ISSN 1348-9364

Japan Labor Review

Volume 6, Number 3, Summer 2009

Special Edition

Further Validation of Japanese-Style Career Development System

Articles

JILPT Research Activities

The Japan Institute for Labour Policy and Training

The *Japan Labor Review* is published quarterly in Spring (April), Summer (July), Autumn (October), and Winter (January) by the Japan Institute for Labour Policy and Training.

EDITORIAL OFFICE
The Japan Institute for Labour Policy and Training
International Affairs Department
8-23, Kamishakujii 4-chome, Nerima-ku, Tokyo 177-8502 Japan
TEL: +81-3-5903-6315 FAX: +81-3-3594-1113
Email: jlr@jil.go.jp
Homepage: http://www.jil.go.jp/english/index.html
Printed in Japan

How to Receive the *Review*:
The *Review* is distributed free of charge. (However, in some cases the receiver will have to pay for postage.) To receive the *Review*, please complete the order form and fax it to the Editorial Office, or access http://www.jil.go.jp/english/index.html.

Japan Labor Review

Volume 6, Number 3,
Summer 2009

CONTENTS

NEXT ISSUE (Autumn 2009)
The autumn 2009 issue of the Review will be a special edition devoted to **Human Resource Management of Atypical Employment**

Introduction

Further Validation of Japanese-Style Career Development System

In-house career is narrowly interpreted as time paths of "diversity of work" (horizontal career) and "promotion of position or grade" (vertical career) in which individual employees have in their companies. Therefore, career development system is a rule system which governs time paths of organizational members' horizontal and vertical careers so that productivity in the workplace and full enterprise competitiveness can be improved. Many of such rules have been autonomously made in the real operations while there are some clearly-stated ones such as labor regulations and labor-management agreement. Therefore, "Japanese-style" system changes with time. This special edition of Japan Labor Review is intended to further verify characteristics and functions of Japanese-Style Career Development Systems (JCDS) obtained from career studies (mainly in the 1980s) for regular employees of Japanese core businesses through five papers starting from critical considerations against "common belief" of JCDS.

Looking back on generation and settlement processes of JCDS, On the Job Training (OJT) system which consciously develops workers' skills through job transfers inside and outside workplaces was partially introduced in Japanese manufacturing industry after World War II. According to Norio Hisamoto who reviewed previous historical experimental studies on skill development system for iron and steel industry, a cross-trained worker policy has been established from about 1965.[1] That is, blue-collar employees at that time were encouraged to become regular employees, conscious utilization of OJT, work place training and the need for training were emphasized and cross-trained worker and high skill systems were established on the basis of medium- to long-range outlook with tensions with daily quantitative personnel management. The outline of JCDS seeking both deep and wide skills at the same time under the wide career development was then determined. One reason behind that labor accepted JCDS based on such cross-trained worker policy is, although social consensus to avoid regular employees' dismissal was essential, that government, labor and management focused on employment during the depression caused by oil crisis occurred at the end of 1973, the custom of long-term stable employment was strengthened, and a series of submitted bills to restrict dismissal for the purposes of reorganization played a role to strengthen social norms of employment security.[2]

However, such original form of JCDS was not designed by managers at that time with strategic intent. As Takahiro Fujimoto who thoroughly surveyed and analyzed the evolution process of Toyota Motor Corporation's production system said, the institutional control of in-house excess/rigid division of labor such as cross-trained worker system, multi-process handling, wide job classification, skill-based pay and revision of operation

[1] Norio Hisamoto, "Noryoku Kaihatsu [Skill development]," in *Nihonteki Koyo Sistemu* [Japanese-style employment system], ed. Michio Nitta and Hisamoto Norio, 107-61 (Tokyo: Nakanishiya Shuppan, 2008).

[2] Michio Nitta, "Koyo no Ryoteki Kanri"[Quantitative Employment Management], in *Nihonteki Koyo Sistemu* (see note 1), 27-71.

standard was a kind of "chance hit": since production sites were constantly short-handed due to continued expansion of production output under quantitatively limited input of management resources such as personnel and capital, Japanese companies could not introduce a segmented division of labor like Western companies even if they wanted to.[3] That is, generation and settlement of JCDS were not based on prior rational decision making but an emergent evolution process which is largely influenced by historical environmental restrictions, unintended knowledge transfer, etc. The evolution ability in which labor and management work together to make "tentative solution" under the historical restraint condition a competitive system afterwards was a driving force behind the development of Japanese companies including Toyota.

Thus, JCDS received world attention as a source of world competitive leadership from the 1970s to 1980s. JCDS was Japan's own form which combines a horizontal coordination such as precise tuning by sharing information with peers or relevant departments and a wide-range career development based on a merit-based incentive system ([job performing] ability-based grade system) which is intended to obtain "intellectual skills" in a mutually complementary manner.[4] According to Kazuo Koike who conducted a series of researches on labor career at production sites, "intellectual skills" are characteristics of Japanese operators' own skills.[5] Particularly, they are know-how of dealing with "unusual operation," i.e., changes and problems. At Japanese production sites, it is more often that operators, direct workers, deal with problems to solve rather than technicians or engineers who are experts in problem processing. As a result, the skill distribution becomes "middle-thick type" in which there are many operators with intellectual skills. He also insisted that if operators have certain knowledge level and motivation, Japanese-style "integrated system" in which operators at sites carry out wide-range duties is better than "separate system" in which operators' duties are limited from the perspective of cost of division of labor and their motivation. The method to obtain these intellectual skills was extensive OJT.

In the first paper written by Masaki Tanaka, a quantitative analysis on skill distributions of operators working at iron and steel production lines based on the intellectual skills theory. As a result, it was demonstrated that most of operators' skills are improved to the required level when their length of service reaches about 25 years. This paper's data are based on interviews with engineers and operators in manufacturing departments conducted from 1998 to 2004. In that sense, JCDS's main characteristic, a wide-range career development based on cross-trained worker system, has been continued.

Intellectual skills hold true for white-collar employees. White-collar employees are the same as blue-collar ones in the sense that they deal with changes and uncertainty based on their wide-range expertise. In this case, the promotion to develop intellectual skills is a

---

[3] Takahiro Fujimoto, *The Evolution of a Manufacturing System at Toyota* (New York, Tokyo: Oxford University Press, 1999).

[4] For example, Masahiko Aoki, *Information, Incentives and Bargaining in the Japanese Economy* (Cambridge; New York: Cambridge University Press, 1988).

[5] For example, Kazuo Koike, "Learning and Incentive Systems in Japanese Industry," in *The Japanese Firm: Sources of Competitive Strength*, ed. Masahiko Aoki and Ronald Dore, 41-65 (Oxford; New York: Oxford University Press, 1994).

system of “promotion of position or grade” (vertical career). Although this is structured by an employee grading system, many of Japanese companies have introduced the ability-based grade system which consists of ability-based grade ladders.

The ability-based grade system has been fully introduced into Japanese companies since General Assembly of Japan Federation of Employers’ Associations (JFEA) in 1965. In *Noryoku-Shugi Kanri: Sono Riron to Jissen* [Merit system: The theory and practice] (JEFA Publications, 1969), JFEA positioned the ability-based grade system as an axis of personnel system, recommended the separation of positions and ability-based grades and insisted that not only performances but also all processes should be evaluated for promotion management and both apparent and potential abilities should be evaluated. If the ability-based grade system is adopted, the promotion structure would consist of two hierarchies, “ladder of position” and “ladder of grade (rank).” The base pay is provided depending on employee’s grade, and when the employee is promoted to upper grade, he/she gets a raise. However, if not promoted to upper grade, he/she would not get a raise even if promoted to upper position. In Japanese, the promotion of position and the promotion of grade are separately called “*Shoshin*” and “*Shokaku*” respectively based on such separation between treatment and assignment. Since many parts of the pay correspond to the grade, total labor cost management is carried out by controlling the number of employees being promoted to upper grades. The promotion system evaluates whether ability improves as time advances in some way such as personnel evaluation and interview exam. Although there are individual disparities of promotion speed and grades to be reached, employees are supposed to be gradually promoted to upper grades and the promotion is normally one by one. There are also minimum required length of service and standard length of service for promotion. Because, the ability-based grade system is based on man-centered idea that “man creates jobs” and “ability is developed by jobs.” This also leads to the perspective of human ability that acquired abilities will not decrease. Therefore, there is no concept of demotion in principle.

Previous studies on promotion of position/grade in white-collar employees’ JCDS focused on when the disparity of reaching to a specific grade occurs, and characteristics such as “simultaneous promotion among employees who joined the company at the same time early in their career (seniority promotion),” “late primary selection” and “transfer to tournament selection later in their career” were stylized. Preceding studies, however, did not look out for the relationship with horizontal career which provides the promotion. In the second paper written by Katsuhito Uehara, an integrated analysis of promotion and assignment was conducted and long-term selection process and career development from joining to leaving the company were surveyed using personnel data of college-educated white-collar employees in General Trading Company A. As a result, the time of promotion disparity is certainly late as same as the conclusions of preceding studies. However, regarding the trend of assignment, it was confirmed that the first job transfer after the first assignment has already had significant impact on the order of promotion to manager and the finally reached grade. That is, it was found that there is a “quick selection” how to allocate next jobs in JCDS against the conventional dominant common belief, Japanese company = “slow promotion.”

In the third paper written by Tetsuo Nakashima, the reality of career competition was analyzed using personnel micro-data of three second-tier manufacturers (more than 1,000 employees) which adopt the ability-based grade system. It was clarified that; (i) there is a heated competition so-called “knock-out competition” early in their career, and (ii) there is also a competition associated with changes in the order later in their career and there is no end of competition. These are different from the common belief that there is a uniform seniority system early in their career and it transfers to a tournament system later in their career. In JCDS, on a foundation of long-term stable employment system, employees start their career as one group at first, and some are gradually straggling behind the group and they are divided into some groups. They compete with others in their own group, e.g., leading group and the second group. If an employee struggles behind the last group, he/she would compete with the closure of vertical career gate. In JCDS, there is a long-term promotion competition like a career marathon.

How about career development of R&D professionals which require high degree of professionalism among white-collar employees? There is no common belief of JCDS on relationship between promotion and transfers of R&D professionals. While there are experimental studies that the more employees experience diversified jobs and works, the quicker or the higher they are promoted, some insist that job transfers beyond the business have a negative impact on the promotion. It is also uncertain whether career changers are in a disadvantaged position against promotion or not. In the fourth paper written by Yukiko Murakami, a comparative analysis on the relationship between transfers and promotion of R&D professionals who work for national laboratories focusing on basic research (NLB), those with an emphasis on applied research (NLA), laboratories of private companies in the pharmaceutical industry (PLP) and those in the electric and electronics industries (PLE) was conducted. In PLE where production knowledge is an important organizational output, it was found that since horizontal coordination plays an important role of management personnel, transfers have a positive impact on the promotion. On the other hand, career changers whose length of service is short in the company are in a disadvantaged position against the promotion due to limited opportunities of transfers, in-house communications or project experiences. Japanese companies like PLE have focused on applied researches and have been highly competitive in integrated product architectures, e.g., cars, precision equipment and functional chemical goods. Provided that Japanese industries have a comparative advantage in integrated product architectures in which a delicate allocation balance of parts determined the value of products, career of Japanese R&D professionals would become wider than that of Western countries and lower the probability of career changers’ promotion.

As is obvious from above four papers, JCDS’s characteristics are; (i) a wide-range career development which promotes the acquisition of intellectual skills (horizontal career), (ii) a quick selection to decide job allocations and a long-term heated promotion competition which obscures the final winner (vertical career) and (iii) an ability-based grade system which supports both careers as an incentive system. At the same time, there is a change of JCDS in industries which focus on basic researches more than applied researches like R&D professionals in a pharmaceutical company that advanced professionals easily function and

mid-career employment is easily used.

In any case, studies on functionality of JCDS have been conducted mainly on the basis of the intellectual skills theory, i.e., experimental studies of hypothesis, "wide-range career development → acquisition of intellectual skills → improved efficiency," have been accumulated. The last paper of this special edition written by Mitsutoshi Hirano, Yasuhiko Uchida and Ryuta Suzuki makes the concept of a new framework which is different from intellectual skills, i.e., a cause-and-effect relationship "wide-range career development → knowledge combination → value creation," and advocates a new descriptive principle of the functionality of JCDS. As a result of career survey on executives of *House Foods Corporation*, Japanese-style emergent resource-based management style which is different from Western strategic management style which focuses on the time of planning was found. Particularly, the personnel department of the headquarters continuously encourages the development, accumulation and utilization of internal resources all over the company through the career development system, and the corporate changes will be made through the emergent process. That is, this mechanism makes a gap between individual own skills and skills required by roles by conducting technically and attributively discontinuous personnel transfers on purpose and uses the gap as motivation to change roles and create values.

In fact, the personnel department of the headquarters of *House Foods Corporation* is deeply involved in this value-creation process. It is carried out through annual regular personnel transfers in which the personnel department demonstrates its initiative. The grade of the job performing ability-based grade system is also promoted by one depending on the evaluation of abilities and performances of organizational members. In short, the characteristic of *House Foods Corporation*'s career development system is that of JCDS which combines wide-range career development, job performing ability-based grade system and strong personnel department of the headquarters.

Knowledge obtained by papers of this special edition can be summarized that JCDS stylized in the 1980s has evolved keeping the characteristics to the significant extent even now and continuously functioned as a source of Japanese companies' international competitiveness. It has also partially changed, e.g., narrow career development for cultivation of advanced professionals and conversion from ability-based grade system to role-based grade system. It is required for the career development system to combine management such as coordination and strategy formation and other activities in a mutually complementary manner as well as complementarity with the national system such as laws and characteristics of labor markets. Therefore, it is highly unlikely that JCDS changes alone outstandingly. Then, how would further globalization of current business activities and serious global recession since last year impact JCDS? In consideration of JCDS's advanced functionality, whether JCDS's complementary rebuilding against environmental restrictions succeeds or not would have a significant impact on business performances. We should continuously pay attention to JCDS's evolution processes.

Mitsutoshi Hirano
Kobe University

Skill Development and the Distribution of Skill at an Iron and Steel Production Line

Masaki Tanaka
Nippon Yakin Kogyo Co., Ltd.

This paper aims to address a case at a stainless steel plant (Plant B of Company A) and reveal the status of production skill that operators (general workers) have acquired at a production line. In particular, I analyzed the distribution of skill among operators and the influence of individual attributes such as a worker's age and academic background on the distribution. The section below summarizes the analysis results.

The analysis was conducted on evaluation findings of all operators (a total of 543 operators) working at Plant B. It was quantitatively confirmed through the skill level distribution that skill distribution is "inverted U-shaped type" centered on mid-level workers, mainly veteran workers. In addition, it was found through quantitative analysis of determining factors in skill level that the skill levels of a vast majority of the operators will be raised with increasing experience, and that a worker after some 25 years of service as an operator will be well qualified for problem-solving skill and maintenance operation. It was also suggested, through an examination of workers' attributes which affect their skill development, that a worker's intellectual level and willingness to improve skills are important for intellectual skill development.

I. The Purpose of This Study and Issues in Analysis

In this paper I address a case at a stainless steel plant (Plant B of Company A) and reveal the status of production skill that operators (general workers) have acquired at a production line.

In spite of some fluctuations in evaluations since the second half of the 1990s, the production system of Japanese corporations has generally received high evaluation marks as a source of competitiveness since the 1970s. Concretely speaking, a production control method known as Toyota's "Kanban," a strong product development capability supported by development projects and project managers in charge of the projects,[1] supplier systems serving as efficient long-lasting commerce networks,[2] and general workers' high level of skill and the way they work at a production line are among specific productions systems

[1] Fujimoto (1997) analyzed Toyota Motor Corporation's product development processes based on a theory of information and organizational ability. In particular, Fujimoto focused on the role of leaders who strongly coordinate and integrate internal and external projects for product development and called them as "heavyweight product managers."

[2] Asanuma (1997) pointed out that parts manufacturers who are generally called as subcontractors can be roughly classified into two types; "approved drawing manufacturers" who develop products by themselves after receiving rough specifications from outsourcers and "rental drawing manufacturers" who only manufacture products based on specifications provided by outsourcers. He also clarified the existence of rules that both outsourcers and their business partners can enjoy benefits brought about by cost reduction, technical innovation, etc.

evaluated so far.

Among the factors constituting the production system, this study focuses on general workers' (or operators') high level of skill. This is because the manufacturing department is somehow involved in production control and product development capability which are considered as a source of competitiveness, and the production line provides an important basis for the competitiveness, and because, among various factors constituting the production system, in particular, the way general workers work and their skill level are admired and criticized at the same time.

One of compelling theories on a high labor productivity of production lines is to evaluate highly-qualified general workers and their dedication. For example, factors appreciated by this kind of theory include a skill to respond flexibly to abnormalities or changes associated with production activities, which is defined as "intellectual skill" by Koike, "On the Job Training (OJT)" as a mechanism which forms such skill, and an ability-based grade system serving as an incentive. While they are sometimes regarded as production systems of Post-Fordism which has replaced Fordism (complete separation of concept and execution of production), at the same time, there has been deep-rooted criticism against general workers at a production line, claiming that they are rarely autonomous and are flexible only to the extent set by the management department in line with the principle of division of labor which lies at the bottom of Taylor System, though ordinary workers are supporting flexible production system by serving as multi-skilled workers.[3]

One of criticisms of Koike and others has argued that their studies lack specifics necessary for experimental studies. There may be two reasons for such criticisms; (i) the description is abstract out of consideration for the surveyed company, and (ii) since main method was interview survey, it was conducted to a limited extent, specific workplaces within the surveyed company. In this study, I have obtained data on the skill level of a total of 543 operators working for a plant from a company surveyed. There are following three issues to be clarified by analyzing the data:

- Skill distribution among operators working at an iron and steel production line
- Meaning of the skill distribution
- Effect of individual attributes such as age and academic background on skill development

[3] Suzuki (1994) reviewed and summarized previous studies. Suzuki pointed out that high productivity of Japanese manufacturing industry is caused by not the difference of manufacturing technologies or mechanization but the dedication of general workers at production lines. He discussed two explanations of factors contributing to the dedication of general workers; "job design" which unofficially encourages workers' initiative and "enforcement" by thorough labor control. He then concluded that a human resource management system at Japanese production lines should be understood as a unique integration of two management function aspects, enforcement to labor and encouragement of initiative, and arbitrariness which is customarily given to quality control circles and job allocation and incentive measures such as objectives management and suggestion systems have been sufficiently controlled from managerial viewpoints.

I would like to explain the reason why I have chosen the iron and steel industry for the study. The iron and steel industry, which has been serving as a key industry in Japan for a long time, is among one of sectors which have placed a particular emphasis on human resources management (personnel management), and accordingly, is a sector on which sufficient findings concerning labor issues have been already accumulated. For example, it has been frequently reported that the iron and steel sector has introduced and established a method of division of labor called "the line and staff system" in the course of production efficiency improvement, and the sector is an industry keen on quality control.[4] In addition, some changes during the 1990s have been reported in the division of roles between the administration and the manufacturing departments within a company which had been maintained so far by the line and staff system. There have been similar changes in the company surveyed in this study.[5]

Based on the above, it is reasonable to suppose that the iron and steel sector is a typical industry which will offer enough material for studying, based on accumulated research findings, skills and management at the production line, the scope of this study. I selected this sector as my case study partly because recently process industries such as the iron and steel industry have been seldom studied while assembly industries, including automakers and electronic manufacturers, have been frequently covered, and because the content and level required for operators may have changed due to revision of the traditional division of roles which took place during the 1990s.

I used the following procedures in this study. I conducted field research on details of the skill mainly through hearing investigation, using organization charts and manpower inventory data provided by the personnel department as basic data. I carried out a field hearing for the period from 1998 through 2004 on the subject of job content and the division of roles from engineers and operators working for the manufacturing department. I used findings from skill evaluation conducted at each workplace and personnel data for quantitatively analyzing individual attributes which can influence the skill distribution and skill level.

[4] Nita (1988) analyzed the management-labor relation at workplaces, offices and entire company in Major Iron and Steel Manufacturer S in the 1970s and examined how workers and labor unions made comments in corporate decision making and decision execution processes and how their comments influenced corporate behaviors. The study focused on workers' commitments at workplaces such as "self control actions" and negotiation between labor and management concerning personnel rationalization, job transfers and productive structure adjustment. He concluded that workers' commitments in Japan have positive influences on economic performance, contributing to solution of labor-management problems and prevention of troubles resulting from responses to changing environments such as oil shocks.

[5] Tsuchiya (1996) reported processes of changing division of labor at a leading integrated steel manufacturer.

II. Earlier Studies on Skill

Koike argues that, through a number of his studies on the actual status of workers' skill, the competence at a Japanese production line lies in "intellectual skills" (Koike 1988, 1991, 1994, 1997; Koike and Inoki 1987; Koike, Chuma, and Ota 2001). Koike's "intellectual skills" are general workers' skill to flexibly respond to changes and abnormalities, which is mainly formed through a wide range of OJT.

In addition, Koike (2003) has also referred to the way roles are being shared among production workers, maintenance workers and engineers, i.e., the way labor is being divided. An important conclusion from his argument is that, assuming that workers actively engaged at a worksite have the intellectual level of someone who has finished compulsory education, (i) from the viewpoint of costs incurred in the division of labor and enhancement of workers' motivation, "integrated systems" where a direct worker is carrying out a wide range of duties is superior to "separated systems" where a direct worker carries out a limited range of duties, and that (ii) in the case of "an integrated system," the skill distribution is "inverted U-shaped type" in which there are many mid-level workers.

Many have already studied the concept of Koike's "intellectual skills," and among them, I would like to refer to studies of Asanuma and Ma both of which are closely related to the theme of this study.

Asanuma (1997) is widely known for having regarded the transaction between a parts manufacturer, generally known as "a subcontractor," and a manufacturer which places orders, as a long-lasting, efficient commercial network. Asanuma also points out some important facts and indications in the first part of his work, by analyzing the skill and career paths of blue-collar workers at a leading automaker, including those promoted to management positions.

More specifically, Asanuma finds out, through his analysis of career paths of blue-collar workers promoted to management positions, that experienced blue-collar workers are required to have "ability to teach others and leadership at a workplace, as well as 'intellectual skills'" (Asanuma 1997, 81). Ma (1994) surveys blue-collar workers' skill development at a plant producing brakes in a non-ferrous metal manufacturer for complementing and generalizing Asanuma's findings, and argues that blue-collar workers' skill development process is made up of three types of skill and a worker is required to master the three in the following order in a progressive manner: (i) "fundamental skills,"(ii) "integrative skills," ability formed based on fundamental skill to flexibly repond to changes and abnormalities, and (iii) "organizational skills," ability to train and supervise subordinates and to control an organization at a workplace, which is formed on the basis of both fundamental skill and integrative skill.

In this way, Asanuma and Ma develop arguments about the concept of "intellectual skills," yet some have criticized the concept. One of the most representative works against the concept is Nomura (1993, 2001). Due to limited space, I cannot introduce details of his

works, yet, in summary, Nomura argues the following two points: (i) those who play roles in developing and maintaining 'intellectual skills' are not general workers but technical experts such as maintenance workers and (ii) he casts doubt on the validity of Koike's experimental studies. Nakamura (1996) also summarizes his findings from experimental studies conducted on some of workplaces with different types of technology as follows. It is confirmed, first of all, that every production line is involved in work associated with product development and production control more or less depending on the workplace. Such involvement is, however, integrated in a course specified by the administration of a company, and is not conducted autonomously by production workers on their own responsibility. That is, it is concluded that it is an "integration based on the separation" in a sense that workers are integrated with the concept based on "the separation of conception and execution," showing a different viewpoint from the division of roles, "integrated system" and "separated system" as Koike described.

These are the outline of Koike's concept of "intellectual skills" and earlier studies related to the theme of this study. While "intellectual skills" and "integrated systems" have provided effective analytical concepts for understanding the skill developed at a Japanese production line, there may be still some questions remained unanswered. For example, in studies prior to Koike (2001), workers surveyed were limited only to production workers. Accordingly, detailed role sharing between maintenance workers and production workers was not always clear. In addition, as Muramatsu (1996, 2002) has pointed out, additional discussion will be necessary with regard to various factors influencing whether one selects integrated systems or separated systems.[6] It is also desirable to conduct quantitative confirmation of the status of the skill level distribution in accordance with job experience, in particular, "inverted U-shaped" skill distribution. If "inverted U-shaped" distribution is confirmed, it would be necessary to consider the meaning of it in relation to the skill acquisition process which Asanuma and Ma have pointed out.

As for workers' intellectual level, one of requirements for the establishment of "intellectual skills," although Koike (1991) assumes it as the level at the end of compulsory education, some studies have revealed different viewpoints. For instance, according to Chatani report (1998), college-educated engineers are assigned to the site of thermal power plant to deal with highly-developed jobs accompanied with technical innovation, and Chuma (2002) points out that there is a possibility that leaders are shifted from operators to engineers at production lines for semiconductor exposure apparatus and other semiconductor devices in which advanced and widened knowledge is required for problem finding and solution. As these studies have suggested, there is also a possibility that workers' academic background is an important requirement for establishment of intellectual skills.

Among the issues listed above which need further discussion, I would like to analyze,

[6] Muramatsu cited "attention to safety" as a reason why integrated systems have not been sufficiently introduced to quantity production lines.

in this study, quantitative confirmation and verification of the skill distribution, and possible influence of individual attributes on skill development.

III. Overview of Those Surveyed

1. Overview of Company A

Company A surveyed in this study is a specialized stainless steel manufacturer with about 1,100 employees. This study focuses on full-scale manufacturing Plant B, one of Company A's core plants, which smelts, rolls and finishes stainless steel. About 900 employees are working at Plant B, including about 540 operators and about 90 maintenance workers. In addition, about 300 employees from group businesses and affiliated companies are involved in a part of maintenance and production activities.

This study mainly covers the time in and after 1990. In the early 1990s, while Company A had to increase production due to active demand, it was strongly required to reduce costs, etc. to maintain its market share in order to oppose a major integrated steel manufacturer which made a full-scale entry into the manufacturing and sales of stainless steel. Plant B has taken measures to improve productivity since 1990 to drastically reduced costs. In this measures, blue-collar operators at the production line drastically reduced the frequency of equipment failure to improve the productivity by "extending their line of duty" such as undertaking maintenance work.

2. Production Organization

Those who directly or indirectly get involved in production activities are engineers, operators and maintenance workers. Engineers are assigned to production lines as chiefs or technical staff. Chiefs manage production, operation, personnel and safety within the section. Technical staff creates and takes measures aimed at improving productivity and quality and reducing costs under chiefs.

Operators consist of team leaders and non-rank-and-file workers. A team consists of a couple of operators and four teams are engaged in operation of equipment on three shifts around the clock. Each team leader has the authority to coordinate and direct operations. Team leaders are appointed from among workers and usually engaged in operation of equipment at the line like other workers. In other industries such as automobile one, the main job of team leaders is to manage the line and sometimes they are involved in practical operation as "reliefs" of sorts only if they have vacancies. In such a case, team leaders usually have to be distinguished from workers to make an analysis. However, in the case of Company A, since the main job of team leaders is to operate equipment, this study makes an analysis on skills of both team leaders and workers as operators.[7]

[7] According to Asanuma (1997), in the case of Auto Manufacturer A (probably Toyota Motor Corporation) in 1982, "team leaders are not engaged in administrative tasks all day long unlike assis-

Table 1. Evaluation Items Concerning Operators' Skill Levels

Ability to operate			Ability to maintain equipment				Ability to improve with scientific methods
Operation	Quality control	Specific technical theory	Basic knowledge	Inspection and diagnosis	Failure analysis	Repair	-Multiple analysis - 4M analysis - PM analysis
Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5	Scale of 1 to 5

Source: Author's self-made table based on data provided by Plant B of Company A.

Engineers direct operators through foremen. Foremen are appointed from among those who were team leaders, control a few lines under the supervision of chiefs and supervise and direct lines in their charge. Foremen, unlike team leaders, do not get involved in the operation of equipment. Therefore, foremen are not analyzed as operators.

IV. Relationship between Skill Distribution and Workers' Attributes

Skills required for operators at production lines are abilities to deal with problems on maintenance, equipment and quality, as well as operating equipment. Operators' ability evaluation by the supervisors, chiefs and foremen, was used as data to understand skill levels of individual operators.

The skill level evaluation on operators was carried out by their supervisors in October 1998 using common criteria. Evaluation items are divided into three main classes: "ability to operate" concerning skills of operating equipment; "ability to improve" using scientific methods required for problem solution such as IE method; and "ability to maintain equipment" concerning maintenance which is essential for improved productivity. As shown in Table 1, "ability to operate" and "ability to maintain" are further divided into more detailed items and rated on a scale of 1 (Poor) to 5 (Excellent).[8] Each evaluation item was rated in

tant managers or group leaders and spend around 50% of their working hours at production lines. Accordingly, they also serve as players within a team made up of ordinary workers, rather than as pure managers." (Asanuma 1997, 52). On the other hand, Auto Manufacturer B (probably Nissan Motor Co., Ltd.) had no position corresponding to a team leader of Company A in 1983. In Company B, there was an informal position which "serves as a leader of a small group made up of five to six workers at an assembly line, the smallest unit at a workplace, and was called as 'boshin'" (Asanuma 1997, 83). In this way, even among auto manufacturers, positions and titles are different depending on the company.

