative policies should respect the will of the workers. This, in turn, is synonymous with asking whether labor unions are equipped with the capability for analyzing business administration and form responsible views. Therefore, a relation of trust between labor and management must be at the

foundation. By extension, labor unions should have a future program for "participation in business administration." The people who are most affected by implementation of business administration policies are the majority of employees. A system in which people most affected by the policies can participate in the decision-making of those policies is a reflection of industrial relations in which corporate democracy is most elevated. Companies in which such a system is properly functioning are most appropriate and are expected to thrive in the era of the new economy.