[8] Koike (2001) introduced an example that there are "work charts (*shigotohyo*)" describing workers' individual scope of job performance and performance standards at workplaces and such perform-

Table 2. Basic Statistics Concerning Operators' Skill Levels

Skill evaluation items	Operators (543 persons)			
	Average	Standard deviation	Minimum	Maximum
Ability to operate	3.44	1.04	1.0	5.0
Ability to improve	2.77	0.88	1.0	4.0
Ability to maintain equipment	3.26	1.01	1.0	5.0
Comprehensive ability	3.16	0.93	1.0	4.7

Source: Author's self-made table based on data provided by Plant B of Company A.
Note: "Comprehensive ability" stands for the average scores of above three abilities.

accordance with "skill criteria" which describe specific criteria. Since "skill criteria" are not open to the public, details cannot be explained here. As for "ability to operate," for example, 1, 2, 3, 4 and 5 stand for "unable," "able to operate with assistance," "normally able to operate without problem," "even able to deal with abnormalities" and "able to direct and instruct others" respectively. Similar detailed criteria are also provided in other items. As above, these criteria imply that operators are required to be ready for "unusual operations" such as dealing with changes and problems as well as execution of "usual operations" in which Koike describes.

Table 2 shows basic statistics concerning evaluation results. While scores of ability to operate and ability to maintain equipment are at the same level in the average and standard deviation, that of ability to improve are relatively smaller. The reason why scores of ability to improve are low may be because evaluation items for ability to improve include analytical methods, etc. which are rarely used by operators in their regular routines, while evaluation items for ability to operate and ability to maintain equipment are nearly skill levels of their regular routines. In fact, the coefficient of correlation between ability to operate and ability to maintain equipment is as high as 0.92, while the coefficients of correlation between ability to improve and ability to operate and between ability to improve and ability to maintain equipment are slightly lower, 0.82 and 0.85 respectively. Given the results above, it would be reasonable to consider only ability to operate and ability to maintain equipment as indices to measure skill levels for regular routines. However, there are many overlapped parts in three criteria; for example, both ability to operate and ability to maintain equipment include things to measure ability to improve. In addition, ability to improve includes "intel-

ances are regularly reviewed and used as basic data for merits evaluation. Skill evaluation in this example was conducted as one of productivity efforts and was frequently reviewed. Afterward, such evaluation has been conducted in a different way, and the revision has become less frequent. Skill evaluation results and employee evaluation results have never been directly linked.

lectual skills" in which Koike described, i.e., measures to evaluate knowledge of problem-solving methods which is necessary when dealing with changes and problems (unusual operations). Therefore, "comprehensive ability," the average score of the three criteria is used for the analysis below.

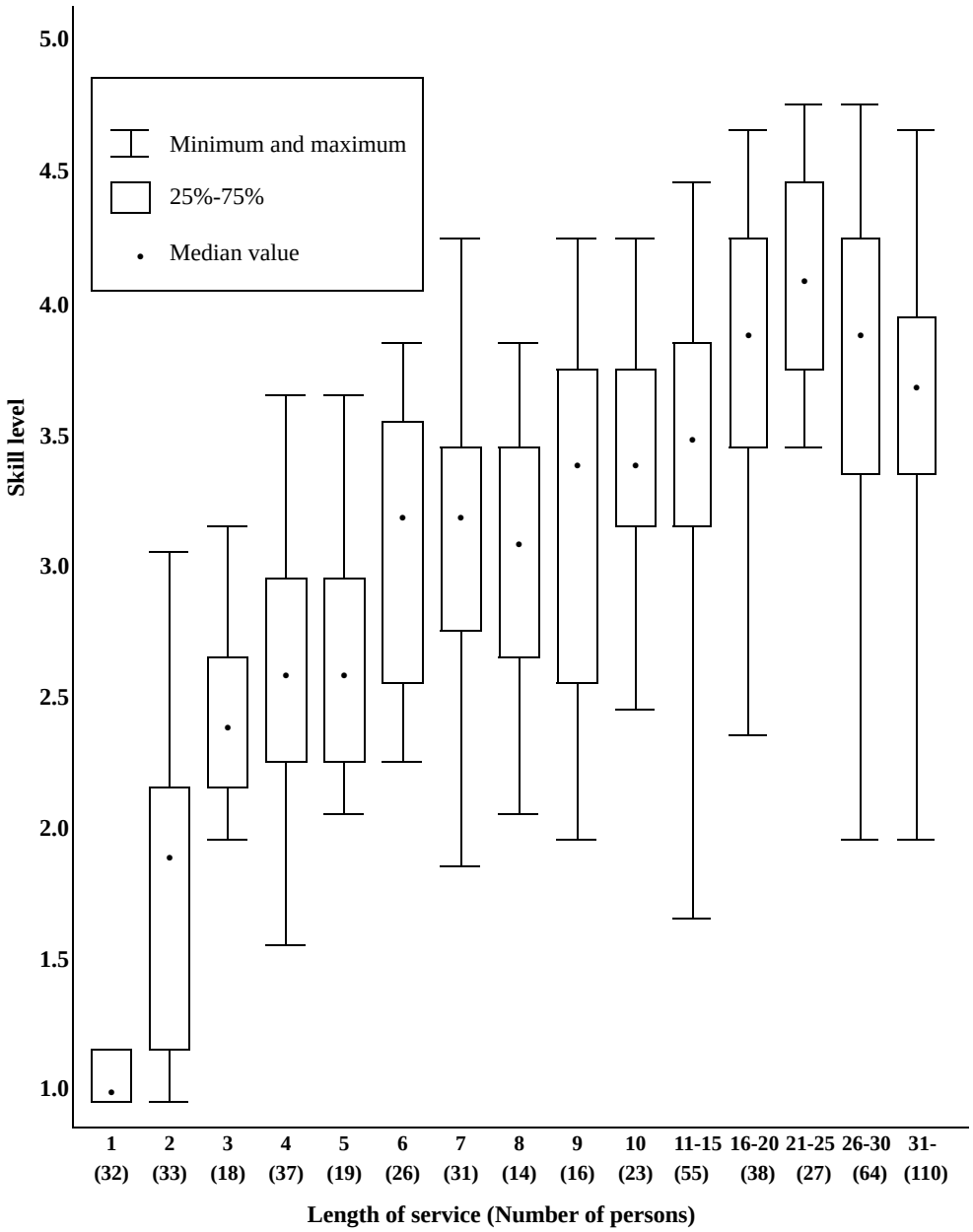
Figure 1 shows the relationship between the length of service and evaluation results of "comprehensive ability" in a boxplot. According to the figure, as a rough trend, a vast majority of operators' skill level is improved with the length of service. In addition, according to an interview survey on engineers and operators, around Level 4 of the evaluation results can be used as a measuring stick for the level enough to solve problems and maintain, and a majority of operators working for around 20 years have reached the level of 3.5 or higher.

As above, it can be said that a majority of operators at Plant B have improved their skill levels in proportion to years of experience. As mentioned above, Koike (2003) argues that at a production line in Japan, leaders dealing with problems on products and quality are mid-level general workers and the skill distribution is "inverted U-shaped" in which many mid-level workers have enough skill levels. These results are consistent with his argument.

However, factors which determine the skill level are not clarified by the distribution alone. Therefore, with more individual attributes on operators in mind, a multiple regression analysis was carried out to clarify determinants of skill levels. Explained variables for estimate are "skill level" indices used in previous analyses. Explanatory variables are, age, length of service, square of age, square of length of service, various qualification dummies, year of employment dummy and academic background dummy. Table 3 summarizes basic statistics of variables used in the estimate.

Of the total of 543 operators, 79% are persons without working experience in other companies; the remaining 21% are mid-career workers. 61% of operators are high school graduates and some senior operators are junior high school graduates. There are some operators who obtained a high school graduate certificate at the in-house training center. Some of those who recently joined the company as mid-career workers are college graduates and career college graduates. Since it is thought that such year of employment and academic background may have an effect on skill levels, those are also included in explanatory variables. Since there are a huge variety of combinations of academic background and year of employment in these samples, age does not always correspond to length of service. In addition, in order to check whether vocational qualifications such as crane operator license, dangerous object handler's license and engineering technician's license have an effect on skill levels or not, those dummy variables were added to explanatory valuables and the estimate was carried out with ordinary least square method (OLS) and ordered probit method.[9]

[9] Ordered probit analysis is suitable when explained variables are ordered category variables. Skill level indices which are explained variables in this analysis are averaged scores evaluated for each of three skill categories on a scale of 1 to 5. Accordingly, though they are considered as continuous quantity in an ordinary analysis, objections may be raised that the scale of 1 to 5 itself is not always based



Source: Author's self-made figure based on data of 543 operators provided by Plant B of Company A.
Note: Since the number of annual samples of 11 years or longer length of service is smaller, samples are collected by every five years for those periods.

Figure 1. Skill Level and the Length of Service

on variable quantities measured at regular intervals. For this reason, estimation with the ordered probit method was also carried out to be careful not to raise any objection. For ordered probit analysis, see Greene (2003, 736-40).

Table 3. Basic Statistics of Variables Used to Estimate Skills

(Sample size＝543)

Variable	Average (standard deviation)	Minimum	Maximum	Description
Skill level	3.16 (0.93)	1	4.7	Skill level Lowest=1, highest=5
Age	36.3 (13.2)	19	60	
Age^2	1,489.6 (1,035.5)	361	3,600	
Length of service	16.6 (12.9)	1	43	
Length of service^2	441.1 (521.6)	1	1,849	
Qualification (crane) dummy	0.831 (0.376)	0	1	Those having crane operator license=1 (451 persons), others = 0. Overhead crane operator license is essential for operators, however, acquisition of overhead crane operator license is relatively difficult and some have failed to obtain the license.
Qualification (dangerous object) dummy	0.433 (0.496)	0	1	Those having authorized dangerous object handling supervisor=1 (235 persons), others = 0. License of dangerous object handler is not essential for jobs, but many professional workers have tried to obtain the qualification.
Qualification (engineering technician) dummy	0.247 (0.432)	0	1	Those having engineering technician qualification = 1 (134 persons), others = 0. The qualification the corporation placed emphasis on during its productivity enhancement efforts. This qualification covers mechanical maintenance, oil pressure and electric maintenance.
Person without working experience in other companies dummy	0.786 (0.410)	0	1	Those who were under 20 years old when joining the company =1 (427 persons), others= 0.
Junior high school graduate dummy	0.133 (0.339)	0	1	Junior high school graduate = 1 (72 persons), others = 0. Operators' final academic background are divided into four: "junior high school graduate," "high school graduate," "graduate of in-house training centers" and "others (university or career college graduate)."
High school graduate dummy	0.606 (0.489)	0	1	Final academic background: high school graduate = 1 (329 persons) and others =0.
In-house training center dummy	0.230 (0.421)	0	1	Final academic background: graduate of in-house training centers =1 (125 persons), others = 0. Those graduating from in-house training centers are considered as excellent.

Table 4. Estimate Results on Determinative Factors for Skill Level (n=543)

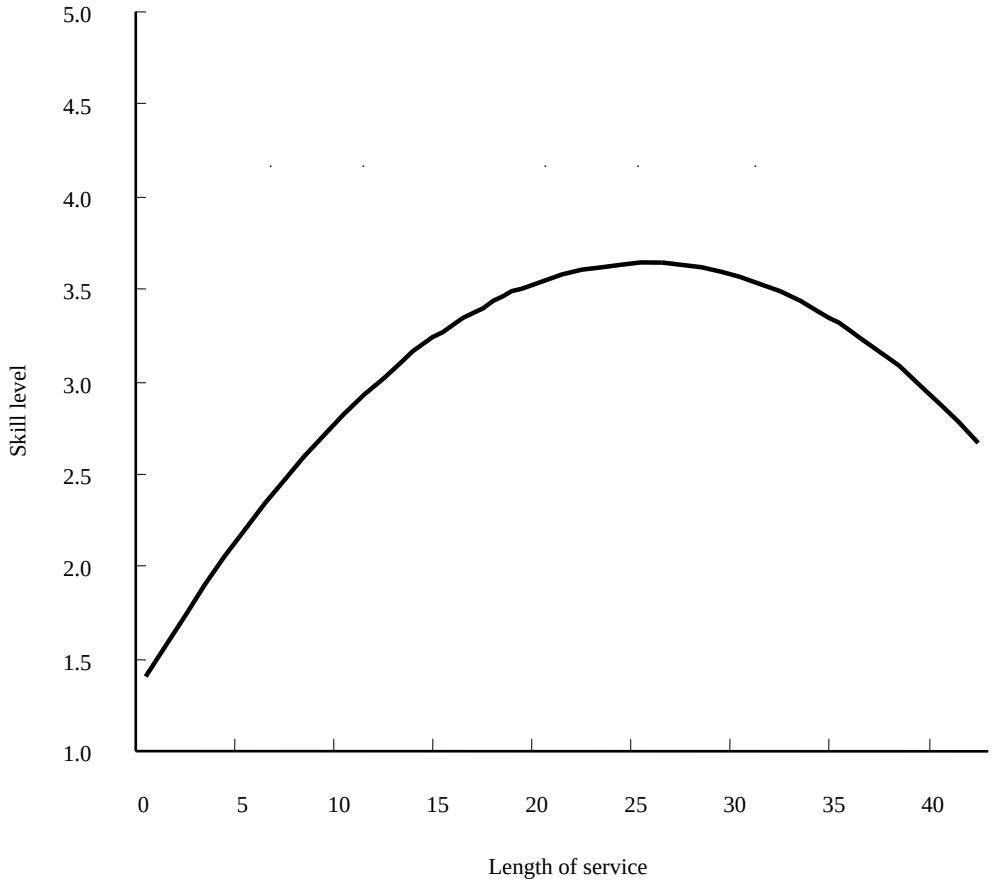
Explanatory Variable	OLS	Ordered Probit
Age	0.1479***	0.2273***
	(0.0274)	(0.0526)
Age^2	-0.0019***	-0.0029***
	(0.0003)	(0.0006)
Length of service	0.0976***	0.1775***
	(0.0181)	(0.0344)
Length of $service^2$	-0.0016***	-0.0028***
	(0.0004)	(0.0007)
Qualification (crane) dummy	0.4438***	0.7342***
	(0.0670)	(0.1329)
Qualification (dangerous object) dummy	0.0168	0.0647
	(0.0540)	(0.1017)
Qualification (engineering technician) dummy	0.1024	0.2719**
	(0.0656)	(0.1242)
Person without working experience in other companies dummy	-0.0741	-0.1597
	(0.0947)	(0.1782)
Junior high school graduate dummy	-0.0065	-0.0018
	(0.1652)	(0.3112)
High school graduate dummy	-0.0830	-0.1241
	(0.1473)	(0.2781)
In-house training center dummy	-0.0605	0.0224
	(0.1640)	(0.3094)
Constant term	-0.6442	
	(0.5059)	
R^2, Dummy R^2 (In the case of ordered probit)	0.6779	0.1506
R^2 with corrected degree of freedom	0.6712	

Note: Upper numeric numbers represent estimated coefficient values and lower numeric numbers in parentheses represent standard errors. Estimated thresholds between categories of explained variables in the ordered probit analysis were omitted. ***: p <1%, **: 1%< p <5%, *: 5%< p <10%.

Table 4 shows the estimate results. This paper mainly explains the result of OLS which is easy to interpret coefficient estimates. The value of determination coefficient (R^2) was explainable, 0.678. Individually significant variables were age, length of service, square of age, square of length of service and qualification (crane operator license) dummy.

In order to check the effect of age and length of service on skill levels, the relationship between length of service and skill levels was analyzed for standard high-school-educated operators who joined the company shortly after graduating from high schools (i.e., age minus length of service equals 18) as shown in Figure 2. The skill level becomes higher with years of experience until 25 years of service and goes down after that. This is an estimate based on the actual distribution and does not mean that individual skill level goes down after 25 years of service. The reason why such distribution is shown may be because operators with high skill level were promoted to foremen and went out of the sample.

A significant variable other than age and length of service was qualification (crane



Note: This was prepared on the basis of estimated results in Table 4.
Skill level＝0.1479 × Age -0.0019× Age^2 + 0.0976 × Length of service - 0.0016 × Length of service^2 - 0.6442
This analysis is for high-school-educated standard workers who joined the company shortly after graduating from high schools, i.e., age minus length of service equals 18.

Figure 2. Estimated Result of Age and Length of Service

operator license) dummy. It has a significant effect accounting for 0.4 point in the range from 1 to 4.7 points of the actual skill level distribution which is an explained variable. On the other hand, other qualifications and academic background were not significant as well as small estimated coefficient values. However, according to the estimate results of the ordered probit analysis, qualification (engineering technician's license) dummy was significant as well as explanatory variables which were significant in the case of OLS models.

Brief explanations of qualifications used as explanatory variables are as follows: Since overhead cranes are frequently used for transporting heavy goods such as products and parts at iron and steel production lines, overhead crane operator's license is essential for

anyone working there and operators are required to obtain the license. In order to obtain it, they must pass both written and practical examinations. In particular, there are four subjects in the written examination; "laws," "dynamics," "electronics" and "structure" and therefore a high-school graduate level of academic ability is required to pass the exam. Accordingly, they must study hard by themselves to obtain a crane operator license, and some operators cannot obtain it due to lack of motivation or ability.[10] Therefore, if an operator has not obtained an overhead crane operator's license yet, his ability or motivation is lower than that of standard-level operator.

On the other hand, although it is desirable to obtain "dangerous object handler's license" and "engineering technician's license," unlike overhead crane operator's license, there is no direct obstacle to their jobs immediately even if they do not obtain those licenses. For this reason, operators voluntarily obtain "dangerous object handler's license" as one of self-development training activities. As for engineering technician's license, some selected operators were forced to take the exam as one of efforts to improve the productivity.[11] Therefore, it comes as no surprise that engineering technician's license and skill level are positively correlated.

To sum up the estimate results, it was found that age and length of service have a significant effect on the skill level, significant qualification variables were "dangerous object handler's license" and "engineering technician's license (in the case of ordered probit)" only and variables on year of employment and academic background were not significant at all. Therefore, most of operators who have normal motivation and ability are able to improve their skills, and skill levels of those who are unable or unwilling to obtain a crane operator's license (or engineering technician's license) tend to be lower.

Based on above analysis, found facts on characteristics of skill distribution are as follows: most of operators' skill levels become higher with years of experience and reach sufficient level around 25 years of service, i.e., "inverted U-shaped" skill distribution. However, there are a very few people whose skill levels are improved at a sluggish pace. There is no significant difference in year of employment or academic background. The significant difference is to have an overhead crane operator's license which is essential for operators or not. If whether an operator has an overhead crane operator's license or not is a proxy indi-

[10] In Japan, a worker who operates a crane which can hoist five tons or more must have a crane operator's license by law (from April 2006, crane/derrick operator's license). According to the Occupational Safety and Health Examination Board which conducts the examination for crane operator's license as designated by the Minister of Health, Welfare and Labour, the pass rates for written and practical examinations were 56.9% and 48.3% respectively in FY2003.

[11] In Japan, any facility which stores or handles a certain amount of dangerous objects such as plants, gas stations and oil storage tanks must assign persons who have a national dangerous object handler's license. According to the Japan Fire Engineering Qualification Center which is a designated examination board as provided by the Fire Service Act, the pass rate for class B dangerous object handler's license was 40.1% in FY2002. According to the Japan Vocational Ability Development Association, the pass rates for the first-class and the second-class mechanical maintenance engineering technician's licenses were 30.6% and 28.4% respectively in FY2003.

cator of a standard operator's ability and motivation, standard operator's skill level would be improved by accumulating experiences.

V. Summary of Analysis Results on Development of Required Skills and Their Distribution

In this paper, a quantitative analysis of skill distribution at an iron and steel production line was carried out and the effect of operators' individual attributes on their skill levels was analyzed. The analysis results are summarized as follows:

As for the distribution of skill levels which are almost synonymous with "intellectual skills" that Koike describes, it was quantitatively confirmed that it is an "inverted U-shaped" distribution centered on experienced workers. In addition, according to a quantitative analysis result on determinative factors for skill levels, skill levels of a vast majority of operators who have the standard level of ability and motivation become higher with years of experience and they reach Level 3.5 or higher which is nearly a measuring stick for the level of sufficiently solving problems and maintaining, Level 4, around 25 years of service. As for workers' attributes affecting skill development, academic background had very little effect on their skill levels. However, since having an overhead crane operator's license or not has a significant effect on it, it shows that workers' certain intellectual level and willingness to improve skills are important in order to develop intellectual skills.

Finally, the relationship between found facts and interpretation in this paper and previous studies is discussed. One of criticisms against Koike's "intellectual skills" is that his theory lacks specifics as an experimental study as Nomura (2001) argues. In this paper, it was quantitatively confirmed that the distribution of workers who have intellectual skills is "inverted U-shaped" distribution by using data on 543 operators of a plant of a single company. Hence, the analysis results in this study would play a role to support Koike's "intellectual skills."

More importantly, problems on the relationship between intellectual skills and ability-based grade system which were clarified by the analysis should be pointed out. The facts that the skills distribution is "inverted U-shaped type" and a majority of workers' skill levels are improved to a sufficient level around 25 years of service mean that skill level differences among workers rarely occur. On the other hand, in general, the rating disparity based on the ability-based grade system increases with the length of service. This probably means that there is another ability requirement evaluated by an employer other than intellectual skills. One of answers to this question may be in the indication of Asanuma and Ma in their preceding studies.

Asanuma argues that abilities such as leadership should be clearly distinguished from other skills in analyzing career of experienced blue-collar workers who are promoted to management positions. Ma argues that this is because the skill development process for blue-collar workers obtains "fundamental skills," "comprehensive skills" and "organiza-

tional skills" in this order progressively.

As above, according to Asanuma's and Ma's arguments, the widening rating disparity at later stages of career may be caused by the evaluation of management abilities such as leadership. However, Asanuma's and Ma's arguments are still disputible. For example, Ma claims that a worker obtains "fundamental skills," "comprehensive skills" and "organizational skills" in this order in the skill development process, but is it true? Although it is understandable that there is some continuity in terms of knowledge and acquisition processes between "fundamental skills" and "comprehensive skills," it remains questionable in terms of "organizational skills" which is quite different in skills and job content from other two skills. Another question is the relationship between blue-collar workers' promotion requirements and their skill levels. Ma (1994) argues that "an employee who has acquired both fundamental and comprehensive skills is in charge of training and supervision of his/her subordinates and is responsible for his/her entire unit organization" and "whether the employee has an ability to train or supervise his/her subordinates and control his/her site organization or not has a significant effect on the assessment and promotion." Accordingly, Ma seems to suppose an enrollment system that those who have acquired both "fundamental skills" and "comprehensive skills" are promoted to positions which requires "organizational skills" at first and after that they will be checked whether they have really acquired those skills.

It is pointed out that if promotion is carried out by the enrollment system, the person who was promoted to new position may not have skills required for the job. In order to avoid such risks, the skill development may be conducted so that "organizational skills" can be evaluated in early stages, i.e., "organizational skills" may be developed in tandem with "fundamental skills" and "comprehensive skills."

However, since there is little description on specifics of "organizational skills" and the development process in Asanuma's and Ma's studies, these questions are not answered. The reason why surveys corresponding to such questions or analysis issues of this study have not been conducted may be because "organizational skills" were simply seen as an extension of skills.

Based on facts found in this study and Asanuma's and Ma's arguments, the remained issue is to further discuss remained questions between intellectual skills and rating in an ability-based grade system.

References

Asanuma, Banri. 1997. *Nippon no kigyo soshiki: Kakushin-teki tekio on mekanizumu—choki torihiki kankei no kozo to kino* [Japanese corporate structure: A mechanism for innovative adaptation—structure and functions of long-lasing transactional relationship]. Tokyo: Toyo Keizai Shinposha.

Chatani, Motokuni. 1998. Sekitan karyoku hatsudensho ni okeru gijutu shinpo to unten rodo: Sho-

kumu naiyo, kyaria, bungyo taisei no hikaku kenkyu [Technological progress at a cole power plant and operations labour]. *The Monthly Journal of the Japan Institute of Labour* 40, no. 8: 50-59.

Chuma, Hiroyuki. 2002. Monozukuri genba ni okeru mondai hakken kaiketu-gata jukuren: Nikyoku bunka keiko no haikei [The problem-finding & solving skilled production workshops: Tendency for polarization]. *The Japanese Journal of Labour Studies* 44, special issue: 4-14.

Fujimoto, Takahiro. 1997. *Seisan shisutemu no shinka-ron: Toyota jidosha ni miru soshiki noryoku to sohatsu purosesu* [Evolution theory of production systems: Organization ability and emergent processes at Toyota Motor Corporation]. Tokyo: Yuhikaku.

Greene, William H. 2003. *Econometric analysis.* 5th ed. Upper Saddle River, NJ: Prentice Hall.

Koike, Kazuo. 1988. *Understanding industrial relations in modern Japan.* Basingstoke, Angleterre: MacMillan.

———. 1991. *Shigoto no keizaigaku* [The economics of work]. Tokyo: Toyo Keizai Shinposha.

———. 1994. *Nippon no koyo shisutemu: Sono fuhensei to tsuyomi* [Japanese employment system: Its universality and advantages]. Tokyo: Toyo Keizai Shinposha.

———. 1997. *Human resource development.* Tokyo: Japan Institute of Labor.

———. 2003. Kyoso-ryoku wo sayu suru gino to sono keisei: Bunken sabei [Skill influencing competitiveness and skill development: Bibliographic survey]. *The Hosei University Economic Review* (Keieishirin) 36, no. 1:1-28.

Koike, Kazuo, and Takenori Inoki, ed. 1987. *Jinzai keisei no kokusai hikaku: Tonan ajia to Nippon* [Country-by-country comparison in human resources development: Southeast Asia and Japan]. Tokyo: Toyo Keizai Shinposha.

Koike, Kazuo, Hiroyuki Chuma, and Soichi Ota. 2001. *Monozukuri no gino: Jidosha sangyo no shokuba de* [Shop-floor production skill: At an automaker workplace]. Tokyo: Toyo Keizai Shinposha.

Ma, Jun. Nippon kigyo no naibu ni okeru gino keisei to insenthibu shisutemu: X-sha no jinteki shigen kanri no jirei kenkyu wo toshite [Skill development and incentive systems inside a Japanese corporation: Through a case study of human resources management at Company X]. *The Economic Review* (Keizaironso), no. 7 (supplementary volume):89-110.

Muramatsu, Kuramitsu. 1996. Ryosan shokuba ni okeru chiteki jukuren to togo bunri no keiko: dai-kigyo to chusho-kigyo no jirei kara [Intellectual skills and the directions of integration vs. separation among mass-production workshops]. *The Monthly Journal of the Japan Institute of Labour* 38, no. 6:2-11.

———. 2002. 1990 nen-dai ni okeru seisan shokuba ni kansuru kikitori shuho no hyoka [Evaluation of case studies on production workshops in the 1990s]. *The Japanese Journal of Labour Studies* 44, no. 2-3:47-55.

Nakamura, Keisuke. 1996. *Nippon no shokuba to seisan shisutemu* [Japanese workplaces and production systems]. Tokyo: University of Tokyo Press.

Nitta Michio. 1988. *Nippon no rodosha sanka* [Japanese workers' commitments]. Tokyo: University of Tokyo Press.

Nomura, Masami. 1993. *Jukuren to Bungyo: Nihon kigyo to teira shugi* [Mastership and the division of labor: Japanese corporations and Taylorism]. Tokyo: Ochanomizu Shobo.

———. 2001. *Chiteki jukuren-ron hihan: Koike Kazuo ni okeru riron to jissho* [Criticism of "intellectual skill theory": Koike Kazuo's theories and demonstration]. Kyoto: Minerva Shobo.

Suzuki, Yoshiji. 1994. *Nippon-teki seisan shisutemu to kigyo shakai* [Japanese-style production system and corporate environment]. Hokkaido: Hokkaido University Press.

Tsuchiya, Naoki. 1996. Tekkogyo ni okeru sagyo soshiki to jinzai keisei: Seizo, hozen no bungyo shisutemu no saihen [Work organizaton and skill formation in the Japanese steel industry]. *The Monthly Journal of the Japan Institute of Labour* 38, no. 12:37-50.

Early or Late Promotion/Screening?: Empirical Analysis of Career Ladders for Japanese White-Collar Workers Using Employees' List*

Katsuhito Uehara
Hitotsubashi University

In this paper, a long-term selection process from joining to leaving General Trading Company A and the reality of in-house career are clarified by analyzing the promotion and personnel assignment (job rotation) with data of 2,933 college-educated male white-collar workers who joined the company from 1962 to 1977 based on its employees' lists.

Company A has adopted a late promotion pattern which is a human resource management characteristic of Japanese companies. As a result of minute analysis on assignment before occurring of the promotion (speed) disparity which had not been clarified yet, a significant disparity which can explain the order of promoting to manager, the time when initial differentiation in upgrading occurs within a group of workers who joined the company at the same time and the finally reached grade was detected in the first personnel transfer after the initial assignment. Even after occurring of promotion disparity, the work contents were significantly different at the same position depending on the order of promotion. In Company A, employees fight in a multilayered tournament shortly after joining the company and human resources may be allocated depending on individual employee's skill acquirement.

I. Introduction

The purpose of this paper is to clarify the reality of in-house career practices[1] of white-collar workers working for Japanese companies based on obtained 37 years of employees' list[2] of General Trading Company[3] A. Japanese companies' traditional promotion mechanisms have already been clarified. However, there are only a few studies making empirical analyses which correlate promotion with job assignment (job rotation) during the period from joining to leaving the company. Referring to Shaeffer (1972), Baker, Gibbs, and Holmstrom (1994), etc., this paper is beneficial in terms of finding new insights from above

* I was given warm support from two former employees of Company A and the personnel department of Company A while I was writing this paper. An anonymous referee also gave me an appropriate comment. I would like to extend a special thank to them here. The writer takes full responsibility for contents of this paper.

[1] Koike (1999) defined career as a long-term experienced job group and Morishima (2004) defined it as a process to increase an individual value as a business worker through various experiences and training. This paper also advances the discussion with these definitions in mind.

[2] We were permitted to use the employees list subject to using anonymously and for academic study only.

[3] According to ITOCHU Corporation Edition (1997), a general trading company is a wholesaler focusing on trading, deals in a variety of goods, its size of the business transaction is large; domestic, export, import and tripartite trades, and integrates them organically. In addition, it also defines that a general trading company has many domestic and overseas branches and overseas subsidiaries and develops its business worldwide.

perspectives.

The structure of this paper is as follows: the next section briefly surveys related literature on Japanese companies' promotion and job assignment and formulates a hypothesis. Section III explains the personnel system of targeted Company A and data to be used. Section IV analyzes the career based on employees' background. Based on these results, Section V verifies the hypothesis and finally presents the summary of this paper and challenges for the future.

II. Literature Review and Hypothesis Formulation

1. Literature Review

Although it is pointed out that studies on white-collar workers' career development are fewer than that of blue-collar workers, they have gradually been accumulated and discussed to this day. As a result, Characteristics of promotion management which are unique to Japanese companies such as "late promotion" and "late selection" compared with Western companies (e.g., Koike 1991), and "selection mechanism changing according to the career stage"[4] (Imada and Hirata 1995; Takeuchi 1995) were found. Facing contradictory constraining factors, "selection/cultivation" and "motivation," the efficiency of the found promotion mechanisms and advantages and disadvantages have been discussed under Japanese employment practice.

The promotion plays a role as incentive and reward devices as well as a role in assigning people to jobs in which they contribute most to results and success for the organization (Milgrom and Roberts 1992). According to Prendergast (1992), since both information and decision-making are decentralized and authority is handed over to not only senior levels but also middle levels in many of Japanese companies, higher returns can be obtained when many employees experience company-specific training and master skills. In addition, since external labor market is not competitive, late promotion is suitable for Japanese companies. This system which selects personnel to be promoted to senior levels quite late after joining the company has the advantage of keeping an incentive for long-term upskilling for many employees and allowing a proper capability assessment with less arbitrariness of more than one supervisor. On the other hand, it is also pointed out that there is not much time for cultivating excellent personnel who will become executives in the future and it makes waste of training investment (e.g., Koike 1999).

The purpose of job assignment is to provide employees' opportunities of finding their adequacy, broaden their breadth of work experience, improve their skill and capacity, etc.

[4] Takeuchi (1995) pointed out that a promotion pattern changes in the order of employees who joined the company at the same time being promoted at the same time, with time difference, by selection and by sorting. Imada and Hirata (1995) pointed out that it changes in the order of uniform seniority, promotion speed competition and tournament competition. Although their means of expression are different, both express a detailed aspect of late selection.

Table 1. Related Literature Focusing on White-Collar Workers' Job Assignment before the Promotion Disparity Occurs and Subsequent Promotion

Related Literature	Analyzed company	Analyzed employees, analysis method, etc.	Time when initial differentiation in upgrading occurs, grade, position, etc.	Analysis results, etc.
Wakabayashi (1987)	A major department store	71 college-educated male employees who joined the company in 1972	7th yr of joining the company, 42 chiefs (59%)	Vertical exchange relationship with immediate supervisor for the first three years after joining the company (accessibility, understanding and flexibility) has a positive significant effect on the 13-year career.
Matsushige (1995)	An electronic manufacturer	292 college-educated male employees, Questionnaire survey	Around 10th yr of joining the company, chiefs	Before occurring of the promotion disparity, it is known who will be promoted by training, performance, graduating school, experienced departments, etc. 5th to 6th year's personnel transfer may have a positive/negative effect on the promotion.
Umezaki (1999)	Two major drug companies	Interview survey	15th yr of joining the company or later, team leaders	Although MRs are in charge of the same job for a long time after joining the company, jobs with different difficulty are allocated depending on the speed of skill development and they are orderly selected.
Matsushige (2000)	Processing and assembly companies	Mainly based on questionnaire survey	About 10th yr of joining the company, chiefs	Job assignment before occurring of the promotion disparity may have either positive or negative effect on promotion to manager. The personnel transfer is not only the factor to determine subsequent promotion.
Mineno (2000a,b)	Government-designated city	Senior official as of 1998	7th yr of joining the company, chiefs	Persons who were finally promoted to bureau manager are engaged in management departments of the city hall or each bureau after the second assignment. Persons staying in middle or lower positions were engaged in general departments for a long time.
Matsuo (2002)	City A	85 college-educated white-collar employees who joined the company in the 1990s	9th yr of joining the company, chiefs (Grade 6)	Tournament competition from the first personnel transfer in the 3rd or 4th year after joining the city government. Due to experienced jobs during the first eight years and the position in the 11th year, the career range of early promotion to manager is narrow and biased towards management staff.

Studies on Japanese companies' job assignment have been conducted by mostly interview survey (e.g., Koike 1991; Koike and Inoki 2002). It has also been clarified that know-how of dealing with uncertainty such as changes and problems is constructed by job rotation from easy to difficult relevant jobs repeatedly mainly through On-the-Job Training (OJT).

Career of personnel working for companies is developed by close relationship between above promotion and job assignment (job rotation). Nevertheless, many of related literature analyzing Japanese companies' promotion mechanism pay much attention to when the disparity occurs but have less perspective of job assignment which is strongly related to skill development—and vice versa. One of contributing factors to be blind to reality may be that those have not been analyzed together nor making the connection between them.

According to related literature, it is necessary for promoting to senior positions to be selected early when initial differentiation in upgrading occurs within a group of workers who joined the company at the same time (hereinafter referred to as "cohort") (e.g., Hanada 1987; Abe 1995; Uehara 2003). However, such disparity after the time of primary selection appearance does not occur suddenly. According to the related literature[5] which analyzed the relationship between promotion and job assignment (job rotation) shown in Table 1, work-

[5] In addition to this, Asanuma (1997) analyzed blue-collar workers.

ers' capability has been recognized shortly after joining the company. It is also occasionally pointed out that even before occurring of the promotion disparity, it becomes obvious as the disparity of job assignment and/or job grade. Yashiro (2002) calls it an "invisible fast track." In addition, disparities occur in capacity and skills depending on which jobs employees have (e.g., Yashiro 1997; Matsushige 2000). However, many of them analyzed the effect of job assignment at some point or the number of personnel transfers on the most recent promotion using only a few personal data. Although there are some studies on departments experienced by personnel who were promoted to the managerial level in listed companies (e.g., Kuwahara 1998; Human Ability Development Center, All Japan Federation of Management Organizations 1979), further analysis such as comparison with majority of personnel who were not able to be promoted to senior levels has not been carried out.

2. Hypothesis Formulation

Based on above related literature, the following working hypothesis is formulated in this paper:

【Hypothesis】Employees are selected before occurring of the promotion disparity and disparities occur in career.

So far, detailed analyses on the reality of competition after occurring of promotion disparity have been carried out. However, even though career is developed in a consistent movement from joining to leaving the company, there are few studies which analyzed career ladders including the long-term simultaneous promotion of cohort. Koike (2002) said that it is necessary to get a handle on individual improved skills in order to set a successful career to efficiently develop skills, and Matsushige (1995), etc. pointed out that there may be the disparity in job assignment before occurring of promotion disparity. However, there are few studies which made a detailed analysis of what disparity exists, when it occurs and what effect is it having on the order at the time when initial differentiation in upgrading occurs within a cohort and subsequent promotion using detailed personnel data and limiting to private companies. Therefore, the purpose of this paper is to clarify how promotion and job assignment are linked and jointly managed under the human resources management indicating one biaxial in-house career path of promotion and job assignment as time advances from joining to leaving the company using a great deal of personnel data.[6]

In order to analyze the promotion mechanism using individual data, a long-term observation is needed, and therefore, people who joined the company in 1960s and already retired the company are targeted in many of the related literature (e.g., Hanada 1987; Takeuchi 1995; Abe 1995; Nishiyama 1999). After that, even though the trend is shown in the questionnaire survey (Japan Institute of Labour 1993), etc., there are few studies which clarified the reality using data. In this paper, we will analyze how Company A's career structure has changed with the times using data of more than one cohort.

[6] This framework conforms to Asanuma (1997) who analyzed blue-collar workers working for a major car company.

III. Explanation of Company A's Personnel System and Data to Be Used

1. Outline of Company A's Personnel System

Before the analysis, Company A's personnel system is outlined on the basis of the interview survey on two former personnel department employees who actually established and operated the system and the current personnel manager.[7]

The grade system was introduced in Company A in the early 1970s. Reflecting on rapid increase in operating officers accompanied with increase in posts, the company made the grade as an only index indicating in-house positions and limited the number of persons to be promoted with fixed numbers of places by grade so that many employees cannot be remained at senior level. Table 2 shows the grade classification and the standard for length of service of employees and the rough correspondence between grade and position. College graduates start from Grade 3 and the time when initial differentiation in upgrading occurs within a cohort is the 15th year after joining the company when the promotion to Grade 7 (manager) begins. There is no remaining year required for the condition of promotion so employees can be promoted one year after if the standard for length of service is satisfied. Under Grade 10 (general manager), the age of retirement from the positions is 56 due to the age limit system for managerial personnel. There is no education-based discrimination or fast track to early cultivate personnel who will become executives in the future in the system. Even though the system was revised[8] several times such as shortening the period of simultaneous promotion of cohort after introducing, the foundation of the system had been maintained for about 30 years until the system revision in 2000.

Company A, as same as the trading company analyzed by Nakamura (1991), introduced a department system classified based on the merchandise they manage in the late 1960s and divided into about 10 groups such as machinery and fuel.[9] While the first assignment group is decided by the personnel department, subsequent medium- to long-term personnel management is carried out by each group. This is different from typical Japanese companies where, as Jacoby (2005) has noted, personnel departments have the strong power to shuffle personnel for promotion and job assignment. In addition, since there is little per-

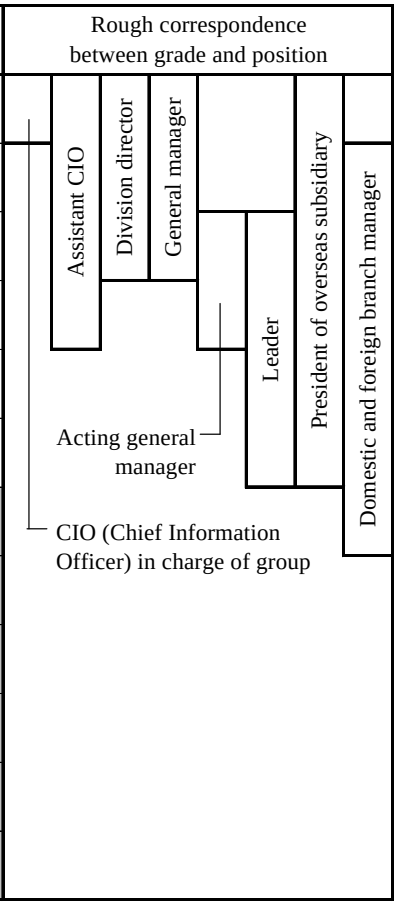
[7] I interviewed former employees of the personnel department in November 2003 and July 2005 and current personnel manager in December 2003. The former employees of the personnel department kindly answered questions from me on the personnel system of Company A many times by email.

[8] Since the grade system was introduced, Company A revised the system three times mainly for making the standard for length of service earlier. Particularly, it made the time of starting promotion to Grade 6 (deputy manager) and Grade 5 (assistant manager) which were previously simultaneous promotions of cohort one year earlier in 1985 and 1988 respectively. In addition, it changed the simultaneous promotion to Grade 6 to the time difference promotion among employees who joined the company at the same i.e., those are all promoted to Grade 6 within three years. To avoid any confusion, Table 1 shows the standard applied for analyzed employees only. Grades and positions in the table may be different from actual ones from the perspective of protecting their anonymity.

[9] At first when introducing the system, it was divided into 9 groups; general affairs, accounting, fuel, metal, machinery, food, textile, chemistry and material.

Table 2. Comprehensive Work's Grade Classification and Standard for Length of Service and Rough Correspondence between Grade and Position

Grade	Title	Age	Minimum length of service required
Executive			
Councilor			
Grade 10	General manager	47 -	26th year or age of 47
Grade 9	Deputy general manager	44 -	23rd year or age of 44
Grade 8	Assistant general manager	40 -	19th year
Grade 7	Manager	36 -	15th year
Grade 6	Deputy manager	33 -	12th year
Grade 5	Assistant manager	30 -	9th year
Grade 4	Chief	26 -	5th year
Grade 3	Staff	22 -	Beginning class for college graduates
Grade 2		20 and 21	Beginning class for junior college graduates
Grade 1		18 and 19	Beginning class for high school graduates



Source: Based on interview survey and obtained data.

Note: Administrative positions are Grade 6 or higher. The shaded region in the table shows the period of simultaneous promotion of cohort. The time when initial differentiation in upgrading occurs within a cohort is the 15th year after joining the company. Years in the column of "minimum length of service required" are based on college graduates. Add four years for high school graduates and two years for junior college graduates. The 5th year of high school graduates and 3rd year of junior college graduates apply to Grade 3. Leader roughly corresponds to manager in other companies.

sonnel transfer between groups and information of personnel and jobs is shared within one group, information cost, as Hirano (2006) said, can be reduced by fractionally accumulating such information.

Many of college graduates develop their career through job assignment within a department, between departments and between branches including overseas after the first assignment to either Tokyo, Osaka or Nagoya. Imano and Sato (2002) point out that in order

to avoid the event that bosses hang on to their good subordinates, each department head draws up a personnel transfer plan to carry out systematic job assignment every year as well as determining the standard working duration at one post in Company A since the 1970s.

2. Explanation of Data to Be Used

The analysis of this paper is based on Company A's 37 years of employees' list from 1961 to 1997.[10] Names of employees working for Company A and their grades are listed on it by work location and department. However, listed data are insufficient due to lack of individual attributes such as the year of joining the company, sex and academic background. Therefore, employees were categorized by such attributes for analysis.

In particular, the year of joining the company after 1962 was deduced from the year when their name appeared in employees list for the first time and the time of promotion to Grade 4 (chief) and Grade 5 (assistant manager). Gender could be assumed based on the different promotion systems adopted for males and females. Academic background was estimated on the basis of the disparity of the standard for length of service from joining the company to promoting to Grade 4 (chief). In addition, these were identified validly utilizing the "List of Company Employees" and available alumni lists of college graduates.[11] As a result, about 95% of the total number of new graduates whom Company A hired as indicated by the information in magazines for jobseekers[12] were estimated. In this paper, promotion and assignment are analyzed with data of 2,933 college-educated male white-collar workers who joined Company A from 1962 to 1977, worked for 15 years or longer and finally promoted to Grade 7 (manager) or higher position. The breakdown for their year of joining the company is shown in the lower level of horizontal axis, Figure 3. According to the job information magazine, about 60% of college graduates are from elite universities[13] and most of them are from liberal arts departments such as economics, commerce and foreign languages. Male high school graduates have not been hired since mid-1970s. While white-collar workers working for Japanese companies are analyzed in this paper, it is necessary to keep in mind that above bias exists.

IV. Empirical Analysis of Promotion and Job Assignment

In order to verify the working hypothesis, the analysis is carried out as follows:

(i) As a starting point for discussion, Company A's promotion mechanism is clarified.

[10] However, the list in 1976 was not available. Therefore, the analysis was carried out based on 36 lists.

[11] Alumni lists of the University of Tokyo, Hitotubashi University and Keio University which are available in public libraries were used.

[12] Diamond Inc. "Diamond Inc.'s Employment Guidebook for College Graduates," etc.

[13] Elite universities are seven former imperial universities, Hitotsubashi University, Kobe University, Tokyo Institute of Technology, Keio University and Waseda University; as same as Tachibanaki (1995).

The reality of competition for promotion of cohort after occurring of promotion disparity is clarified by using the "career tree" method. In addition, correlation between the order of promoting to Grade 7 (manager) and the finally reached grade and the possibility of consolation type of promotion are sought. Furthermore, the disparity of promotion patterns between cohorts classified by the year of joining the company is clarified through comparison.

(ii) The possibility of horizontal personnel transfer disparity before occurring of the promotion disparity is sought. It is clarified by probit analysis that the personnel transfer patterns before occurring of the promotion disparity can explain the order of promoting to Grade 7 (manager), finally reached grade and the possibility of promotion to senior grade (Grade10 [general manager] or higher position) and which jobs affect the order of promoting to Grade 7 (manager) and which point of personnel transfer is important.

(iii) The relationship between promotion and assignment from joining to leaving the company is clarified. 82 employees assigned to the accounting group are classified by finally reached grade and analyzed that when and what disparity is found in their work locations or departments. Considering of business category, the sales group should have been analyzed, since it creates, eliminates and consolidates sections very often, classification and indication of the analysis results would be very difficult. The accounting group was selected as the object of the analysis due to technical factors that there is no drastic organizational change for a long time, the same trend as the sales group is observed and wide career which is suitable for the analysis is developed there. In addition, there is a good merit that related literature on personnel assignment which analyzed employees assigned to the accounting department such as Koike and Inoki (2002) are occasionally found and can be compared with this analysis.

1. Company A's Promotion Mechanism

We clarified Company A's promotion mechanism. An obtained latest employees list was issued in 1997. As of 1997, the period of joining the company of employees who were promoted to executives was from 1962 to 1966. There were 840 college-educated male employees who joined the company from 1962 to 1966, worked for the company for 25 years or longer and were promoted to Grade 7 (manager) or higher grade(s). Table 3 shows the distribution of grades of those 840 employees as of 1997.[14] According to Table 3, percentages of employees who were promoted to Grade 8 (assistant general manager) or higher position, Grade 9 (deputy general manager) or higher position, Grade10 (general manager) or higher position, councilor or higher position and executive are 94.8%, 75.8%, 36.9%,

[14] Persons who retired from their executive posts before 1997 were counted as executives just before the retirement from the position. Persons who retired were counted as positions just before the retirement.

Table 3. Number of Analyzed Employees and Finally Reached Grade as of 1997 by Year of Joining the Company

Year of joining the company	Finally reached grade						
	Grade7	Grade8	Grade9	Grade10			
	Manager	Assistant general manager	Deputy general manager	General manager	Councilor	Executive	Total
1962	10	37	69	45	19	9	189
1963	9	23	49	25	24	6	136
1964	6	33	77	40	18	10	184
1965	7	29	67	31	21	3	158
1966	12	37	65	35	21	3	173
Total	44	159	327	176	103	31	840
Ratio (%)	5.2	18.9	38.9	21.0	12.3	3.7	100.0
Accumulated ratio (%)	100.0	94.8	75.8	36.9	16.0	3.7	

Note: Table 3 shows finally reached grade as of 1997 of 840 college-educated employees who joined the company from 1962 to 1966, worked for Company A for 25 years or longer and were promoted to managers or higher grades. Employees who retired their position before 1997 due to the age limit system for managerial personnel were counted as positions just before leaving their positions and other employees were counted as positions just before retirement.

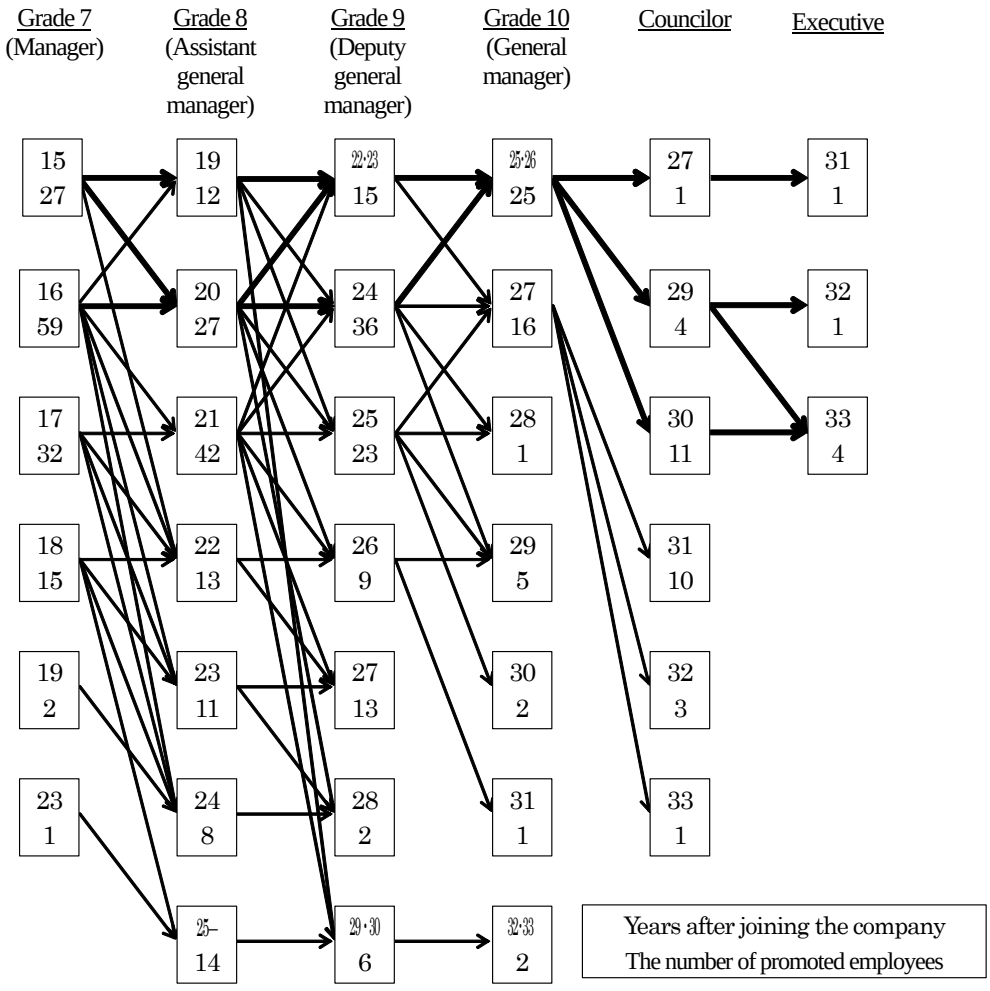
"Ratio (%)" in the table indicates the percentage of 840 employees by position. "Accumulated ratio (%)" is calculated from senior position (executive).

As for "councilor," for instance, 103 employees finally reached councilor among those who joined the company from 1962 to 1966 and account for 12.3% of 840 employees. "16.0%" of accumulated ratio indicates that those who were promoted to councilors or higher position (executive) account for 16.0 % of 840 employees (103 councilors + 31 executives = 134. 134/840 x 100 = 15.95).

Since employees who joined the company in 1965 or later are before the age limit for managerial personnel, they may be promoted to senior positions in 1998 or after. That is, this is not the distribution of finally reached grade. However, since the time when half of this cohort can no longer expect further promotion in the company is about 26 years and the length of service of those who joined the company in 1966 is 32 years as of 1997, we judged such chance is low and has an insignificant effect on the result, and added them to the analysis.

Besides 840 employees, there are four persons who stay in Grade 6 (deputy manager) among college-educated employees who joined the company from 1962 to 1966 and worked for 25 years or longer.

16.0% and 3.7% respectively, i.e., three fourth was promoted to Grade 9 (deputy general manager) or higher position and one third was promoted to Grade10 (general manager) or higher position. There are very few (four) employees who stayed at Grade 6 (deputy manager) and could not be promoted to Grade 7 (manager). The time when half of this cohort



Note: Figure 1 is a career tree showing the reality of promotion competition among those who joined the company at the same time using data of college-educated 136 employees who joined Company A in 1963, worked for 25 years or longer and finally reached manager or higher positions. In the figure, the upper numeric number in the box indicates years after the joining company and the lower numeric number indicates the number of promoted employees. Particularly, 27 out of 136 were promoted to managers in the 15th year after joining the company. Arrows pointing to the right indicate promotion routes of 27 employees to assistant general manager which is next grade. 27 were promoted to assistant general managers in the 19th, 20th or 22nd year after joining the company. Bold arrows indicate promotion tracks after manager of 6 employees who were promoted to executives.

Figure 1. Career Tree of 136 Employees Who Joined the Company in 1963

can no longer expect further promotion in the company calculated on the basis of data of object persons is about 26 years after joining the company, far later than the average of large Japanese companies, 22.30 years, surveyed by Japan Institute of Labour (1998).

(1) Competition for Promotion of Cohort

The reality of competition for promotion of cohort after occurring of promotion disparity is clarified. Figure 1 shows a career tree drawn based on the career data of 136 who joined the company in 1963[15] out of above 840 employees. According to this career tree, 27 employees (19.9%) were promoted to manager in the 15th year after joining the company by the primary selection. Within the subsequent three years, by the time the promotion to assistant general manager begins (by the 18th year after joining the company), almost all of them (133, 97.8%) were promoted. Therefore, there was no huge disparity of promotion speed at this time.

At the time of promoting to assistant general manager, the number of primarily-selected employees to be promoted decreased and the promotion disparity of cohort occurred. Even though the number of employees to be promoted increased at the time of promoting to deputy general manager and general manager again, the promotion disparity further widened due to increase in the number of employees to be promoted later and the number of employees who were not able to be promoted increased further gradually. Although secondarily-selected employees were promoted to general managers at the 27th year after joining the company, employees who were newly promoted to deputy general managers at that time or later were rarely promoted to general managers afterward. Such selection trend can be seen since the time of promoting to deputy general manager and it becomes more pronounced when they were promoted to higher positions. Since the 31st year after joining, the 6 employees (about 4.2% of all) have been promoted to executive as a result of keen promotion competition among them. Retracing in reverse order of the promotion career of 6 employees who were promoted to executives, shown in the figure as bold arrows, since they were promoted to managers, they were promoted by primary or secondary selection and all were promoted to general manager by primary selection.

(2) Ranking of Promotion to Manager and Finally Reached Grade

The relationship between order of promotion to manager when the promotion disparity begins to occur among the cohort and finally reached grade are clarified. 840

[15] 141 employees were estimated to have joined the company this year and the other four retired the company before the promotion to manager and one stayed at deputy manager. The oldest year of employment estimated from the employees' lists is 1962 and therefore data of those who joined the company in 1962 should normally be used for the illustration. However, the employees' list in 1976 is not available. 1976 is the 15th year after joining the company for those who joined in 1962 and the reality of the primary selection for promotion to manager which is essential for the illustration cannot be checked. Therefore, data of those who joined the company in 1963 was used for the analysis instead.

Table 4. The Order of Promotion to Manager and Finally Reached Grade as of 1997 of 840 College-Educated Male Employees Who Joined the Company from 1962 to 1966

Order of promotion to manager	Finally reached grade							Ratio (%)
	Grade7	Grade8	Grade9	Grade10				
	Manager	AGM	DGM	GM	Councilor	Executive	Total	
Primarily- or secondarily-selected								
Number of employees	4	46	180	132	90	31	483	
Ratio	0.8	9.5	37.3	27.3	18.6	6.4	100.0	57.5
Accumulated ratio	100	99.2	89.6	52.4	25.1	6.4	-	
Thirdly-selected or later								
Number of employees	40	113	147	44	13	0	357	
Ratio	11.2	31.7	41.2	12.3	3.6	0.0	100.0	42.5
Accumulated ratio	100	88.8	57.1	16.0	3.6	0.0	-	
Total number of employees	44	159	327	176	103	31	840	100.0
Ratio (%)	5.2	18.9	38.9	21.0	12.3	3.7	100.0	
Accumulated ratio (%)	100.0	94.8	75.8	36.9	16.0	3.7		

Note: Table 4 shows finally reached grade as of 1997 of 840 employees who joined the company from 1962 to 1966, worked for 25 years or longer and were promoted to managers or higher positions by the order of promotion to manager. As shown in the table, analyzed 840 employees are classified by the order of promotion to manager; those who were primarily or secondarily selected as managers in the 15th or 16th year after joining the company and those who were thirdly or later selected as managers in the 17th year after joining the company or later. "Ratio" on the left indicates the percentage of 840 employees and "accumulated ratio" is calculated from senior position (executive). "Ratio" on the right indicates the percentage of "primarily- or secondarily-selected" (57.5%) and "Thirdly-selected or later" (42.5%). For instance, 132 employees were promoted to general managers as of 1997 among "primarily- or secondarily-selected" managers and account for 27.3% of 483 "primarily- or secondarily-selected" managers. 253 employees including 132 were promoted to general managers or higher positions (executives or councilors) among them and account for 52.4% (31 executives [6.4%] + 90 councilors [18.6%] + 132 general managers [27.3%] = 253 [52.4%]).

Abbreviations: AGM (assistant general manager), DGM (deputy general manager), GM (general manager).

employees were classified by whether they were primarily- or secondarily-selected to Grade 7 (manager) or not based on the promotion patterns of executives and their finally reached grade are shown in Table 4. The breakdown is; primarily- or secondarily-selected 483, (57.5%) and thirdly-selected or later 357 (42.5%). This shows that the order at the time of promotion to manager have considerable effect on the subsequent promotion. Particularly, among primarily- or secondarily-selected employees, more than half of them (52.4%) were promoted to general manager and one out of four (25.1%) were promoted to executives or councilors. On the other hand, among thirdly-selected or later employees, nobody was promoted to executives, 13 (3.6%) were promoted to councilors, counting only 57 (16.0%) even including those who promoted to general manager.

Table 5. Order Changes between Positions of 840 College-Educated Male Employees Who Joined Company A from 1962 to 1966

(1) Grade 7 (manager) → Grade 8 (assistant general manager)

		Promotion to Grade 8		Staying in Grade 7	Total
		Primarily- or secondarily-selected	Thirdly-selected or later		
Promotion to Grade 7	Primarily- or secondarily-selected	192	287	4	483
		39.8	59.4	0.8	57.5
	Thirdly-selected or later	19	298	40	357
		5.3	83.5	11.2	42.5
Total		211	585	44	840
		25.1	69.6	5.2	100
Total percentage of primarily- or secondarily-selected → Thirdly-selected or later and Thirdly-selected or later → primarily- or secondarily-selected					64.7

(2) Grade 8 (assistant general manager) → Grade 9 (deputy general manager)

		Promotion to Grade 9		Staying in Grade 8	Total
		Primarily- or secondarily-selected	Thirdly-selected or later		
Promotion to Grade 8	Primarily- or secondarily-selected	171	38	2	211
		81.0	18.0	0.9	26.5
	Thirdly-selected or later	103	325	157	585
		17.6	55.6	26.8	73.5
Total		274	363	159	796
		34.4	45.6	20.0	100
Total percentage of primarily- or secondarily-selected → Thirdly-selected or later and Thirdly-selected or later → primarily- or secondarily-selected					35.6

(3) Grade 9 (deputy general manager) → Grade 10 (general manager)

		Promotion to Grade 10		Staying in Grade 9	Total
		Primarily- or secondarily-selected	Thirdly-selected or later		
Promotion to Grade 9	Primarily- or secondarily-selected	197	32	45	274
		71.9	11.7	16.4	43.0
	Thirdly-selected or later	36	45	282	363
		9.9	12.4	77.7	57.0
Total		233	77	327	637
		36.6	12.1	51.3	100
Total percentage of primarily- or secondarily-selected → Thirdly-selected or later and Thirdly-selected or later → primarily- or secondarily-selected					21.6

(3) Riversal in Promotion Competition

Given thirdly-selected or later employees become primarily- or secondarily-selected ones when promoting to upper positions as consolation type of promotion, the inversion phenomena of the order of promotion between positions for 840 employees are shown in Table 5. The table shows that consolation type of promotion is seen until (3) deputy general manager → general manager. Even though the percentage of consolation match winner at (2) assistant general manager → deputy general manager is high (17.6%) due to reaction of decrease in the number of primarily- or secondarily-selected employees at the time of promotion to assistant general manager, other time points are all less than 10% and therefore such phenomena are generally seldom.

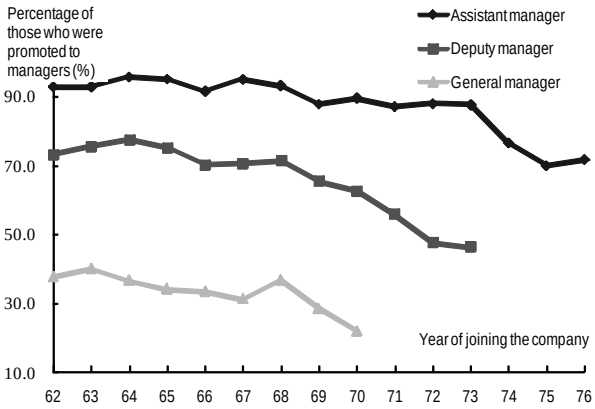
(4) Trend of Promotion Mechanism

How has Company A's promotion mechanism changed accompanied with slow down of company scale expansion,[16] hiring freeze of male high school graduates, etc.? Figure 2 shows the trend of percentage of employees being promoted to manager or higher grade among employees who joined the company from 1962 to 1976 putting the year of joining the company as horizontal axis.[17] This tells that the percentage of employees being promoted is gradually lower as the year of employment is later. Among generations being promoted in the mid-1990s, the percentage of employees being promoted to any position is about 20% lower than that of employees who joined the company in 1962. Details are analyzed focusing on the times of promotion to manager and assistant general manager.

Figure 3 shows the trend of year when the employees were promoted to Grade 7 (manager). In this figure, thirdly-selected or later employees are subdivided into two categories; before promotion to assistant general manager (17th or 18th year after joining the company) and after promotion to assistant general manager (19th year after joining the company or later). It shows that the proportion of primarily- or secondarily-selected employees firstly becomes lower than that of thirdly-selected or later employees among employees who joined the company in 1966, and the proportion of primarily- or secondarily-selected employees consistently decreases until those who joined the company in the early 1970s. The lowest proportion is among employees who joined the company in 1971, lower than 30%. On the other hand, the maximum proportion of employees who were promoted in 19th year or later after joining the company is 20%. Therefore, the period required for promotion to manager was prolonged and when the last employee was promoted to manager, the first employee was promoted to assistant general manager, i.e., the promotion disparity clearly occurred of cohort at this point. After that, the proportion of primarily- or secondarily-selected employees slightly increased again and the proportion of employees

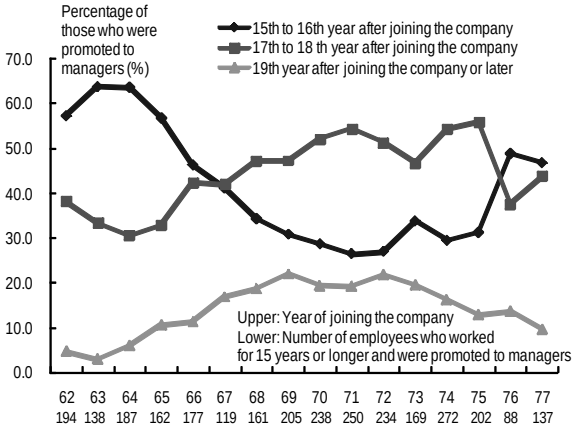
[16] Company A's performance consistently increased before the 1973 oil shock and is fluctuating depending on Japanese economic trend since the oil shock.

[17] There is no drastic change in the promotions of persons being promoted to manager, persons staying at deputy manager and persons who retired before the promotion to manager of cohort.



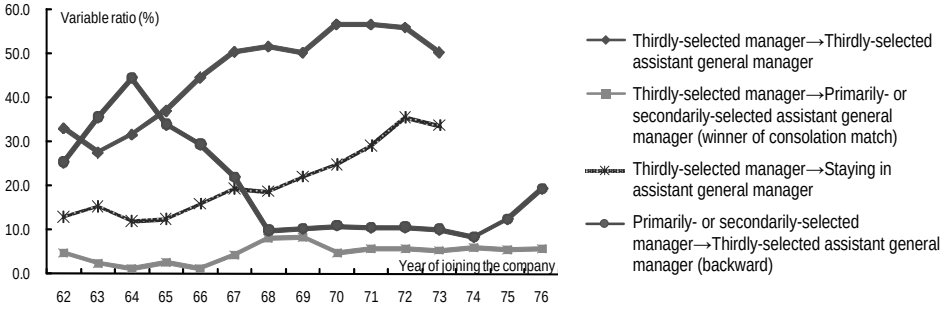
Note: The figure is based on data on employees' lists. The right edge of each curve shows a year of joining the company when promotion to such grade would end.

Figure 2. Promotion Ratio by Year of Joining the Company



Note: Same as Figure 2.

Figure 3. Trend of Year of Promotion to Manager by Year of Joining the Company



Note: Same as Figure 2.

Figure 4. Order Changes When Being Promoted to Assistant General Manager

who were promoted in 19th year or later after joining the company became lower. Although peculiar cases are seen among employees who joined the company in 1973 and 1976, this may be due to the small number of employees who joined the company at the same time.

Figure 4 shows the trend of changes in the order at the time of promotion to assistant general manager. As shown in Figure 3, even though the proportion of thirdly-selected or later employees increased, there was no drastic change in the proportion of consolation match winner at the time of promotion to assistant general manager (always lower than 10%), it leads to increased proportion of employees who were promoted to assistant general manager in the third selection or later and who subsequently, stayed in assistant general manager. On the other hand, the proportion of employees who were promoted to manager by primary or secondary selection but were promoted to assistant general manager in the third selection or later shows the similar trend as lowered proportion of employees who were promoted to manager by primary and secondary selection shown in Figure 3. That is, as the existing foundation which maintained slow selection changed, the period of time required for promotion to manager when initial differentiation in upgrading occurs within a cohort was prolonged and delayed, the period of promotion of cohort in a small time difference was shortened and the subsequent order change was small. The selection became earlier than before in general.

2. Statistical Analysis on Assignment before Occurring of the Promotion Disparity and Subsequent Promotion

Based on the analysis result of IV. 1, a statistical analysis is carried out to clarify whether 14-year job assignment difference before occurring of the promotion disparity can explain the order of promotion to manager, finally reached grade and promotion to senior grade or not. Given a total length of service in 11 work locations such as Tokyo, Osaka/Nagoya and other domestic local branches, domestic temporary transfer (*shukko*),[18] overseas subsidiaries (United States, major countries[19] and others), overseas temporary transfer and others (full-time working for labor union, overseas for language study and overseas for business study) (Tokyo-based) as job assignment difference, a probit analysis is carried out adding dummy variables such as the number of relocation, affiliation group, the year of joining the company and graduating school to explanatory variables.

[18] Transfer is to move to other firms which are within the same corporate group or which have had long-term transactions with the core firm in which workers were hired. However, it is a procedure under which the core firm remains in charge of the workers' employment after they have moved, even though they rarely come back to the core firm.

[19] Major countries here are the following five countries; the United Kingdom, Germany, France, Australia and Canada. This was determined on the basis of trading volume and the number of assigned employees described in the company history, etc.

(1) Order of Promotion to Manager

A probit analysis was carried out using data of 858 employees who joined the company from 1962 to 1966, worked for 15 years or longer and were promoted to managers or higher grades with the order of promotion to manager (primarily- or secondarily-selected employees are 1, thirdly-selected or later ones are 0) as an explained variable. Table 6 (1) shows a significant result that all overseas assignment including temporary transfer and full-time working for labor union had a positive effect on early promotion to manager but assignment to Osaka/Nagoya and other domestic local branches had a negative effect on it at the 1 to 5% level. It also shows a significant result in a dummy variable of graduating school.

(2) Promotion to Senior Grades

A probit analysis was carried out for 840 employees who worked for 25 years or longer using above explanatory variables with promotion to councilor or higher grade and to general manager or higher grade (employees being promoted are 1, not being promoted are 0) as an explained variable. An ordered probit analysis was also carried out for them with the finally reached grade as an explained variable (see Table 6 [2] to [4]). The result was, even though significant levels vary slightly, almost same as that of Table 6 (1). In particular, it showed a significant result in any work experiences in the United States and other major countries at the 1% level.

(3) Significant Work Experience for Promotion to Manager

We analyzed when and which work experience has a significant effect on the period of promotion to manager by dividing a total length of service of each workplace during 14 years after joining the company which was used for explanatory variables into four grades at the time of simultaneous promotion of cohort. A probit analysis was carried out with the order of promotion to manager (primarily- or secondarily-selected 1, thirdly-selected or later 0) as an explained variable using data of 2,933 employees who worked for 15 years or longer and were promoted to managers or higher grades as of 1997 among employees who joined the company from 1962 to 1977.

The employees were divided into three by the year of joining the company (i) 1962 to 1966 where employees were previously analyzed using the “career tree” method, etc., (ii) 1967 to 1972 where the proportion of primarily- or secondarily-selected managers consistently decreased and (iii) 1973 to 1977 where there was some improvement in the situation. As for working in overseas subsidiaries and domestic branches including Osaka and Nagoya which showed a significant result in Table 6 (1), a cross term was used to observe a generation gap. Then only explanatory variables which lead a significant result were extracted and shown in Table 6 (5). According to the table, work experience in the United States at the level of chief (5th to 8th year after joining the company) and studying business abroad after being promoted to chief firstly had a significant positive effect on the early promotion to

Table 6. Regression Analysis Results with Total Length of Service during 14 Years after Joining the Company by Work Location as an Explanatory Variable

	(1)	(2)	(3)	(4)
Employees who joined the company from 1962 to 1966 Explained variables: Right columns	Order of promotion to manager	Councilor or higher over_8	General manager or higher	Finally reached grade
Constant term	+	−***	−***	
Osaka/Nagoya	−***	−	−	−
Domestic local branches	−***	−	−	−***
Domestic temporary transfer	−	+	−	+
Overseas temporary transfer	+**	+	+	+**
U.S. subsidiaries	+***	+***	+***	+***
Subsidiaries in major countries	+***	+***	+***	+***
Subsidiaries in other overseas countries	+***	+*	+**	+***
Full-time union	+**	+*	+***	+***
Overseas for language study	+	+	+	+
Overseas for business study	+	+*	+**	+**
Number of assignments	−	+	−	−
Graduating school dummy				
University of Tokyo	+***	+***	+***	+***
Hitotsubashi University	+**	+*	+***	+***
Keio University	+***	+***	+***	+***
Year of joining the company dummy				
1963	+	+**	+	+
1964	+	+	+	+
1965	−	+	−	−
1966	−***	−	−	−*
Sample size	858	840	840	840
Log likelihood	-494.3	-316.3	-491.2	-1202
Pseudo R2	0.1565	0.1423	0.1127	0.0737

Note: Table 6 shows significant variables and results of probit analysis (order probit analysis for [4] and [6]) to clarify whether total length of service during 14 years after joining the company before occurring of the promotion disparity by work location can explain the order of promotion to manager and finally reached grade or not.

(1) is for 858 employees who joined the company from 1962 to 1966, worked for 15 years or longer and finally reached manager or higher grade. (2) to (4) are for 840 employees who worked for 25 years or longer and finally reached manager or higher grade.

Explanatory variables for (1) to (5) are: total length of service (Tokyo-based) during 14 years after joining the company in each work location (Osaka/Nagoya, domestic local branches, domestic temporary transfer, U.S. subsidiaries, subsidiaries in major countries, subsidiaries in

(5) Total length of service before occurring of the promotion disparity by grade and work location

Explained variable: Order of promotion to manager	1962-77	Cross term		
		1962-1966	1967-1972	1973-1977
Grade 4 (chief, 5th-8th year after joining the company)				
Domestic local branches		-0.011	-0.013	-0.073 *
Other foreign countries		0.0936 ***	0.0138	0.0317
Subsidiaries in major countries		0.0609	0.0282	0.1543 *
U.S. subsidiaries		0.0970 **	0.1122 ***	0.2419 **
Overseas for business study	0.3680 ***			
Grade 5 (assistant manager, 9th-11th year)				
Osaka/Nagoya		-0.050	-0.061 *	-0.005
Other foreign countries		0.0184	0.0572 **	0.0350
Subsidiaries in major countries		-0.024	0.1045 ***	0.0204
U.S. subsidiaries		0.0254	0.0974 ***	0.0603
Overseas for business study	0.1988 **			
Grade 6 (deputy manager, 12th-14th year)				
Other foreign countries		0.0454 *	0.0006	-0.030
Subsidiaries in major countries		0.1569 ***	0.0940 ***	0.0328
U.S. subsidiaries		0.1643 ***	0.1091 ***	0.0543 *
Overseas for language study				
Overseas for business study	0.1698 **			
Full-time union	0.6066 ***			
Number of personnel transfers	-0.031 ***			
Sample size	2927			
Log likelihood	-1637.22			
Pseudo R2	0.1674			

other overseas counties, overseas temporary transfer, full-time union, overseas for language study and overseas for business study), number of assignments, year of joining the company dummy (base: those who joined the company in 1962), affiliation group dummy and graduating school (University of Tokyo, Hitotsubashi University and Keio University) dummy. “Major countries” here mean the United Kingdom, Germany, France, Australia and Canada, and “other countries” mean all foreign countries other than the United States and major countries.

As for explained variables, (1) was analyzed with primarily- or secondarily-selected managers as 1 and thirdly-selected or later ones as 0. (2) and (3) were analyzed with promotion to the grade as 1 and not promotion to the grade as 0. (4) was analyzed with finally reached grade as of 1997.

Table 6 (*Continued*)

(6) Analysis with personnel transfer patterns by year of joining the company as an explanatory variable

Explained variable: Order of promotion to manager	1962-1977	Cross term		
		1962-1966	1967-1972	1973-1977
First assignment				
Osaka/Nagoya	−***			
Domestic local branches	−***			
Domestic temporary transfer	−**			
2nd year after joining the company				
Tokyo→Osaka/Nagoya			−**	−**
Tokyo→U.S. subsidiaries				+**
3rd year after joining the company				
Tokyo→Domestic local branches			−**	
Domestic local branches→Tokyo	+*			
4th year after joining the company				
Tokyo→Osaka/Nagoya		−*		+*
Tokyo→Domestic local branches				−**
Tokyo→Other overseas countries		+*	+**	+**
Osaka/Nagoya→Tokyo	+***			
5th year after joining the company				
Tokyo→Osaka/Nagoya		−**	−***	−***
Tokyo→Domestic local branches			−**	
Tokyo→Overseas for language study	−*			
Tokyo→Other overseas countries		+**		
Tokyo→Subsidiaries in major countries				+*
Tokyo→U.S. subsidiaries				+**
Osaka/Nagoya→Domestic local branches	−***			
U.S. subsidiaries→Tokyo	−*			
6th year after joining the company				
Tokyo→Osaka/Nagoya			−*	−***
Tokyo→Domestic local branches				−**
Tokyo→Overseas for business study				
Tokyo→Other overseas countries				+*
Tokyo→U.S. subsidiaries		+**	+***	
Osaka/Nagoya→Other overseas countries	+*			
Domestic temporary transfer→Tokyo	+*			
Other overseas countries→Tokyo	−**			
7th year after joining the company				
Tokyo→Osaka/Nagoya		−*	−*	
Tokyo→Domestic local branches		−***	−***	
Tokyo→U.S. subsidiaries			+*	
Osaka/Nagoya→Domestic local branches	−***			
Subsidiaries in major countries→Headquarters	−**			

Table 6 (*Continued*)

8th year after joining the company				
Tokyo→Osaka/Nagoya		−**	−***	
Tokyo→Domestic local branches				−*
Tokyo→Overseas for business study	+**			
Tokyo→Subsidiaries in major countries			+*	
Tokyo→U.S. subsidiaries		+**	+*	+**
Sample size	2933			
Log likelihood	-2722.58			
Pseudo R2	0.1436			

Note (continued): (5) and (6) were analyzed with data of 2,933 employees who worked for 15 years or longer and finally reached managers or higher grades with the order of promotion to manager as an explained variable as same as (1). However, analyzed employees were divided into three categories (1962 to 1966, 1967 to 1972 and 1973 to 1977), and 14 years after joining the company were divided into four grades shown in Table 2. Cross terms were used for the explanatory variable on work location where significant results were obtained in (1) in order to observe a generation gap. (6) was analyzed to clarify when and which personnel transfer pattern has a significant effect on early promotion to manager (primarily- or secondarily-selected) and shows only results of personnel transfers in which significant results were obtained by the 8th year after joining the company. In tables, * indicates significant level: *** is at the 1% level, ** at the 5% level and * at the 10% level.

manager regardless of the year of joining the company. Other significant effects were; other overseas work experience (positive) among employees who joined the company from 1962 to 1966, and work experience in major countries (positive) and domestic local branches (negative) among employees who joined the company from 1973 to 1977. Significant results were also shown in full-time union experience (positive) and the number of job assignment (negative).

(4) When Personnel Transfer is Significant

In addition, an order probit analysis was carried out to clarify when and which personnel transfer is significant for promotion to manager adding the first assigned workplace to the explanatory variables with the order of promotion to manager as an explained variable. A cross term was also used as an explanatory variable in the similar purpose and way of Table 6 (5). Then a personnel transfer pattern which showed a significant result during eight years after joining the company before promotion to assistant manager is shown in Table 6 (6). It was observed since the beginning when employees have staff (1st to 4th year after joining the company), the younger the generation, the earlier it was shown, and the number of significant personnel transfer patterns is increasing. Regardless of generation, many assignments of “Tokyo → Osaka/Nagoya” and “Tokyo → domestic branch” showed a negative significant effect and that of “Tokyo → US” and “Tokyo → other overseas” showed a positive significant effect since 2nd year after joining the company. As for first assigned department, every workplace showed a negative significant effect on promotion to

manager compared with Tokyo. However, the personnel transfer from the workplace in which employees have staff to Tokyo had a positive significant effect on early promotion to manager.

3. Career Disparity in the Accounting Group

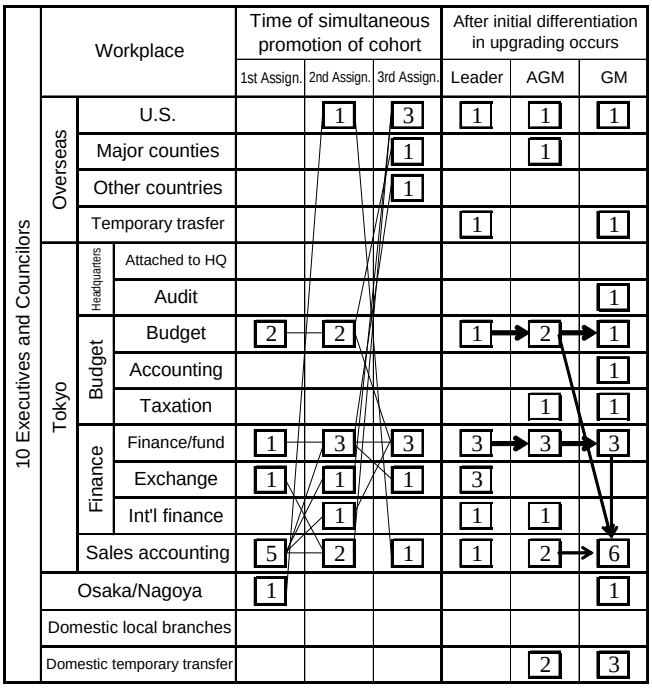
More concrete relationship between promotion and assignment from joining to leaving the company will be clarified here. 82 employees who were assigned to the accounting group were divided by finally reached grade to analyze when and what difference can be seen at the experienced workplaces and departments.

Figure 5 shows 82 employees[20] who joined the company from 1962 to 1966, were assigned to the accounting group, worked for 25 years or longer and finally reached to manager or higher positions divided by finally reached grade and workplaces and departments and divisions experienced until 1997 counted by period and post. The accounting group consists of five departments; budget, finance, sales accounting, audit and information system. According to the former employees of the personnel department, except specialized audit and information system departments, employees evenly experienced three departments; budget, finance and sales accounting by job rotation within the accounting group. 82 employees' ratio of finally reached grade[21] and ratio of the order of promotion to manager (primarily- or secondarily-selected: 48 [58.5%] and thirdly-selected or later: 34 [41.5%]) nearly agree with that of whole company shown in Table 4. The first assigned department was either Tokyo, Osaka or Nagoya and its breakdown is; sales accounting department in charge of accounting for each sales group in Tokyo (38, 46.3%), finance department in Tokyo (19, 23.2%), Osaka/Nagoya (16, 19.5%) and budget departments in Tokyo (9, 11.0%). The work experience in the sales accounting department at entry-level is considered to be beneficial to know the business of general trading company through the job despite of not belonging to the sales group and is an experience of learning the basics as Koike (1991) described. Employees who joined the company earlier than 82 employees and were promoted to executives were often engaged in budget and finance departments for a long time. On the other hand, most high school graduates worked in the sales accounting or domestic local branches; it shows which jobs are more important. While skills are developed through OJT, since the second assignment, their career seems to be different depending on the order of promotion to manager.

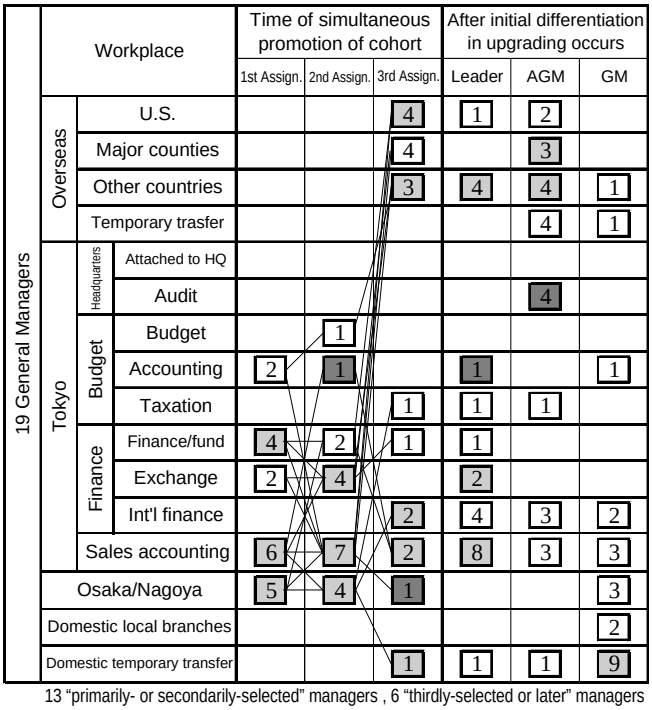
Many of employees who were finally promoted to "executives/councilor" were firstly and secondly assigned to sales accounting and finance/budget departments and thirdly

[20] There are persons who are involved in information system and audit in the accounting group besides 82 employees. However, they are consistently involved in the same work since they joined the company and their personnel transfer pattern is different from that of 82. Therefore, they were removed from the analysis.

[21] The ratio was calculated by dividing the number of employees in the far left row of Figure 5 by 82.

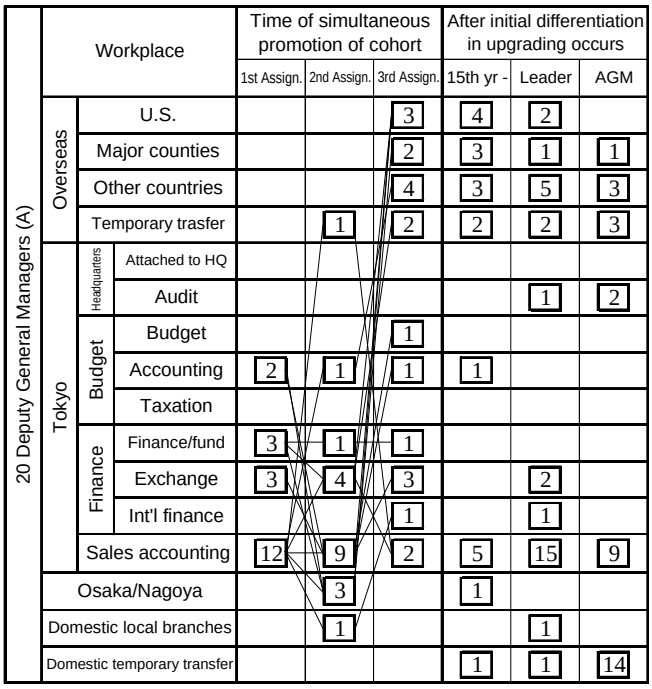


10 “primarily- or secondarily-selected” managers , 0 “thirdly-selected or later” managers



13 “primarily- or secondarily-selected” managers , 6 “thirdly-selected or later” managers

Figure 5. Career Development of 82 Employees Who Joined the Company from 1962 to 1966 and Were Assigned to the Accounting Group



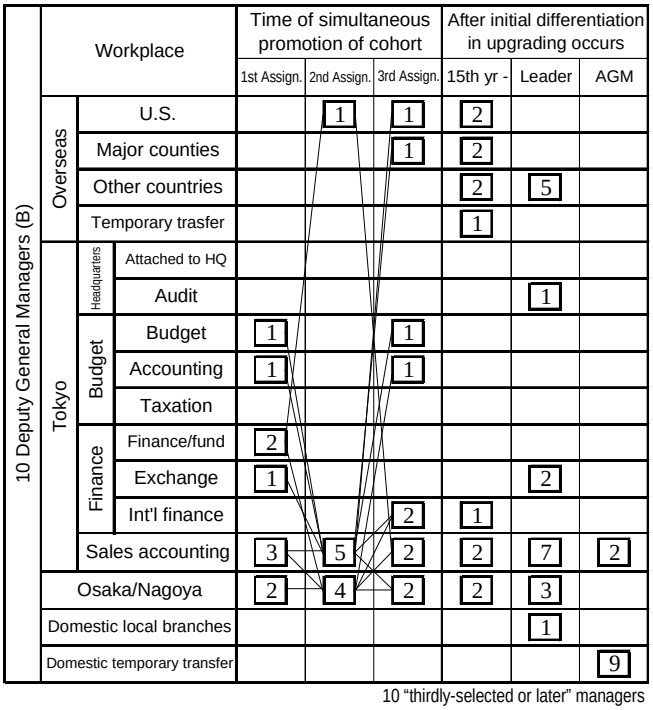
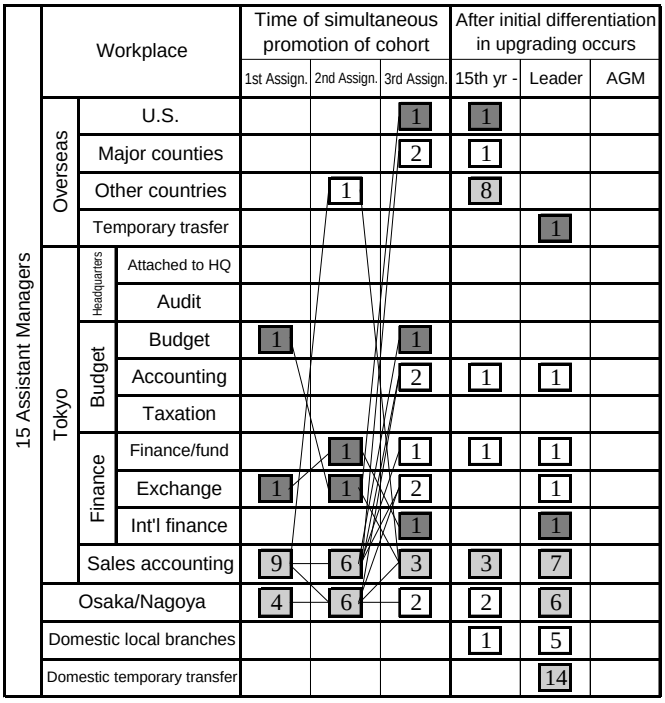
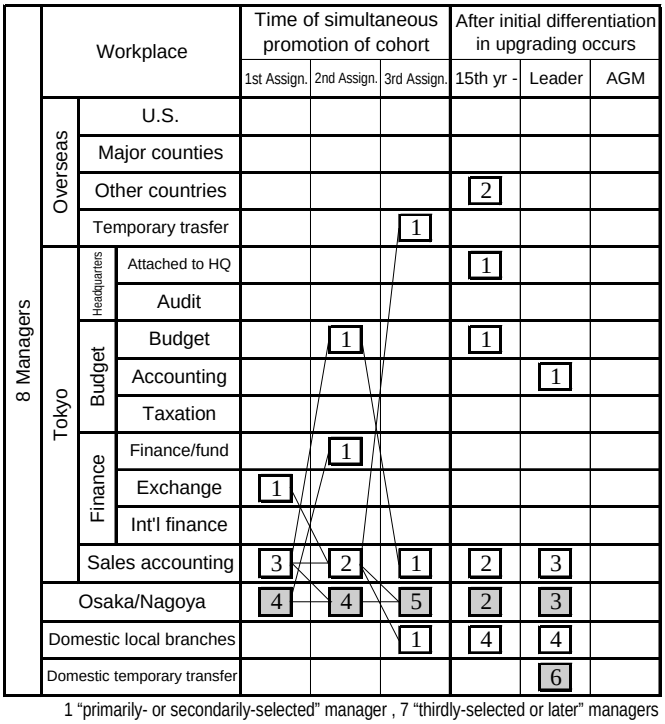


Figure 5. (*Continued*)





1 “primarily- or secondarily-selected” manager , 7 “thirdly-selected or later” managers

Figure 5. (*Continued*)

Note: Figure 5 shows workplaces (departments in case of Tokyo) of 82 employees who were assigned to the accounting group among 840 college-educated employees who joined Company A from 1962 to 1966 and worked for 25 years or longer and finally reached to manager or higher grades by finally reached grade, workplaces and period.

The rows of the table show workplaces (departments) and the number of employees who finally reached such grade. Since quite a number of deputy general managers (30 employees) were analyzed, they were divided into "primarily- or secondarily-selected" (A) and "thirdly-selected or later" (B) depending on when being promoted to manager.

The period of service shown in the colums of the table was divided into the time of simultaneous promotion of cohort who joined the company at the same time (during 14 years after joining the company) and after initial differentiation in upgrading occurs within a cohort (15th year after joining the company or later). Since personnel transfers occur about 1.8 times during 14 years after joining the company, i.e., employees experience about 2.8 workplaces, three workplaces of 82 employees were categorized as "first assignment (1st Assign.)," "second assignment (2nd Assign.)" and "third assignment (3rd Assign.) "

Since some were transferred three times or more, three workplaces of long length of service were extracted and put in the order of experience for them. To clarify personnel job rotations of each person, boxes were connected by straight lines.

After occurring of promotion disparity, the table shows all workplaces where employees were engaged in for two years or longer as "leader," "acting general manager (AGM)," and "general manger (GM)" shown in Table 2. That is, when one experienced more than one workplace as a general manager, those were all counted. For employees who finally reached deputy general managers or lower grades, a column of experienced department before becoming a leader in the 15th year after joining the company or later (15th yr -) was created. As for employees who finally reached general managers, assistant general managers and managers, "primarily- or secondarily-selected" and "thirdly-selected or later" are mixed in the order of promotion to manager. Therefore, in order to distinguish them, dark-shaded boxes indicate minority ("thirdly-selected or later" for general manager and "primarily- or secondarily-selected" for assistant general manager) only, light-shaded boxes indicate mixed parts and boxes with no shade indicates majority only.

assigned to overseas. There are some employees who worked in finance and budget departments for a long time since the first assignment. There are few persons assigned to overseas after occurring of the promotion disparity and many of them became leaders within the finance department in Tokyo. As personnel transfer patterns of employees being promoted to executives shown by heavy arrows in the figure, employees who were leaders and continuously became deputy general managers and general managers in the same departments finally reached executives. Employees who became deputy general managers but could not be promoted to general managers there became general managers in the different departments and went on loan to other domestic companies. There was no employee who experienced Osaka/Nagoya or other domestic local branches after the second assignment except one who was transferred as a general manager.

As for "general manager," the tendency of job assignment before occurring of the promotion disparity is similar to that of "executive/councilor." However, after the promotion to manager, they often became leaders in the sales accounting department. Although some became leaders in budget and finance departments, those were transferred to overseas subsidiaries or the sales accounting department to be deputy general managers and became

general managers there. There were also many employees who became general managers in Osaka/Nagoya and other domestic branches. Even if the finally reached grade is the same, assigned departments are likely to be different depending on the order of promotion to manager. There are few thirdly-selected or later managers who experienced overseas assignment during the time of simultaneous promotion of cohort, and many of them experienced it in "others (i.e., counties other than the US and major countries)" after occurring of the promotion disparity. After that, they became leaders within the sales accounting department and were transferred to the audit department which monitors the operation of the sales accounting department. There was no thirdly-selected or later manager who became a general manager in Company A. They went on loan to other domestic companies as executives, etc. There was no primarily- or secondarily-selected manager who was assigned to the audit department.

As for "deputy general manager," the tendency of job assignment differs depending on whether they were primarily- or secondarily-selected managers or not. From the perspective of personnel transfer patterns during the time of simultaneous promotion among the cohort and the proportion of those who experienced overseas assignment, "deputy general manager A" who was primarily- or secondarily-selected as a manager is similar to above mentioned employee being promoted to senior position, and "deputy general manager B" who was thirdly-selected or later as a manager is similar to below mentioned employee staying at lower grade. As for "deputy general manager A," the proportion of employees who experienced overseas assignment after occurring of the promotion disparity is higher than that of ones being promoted to senior positions. After that, many of them became leaders or acting leaders in the sales accounting department or overseas subsidiaries and went on loan to other domestic companies.

As for "deputy general manager B," on the other hand, most of all continuously experienced the sales accounting or Osaka/Nagoya branch even at the second assignment, and at the third assignment they are in charge of budget or finance which employees being promoted to senior positions and primarily- or secondarily-selected managers were engaged in at the second assignment. Many of them experienced overseas assignment in "others" in the 15th year after joining the company or later. That is, they are likely to be engaged one period (one assignment) later than others after the second assignment. Compared with "deputy general manager A," there are few persons who became leaders overseas, many of them became leaders in the sales accounting or Osaka/Nagoya branch and went on loan to other domestic companies without becoming acting leaders.

The tendency of "deputy general manager B" is also seen in "assistant general manager" and rather greater. Some of them never experienced overseas assignment until leaving the company. Even though some experienced budget and finance at the second assignment and assignment to U.S at the third assignment, many of them are in a shaded region of the figure, i.e., primarily- or secondarily-selected managers.

As for "manager," there are extremely few persons who experienced budget, finance

or overseas assignment after the second assignment. Many of them were transferred to the sales accounting department, Osaka/Nagoya and domestic local branches repeatedly and developed careers in a narrow field, domestic sales accounting, for a long time. Many of them also became leaders there but the time of becoming leaders was late and the period was short.

V. Discussions

The hypothesis is verified on the basis of summarized analysis results.

1. Summary of Analysis Results

In IV. 1, Company A's promotion mechanism was analyzed using the "career tree" method (Figure 1) etc. As a result, as same as Japanese companies analyzed by related literature, there was a tendency of late promotion by judging from the time when initial differentiation in upgrading occurs within a cohort in the 15th year after joining the company, more than 70% of employees being promoted to deputy general managers among those analyzed (Table 3) and continued changes in the order until the time of promotion to general manager. On the other hand, the consolation type of promotion was seldom and the order of promotion to manager at the time when initial differentiation in upgrading occurs within a cohort had a significant effect on finally reached grade (Table 4).

In IV. 2, based on the results of IV. 1, the possibility of job assignment disparity before occurring of the promotion disparity was statistically verified (Table 6). As a result, overseas work experience after the second assignment had a positive significant effect and work experience in domestic branches including Osaka and Nagoya has a negative significant effect on the order of promotion to manager and senior positions. The time of showing significant results became earlier among younger generations in which the time of promotion tends to be late.

In IV. 3 (Figure 5), findings obtained by IV. 2 were minutely clarified using personnel data from joining to leaving the company of 82 employees who were assigned to the accounting group. As a result, there was a disparity in experienced departments and the time of experience depending on the order of promotion to manager after the second assignment. In addition, after occurring of promotion disparity, the work contents were significantly different at the same grade depending on the order of promotion.

2. Interpretation of Analysis Results

As a result of the analysis on career from two perspectives, promotion and assignment, unlike discussions of Koike (1991) and others, Company A showed a tendency of "early selection and late promotion" such as job assignment disparity of cohort since the time of no difference in their grade. However, the term "early selection" here is different from fast track which has been introduced by part of Western companies. The de facto selection was

gradually carried out since the early period after joining the company and employees to be promoted to senior positions such as executives were strictly selected at the time of occurring of promotion disparity. This would agree with the result that if employees are not primarily- or secondarily-selected at the time of occurring of the promotion disparity, they cannot be promoted to senior positions as obtained by many of related literature which only analyzed a promotion mechanism after occurring of the promotion disparity. Particularly, there is a possibility that career was developed depending on the order of promotion to manager which can be assumed as a proxy variable of acquired skills since the time of no disparity in the grade and took the form of difference in assignment. If so, the promotion after the time when initial differentiation in upgrading occurs within a cohort would be based on a long-term performance since shortly after joining the company. Furthermore, even if finally reached grade is the same, since there was a significant disparity in assigned departments due to the difference of the order of promotion to manager, there is a possibility that the career at the time of simultaneous promotion of cohort also influences it even after occurring of the promotion of disparity.

Even though a late promotion mechanism which supports Prendergast (1992) described in II. 1 was shown, there is a possibility that there was a job allocation disparity from the early period and human resources were allocated depending on their ability. Such reality would be able to be explained using a job competition model of Thurow (1975). As shown in Figure 5, the OJT contents after the secondary selection differ depending on the level of skills obtained in the first assigned department where they experienced the basic works such as sales accounting. Those who reached a certain level of skills conduct more difficult business step by step to acquire advanced skills. Those who could not reach a certain level or failed to be selected from the limited numbers of being promoted to next level are in charge of the same level of work as that of the first assignment until they reach there or are included in the limited numbers. This continues even after the second assignment and those who reached a required level of skills through OJT before occurring of the promotion disparity are promoted to managers.

It can be explained with the same model even after occurring of the promotion disparity. However, the selection method changes from loser discrimination before occurring of the promotion disparity to shakedown. It becomes a tournament competition aimed at promotion to senior position among those who obtained advanced skills early and among those who lagged behind in promotion to manager. Losers were transferred to departments including domestic temporary transfer to other companies where their obtained skills can be utilized after the competition. Although it was the same to develop wide-range expertise, the main area and range of work was different depending on acquired skills. Those who took a long time to acquire skills are engaged in the department in which the responsibility and importance of the job are rather less than that of those who acquired skills earlier. Those who could not acquire a certain level of skills despite of taking time to acquire skills through OJT such as those staying at manager level never experienced overseas assignment

even after occurring of the promotion disparity, were engaged in the same level of work as the first assignment and built their expertise changing workplaces.

The disparity of job assignment from early stage would alleviate a problem that "there is not much time for cultivating excellent personnel who will become executives in the future and it makes waste of training investment" which was considered as a disadvantage of "late selection." There is also concern that "late selection" makes excellent personnel difficult to maintain the incentive at the time of simultaneous promotion of cohort, but if they can recognize that future promotion is based on a long-term performance since they joined the company, such concern would be alleviated. On the other hand, a disadvantage of early selection, particularly morale slump of employees who are not early selected would be pointed out. However, as shown in Figure 5, it can be estimated that a long-term hierarchically-structured tournament competition, not one-shot deal, rarefies it. As Lazear and Rosen (1981) discussed, it can also be considered that more employees' efforts are improved by bringing those who have the similar skill into competition. It is also considered, as Koike (2002) described, that an efficient skill development was carried out by knowing their improved skills.

It is said that skills for jobs and values of human resources are provided by the career path and vocational capability development is provided by the level of assigned jobs (e.g., Koike 1999). From this aspect, sufficient opportunity for vocational capability development which is one of the purpose of job assignment is not provided to thirdly-selected or later managers. Therefore, employees who stand out too late have a disadvantage. Even though overseas assignment is not only the experience to make great improvements (Kanai 2002), sufficient opportunities for training and to demonstrate their abilities are not provided unlike primarily- or secondarily-selected managers. In addition, it would be pointed out that the tendency of decreased chance of being promoted to senior positions which can be seen among younger generation and declining proportion of employees who are promoted early when initial differentiation in upgrading occurs within a cohort and decreased variations of the consequent order of promotion may make incentive of improving skills difficult to maintain. Such problems are beyond all reason for companies in which a wide variety of human resources development is essential to maintain their competitiveness today, and this would be one of reasons to accelerate today's personnel-system reform.

VI. Conclusion

This paper clarified the reality of in-house career path consisting of two axes; promotion and assignment of white-collar workers based on the obtained employees' lists of General Trading Company A. As a result of detailed analysis on assignment before occurring of the promotion disparity which had not been clarified yet while the slow promotion was adopted, an aspect of job competition model was shown from the early period and it pointed out the possibility of human resource allocation depending on their ability utilizing a

screening function of job assignment.

This paper analyzed a general trading company which falls under the category of traditional conservative firm as Hanada (1987) described and has a different career development method from Japanese companies in other industries. If the results are different from common belief, one of the reasons may be low asymmetric cost of personnel information, as Hirano (2006) described, accompanied with Company A's personnel management by group classified by products. However, since the analysis results indicate a similar tendency to that of related literature which analyzed companies in other industries shown in Table 1, it can also be considered that a dominant common belief, "Japanese companies are always 'late promotion,' 'late screening'" was elaborated by focusing on the assignment before occurring of the promotion disparity. In regard to this point, further analysis with widened scope based on detailed data and discussions including pros and cons of today's personnel system reform are required.

References

Abe, Takeshi. 1995. Jimukei howaito kara no kigyo nai ido: Daikigyo A-sha no jirei [Promotion, job rotation and Retirement of white-collar workers]. *The Monthly Journal of the Japan Institute of Labour* 37, no.9:30-39.

Asanuma, Banri. 1997. Nippon no daikigyo no naka no shokuba soshiki to shoshin kanri [Workplace Organization and Promotion Management of Japanese Major Companies]. In Nippon no kigyo shoshiki kakushinteki tekio no mekanizumu: Choki torihiki kankei no kozo to kino [Japanese Corporate Structures: Mechanism of Innovative Adaptation—Structures and Functions of Long-Term Business Connections] 45-89. Tokyo: Toyo Keizai Shinposha.

Baker, George, Michael Gibbs, and Bengt Holmstrom. 1994. The internal economics of the firm: Evidence from personnel data. *Quarterly Journal of Economics* 109, no. 4: 881-919.

Hanada, Mitsuyo. 1987. Jinji seido ni okeru kyoso genre no gittai: Shoshin, shokaku no shisutemu kara mita nihon kigyo no jinji senryaku [Realities of the Principle of Competition for Personnel System – Personnel Strategies of Japanese Companies from the Perspective of Promotion]. *Organizational Science* 21, no. 2: 44-53.

Hirano, Mitsutoshi. 2006. *Nihon-gata jinji kanri: Shinka-gata no hassei purosesu to kinosei* [Japanese-Style Personnel Management—Evolutionary Generation Process and Its Functionalities]. Tokyo: Chuo Keizaisha.

Human Ability Development Center, All Japan Federation of Management Organizations. 1979. Bucho no kyaria patan: Bucho 173-nin no kyaria to iken [Career Patterns of General managers—Careers and Opinions of 173 General managers]. Tokyo: Human Ability Development Center, All Japan federation of Management Organizations.

Imada, Sachiko, and Shuichi Hirata. 1995. *Howaito kara no shoshin kozo* [Promotion mechanism of White-Collar Workers] Tokyo: The Japan Institute of Labour.

Imano, Koichiro, and Hiroki Sato. 2002. *Jinji kanri nyumon* [Handbook on Personnel Management].

Tokyo: Nihon Keizai Shinbunsha.

ITOCHU Corporation, Research Division, ed. 1997. *Zeminaru: Nippon no sogo shosha* [Seminar: Japanese General Trading Companies]. 2nd ed. Tokyo: Toyo Keizai Shinposha.

Jacoby, Sanford M. 2005. *Nippon no jinji-bu, Amerika no jinji-bu: Nippon kigyo no koporeto gabanansu to koyo kankei* (The Embedded Corporation: Corporate Governance and Employment Relations in Japan and the United States). Trans. Yoshiji Suzuki, Ken-ichi Ito and Ryuji Hori. Tokyo: Toyo Keizai Shinposha.

Japan Institute of Labour. 1993. Daikigyo Howaito Kara no do to Shoshin: "Howaito Kara no Kigyo-nai Haichi, Shoshin ni kansuru Jittai Chosa" Kekka Hokokusho [Personnel Transfer and Promotion of White-Collar Employees in Major Companies: Report of "Survey on In-House Transfer and Promotion of White-Collar Employees"]. JIL Research Report. no.37. Tokyo: The Japan Institute of Labour.

———. 1998. Kokusai Hikaku: Daisotsu Howaito Kara no Jinzai Kaihatsu, Koyo Sisutemu—Nichi, Eei, Bei, Doku no Daikigyo (2) Anketo Chosa-Hen [International Comparison: Personnel Development and Employment Systems for College-Educated White-Collar Employees —Major Companies in Japan, the United Kingdom, Germany and the United States (2) Questionnaire Survey], JIL Research Report. no.111. Tokyo: The Japan Institute of Labour.

Kanai, Toshihiro. 2002. *Shigoto de hitokawa mukeru: Kankeiren, hitokawa muketa keiken ni manabu* ["Great Improvements" Made by Work—Learning from "Kansai Economic Federation's Experiences of Making Great Improvements"]. Tokyo: Kobunsha.

Koike, Kazuo, ed. 1991. *Daisotsu howaito kara no jinzai kaihatsu* [Personnel Development of College-Educated White-Collar Employees]. Tokyo: Toyo Keizai Shinposha.

———. 1999. *Shigoto no keizaigaku* [The Economics of Work in Japan], 2nd ed. Tokyo: Toyo Keizai Shinposha.

———. 2002. Mondai, hoho, imi [Problems, methods and meanings]. In *Howaito kara no jinzai keisei: Nichi, Bei, Ei, Doku no hikaku* [A comparison of personnel development among white-collar workers in four countries: Japan, Germany, the United Kingdom and the United States], ed. Kazuo Koike and Takenori Inoki, 15-33. Tokyo: Toyo Keizai Shinposha.

Koike, Kazuo, and Takenori Inoki, eds. 2002. *Howaito kara no jinzai keisei: Nichi, Ei, Bei, Doku no hikaku* [A comparison of personnel development among white-collar workers in four countries: Japan, Germany, the United Kingdom and the United States]. Tokyo: Toyo Keizai Shinposha.

Kuwahara, Yasuo. 1988. Kanrisha, keieisha kyaria keisei no mekanizumu [Mechanism of Management Career Development]. In *Gendai howaito kara no rodo mondai* [Labor Issues of Modern White-Collar Employees], ed. Kazuyoshi Koshiro and Yasuo Kuwahara, 72-83. Tokyo: The Japan Institute of Labour.

Lazear, Edward P., and Sherwin Rosen. 1981. Rank-order tournaments as optimum labor contracts. *Journal of Political Economy* 89 (October):841-64.

Matsuo, Koichi. 2002. Chiho komuin no shoki kyaria kanri: Seirei shitei toshi A-shi no daisotsu jimukei shokuin no jirei kara [Career Management During the Early Years of Local Public Employees—A Case Study of College-Educated Employees for the Administrative Division of

Government-Designated City A]. *The Aoyama Journal of Economics* 54, no. 3:43-81.

Matsushige, Hisakazu. 1995. Denki B-sha daisotsu danshi jugyoin no kinzoku 10 nen made no ido to sono go no shoshin [Personnel Transfers of College-Educated Male Employees in Electric Company B During the First 10Years After Joining the Company and Their Subsequent Promotion]. In *"Shoshin" no keizaigaku* [The Economics of "Promotion"], ed. Toshiaki Tachibanaki and Research Institute for Advancement of Living Standard, 153-77. Tokyo: Toyo Keizai Shinposha.

———. 2000. Kyaria marason no joban: Bunkei daisotsu howaito kara no ido to senbatsu [The first phase of career marathon—Personnel transfers and selection of arts college-educated white-collar employees]. *International Public Policy Studies* 4, no. 2:21-40.

Milgrom, Paul, and John Roberts.1992. *Soshiki no Keizaigaku* (Economics,Organization and Management). Trans. Masahiro Okuno, Hideshi Ito, Haruo Imai, Osamu Nishimura, and Hajime Yagi. Tokyo: NTT Shuppan.

Mineno, Yoshiro. 2000a. Kuni ya chiho jichitai nado no gyosei soshiki ni okeru shoshin kanritoshiteno "hayai shoshin" to "osoi shoshin" ["Quick Promotion" and "Slow Promotion" as Promotion Management of Administrative Organizations of National or Local Governments] [Industrial Psychology Study]. *Sangyo Soshiki Shinrigaku Kenkyu* [Studies of industrial and organizational Psychology] 13, no. 2:113-20.

———. 2000b. Chiho kokyo danatai ni okeru shokuin no shoshin kanri ni tsuite: Aru seireishitei toshi wo reini [Promotion Management of Employees in Local Governments—A Case Study of a Government-Designated City]. *Organizational Science* 34, no. 2:80-91.

Morishima, Motohiro. 2004. *Jinzai manejimento nyumon* [Handbook on Personnel Management]. Tokyo: Nihon Keizai Shinbunsha.

Nakamura, Megumi. 1991. Sogo shosha ni okeru kyaria keisei [Career Development in a General Trading Company]. In Daisotsu howaito kara no jinzai kaihatsu [Personnel Development of College-Educated White-Collar Employees], ed. Kazuo Koike, 103-20. Tokyo: Toyo Keizai Shinposha.

Nishiyama, Akihiko. 1999. Daikigyo howaito kara no saishu kyaria: A-sha ni okeru saishu senbatsu [Final positions held by university-graduate white-collar workers at Company A]. *The Monthly Journal of the Japan Institute of Labour* 41, no. 2-3:147-59.

Prendergast, Canice. 1992. Career development and specific human capital collection. *Journal of the Japanese and International Economies* 6, no. 3:207-27.

Rosenbaum, James E. 1984. *Career Mobility in a Corporate Hierarchy*. Orlando, FL: Academic Press.

Shaeffer, Ruth G. 1972. *Staffing Systems: Managerial and Professional Jobs.* New York: Conference Board.

Tachibanaki, Toshiaki. 1995. Yakuin e no michi to yakuin no yakuwari [Road to the Board and Its Role]. In *"Shoshin" no keizaigaku* [The Economics of "Promotion"], ed. Toshiaki Tachibanaki and Research Institute for Advancement of Living Standard, 13-38. Tokyo: Toyo Keizai Shinposha.

Takeuchi, Yo. 1995. *Nippon no meritokurashi: Kozo to shinsei* [Japan's meritocracy: structure and

mentality]. Tokyo: University of Tokyo Press.

Thurow Lester, C. 1984. *Fubyodo wo umidasu mono* (Generating Inequality). Trans. Kazuo Koike and Akira Wakisaka. Tokyo: Dobunkan Shuppan.

Uehara, Katsuhito. 2003. Ote ginko ni okeru howaito kara no shoshin kozo: Kyaria tsuri ni yoru choki shoshin kyoso no jisho bunseki [The Promotion structure of white-collars for large banks in Japan: An empirical analysis of long-term promotion competition using "career tree" method]. *The Japanese Journal of Labour Studies* 45, no. 10:58-72.

Umezaki, Osamu. 1999. Daikigyo ni okeru howaito kara no senbatsu to shoshin: Seiyaku kigyo, MR no jirei kenkyu [Selection and Promotion of White-Collar Employees in Major Companies— A Case Study of a Pharmaceutical Company and MR]. *Osaka Economic Papers* 49, no.1:94-108.

Wakabayashi, Mitsuru. 1987. Kanrishoku e no kyaria hattatsu: Nyusha 13-nen me no foroappu [Career Development for Administrative Positions—Follow-Up in the 13th Year after Joining the Company]. *Japanese Journal of Administrative Science* 2, no. 1:1-13.

Yashiro, Atsushi. 2002. Nippon no howaito kara no shoshin ha hontoni "osoi" no ka [Is Japanese white-collar employees' promotion really "slow?"]. *The Japanese Journal of Labour Studies* 44, no. 2:41-42.

Yashiro, Naohiro. 1997. *Nihon-teki koyo kanko no keizaigaku* [The Economics of Japanese-Style Employment Practice]. Tokyo: Nihon Keizai Shinbunsha.

Data and Materials

Company A. "Employees List of Company A."

Company A. "Corporate History of Company A. "

Diamond, Inc. "Diamond Inc.'s Employment Guidebook for College Graduates" (each year's edition).

Diamond, Inc. "The List of Company Employees: All Publicly Traded Companies" (each year's edition).

Josuikai (Hitotsubashi University Alumni Association). "Alumni List of Hitotsubashi University (by Company). "

Keio University Alumni Association. "Alumni List of Keio University by Company. "

The University of Tokyo Alumni List Press. "Alumni List of the University of Tokyo by Company. "

Career Competition within Organizations: Competition among Graduate White-Collar Workers in Medium-Sized Manufacturing Firms*

Tetsuo Nakashima

Consultant on Training for Personnel Management

The purpose of the present study is to make clear the severity of interpersonal career competition in companies somewhat smaller than are usually counted as "large corporations." It uses as its data-set the micro-data of three medium-sized manufacturing firms (with a little over 1000 employees each). These are companies which use the Ability-Based Grade System common in Japanese personnel management. The study analyses at two points in time, both the dispersion in basic salaries and changes in the ranking of individuals within those dispersions.

My findings are: (i) At the beginning and in the early stages of a career, competition focuses on the effort not to become a drop-out, (ii) Individuals differ in the career point at which they become sub-section chiefs (*shunin*), (iii) In mid-career the competition focuses on gaining early promotion to the rank of section chief (*kacho*), (iv) Competition continues through into the later stages of careers when changes in individuals' rank order can still occur.

These results may be considered to demonstrate that what is commonly described as a *nenko*[1] system of pay and promotion in Japanese enterprises nevertheless involves fierce competition.

I. The Nature of the Problem

The purpose of the present paper is to analyze how differences in pay develop over the course of individual careers as a result of the personnel evaluations they receive. The pay system is based on a series of grades and sub-steps within grades, and the observations used are of differentials both in basic pay and in grading. The evidence concerning the way in which dispersions develop, and the changing positions of individuals within those dispersions, may be taken as an index of the nature of competition among career white collar

* The present paper is a revision and expansion of a paper of the same title published in the *Journal of Career Design Studies*, no.2, 2006. I would like to thank both Professor Hisakazu Matsushige of Osaka University Graduate School and Professor Osamu Umezaki of Hosei University for much good advice, and also Professor Megumi Nakamura of Kobe Gakuin University for his useful advice on the occasion when I presented the paper at the second general meeting of the Career Design Association. I am precluded from giving the names of the three companies but I would like to record my thanks to them for lending me the documents which made this study possible.

[1] *Nenko* system is usually translated as "seniority system." *Nen* means "age" and *ko* means "achievement/merit/performance." The original meaning, therefore, is "pay and promotion according to seniority plus merit," and the system of annual or semi-annual evaluations of "merit" for pay-fixing purposes, referred to in this paper, has always been a standard accepted part of the system. However, the common translation of *nenko* as "seniority" *tout court*, does no injustice to the common Japanese usage of the term, particularly in recent years when it is often used in sharp contrast to *seika-shugi*—"performance pay."

workers.

Career competition within Japanese enterprises is often described as a *nenko* ranking system. Some studies, however, have pointed out that differential personnel evaluations give rise to fierce competition (Koike 2009). In this paper I wish to demonstrate the real existence of such fierce competition, in spite of the fact that it is nominally a *nenko* ranking system.

There have been a number of earlier studies of which Hanada (1987) may be considered representative. He created a "career tree" for the male graduate employees of five large corporations, and showed how the initial weeding out took place between their fifth and their twelfth year of employment. Koike (1991), based on interviews with white collar workers in three large corporations, found initial selection to take place over the same period, and later, Koike (2005) came up with the characterization of the Japanese system as a "late selection system," differentiating the "initial selection period" from the "moving in step period."

Among studies of individual firms one might cite Hirata and Imade (1995) which looked at the data for a major heavy industrial corporation and identified what they called a "multi-layered promotion competition" system—an initial period of "*nenko*-like marching in step promotion," a mid-career period of "competition for fast promotion" and the final period of "tournament competition." They also identified a "mezzanine waiting floor" and the notion of a "return match." Takeuchi (1995) also created the career tree for a large finance and insurance corporation. He saw the "all go up together" period as lasting for five to eight years, followed by "competition for fast promotion" and the "return match."

In this way the image emerging from existing studies is of the selection period being the main index of career competition—competition being relatively relaxed in the initial period, but then increasing in mid-career as people struggle to become promoted faster than others.[2]

However, what has not hitherto been made clear is whether in medium and small firms the same career competition takes place as in the large enterprises. In general the usual assumption is that it does not. Koike (1981) asserted that in small and medium enterprises, one found a gathering together of three heterogeneous groups: the core group of employees with a high level of broad skills, semi-skilled workers who had reached a plateau after some ten years' experience, and unskilled workers. Matsushige et al. (2005) in a panel data study of small and medium firms showed that quite wide dispersions developed at an

[2] By contrast, Uehara (2003) in a detailed study of three major banking corporations found that in two of them competition became fierce after promotion to mid-manager level (i.e. *kacho* level). He explained differences within the three firms as being attributable to their different functional organization. Tsuru, Abe, and Kubo (2005) also studied the micro-data of three firms and created boxplot diagrams for each age group (monthly pay, plus bonuses and annual salary). In all three companies there were quite a lot of outlier values which they assumed to be due to the fact that some employees were being held back in lower grades over long periods.

early stage in the careers of graduate employees.

Given these differences in the general assumptions about large corporations and small and medium firms, the question naturally arises: what about what one might call "near-large" firms—those with around a thousand employees? This paper uses micro-data to try to answer that question, to fill in the gaps in the story and further the discussion.

The structure of the paper is as follows: in Section II I discuss methodology; in Section III, the different institutional practices of the firms; in Section IV, the data and in Section V, I show the basic statistics and draw conclusions about the real state of career competition. Section VI concludes.

II. Method Used

As already described, most studies use as a main index, the career point at which an initial selection takes place. However, that alone may not capture the whole reality of career competition: other indicators might give different results. If there are differences between individuals in the annual increases they receive in monthly pay or bonuses and if these act as work incentives, then this might generate competition. Also, before there is competition for promotion, there might well be competition for job assignments (Umezaki 2005). Or there might be micro-competition among those who do not get promoted (Matsushige 2005). To get a good picture of all this one needs to develop new indices and go beyond data simply on promotion to higher rank.

For this study I have obtained the personnel records of the three firms and selected the individuals into groups which are homogeneously male university graduates recruited at the beginning of their work careers rather than in mid-career. I look at the distribution of individuals by years of service in each grade, and at the distribution of basic salaries and grade for each years-of-service cohort, plus the changes in individual rankings in salary and grade. In this way I am able to examine the nature of competition as a whole, including both competition for grade promotion and competition for salary increase.

The analysis proceeds from three angles. First I look at the years-of-service distribution in each grade. If there were some in low grades who had long lengths of service this would be an indication that the firm did not practice the "everyone marching in step promotion," and the presence of people with over thirty-years' service in sub-managerial grades would show that not everybody gets to be a middle manager. Moreover the distribution of years-of-service by grade gives information on variations in individual promotion speeds and on the overtaking of older by younger employees.

Secondly, I look at the distribution of grade levels and basic salary in each years-of-service cohort and calculate the coefficient of variation within each. An increase in this coefficient as years-of-service increase would indicate an increase in the spread, and a decrease would mean that it contracts. Moreover, if the two coefficients, for basic salary and for grade, showed divergent behavior, that would mean that competition for promotion and

competition for salary increase were interacting in a complex way.

Thirdly, I look at the rank-ordering of individuals by both grade and basic salary at two points in time, using the Spearman rank correlation coefficient. The interval between the two time points was five years, a choice made bearing in mind the fact that the standard frequency for grade promotions in most firms was around four years.[3] A high correlation would mean that there was little change in the ranking over the interval, a low one would mean the reverse. Also, if there was a divergence between the correlations for salary and the correlations for grade, this would mean that competition was not solely competition for grade promotion, but a more complex matter involving also salaries.

A combination of these three observations gives a picture of the nature of career competition in firms not quite large enough to be called "large corporations."

III. The Three Firms' Personnel Management Systems

1. Firm A

A is a consumer goods producing firm with somewhat over 1300 employees founded during the Taisho period, i.e. between 1911 and 1925. The average age of its employees in the year 2000 was 37, and their average length of service was 13 years. University graduates made up 63% of employees. The enterprise union had a policy of cooperation with management. It experienced steady growth in the 1990s, by dint of its efforts to develop new products. In the second half of the 1990s it energetically pursued a policy of personnel management reform.[4]

The process began with the introduction, in 1994, of an Ability-Based Grade System. This was followed by the abolition of the age-related element in pay, a shift to annual (rather than monthly) salaries for management, and the introduction of management by objectives, competency assessments, etc. There were, however, no changes in the Ability-Based Grade System during the period of this research.

This system was based on 12 grades (see Table 1). The first five were considered to be the basic grades, passing through which employees were expected to acquire basic skills. University graduates entered at Grade 3. Grades 6 to 10 were the professional grades during which employees honed their skills and were expected to produce results. The last two grades were executive grades for senior management with responsibility for company decisions. Managers, i.e. people with supervisory responsibility referred to as *kanrishoku*, were normally of Grade 9 or higher, though sometimes people of lower grades were given such positions.

[3] I also tried working with an interval of 4 years but it made no difference to the overall result.

[4] For a description of the reform process, see Nakashima (2005), and Nakashima, Umezaki, and Matsushige (2004).

Table 1. The Ability-Based Grade System at Firm A

Salary System	Grade	Corresponding Post	Entry Qualification	Stratum
Employees with annual salary	Grade 12	Management		Executive stratum
	Grade 11			
	Grade 10			Professional Stratum
Employees with marit-based wage	Grade 9	Ordinary employees		
	Grade 8			
	Grade 7			
	Grade 6			
	Grade 5			Basic stratum
	Grade 4		Masters degree	
	Grade 3		Bachelo degree	
	Grade 2		Junior college or specialist high school diploma	
	Grade 1		High school graduation	

There are guidelines setting standards for promotion to each grade. Promotion is automatic up to Grade 3. Thereafter there is a committee evaluation, top-level interview, etc. The minimum period to be spent in each grade before promotion out of it, and the parameters to be used for personal evaluation are also specified; promotion does not depend on earlier evaluations.

2. Firm B

Firm B is a manufacturer of producer goods with a long history. It had 1100 employees in the year 2000, average age 37 and average length of service 13 years. University graduates make up 52% of employees. The firm is doing well thanks to its highly competitive products. The union has adopted a policy of cooperation.

B adopted the Ability-Based Grade System in 1995. Since then it has, as one personnel manager described it, “reformed its excessively seniority-based wage system” and introduced reforms to the remuneration system gradually and in stages.[5] During the present study, however, there were no changes in the Ability-Based Grade System.

That system is divided into four “general” grades (career path for routine and support work) and ten “comprehensive” grades. The comprehensive grades with which we are concerned here, are divided into four segments. Grades 1 to 3 are for younger general workers, with university graduates entering at Grade 3. Grades 4 to 6 are for group-leaders and sub-section chiefs (*kakaricho* and *shunin*), Grades 7 and 8 are for section chiefs (*kacho*) and 9 to 10 are for division chiefs (*bucho*). Grades above 7 are counted as management positions (see Table 2).

[5] This is analysed in Ikawa (2004).

Table 2. The Ability-Based Grade System at Firm B (Comprehensive Grade)

Grade	Job Description	Corresponding Post	Entry Qualification	Minimum Age
Grade 10	Executive support	Department head		
Grade 9				
Grade 8	Supervisory management Specialist professional	Section chief		
Grade 7				35
Grade 6	Supervision, leadership	General workier		32
Grade 5				29
Grade 4			Graduate school	26
Grade 3	Responsible worker		University bachelor, master	22
Grade 2			Specialist high school/junior college	20
Grade 1			High school	18

The procedures for promotion are made known to employees and evaluations are carried out. For promotion from one of the four segments to the next, in addition to the regular personnel evaluations, there is a more complex review process involving written examinations, thesis-writing, and personal assessments. There is also a fixed minimum age requirement for each rank.

3. Firm C

Firm C is also a manufacturer of producer goods with a long history: 1400 employees in 2000, average age 40, average length of service 18 years and 34% university graduates. The union is cooperative. The only difference from the other two firms is that in the mid-nineties its earnings deteriorated and in 1998 it offered early retirement to workers over 45.[6]

The firm introduced the Ability-Based Grade System in 1991 with 12 grades. Grades 1 to 4 are for general task positions, with university graduates coming in at Grade 3. Grades 5 to 7 are called leadership Grades and 8 and above management grades, management posts being given to those above Grade 8 (see Table 3).

The criteria for promotion are made clear to employees and personnel evaluations and interviews are used for promotions. There is also a requirement for report-writing for promotion to Grade 5 and taking an aptitude test before promotion to Grade 8. For grades of 7 and below, successive promotions must be at least two years apart.

Thus, all of the firms had introduced Ability-Based Grade Systems with 10-12 Grades in the 1990s, and this may be seen as typical of manufacturing firms of comparable size.

[6] This is analysed in Kakizawa (2004).

Table 3. The Ability-Based Grade System at Firm C

Work Ability Stratum	Grade	Characteristic Tasks	Entry Qualification
Managerial stratum	Grade 12	Execcutive support	
	Grade 11	Coordination	
	Grade 10	Supervisory Management	
	Grade 9		
	Grade 8		
Leadership stratum	Grade 7	Leadership and supervision	
	Grade 6		
	Grade 5	Adjudicatory work	
General work stratum	Grade 4	Complex tasks	Graduate school
	Grade 3	Standard tasks	University bachelor, master
	Grade 2		Specialist high school/junior college
	Grade 1	Assistance for standard tasks	High school

IV. The Data Set

The firms provided for our study microdata comprising details of age, educational qualifications, years of service, grade, sex, basic salary, bonus, evaluation of the previous year and job position/department.

Given my emphasis on graduate careers, I extracted from these the schedules for those male employees who were university graduates and were recruited into the firm at the beginning of their work careers. The records over a five year period were available for all the firms.

The sample for Firm A consisted of 761 men, average age 35.5, average length of service 11.8 years, gradings concentrated in the middle and averaging 6.7 and average basic salary 330,000 yen (see Table 4) .

The sample for Firm B consisted of 420 men, average age 35.4, average length of service 12.2 years, gradings concentrated in the lower grades and averaging 4.8 a sign, probably, of a recent increase in graduate recruitment. The average basic salary was around 300,000 yen (see Table 5).

The sample for Firm C consisted of 440 men, average age 37.6, average length of service 14.2 years, gradings concentrated at the higher end, averaging 7.0, a sign of the fact that with poor recent results the firm had recently cut back on graduate recruitment. The average basic salary is 350,000 yen (see Table 6).

The great similarity in the firm's age and salary structure will be obvious.

Table 4. Firm A: Basic Statistics (2000)

Variable	Numbers	Average	Standard Deviation	Lowest Value	Highest Value
Age	761	35.5	8.05	22.0	58.0
Years of Service	761	11.8	8.09	0.0	35.0
Grade	761	6.7	2.18	3	12
Basic Salary	761	332705	116016	206700	812840

Table 5. Firm B: Basic Statistics (2000)

Variable	Numbers	Average	Standard Deviation	Lowest Value	Highest Value
Age	420	35.4	7.84	23.0	56.6
Years of Service	420	12.2	7.93	0.9	33.0
Grade	420	4.8	1.54	3	10
Basic Salary	413	304965	81729	202806	633419

Table 6. Firm C: Basic Statistics (2000)

Variable	Numbers	Average	Standard Deviation	Lowest Value	Highest Value
Age	440	37.6	8.30	24.0	56.0
Years of Service	440	14.2	8.32	2.0	33.0
Grade	440	7.0	2.54	3	12
Basic Salary	440	347447	118348	205520	639900

V. The Pattern of Career Competition

My focus was primarily on whether one found evidence of career competition in the early stages (first ten years) of careers which earlier studies had not considered in depth, and also in the later stages—after 20 years. If one did so find, this, together with earlier studies, would show that there was fierce competition throughout graduate careers.

The method was as already described. The distribution of years-of-service within grades, identifying the left-behinds and the promotion of younger over older: the coefficient of variation for grades and basic salaries within years-of-service groups to ascertain the extent to which dispersions increase, and the comparison of rankings at two points in time to see how far they diverge or remain the same; the three measures giving an overall measure of career competition within the firm.

1. Firm A

Beginning with the results for Firm A, Table 7 shows the distribution of grades within each years-of-service cohort. Note, first, the range, which in most grades is over 10 years; in Grade 8 as much as 21 years and in Grade 4, 18 years. Since Grade 8 is the pre-management

Table 7. Years-of-Service Distribution within Each Grade (Firm A, 2000)

Grade	Numbers	Average	Standard Deviation	Coefficient of Variation	Lowest Value	Highest Value	Range	Skewness	Kurtosis
Grade 12	5	32.3	3.243	0.101	27.9	35.8	7.9	-0.346	1.589
Grade 11	19	29.3	4.306	0.147	23.9	35.8	11.9	0.170	1.590
Grade 10	68	24.3	3.248	0.134	19.9	33.8	13.9	0.633	2.836
Grade 9	94	20.5	3.708	0.181	15.9	33.8	17.9	1.309	4.445
Grade 8	101	17.5	4.069	0.232	12.8	33.8	21.0	1.204	4.789
Grade 7	68	14.1	3.603	0.255	10.8	24.8	14.0	1.164	3.207
Grade 6	139	9.8	1.715	0.175	7.8	16.9	9.1	2.182	9.199
Grade 5	137	7.0	1.724	0.246	4.8	17.9	13.1	2.074	13.323
Grade 4	85	3.3	2.276	0.691	1.8	19.8	18.0	4.902	34.506
Grade 3	45	0.8	0.000	0.000	0.8	0.8	0.0		
Total	761	12.7	8.124	0.640	0.8	35.8		0.534	2.534

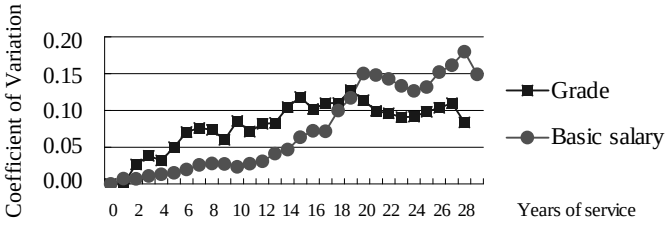


Figure 1. Differentials of Pay and Grade within Each Years-of-Service Cohort (Firm A, 2000)

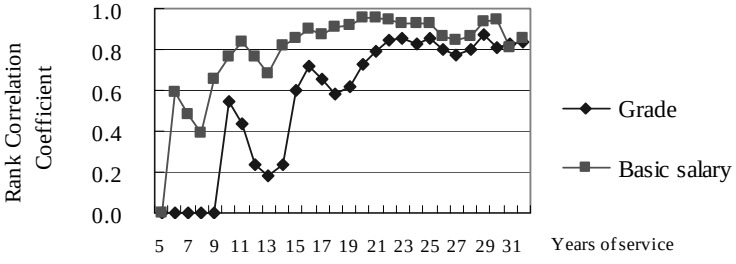


Figure 2. Spearman Rank Correlation Coefficient for Each Years-of-Service Cohort (Firm A)

grade, this means that there are some who are falling well behind in the promotion race. One person has 34 years of service and there is a distinct possibility that he will never reach a *kanrishoku* position. The long-service people in Grade 4 are those who have lost promotion chances in their early careers. Already they are overtaken by, and possibly under the supervision of, men who joined the firm after they did. There is, therefore, no automatic promotion in the early stages.

Looking next at the skewness of the distributions, in Grades 4 to 6 the skewing is to the right. Since the curve has high kurtosis, this means that the pattern in the early stages is for simultaneous promotion of most of a cohort, leaving behind a small number of people who then become subordinated to their juniors.

Following on this I calculate the coefficient of variation (i.e., the standard deviation divided by the average) in grade and basic salary for each age cohort. Since there was considerable variation in the numbers in the various cohorts[7] to eliminate this effect, the graph shows the results of a moving three-year-span average.[8]

The changes in the coefficient for grades show a step-like pattern. There is a slight increase in the first three years, and then a stable pause. Subsequently it increases at the seventh year and again stabilizes. There is a further increase between the 12th and the 16th year, and then, after the 19th year, the tendency is for stability with a slight decrease.

As for the coefficients for basic salary, they increase from the very beginning and quite steadily until about the 8th year. Then, after a pause, from the 12th to the 22nd year there is a rapid increase followed by stability (see Figure 1).

Thus, a salary dispersion begins to appear after the first year and widens gradually, and the grade variation appears, and begins to increase step-wise, two years later. The dispersion of grades is a matter of differential speed of promotion into the key transition grades, with variation in basic salary kicking in later.

The changes in the ranking of individuals as between 1995 and 2000 was the next to be calculated, using a Spearman rank correlation of the two points in time for each years-or-service cohort, a score of 1 indicating zero change in ranking, the more changes, the lower the coefficient. How the coefficient changed is shown on the graph, (the x axis being years of service) using a moving three-year average to reduce the effect of variations in the numbers in each cohort.[9] The plotting on the y-axis shows the correlation for the beginning year, that is to say the figure for three-years-service is the correlation of the third

[7] As for the numbers in each age cohort, the average was 24.8 and the standard deviation 13.7.

[8] Similar graphs are provided for the other two firms.

[9] One problem is posed by the fact that the numbers in some of the cohorts are low, and even zero, outlier figures which distort the results. The precautions taken were, first to eliminate all 0 cohorts and to calculate the three-year moving average from a time-series which excluded them. Secondly, I filled in missing variables by using a weighted average of the preceding and the subsequent years. The subsequent recalculation of the figures is shown in the graph. The data for the other two firms were similarly treated. For the first year cohort for which there could be no stability correlation, the first year's coefficient was used in the graph, not a weighted average.

year cohort in 1995 with the eighth year cohort in 2000 (see Figure 2).

Note also that when in the base year everybody is of the same rank so that there can be no ordering, the coefficient is not calculated. It is calculated however if there are differences in rank in the base year. Hence the absence of a coefficient calculated for those cohorts in which there were in fact numbers of employees involved means that in the base year they were all of the same basic salary (or grade) or were at the first stage of differentiation. With this in mind, let us look at what the data tell us.

First let us look at grades. The calculation starts with the five-years-of-service group since the youngest four 1955 cohorts were all of the same grade in the base year (or had received only one promotion). The 1955 five-years-of-service cohort coefficient can be calculated and since by this time two grade promotions are possible, it shows that the ordering of promotion to the first grade differs from the order of promotion to the second grade. From the five years-of-service cohort to the eighth, the coefficient gradually shrinks which means an increased change in ranking. After that, from cohort 9 to 12 comes a period of lesser change, but then from the 12th to the 17th year again greater change, followed subsequently by a period of a relatively stable correlation. However, even after the 17th year the coefficient is around 0.8 which shows that changes in relative rankings occur right to the end of the career.

For basic salary, variation begins in the 1955 two-years-of service cohort. That is to say the salary increase after the first year varies from person to person, but the rank order thus established changes over the following five years. Changes in ranking increase for the next three cohorts, and from the 1955 six-years-of-service cohort to the nine-years cohort, the same increase in changes in pay ranking occurs as was found in the grade ranking. Thereafter, the ranking becomes more stable and for cohorts later than 14-years-of-service, the coefficient gets close to 1.

Thus we find changes in rank ordering from the very earliest stages of careers with respect both to grades and to basic salaries, and after the quite extreme changes of the early years, in mid-career rankings stabilize, particularly the pay ranking, though the grade ranking continues to show changes. One can assume that this happens because when those who experience slow promotion finally reach a given grade, the people who were there before them already have higher wages and so there is no change in the salary ranking. Nevertheless, since there is some change in both grade and salary rankings right up to the 30-years-service cohort, one can safely say that competition continues right to the end of careers.

To summarize, career competition in Firm A is characterized by (i) competition for pay increases begins right from the point of entry into the firm. Most people are promoted in grade at the same time, but a minority remain without promotion for long periods; there is competition not to become one of the ‘dropped-outs”; (ii) in the early stages of a career there is considerable change in individuals’ rank-ordering within their cohort, but during this time variations in basic salary rankings diminish and tend to produce a more stable

ordering; (iii) although variations in rank achieved occur through the middle career period, the ranking in terms of pay moves towards stability but with differentials widening; but (iv) even towards the end of careers some changes in ranking occur, so there is always, until the end, something to compete for.

2. Firm B

To turn to Firm B, and again begin with the distribution by years of service within each grade, as Table 8 shows, there is no great dispersion in grades above 8, but in the lower grades it is more than 10 years – almost 20 in Grades 6 and 5. Again, if we look at the individual with the greatest length of service in each grade, for Grades 6, it is around 30 which suggests that some people do not manage to get promotion into Grade 7, which corresponds to the section-chief level. At the same time, the maximum length of service in the lower Grades 3 and 4 is over 10 years. The existence of relatively long-serving people in Grade 3 means that there is not automatic promotion even for the first step, and the "younger getting ahead" phenomenon is there from the start.

Next I examine the skewness and the kurtosis. With the exception of Grades 5 and 7, the higher up the grade scale you go, the lower becomes the skewness and the kurtosis, but Grades 5 and 7 show a different tendency from the other grades. In Grade 5 there are just a few outliers with long service, while most of the others are bunched together. This is presumably because Grade 6 is seen as the preparation for a section-chief position, and people deemed unsuitable for such positions have their promotions blocked at the previous stage. Again the high degree of both skewness and kurtosis in Grades 3 and 4 suggests the presence of a small number of longer-serving employees stuck in those grades (see Table 8).

Next, let us look at the changes in the dispersion of grades and of basic salary within years-of-service cohorts which I have plotted on a graph[10] (see Figure 3). It will be obvious that in Firm B there is a wide discrepancy between grade differentials and salary differentials.

The dispersion of grade positions increases rapidly from the second to the fifth year of service. Beyond the 5th year there is basically stability in the range of the dispersion, though there is a slight increase from the 8th to the 10th year. Thereafter the dispersion diminishes slightly, though a good deal more than slightly in the 18th year, increasing slightly thereafter.

The basic salary distribution shows a tendency of gradual increase, but there are several things to note even within that tendency. The first is that the dispersion begins from year 2, slowly increasing until year 4. From 5 to 10 year's service it remains level, followed by a slight increase in year 11, and continuous growth thereafter as the years of service lengthen.

Next, in Figure 4, we have details of changes in rank orders from the second half-year of 1998 to the second half-year of 2003 for each year-of-service cohort. Analysing first by

[10] The numbers in each cohort averaged 14.2 with a standard deviation of 9.4.

Table 8. Years-of-Service Distribution within Each Grade (Firm B, 2000)

Grade	Numbers	Average	Standard Deviation	Coefficient of Variation	Lowest Value	Highest Value	Range	Skewness	Kurtosis
Grade 10	2	31.5	0.707	0.022	31.0	32.0	1.0	0.000	1.000
Grade 9	9	28.3	3.354	0.118	24.0	33.0	9.0	0.115	1.719
Grade 8	12	25.1	2.503	0.100	22.0	29.0	7.0	0.556	1.788
Grade 7	37	23.6	4.481	0.190	16.0	31.0	15.0	-0.373	2.288
Grade 6	64	18.3	4.906	0.268	10.9	33.0	22.1	0.903	2.892
Grade 5	73	14.0	3.590	0.256	7.9	27.0	19.1	1.102	5.685
Grade 4	128	8.6	2.520	0.292	4.9	16.0	11.1	0.937	3.322
Grade 3	95	3.3	2.469	0.741	0.9	10.9	10.0	0.865	2.768
Total	420	12.2	7.927	0.652	0.9	33.0	32.1	0.633	2.624

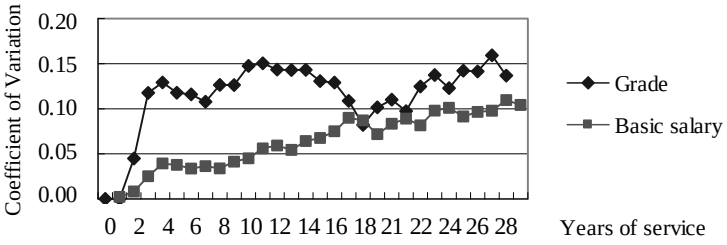


Figure 3. Differentials of Pay and Grade within Each Years-of-Service Cohort (Firm B, 2000)

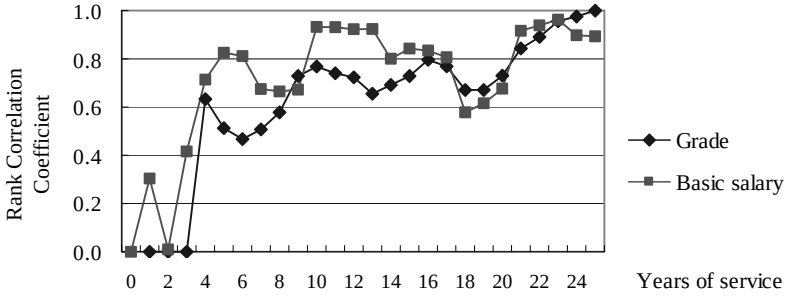


Figure 4. Spearman Rank Correlation Coefficient for Each Years-of-Service Cohort (Firm B)

grade, for the first three cohorts there is no coefficient calculated since the 1998 entrants remained for three years at the same grade. The rank correlation coefficient is calculated for subsequent grades. By the fifth year of service some have received one grade promotion and some two, thus generating changes in rank order. Particularly worth noting are the coefficients for the 4th to 9th years-of-service cohorts, those around the 13th and those around the 18th. In these periods one finds a V-shaped shift in the coefficients; they become smaller (i.e. more change) but then stabilize at a higher correlation. As in Firm A there is first a period with a good deal of change in individuals' speed of promotion, but then a settling down, reflecting, one presumes, differences in the speed of promotion to sub-section chief (*shunin* or *kakaricho*). Nevertheless, in spite of such episodes the general tendency is for the coefficient to rise with the age of the cohort, that is to say for the interpersonal ranking to stabilize after the cohort reaches its 22nd or 23rd year of service.

Looking next at salary rankings, coefficients can be calculated from after the first year of service in this case, and for year 2 the coefficient is extremely low—meaning that the evaluation in the second year is carried out with no reference whatever to that of the first year and so change in ranking is very great. In year 4 the coefficient rises considerably, but between years 6 and 10 one sees the v-shaped shift. The ranking, once established, remains stable and then stabilizes, reflecting, probably, changes in salary accompanying promotion to sub-section chief. From year 10 there is a period of relative stability, followed by further ranking changes between the 14th (to 19th) and the 20th (to 25th) year of service. This is the period in which lies the turning-point event of promotion to section chief where the central focus of competition is on how early one makes that grade. From the 18th year the coefficient grows; things settle down and relative rankings do not change greatly.

To summarize the picture for career competition in Firm B, (i) differential evaluations leading to differential pay levels start from the point of entry into the firm, and, as another source of competition, although grade promotion is simultaneous for most of the people in the cohort, there is competition not to be among the small number who are not promoted; (ii) in the early stage of the career there is fierce competition resulting in considerable changes in ranking, but a relatively stable ranking hierarchy becomes established via differential speeds of promotion to managerial positions; (iii) in mid-career that competition particularly hots up over promotion to section chief posts; (iv) but thereafter rankings are more stable with respect both to grade and to basic salary.

3. Firm C

Again I begin with the dispersions of years-of-service within grades (see Table 9). Grade 3 has nobody with many years of service, but there is at least one person with 10 years' service in Grade 4, indicating that promotion to Grade 5 is not automatic and later entrants can overtake earlier ones. The fact that the dispersion increases in Grades 5 and 6 shows that there are wide differences in the speed of promotion. As in Grade 4 with 10 years service as the upper limit the skewness and kurtosis of the distribution shows that the

great majority go up together but a minority is left behind. In Grade 7 there is someone with 32 years' service, someone that is, who has been prevented from entering the managerial grades which begin with Grade 8, Grade 7 being the grade in which selection for managerial ranks takes place.

Looking next at differentials within years-of-service cohorts,[11] in Firm C they increase both for grades and for pay steadily as people become more senior, but differently for the two measures.

For grades (see Figure 5) the differentials appear in the 5th year, grow until the 10th, and remain relatively stable until the 16th after which they begin to grow again reaching the greatest dispersion in the 23rd year. Thereafter there is a slight tightening of the dispersion and then a steady level. Again one assumes that this reflects differential speeds of promotion to sub-section and section chief posts.

For salary, the differentials start to appear in the 3rd year and slowly increase until the 15th year. Thereafter there is a rapid increase in dispersions until the 22nd year, after which they diminish—again one can assume this to be a function of differential speeds of promotion to managerial positions.

As for the stability of rank orderings, Firm C shows fewer changes than in either of the other two. The changes in rankings also tend to begin later in careers. This is presumably partly the effect of automatic promotion of everyone in the early grades.

The correlation coefficient for grades shows change as beginning from the 6th year of service, and then increasing (i.e., the coefficient is declining, competition is getting fiercer) until the 14th year. Thereafter rankings become more stable, but start shifting again to a peak degree of ranking change in the 20th year. Change continues, however, to the 29th year; there is no final period of stable rankings.

For salaries the change in rankings begins from the 5th year, but the coefficient rises to show lesser changes in ranking. However, one can discern a tendency for the rate of change to be slightly higher—i.e., for competition to become fiercer between the 8th and the 12th years, around the 16th and around the 21st year (see Figure 6), again presumably as a result of differential speeds of promotion to managerial positions.

So, to summarize these observations on competition in Firm C, (i) there is automatic promotion in the early years, but different speeds of grade promotion thereafter, with salary differentials appearing as a result of evaluation differences from the 3rd year. There is also a limited process of "dropping out" through delayed promotion; (ii) in the early part of the career, there is fierce competition to gain earlier promotion to sub-section chief positions, leading to sharp changes in ranking, though those ranking shifts are not as great as in the other two firms; (iii) In mid-career, competition for early promotion to section chief positions is the focus and interpersonal differences increase; (iv) rankings become relatively more stable in late career, though there are still some shifts in ranking.

[11] The numbers in each cohort averaged 15.0 with a standard diviation of 10.4.

Table 9. Years-of-Service Distribution within Each Grade (Firm C, 2000)

Grade	Numbers	Average	Standard Deviation	Coefficient of Variation	Lowest Value	Highest Value	Range	Skewness	Kurtosis
Grade 12	35	27.9	3.081	0.110	21.0	33.0	12.0	-0.567	2.322
Grade 11	30	24.9	4.744	0.191	19.0	33.0	14.0	0.306	1.799
Grade 10	31	24.0	4.929	0.205	18.0	33.0	15.0	0.157	1.518
Grade 9	19	21.2	5.287	0.249	17.0	33.0	16.0	1.202	2.836
Grade 8	43	16.4	3.471	0.212	13.0	27.0	14.0	1.825	6.002
Grade 7	48	16.0	5.623	0.351	11.0	32.0	21.0	1.864	5.189
Grade 6	82	11.1	3.436	0.310	8.0	30.0	22.0	3.285	15.569
Grade 5	90	8.1	1.197	0.148	6.0	12.0	6.0	0.543	3.685
Grade 4	51	4.5	1.554	0.348	3.0	10.0	7.0	1.671	6.542
Grade 3	11	2.0	0.000	0.000	2.0	2.0	0.0		
Total	440	14.2	8.316	0.587	2.0	33.0	31.0	0.690	2.421

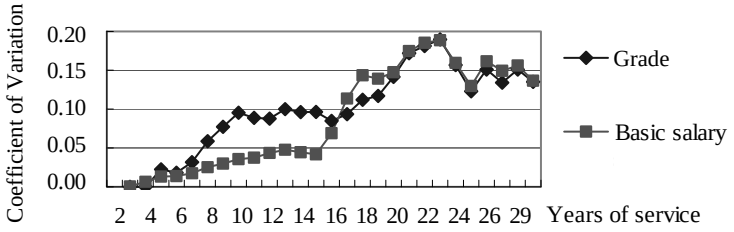


Figure 5. Differentials of Pay and Grade within Each Years-of-Service Cohort (Firm C, 2000)

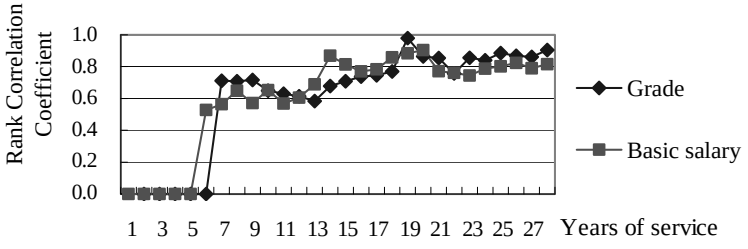


Figure 6. Spearman Rank Correlation Coefficient for Each Years-of-Service Cohort (Firm C)

4. Career Competition in the Three Firms

The common elements in all three firms are as follows. In the early stages, for the first few years of a career the competition focuses on getting evaluations that yield higher salary increases, and also on getting earlier grade promotion. In firms A and B not everybody is automatically promoted to the second grade, and even in firm C, some are promoted ahead of others from the second to the 3rd grade. This produces a small minority of people who are held back, right from the first or second grade promotion hurdle. The competition not to be "dropped out" starts early.

In the early stages, promotion to the sub-section chief positions occurs earlier for some, later for others. In this period there can be changes in individuals' ranking within their entry cohort, but these changes diminish once this period is passed, but the stable ranking is of differences in both grade and salary which are increasing. One can assume that this is the period when people who are thought to be suitable for managerial positions are being sorted out from people who are not.

In mid-career the difference lies in earlier or later promotion to a post as section chief. There are fewer changes in ranking as compared with the earlier competition for sub-section chief posts, but nevertheless rankings for both grade and salary do to some extent shift, and differentials in both dimensions increase.

By late career, rankings tend to stabilize. In two of the firms the dispersal of both grades and salaries increases and in the other decreases. There is also some shift in the rank order of individuals at A and C after long years of service, (though not at B) indicating that there is no final stable state.

To put these findings in the context of earlier studies, first they differ from earlier studies in discerning competition already at the beginning and in the early stages of careers. Earlier studies have stressed "*nenko*-style everyone up" promotion, "marching in step" promotion, but I have found marching-in-step promotion for the great majority, accompanied by competition not to be "dropped out" and the creation of a small group of long-term laggards. Again, in the early stage of a career, there is competition for early promotion to sub-section chief posts. Earlier studies have put the "point of first selection" at between the 5th and the 12th year, but I would put the emergence of differential promotion speeds at the earliest point ever mentioned by previous studies.

Secondly, I have been able to confirm that in mid-career the focus of competition is on early promotion to a section chief position which is what earlier studies refer to as "promotion speed competition."

Thirdly, as far as the later period of careers is concerned, rankings of individuals by both grade and salary change relatively little. But in two firms there was still some change. That is to say that competition in the later stages of careers is not only tournament competition, but involves also small ranking changes in which some overtake others. Given the relatively small number of earlier studies of this career stage, this can be counted as one of this study's discoveries. One can sum up by saying that in Japanese firms of this size—not

quite big enough to be counted as large corporations—there is consistently fierce competition from the beginning to the end of careers.

VI. In Conclusion

In this paper we have examined the micro-data of three firms in order to grasp the reality of career competition within them. I have ascertained that (i) there is competition not to be "dropped out" at the beginning and in the early stage of careers; (ii) that there is competition to get appointed to the position of sub-section chief earlier than others; (iii) that in the middle stages of the career there is competition for early promotion to a position as section chief; (iv) that even in the later stages competition does not cease; some people can still compete to overtake others.

This picture of career competition differs from that of earlier studies, particularly in stressing the "drop-out" process and in pointing out that in the competition for positions as section chief some people never succeed and remain unpromoted.

If one asks the reason for the competition not to be "dropped out" in the early stages of a career, the explanation probably goes as follows. The university graduates who are recruited to firms of this size show a very wide dispersion of ability. Compared with large corporations, the resources they can devote to the recruitment process are limited. The largest corporations can choose among a selected group of talented graduates, and firms like those I studied have to be content with those who are left over, which probably means that the variation in ability is very great. There are likely to be some among them who are not likely to become candidates for managerial positions. In such cases, early differentiation of treatment may be seen as a signal indicating the hope that people would voluntarily leave the firm. And by several selection phases at an early stage the firm can rigorously select the candidates for managerial positions. These are certainly possible interpretations.

As for the reason for maintaining competition until the latest stages of a career, one can see it as a means of continuing to evoke effort until the very last. It is best indefinitely to postpone the conclusion of a competition, otherwise it becomes difficult to get people to put out their best efforts. If even those who have lost out at earlier stages can still compete for advancement, employees can be motivated to use the best of their abilities to the very end of their careers.

Competition of this sort is reminiscent of the marathon. The runners start off all bunched together; gradually a few become stragglers; they separate into clusters. The top runner is competing in the top-runner group; the second-rank runners in the second-rank group. For those in the tail-end group it is a matter of struggling to get there before the close-out time. Matsushige (2005) did well to name this the "career marathon."

What was hitherto the predominant image of Japanese practices, namely the initial marching-in-step followed by later selection, was established by studies predominantly in large corporations. As this study has demonstrated in enterprises smaller than large corpora-

tions, a different pattern of competition prevails.[12] That is to say that career competition in Japanese enterprises may be much more diverse than has hitherto been thought to be the case. Consequently, when generalizing about career competition within organizations, one needs to consider carefully such factors as type and scale of the enterprise. And if the creation of pay differentials through the evaluation process functions as a work incentive, one needs also to consider the delicate interaction between competition for grade promotion and competition for a higher salary.

This paper has been about career competition in firms smaller than large corporations. The reality which it has revealed may be to some extent generalized. Whether that is so or not depends on the accumulation of many more studies to which I hope to contribute.

References

Hanada, Mitsuyo. 1987. Jinji seido ni okeru kyoso genri no jittai: Shoshin, shokaku no shisutemu kara mita nihon kigyo no jinji senryaku [The reality of the competition principle in personnel management: The personnel management strategy of Japanese firms as seen in their systems of grade promotion and pay increase]. *Organizational Science* 21, no. 2:44-53.

Igawa, Shizue. 2004. Seido kaitei ni yoru chingin kozo no henka: Kigyo-nai jinji maikuro deta ni yoru paneru bunseki [Changes in wage structure caused by institutional revisions: Panel analysis based on intracompany personnel microdata]. *The Japan Journal of Labour Studies* 46, special issue: 54-56.

Imada, Sachiko, and Shuichi Hirata. 1995. *Howaito kara no shoshin kozo* [Promotion structures for white-collar workers], 41-64. Tokyo: The Japan Institute of Labour.

Kakizawa, Hisanobu. 2004. Soki taishoku seido ni yoru rishoku kodo: Aru kigyo no jirei kenkyu [The working of early retirement schemes; Patterns of exit from the firm: A single company case study]. *Japan Journal of Human Resource Management* 6, no. 2: 2-13.

Koike, Kazuo. 1981. *Nippon no jukuren* [Japan's skill resources], 185-212. Tokyo: Yuhikaku.

———. 2005. *Shigoto no keizaigaku* [The economics of work], 3rd ed., 59-82. Tokyo: Toyo Keizai Shinposha.

———. 2009. *Nihon sangyo shakai no "shinwa": Keizai jigyaku shikan wo tadasu* [Myths about Japanese industrial society: How to cure habits of self-deprecation], 15-58. Tokyo: Nihon Keizai Shinbunsha.

———, ed. 1991. *Daisotsu howaito kara no jinzai kaihatsu* [Developing the human resources of white collar graduate workers]. Tokyo: Toyo Keizai Shimposha.

Matsushige, Hisakazu. 2005. Jinji seido kaikaku no taju-sei to marason-gata kyoso mekanizumu [The multi-layered nature of personnel management reform and the mechanisms of the marathon-style competition]. In *Jinji no keizai bunseki: Jinji seido kaikaku to jinzai manejimento*

[12] If one were to use the methods employed in this study, it might transpire that a similar pattern was found even in large corporations. That possibility must remain open as a subject of future research.

[An economic analysis of personnel management: The reform of personnel systems and the management of human resources], ed. Hisakazu Matsushige, Osamu Umezaki and Tetsuo Nakashima, 1-13. Kyoto: Minerva Shobo.

Matsushige, Hisakazu, Hisanobu Kakizawa, Tetsuo Nakashima, Osamu Umezaki, Kenji Iwata, and Shizue Igawa. 2005. Chusho kigyo ni okeru satei, shokaku, chingin kakusa [Evaluations, promotions and wage differentials in Japanese small and medium enterprises]. *Japan Journal of Human Resource Management* 7, no. 2: 28-43.

Nakashima, Tetsuo. 2005. Jinji seido kaikaku no purosesu: Seika shugi he no kaikaku to jugyoin no juyo [Reforming personnel management systems; the process: Moving towards payment by results and its reception by employees]. In *Jinji no keizai bunseki: Jinji seido kaikaku to jinzai manejimento* [An economic analysis of personnel management: The reform of personnel systems and the management of human resources], ed. Hisakazu Matsushige, Osamu Umezaki and Tetsuo Nakashima, 36-55. Kyoto: Minerva Shobo.

Nakashima, Tetsuo, Osamu Umezaki, and Hisakazu Matsushige. 2004. Chingin to satei ni mirareru seika shugi donyu no koka: Kigyo-nai maikuro deta ni yoru bunseki [The Effects of performance based HRM on payment and evaluation: An analysis with microdata for employees in Japanese company]. *JCER Economic Journal*, no. 48:18-33.

Takeuchi, Yo. 1995. Nippon no meritokurasi: Kozo to shinsho [Japan's meritocracy: Its structure and its ethos], 155-90. Tokyo: University of Tokyo Press.

Tsuru, Tsuyoshi, Masahiro Abe, and Katsuyuki Kubo. 2005. *Nihon kigyo no jinji kaikaku: Jinji deta ni yoru seika shugi no kensho* [Personnel management reform in Japanese enterprises: An examination of the use of personnel data for payment-by-results purposes], 61-104. Tokyo: Toyo Keizai Shinposha.

Uehara, Katsuhito. 2003. Ote ginko ni okeru howaito kara no shoshin kozo: Kyaria tsuri ni yoru choki shoshin kyoso no jissho bunseki [The promotion structure of white-collars for large banks in Japan: An empirical analysis of long-term promotion competition using "career tree" method]. *The Japan Journal of Labour Studies* 45, no. 10:58-72.

Umezaki, Osamu. 2005. Soki senbatsu to shigoto joretsu kyoso: Seiyaku kigyo MR no Gijutsu keisei [Early selection and the competition within an established job hierarchy: Skill formation among medical representatives in a pharmaceutical company]. In *Jinji no keizai bunseki: Jinji seido kaikaku to jinzai manejimento* [An economic analysis of personnel management: The reform of personnel systems and the management of human resources], ed. Hisakazu Matsushige, Osamu Umezaki and Tetsuo Nakashima, 145-67. Kyoto: Minerva Shobo.

Promotion of R&D Professionals in Japan: Influences of Inter-Functional Transfers and Inter-Organizational Mobility*

Yukiko Murakami
Waseda University

This study analyzed the career development of R&D professionals, focusing on internal promotions. In this study, two research questions—whether inter-functional transfers are a prerequisite for their promotion and whether inter-organizational moves have a negative influence were examined by analyzing original data on four types of organizations: national laboratories emphasizing basic research, those focusing on applied research, private laboratories in the electric and electronics industry, and those in the pharmaceutical industry. Inter-functional transfers increase and inter-organizational moves decrease prospects for promotion only in private laboratories in the electric and electronics industry, which produce highly-integrated products and demand cross-functional coordination. There are two avenues of career development for R&D professionals: The first is through inter-functional transfers and internal promotion within an organization, while the second is career development specializing in and advancing specific functional knowledge, which is sometimes pursued through inter-organizational moves. The characteristics of knowledge that each organization requires its R&D professionals to possess influence the nature of its R&D professionals' career development. Because the first type is the majority in the Japanese economy, the labor market for R&D professionals is immobile.

I. Introduction

Many scholars studied characteristics of Human Resource Management (HRM) practices in large Japanese firms and Japanese labor markets after World War II. Recruitment of new graduates, the practice of long-term employment until mandatory retirement age, and seniority-based promotions and pay raises were considered to be typical characteristics of Japanese HRM. After the bubble economy burst in the 1990s, many companies changed their HRM practices. They put more weight on performance and abilities when determining employees' remunerations, increased mid-career hiring, and discontinued long-term employment security until the mandatory retirement age. However, the change was not so drastic that Japanese labor markets have been basically immobile. Therefore, Japanese workers tend to pursue their career development through intra-firm transfers and internal promotions.[1] This trend has been observed not only with white-collar workers, but also

* This paper is a revision of Yukiko Murakami, "Transfer, Turnover and Promotion among R&D Professionals in Japan (Japanese title: Kenkyu Kaihatsu Gijutsusha no Haichi Tenkan, Tenshoku to Shoshin)," *Japan Journal of Human Resource Management* 5, no.2 (2003):56-67.

[1] A seniority-based promotion system does not mean that workers are promoted automatically as they get older. The essence of the system is relatively late selection of outstanding employees. In contrast to the early selection in the United States, workers belonging to the same entry cohort are not

with R&D professionals. Although there has been little quantitative research on the career development of R&D professionals, some notable studies exist. For example, Sato (1995) compared the career patterns of R&D professionals in the U.S., the U.K., Germany, and Japan. The author found that the percentage of R&D professionals who had firm-to firm job mobility was only 5.8% with the Japanese sample; on the other hand, all the other countries had percentages of over thirty. In Japan, national laboratories are more likely than private firms to hire R&D professionals at mid-career. However, even in national laboratories, Murakami (2002) reported that the percentage of R&D professionals with outside work experience was 17.2% in the Japanese sample, which was lower than the 30.2% in the American sample.[2] Such low rates of inter-organizational mobility in Japan seem to imply that career development within an organization is very important for Japanese R&D professionals. Therefore, this paper will study internal promotions of Japanese R&D professionals.

The focus of this paper is on whether inter-organizational moves and inter-functional transfers influence R&D professionals' promotion. Prior research has found that in Japanese firms, employees transfer between functional units more frequently than in U.S. firms, and the pattern of transfers is highly standardized. For instance, Sakakibara and Westney (1985) compared cases at electronics firms between the U.S. and Japan. The authors found that Japanese R&D professionals assigned to the corporate-level R&D laboratory spent the first five to seven years there doing research work, then moved to a divisional lab to engage in development projects, and several years later, they were promoted to line managers. On the other hand, American firms used various methods of recruitment and exhibited multiple career patterns for employees. Therefore, the authors concluded that there was no typical career pattern of R&D professionals in U.S. firms.

Moreover, Lynn, Piehler, and Kieler (1993) compared engineers' careers between Carnegie Mellon University alumni and Tohoku University alumni. These two universities are among the elite universities in the U.S. and Japan, respectively, and are roughly comparable. Although "engineers" in their research is a broader category than R&D professionals in this paper, they found clear signs of less inter-organizational mobility and more frequent job rotation in their Japanese sample. In total, 74% of the Japanese respondents have never changed employers, and 61.9% of them had been assigned to other areas outside their pri-

differentiated during the first 10 to 15 years in terms of positions in the corporate hierarchy and wages. However, even during these years, OJT is conducted through intra-firm transfers, and workers' abilities, performances, and behaviors are observed by their bosses. The information collected by the observations will be used for competitive selections for middle or higher managerial positions in 10 to 15 years. In contrast to the U.S. system, in which winners and losers are clearly screened in the early stages for their careers, the Japanese promotion system gives all workers hope that they will be promoted to higher hierarchical positions, which in turn motivates them to acquire firm-specific human capital. See Ohashi and Teruyama (1998), Koike (1991), and, Ariga, Brunello, and Ohkusa (2000).

[2] The study is a comparison of national laboratories conducting agricultural research between Japan and the U.S.A. The number of R&D professionals in the American sample is 93, and 87 for Japanese sample. See Murakami (2002).

mary responsibility or specialty. In the American sample, the former value was 43.4%, and the latter was 40.4%. In addition, Japanese respondents experienced jobs outside their specialty multiple times, and the areas to which they were transferred were mainly research/design/development, production, and marketing/sales.

Intra-organizational transfers of R&D professionals in Japan have important functions, such as internal transfer of information and knowledge, cross-functional coordination, job-matching, and training and development of R&D professionals (Kusunoki and Numagami 1996). Therefore, obtaining a wide range of knowledge through inter-functional transfers may be a prerequisite condition for R&D professionals to be promoted. However, R&D workers are also professionals who are required to have a high level of expertise. Therefore, only those who have concentrated on research/development alone and have acquired advanced knowledge about a particular functional area/discipline may be promoted. In fact, some previous research has indicated that those who experience more frequent job transfers are likely to be promoted faster or reach higher positions (Imano 1991; Noda 1995; Kusunoki and Numagami 1996), and other work has shown that job rotations crossing over branches/functional units are not always helpful for workers' promotions and sometimes hinder them (Matsushige 1995; Imada and Hirata 1995).

Why have different associations between promotions and intra-organizational transfers been found in the prior research? When we consider the roles of intra-organizational transfers, an answer to this question seems to be in characteristics of knowledge that R&D professionals in managerial positions should have. Hence, this paper will pay attention to organizations' outputs and argue that depending on the characteristics of each organization's output, R&D professionals are required to possess different types of knowledge and skills, which, in turn, cause different associations between promotions and inter-functional transfers/inter-organizational moves. I will elaborate on this idea and construct hypotheses in Section II and examine them in Section III.

II. Types of R&D Performed by National Laboratories and Industries

Kusunoki (1997) classified knowledge used for innovation into function knowledge and production knowledge. The former is knowledge about elements, such as components of products (engine, brake, transmission, etc.), disciplines (electronics engineering, machine engineering, information engineering, etc.), and functions (research, development, manufacturing, marketing, etc.). The latter knowledge contributes to product integrity. Clark and Fujimoto (1991) defined product integrity as the extent to which the totality of a product achieves a balance of numerous product characteristics, including basic functions, aesthetics, semantics, reliability and economy. Product integrity has internal and external dimensions. Internal integrity is consistency between the function and structure of a product, including how well parts fit and components match. In order to produce integrated products, knowledge about linkages between individual components/parts and coordination between func-

tional units are indispensable. On the other hand, external integrity refers to how a product's function, structure and concept fit customers' demands. Knowledge about market needs and market competition are necessary for external integrity. Production knowledge includes these two types of knowledge required for internal and external integrity.

The importance of function knowledge and production knowledge depends on organizations' outputs. In an organization that produces a highly integrated product, production knowledge is more important than function knowledge. On the other hand, an organization that specializes in producing a specific component or works in a particular functional area requires more function knowledge than production knowledge. Therefore, we need to consider organizations' outputs in order to discuss career development. In order to clarify the influence of outputs on the career development of R&D professionals, this paper will compare promotions in four kinds of organizations that produce different types of outputs—national laboratories focusing on basic research (NLB), those with an emphasis on applied research (NLA), laboratories of private companies in the pharmaceutical industry (PLP), and those in the electric and electronics industry (PLE). The electric and electronics industry includes manufacturers of electronic information and communication equipment, electronic parts and devices, and electrical machinery and equipment.

In general, national laboratories focus on research work and private laboratories put more emphasis on development and design. The major outputs of national laboratories are papers describing scientific principles, theories, and experimental results. Therefore, a high level of function knowledge is necessary for R&D professionals in national laboratories. However, there are some variations in research subjects and missions among national laboratories. Some national laboratories focus on basic research, and others on applied research with a specific practical purpose. In the latter type of national laboratories, both patents and papers are valuable output.

On the other hand, the main outputs of private companies are products and services that are sold on the market. Therefore, laboratories of private companies pursue research that may improve the companies' products and manufacturing process. Their research results should be embodied somehow in their final products or production process, and papers and patents are byproducts. As a result, the importance of production knowledge is generally greater in private laboratories than in national laboratories.

In addition, the importance of production knowledge depends on their products' integrity level. For example, Japanese firms in the electric and electronics industry that manufacture such items as personal computers, printers, facsimiles, and copy machines focus on producing highly integrated products in a timely manner. Those companies confronting highly competitive global markets adopt a main strategy of supplying improved models earlier and at lower cost than their competitors. Several authors have emphasized inter-functional coordination as a key element of the competitive advantage of those Japanese firms (Nonaka and Takeuchi 1995; Ikejima 1999; Yoneyama and Nonaka 1995; Okimoto and Nishi 1994; Takeuchi and Nonaka 1986, 1993; Nonaka 1989). Their development

teams are composed of members from a wide range of functional units, such as R&D, production, sales/marketing, planning, and service. From the beginning of the development process, team members from the R&D and manufacturing units communicate and closely collaborate for efficient manufacturing. In order to produce new products better suited to consumers' current demands and the latest technology, feedback from marketing to development is provided, even after the development process has started. Therefore, each phase of the development process, such as R&D, manufacturing, and marketing, is not isolated from the others; nor is the development process conducted linearly or step by step. In Japanese firms, where each phase overlaps, production knowledge is very important.

In such Japanese firms, the core members of production development teams experience inter-functional transfers (Nonaka and Takeuchi 1995). Kusunoki and Numagami (1996) argued that such transfers enable workers to possess broader knowledge. Due to their own cross-functional knowledge obtained through the transfers, they can efficiently solve some engineering problems related to cross-functional coordination on their own. In other words, cross-functional integration can be spontaneously realized at the individual level before managers coordinate intentionally, which saves time that would otherwise be spent on interpersonal information transfers.

On the other hand, R&D in the pharmaceutical industry is conducted in a linear fashion, from drug discovery through preclinical research to clinical trial. Drug discovery is the process of finding a lead compound that has a desirable effect. The probability that a discovered candidate compound will proceed to the preclinical research is just one in one thousand, and its probability of becoming a final product is only one in six thousand (Kuwashima 1999). In other words, drug discovery research is highly uncertain. However, drug discovery is extremely important because new scientific discoveries in this stage determine the essential traits of drugs, such as efficacy and safety. In preclinical research, information about safety is collected through animal testing. Preformulation development studies of candidate compounds are also conducted to determine dosage forms. Once satisfactory information has been gathered on the quality of the products and the Minister of Health, Labor, and Welfare has approved them, the products are moved into human testing. This last stage is called clinical trial.

In contrast to R&D in the electric and electronics industry, which adopts the overlap model, R&D phases in the pharmaceutical industry are separated from each other, and the first phase, basic research, is vital for their success. Henderson and Cockburn (1994) studied research productivity in the pharmaceutical industry and found that the frequent exchange of rich, detailed information across disciplinary or disease area boundaries did not positively influence research productivity. Kuwashima (1999) argued that success in drug discovery research basically depends on individual researchers' abilities and efforts. Their success does not require collaboration between team members involved in the drug discovery, preclinical research and clinical trial phases. Therefore, function knowledge about each phase and discipline is more significant than production knowledge for research and devel-

opment of drugs.

Based on the above consideration, the following relationships between promotions and inter-functional transfers/inter-organizational moves can be inferred. First, in organizations in which the importance of production knowledge dominates, R&D professionals with more frequent inter-functional transfers are likely to be promoted because the transfers provide good opportunities for acquiring knowledge through learning by doing. Second, production knowledge may also be acquired through informal communication and experiences on cross-functional project teams. Therefore, R&D professionals who have experienced inter-organizational moves would be at a disadvantage in terms of promotion in organizations with an emphasis on production knowledge. Hence, I posit the following hypotheses:

Hypothesis 1a: In private laboratories of the electric and electronics industry, where greater importance is put on production knowledge, R&D professionals with more frequent inter-functional transfers are likely to be promoted to managerial positions.

Hypothesis 1b: R&D professionals who have experienced inter-organizational moves are less likely to be promoted to managerial positions in private laboratories of the electric and electronics industry.

Hypothesis 2a: In national laboratories and private laboratories in the pharmaceutical industry, which puts a greater emphasis on functional knowledge, inter-functional transfers of R&D professionals will not increase their promotion prospects.

Hypothesis 2b: In national laboratories and private laboratories in the pharmaceutical industry, the experience of inter-organizational moves will not prevent R&D professionals from being promoted to managerial positions.

III. Empirical Analysis

To test the above hypotheses, I used data collected by a survey on the career development of Japanese R&D professionals and their Human Resources Management. The survey was conducted in 1999 in eleven laboratories of internationally known companies and ten national laboratories, with financial support by the Agency of Science and Technology. The survey questions concern a wide range of topics, including the respondents' personal careers, their organizations' HRM, their satisfaction with their working environment, their communication and information exchange, etc. The questionnaires were distributed to R&D professionals through each organization's general/personnel department. Five hundred ninety-four completed questionnaires from ten national laboratories and 909 completed questionnaires from eleven private laboratories were collected in all, yielding response rates

Table 1. Factor Analysis of Performance

Performance	Factor	
	1	2
Papers in Japanese journals	0.450	0.048
Papers in international English journals	0.617	-0.060
Presentation at international conferences	0.714	-0.026
Presentations at Japanese conferences	0.782	-0.142
Prizes given by other organizations	0.319	0.199
Domestic patents	-0.037	0.745
Overseas patents	-0.002	0.723
Practical use of research results	-0.052	0.473
Prizes given by their employers	0.078	0.468
Eigenvalue	2.384	2.143
Cumulative factor contribution rate (%)	26.491	50.307

Notes: 1. Principal factor analysis was applied.
2. The figures in the table show the factor loading after varimax rotation.

of 59.4% and 90.9%, respectively.[3]

First, I selected respondents who fit the four categories mentioned above: NLB, NLA, PLE, and PLP. Because private laboratories are part of large manufacturers, it is simple to distinguish the industry to which each individual private laboratory belongs. However, it is not easy to determine whether each national laboratory is basic-research oriented or applied-research oriented. In this study, the following method of distinguishing these two types of laboratories was adopted.

In the survey, the respondents reported their research performance for the past five years as measured by the number of domestic patents, overseas patents, papers in Japanese journals, papers in international English journals, presentations at Japanese conferences, those at international conferences, practical use of research results, prizes given by their employers, and prizes given by other organizations. When I applied factor analysis to those measurements, two factors with eigenvalues greater than one were obtained (Table 1). Because the first factor had high factor loadings with papers and conference presentations, it can be labeled "scientific performance." The second factor had high factor loadings on patents and practical use of research results. Therefore, it can be called "practical performance."

Next, the ten national laboratories were ranked based on their average values of respondents' factor scores on the scientific performance and the practical performance scales,

[3] The questions on the questionnaire and their answers' distributions are shown in Shakai Kogaku Kenkyujo (2000).

Table 2. Variables for the Logit Analysis for Promotion

Dependent variable: managerial position=1, others=0 Independent variables ・Age: respondents' ages at the time of the survey ・Doctorate dummy: doctorate holders=1, others=0 ・Inter-functional transfers: the number of inter-functional transfers ・Organization change dummy: if respondents changed their employers, organization change dummy=1, others=0 ・Loan of personnel dummy: if respondents experienced loan of personnel, loan of personnel dummy=1, others=0 ・Scientific performance: factor scores of the "scientific performance" factor ・Practical performance: factor scores of the "practical performance" factor ・12 kinds of organization dummy variables (NLB1-4, NLA1-4, PLE1-3, and PLP1): if a respondent belongs to NLB1, NLB1=1, others=0. The same rule was applied to NLB2-4, NLA1-4, PLE1-3 and PLP1.

respectively. When the rank of the scientific performance of a national laboratory was equal to or greater than that of its practical performance, the national laboratory was classified into NLB; otherwise it was classified into NLA. As a result, each category has five laboratories. All of the NLB research is in the fields of medical science or materials science, and all of the NLA research is in the fields of agriculture, engineering, or information technology.

In order to test the above hypotheses, I conducted the following logit analysis regarding each of the four kinds of laboratories. The independent and dependent variables are shown in Table 2. The dependent variable is whether or not the respondents were managers. The independent variables include "organization change dummy" and "inter-functional transfers." In the survey, functions were divided into four units: basic research, applied research, development and design, and others. The number of transfers between these functional units is captured by the variable of "inter-functional transfers."

In addition, control variables are age, doctorate dummy, scientific performance, practical performance, loan of personnel dummy and 12 kinds of organization dummy variables. Age is an important variable in organizations using the seniority-based promotion practice. Previous research about promotion practices for white-collar workers has shown that educational attainment is a key factor for promotion in Japanese companies.[4] Because R&D workers have at least a bachelor's degree, a doctorate dummy was used to show educational attainment in this paper. In addition, performance may also influence promotion because even in Japanese organizations, it is quite unusual for age and length of experience alone to

[4] See Tachibanaki and Rengo Soken (1995).

determine promotion. In this paper, scientific performance and practical performance, as mentioned above, were added to the dependent variables.

Moreover, Japanese companies dispatch their employees to other related organizations for training, coordination between accepting and sending organizations and so on, which is called *shukko* in Japanese.[5] Some respondents of our survey experienced the loaning of personnel in private companies, national laboratories, universities within and outside Japan, etc. Loaning of personnel may have a similar effect on promotions as inter-organizational moves in the sense that R&D professionals who are on loan to other organizations may miss good chances to acquire production knowledge. Therefore, a loan of personnel dummy was added to the independent variables. Finally, 12 kinds of organization dummy variables were used to represent differences in promotion policies between organizations.

Basic statistics for the independent variables in each type of organization are shown in Table 3. As can been seen in the table, the average of the organization change dummy is highest for NLB at 0.32, and less than 0.1 for the two types of private laboratories, PLE and PLP. This result stems from a difference in hiring practices, namely that national laboratories employ mid-career hiring more often than companies. On the other hand, the average number of inter-functional transfers is lowest with NLB, where function knowledge is important, and highest with PLE, in which highly integrated products are manufactured. As far as performance is concerned, both kinds of national laboratories show high scientific performance, with NLB being particularly high performing. PLE shows the highest practical performance. These results reflect differences in the R&D focus of the different types of organizations.

The results of the logit analysis are shown in Table 4. Looking at the inter-functional transfer variable, a significant positive coefficient can be seen only for PLE. In other words, R&D professionals with more frequent inter-functional transfers are likely to be promoted only in the electric and electronics industry, in which production knowledge is highly valuable. Therefore, Hypothesis 1a and Hypothesis 2a were confirmed. In addition, it is only for PLE that the coefficient of the organization change dummy is significantly negative. In other type of organizations, the coefficients are insignificant. R&D professionals recruited by their present employers in mid-career have fewer opportunities for advancing their production knowledge than those hired immediately after obtaining their degrees. Therefore, in the electric and electronics industry, where the importance of production knowledge is quite high, R&D professionals recruited in mid-career have more difficulty being promoted, even if the effect of inter-functional transfers is controlled for. In other types of organizations, the experience of an inter-organizational move does not positively or negatively affect promotion prospects. Therefore, Hypothesis 1b and Hypothesis 2b were also confirmed.

[5] Nagano (1989) pointed out that *shukko* is sometimes used to discharge unproductive employees, usually elderly workers.

Table 3. Basic Statistics

(*org.*) Variables	Minimum	Maximum	Average	s.d.
NLB				
Age	29.0	59.0	44.17	8.69
Doctorate dummy	0.0	1.0	0.53	0.50
Inter-functional transfers	1.0	5.0	1.47	0.81
Organization change dummy	0.0	1.0	0.32	0.47
Loan of personnel dummy	0.0	1.0	0.51	0.50
Scientific performance	-0.78	5.28	0.73	1.21
Practical performance	-1.02	1.14	-0.55	0.31
NLA				
Age	25.0	60.0	41.87	8.92
Doctorate dummy	0.0	1.0	0.41	0.49
Inter-functional transfers	1.0	6.0	1.87	1.21
Organization change dummy	0.0	1.0	0.14	0.34
Loan of personnel dummy	0.0	1.0	0.50	0.50
Scientific performance	-0.81	4.74	0.42	0.89
Practical performance	-0.89	2.38	-0.41	0.41
PLE				
Age	26.0	57.0	38.79	6.12
Doctorate dummy	0.0	1.0	0.19	0.39
Inter-functional transfers	1.0	6.0	2.19	1.27
Organization change dummy	0.0	1.0	0.07	0.26
Loan of personnel dummy	0.0	1.0	0.30	0.46
Scientific performance	-0.81	6.35	-0.04	0.73
Practical performance	-0.66	4.83	0.68	1.03
PLP				
Age	27.0	55.0	37.30	5.71
Doctorate dummy	0.0	1.0	0.21	0.41
Inter-functional transfers	1.0	6.0	1.56	0.91
Organization change dummy	0.0	1.0	0.01	0.11
Loan of personnel dummy	0.0	1.0	0.46	0.50
Scientific performance	-0.81	0.52	-0.56	0.23
Practical performance	-0.68	4.81	-0.13	0.73

Note: Assignment to the first functional unit is counted as one transfer.

Table 4. Results of the Logit Analysis

Variables	Organization			
	NLB	NLA	PLE	PLP
Constant	-1.983(2.517)	-0.973(1.288)	-8.519(1.976) **	-16.555(3.254) **
Age	0.098(0.032) **	0.114(0.019) **	0.263(0.037) **	0.451(0.082) **
Doctorate dummy	-0.814(0.456)	-0.730(0.307) *	0.306(0.442)	0.515(0.593)
Inter-functional transfers	0.018(0.309)	0.196(0.126)	0.435(0.149) **	0.041(0.260)
Organization change dummy	-0.777(0.481)	-0.479(0.409)	-1.543(0.723) *	
Loan of personnel dummy	-0.901(0.460)	-0.368(0.282)	-1.086(0.388) **	-0.676(0.523)
Scientific performance	0.602(0.214) **	0.112(0.184)	-0.266(0.229)	-0.126(1.388)
Practical performance	-0.205(0.830)	0.930(0.431) *	1.274(0.252) **	-0.031(0.404)
NLB1	-1.833(0.788) *			
NLB2	-0.711(0.793)			
NLB3	-0.013(0.799)			
NLB4	-0.264(0.782)			
NLA1		-0.804(0.553)		
NLA2		-1.173(0.493) *		
NLA3		-1.014(0.393) **		
NLA4		-0.816(0.410) *		
PLE1			-0.754(0.524)	
PLE2			0.368(0.538)	
PLE3			-0.796(0.483)	
PLP1				-1.461(0.595) *
N	133	311	308	166
-2logL	130.496	328.421	230.789	117.546
χ^2	47.506 **	97.813 **	188.037 **	109.655 **

Notes: 1. NLB: national laboratories focusing on basic research
NLA: national laboratories with an emphasis on applied research
PLE: laboratories of companies in the electric and electronics industry
PLP: laboratories of companies in the pharmaceutical industry

2. Values in parentheses show standard error.
3. **p<0.01, *p<0.05.
4. The number of organization changers is 43 in NLB, 42 in NLA, 22 in PLE and 2 in PLP. Because of the small number in PLP, the organization change dummy was not included in the model for PLP.

Looking at other independent variables, the loan of personnel dummy also has a significantly negative coefficient in the case of PLE. Loan of personnel does not end the relationships between R&D professionals and their employers. However, while these professionals work on other organizations' premises, they are not given chances for acquiring production knowledge. Therefore, loan of personnel has a similar effect on R&D professionals' promotion as an inter-organizational move.

For all of the models, the coefficients of the age variable are positive and significant at a 1% level. This reflects the seniority-based promotion system, which has been considered to be an outstanding feature of Japanese HRM practices. However, it is notable that performance also affects promotion. Scientific performance has a significantly positive coefficient for NLB, as does practical performance for NLA and PLE. Managers' roles are not only coordination among functional units, but also training, supervising and evaluating their subordinates. In NLB, where scientific performance is emphasized, R&D professionals showing high levels of scientific performance tend to be promoted to managerial positions. On the other hand, in NLA and PLE, where enhancing practical performance is important, R&D professionals whose practical performance is high are likely to be promoted.

IV. Discussion and Conclusion

This paper analyzed the relationships between promotion and inter-functional transfers/inter-organizational moves. In organizations where highly integrated products are produced, coordination is an important responsibility for managers. Therefore, they need to acquire knowledge about the functional areas that must be coordinated. Learning by doing is the most efficient way of acquiring such knowledge, and inter-functional transfers provide good opportunities for doing so. Thus, I expected that R&D professionals with more frequent inter-functional transfers would be likely to be promoted. R&D professionals who were hired in mid-career have fewer chances for inter-functional transfers, assignment to project teams, and informal communication within an organization. Therefore, they seem to have difficulty being promoted. On the other hand, in organizations that produce outputs based on high levels of function knowledge, production knowledge and coordination among functional units are less significant. In such organizations, managers should have the high level of function knowledge that is necessary for training, supervising and evaluating their subordinates. Function knowledge can be acquired by dedicating oneself to a specific discipline and functional area. Additionally, it can be acquired outside the organization within which the individual is currently employed. Therefore, I expected that inter-functional transfers are not a prerequisite condition for promotion, and mid-career recruiting does not confer a disadvantage for promotion. I examined these hypotheses by comparing the relationships between promotion and inter-functional transfers/inter-organizational moves in four kinds of organizations. Only in private laboratories of the electric and electronics industry, in which production knowledge is highly respected, are R&D professionals with

more frequent inter-functional transfers more likely to be promoted. It was also confirmed that in such organizations, mid-career recruiting reduces promotion probability.

Japanese firms, not only in the electric and electronics industry, but also the auto manufacturers and other mechanical assembled products industries, are known for their ability to create highly integrated products. Kusunoki (1998) found a source of this strength in the product development management style. He stressed that managers in functional units as well as product managers play key roles in product integration in Japanese firms. Japanese firms do not employ an integration process in which product managers bear all responsibilities for integrating independent functions and components. Before product managers do this, production knowledge has been used in each functional unit by functional managers, which enables integration to be done in an earlier stage. Hence, managers in functional units in Japanese companies need a wide range of knowledge and experience outside their area of expertise, which is different from Western companies, where functional managers are specialists. In that sense, Japanese managers in functional units are similar to production managers. Such features of R&D professionals and the Japanese method of training them could be one reason for the immobile labor market for R&D professionals in Japan.

In organizations producing highly integrated products, professional ladders do not seem to work well. A professional ladder provides several levels of non-managerial advancement. Employees climb the professional ladder depending on their level of expertise and can get pay raises just like employees climbing a managerial ladder. However, the professional ladder seems to be less attractive for R&D professionals in organizations emphasizing production knowledge rather than function knowledge. The *Nihon Seisansei Honbu* (Japan Productivity Center) (1991) found differences in the ideal patterns of engineers' career development between Japanese and U.S. private companies. The specialist orientation of American engineers was reflected in their wish to continuously work on front-line R&D, which became stronger with increasing age. On the other hand, Japanese engineers showed a stronger desire to become managers and a weaker specialist orientation as they got older. In Japanese firms with an emphasis on integrated products, managers have greater authority and higher status, which encourages Japanese engineers to prefer a managerial ladder to a professional ladder.

On the other hand, an inter-organizational move does not hinder promotion in national laboratories, where production knowledge is less important. Therefore, mid-career hiring is more often observed in national laboratories than private ones. In addition, more frequent inter-functional transfers do not assure promotion in national laboratories. There, promotions are determined by performance as well as age.

As discussed above, there are at least two types of career development of R&D professionals in Japan. The first type is advancing production knowledge through inter-functional transfers and promoting within an organization, which is typical for R&D professionals in the electric and electronics industry. The second type is developing function knowledge and professional abilities that are useful beyond the boundaries of organizations.

The latter type of career development includes inter-organizational moves, which are observed among R&D professionals in national laboratories. Prior studies of Japanese firms have focused mainly on the automobile industry and the electric and electronics industry, in which Japanese firms have strong international competitiveness.[6] As a result, the second type of career development for R&D professionals has been overlooked or has not been given much attention.

Although the second type of career development exists, it should be noted that it is in the minority. There were 820,000 researchers in Japan in 2006, and 58.7% worked for private companies, mainly in the industries of information and communication, transportation machinery, general-purpose machinery, electric machinery, and electronics parts and devices (Ministry of Education, Culture, Sports, Science and Technology 2007). The percentages for university and public laboratories were 36.0% and 4.2%, respectively. The dominance of the former type of employer in the Japanese economy, which relates to the present industry development, makes the Japanese labor market for R&D professionals immobile.[7] Future mobilization of the Japanese labor market will depend on what types of production strategies private companies choose and how they adjust their R&D organizations and employment practices to the strategies.

References in English

Aoki, Masahiko. 1988. *Information, incentives, and bargaining in the Japanese Economy*. Cambridge, MA: Cambridge University Press.

Ariga, Kenn, Giorgio Brunello, and Yasushi Ohkusa. 2000. *Internal labour markets in Japan.* Cambridge, MA: Cambridge University Press.

Clark, Kim B., and Takahiro Fujimoto. 1991. *Product development performance: Strategy, organization, and management in the world auto industry*. Boston: Harvard Business School Press.

Henderson, Rebecca, and Iain Cockburn. 1994. Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management Journal* 15, special issue 1: 63-84.

Kusunoki, Ken and Tsuyoshi Numagami. 1996. Interfunctional transfers of engineers in Japan: An empirical study on a large-scale manufacturing firm. *Keio Business Forum* 13, no. 2:45-72.

Lynn, Leonard H., Henry R. Piehler, and Mark Kieler. 1993. Engineering careers, job rotation, and gatekeepers in Japan and the United States. *Journal of Engineering and Technology Management* 10:53-72.

[6] Aoki (1988) stylized Japanese firms and American firms based on prior research. In Japanese firms, job demarcation is fluid and ambiguous. Japanese workers perform a certain range of jobs as team members, rotate among the jobs, share information, and are trained as generalists. On the other hand, American firms emphasize sharp job demarcation and fine specialization. Individual workers are assigned to specific jobs and trained as specialists based on the principle of "the right person in the right place."

[7] Murakami (2003) studied the labor market for R&D professionals in Japan.

Nonaka, Ikujiro, and Hirotaka Takeuchi. 1995. *The knowledge-creating company: How Japanese companies create the dynamics of innovation.* New York: Oxford University Press.

Ohashi, Isao, and Hiroshi Teruyama. 1998. Intra-firm mobility, wages and promotion in the Japanese employment system. In *Internal labour markets, incentives and employment*, ed. Isao Ohashi and Toshiaki Tachibanaki, 269-99. New York: Macmillan Press.

Okimoto, Daniel I., and Yoshio Nishi. 1994. R&D organization in Japanese and American semiconductor firms. In *The Japanese firm: The sources of comparative strength*, ed. Masahiko Aoki and Ronald Dore, 178-208. New York: Oxford University Press.

Sakakibara, Kiyonori, and Eleanor D. Westney. 1985. Comparative study of the diversification of career orientations on management systems in Japan. *Human Resource Management* 32 (4):525-43.

Sato, Hiroki. 1995. Corporate careers of R&D personnel. In *The R&D workers*, ed. Phillip Shapira, 45-58. Westport, CT: Quorum Books.

References in Japanese

Ikejima, Masahiro. 1999. *Senryaku to kenkyu kaihatsu no togo mekanizumu*. Tokyo: Hakuto Shobo.

Imada, Sachiko, and Shuichi Hirata. 1995. *Howaito kara no shoshin kozo*. Tokyo: Toyo Keizai Shinpo-sha.

Imano, Koichiro. 1991. Gijutsusha no kyaria. In *Daisotsu howaito kara no jinzai kaihatsu*, ed. Kazuo Koike. Tokyo: Toyo Keizai Shinpo-sha.

Koike, Kazuo. 1991. *Shigoto no keizaigaku.* Tokyo: Toyo Keizai Shinpo-sha.

Kusunoki, Ken. 1997. Shisutemu bunka no soshiki-ron: Inobeshon no soshiki-ron no inobeshon ni mukete. *Business Review* 45, no.1:129-50.

———. 1998. Kino maneja to seihin maneja: Inobeshon kanri-sha no hikaku bunseki. *Business Review* 45, no.3:17-37.

Kuwashima, Kenichi. 1999. Iyakuhin-gyo ni okeru kokateki na kenkyu kaihatsu manejimento: Shinyaku kaihatsu no jirei bunseki wo toshite. *Kenkyu Gijutsu Keikaku* 13, no.3/4:166-81.

Matsushige, Toshikazu. 1995. Denki B-sha daisotsu danshi jugyoin no kinzoku 10 nen made no ido to sono go no shoshin. In *Shoshin no keizaigaku: Nani ga shusse wo kimeru no ka*, ed. Toshiaki Tachibanaki and Rengo Soken (Japanese Trade Union Confederation. Research Institute for Advancement of Living Standards). Tokyo: Toyo Keizai Shinpo-sha.

Ministry of Education, Culture, Sports, Science and Technology. 2007. Kagaku Gijutsu Hakusho: Kagaku Gijutsu no Shinko no Seika. Tokyo: Nikkei Insatsu.

Murakami, Yukiko. 2002. Amerika no kenkyusha no kyaria to jinzai manejimento. In *Kenkyu Kaihatsu Jinzai no Manejimento*, ed. Hideo Ishida. Tokyo: Keio Gijuku Daigaku Shuppan-kai.

———. 2003. *Gijutusha no tenshoku to rodo shijo*. Tokyo: Hakuto Shobo.

Nagano, Hitoshi. 1989. *Kigyo gurupu nai jinzai ido no kenkyu: Shukko wo chushin to shita jissho bunseki*. Tokyo: Taga Shuppan.

Nihon Seisansei Honbu (Japan Productivity Center). 1991. *Beikoku no gijutusha , Nihon no gijutusha.*

Nihon Seisansei Honbu.

Noda, Tomohiko. 1995. Rikokei, bunkei to shoshin: Rikokei yakuin to bunkei yakuin no hikaku. In *Shoshin no keizaigaku: Nani ga shusse wo kimeru no ka*, ed. Toshiaki Tachibanaki and Rengo Soken (Japanese Trade Union Confederation. Research Institute for Advancement of Living Standards). Tokyo: Toyo Keizai Shinpo-sha.

Nonaka, Ikujiro. 1989. Seihin kaihatsu to inobeshon. In *Nihon no kigyo*, ed. Kenichi Imai and Ryutaro Komiya. Tokyo: Tokyo Daigaku Shuppan-kai.

Shakai Kogaku Kenkyujo. 2000. *Sozoteki kenkyu seika wo unagasu kenkyu-sha no jinzai manejimento no arikata ni kansuru chosa*. Tokyo: Shakai Kogaku Kenkyujo.

Tachibanaki, Toshiaki, and Rengo Soken (Japanese Trade Union Confederation. Research Institute for Advancement of Living Standards), ed. 1995. *Shoshin no keizaigaku: Nani ga shusse wo kimeru no ka.* Tokyo: Toyo Keizai Shinpo-sha.

Takeuchi, Hirotaka, and Ikujiro Nonaka. 1986. Shinseihin kaihatsu no senryaku to soshiki. In *Inobeshon to soshiki*, ed. Kenichi Imai. Tokyo: Toyo Keizai Shinpo-sha.

———. 1993. Shinseihin kaihatsu purosesu no manejimento. In *Nihon no kigyo shisutemu*, vol. 2, ed. Takayuki Itami, Tadao Kagono and Motoshige Ito. Tokyo: Yuhikaku.

Yoneyama, Shigemi, and Ikujiro Nonaka. 1995. Shugo kakushin no dainamikkusu. In *Nihongata Inobeshon Shisutemu*, ed. Ikujiro Nonaka and Akiya Nagata. Tokyo: Hakuto Shobo.

Knowledge Combination and Value-Creation Mechanism under the Japanese-Style Career System

Mitsutoshi Hirano
Kobe University
Yasuhiko Uchida
Yamaguchi University
Ryuta Suzuki
Kobe University

Researches regarding the functionality of Japanese companies' white-collar employees career system having three features, (i) wide-range career development, (ii) job performing ability-based grade system, and (iii) human resources (HR) department involved in personnel transfers has been accumulated mainly on the basis of intellectual skills. In other words, a cause-and-effect relationship, "wide-range career development → obtained intellectual skills → efficiency enhancement," has been hypothesized and borne out. This paper makes the concept of a new framework which is different from intellectual skills, i.e., a cause-and-effect relationship "wide-range career development → knowledge combination → value creation," and advocates a new descriptive principle of the functionality of Japanese-style career system. According to the career tree analysis and interviews conducted on 28 senior managers of House Foods Corporation, "knowledge combination → value creation" mechanism, with three patterns of "continuous role expansion," "add-on role" and "regeneration of the existing role," have been found. In addition, it has become evident that the HR department of the headquarters which demonstrates its initiative in regular personnel transfers is deeply involved in value creation.

I. Placing the Right Persons in the Right Jobs

The purpose of this paper is to insist that although Japanese-style career system is seemingly irrational, it has a systematic wisdom to combine members' knowledge and create new values based on the field survey on a food manufacturer. The target of discussion in this paper is white-collar employees working for Japanese companies. The word "Japan" used here means Japanese major companies and the word "Japanese-style" mainly means "stylized facts"[1] of Japan's human resources management (HRM) or career system accumulated since the 1980s.

Career is narrowly interpreted as time paths of "diversity of work" (horizontal career) and "promotion of position or grade" (vertical career) which are experienced in the organization, and its essence is considered as "placing the right persons in the right jobs." Then what is placing the right persons in the right jobs? Simply stated, it means the best match with skills of "workers" and skills required by "roles." There is, however, a challenge that

[1] "Stylized facts" mean characteristics of Japanese major companies' HRM accumulated through Japan-US comparative and experimental studies.

both are always changing and a time lag occurs between them.

According to "Human Capital" (Becker 1964), although the capacity to play a role is currently insufficient, if the career is developed with the intention to improve special skills (companies' specific training investment), both labor and management will be able to benefit from increased production capacity in the future. In this case, placing the right persons in the right jobs means when and how they experience a variety of jobs in the proper sequence, i.e., an optimum solution of horizontal career's time path, taking training and investment costs and learning efficiency into account.

In addition, for workers who are interested in effects of current job performance on their future career, the position/grade promotion system, i.e., vertical career, works as an indirect incentive effect called "career concern" to bring out their efforts to acquire skills (Gibbons and Murphy 1992). In general, the reason why the seniority-based fixed salary in youth is shifted to merit-based reward reflecting a short-term performance when moving up into management position is because young workers have many potential promotion opportunities and the career concern has a major effect on them. If career concern complements a direct incentive of short-term performance-based compensation, the design of vertical career's time path, e.g., promotion speed, timing of career plateau and skill levels which determine the promotion, would affect workers' motivation of obtaining skills.

In short, placing the right persons in the right jobs is a means to successfully link the time lag between workers' skills and skills required by their jobs with the efficiency of obtaining skills and their motivation in aspects of both vertical and horizontal careers to increase the production capacity. Then what skills have actually been required for workers in Japan? What mechanisms have promoted their learning and increased the production capacity? The characteristics of Japanese-style career system can be found by comparing with other countries as far as these matters.

II. Characteristics of Japanese-Style Career System

1. Horizontal Career

(1) Intellectual Skills

A series of researches conducted by Kazuo Koike who advanced "intellectual skills" showed the characteristics of Japanese horizontal career and clarified their advantages (e.g. Koike 1994). Koike found out that skills which contribute most to the efficiency in Japanese workplaces are "intellectual skills" without a doubt through international comparison of an analysis point, "breadth of career." Intellectual skills are know-how of dealing with "unusual operation," i.e., changes and problems. Even if processes are well controlled in the production plant, operations in the workplace are not always normal. Changes and problems occur very often. The efficiency varies widely depending on whether "the man on the spot" can deal with problems properly by changing tools and tooling or fine-tuning without stop-

ping production line. Hayek (1945) thought that there is an impossibility of centralizing site information that "the man on the spot" has. After all decentralized information based on special circumstances of time and place cannot be centralized or integrated, it is more efficient that "the man on the spot," a direct operator, processes site information (changes and problems). However, the following conditions must be satisfied: (i) operators have built intellectual skills, and (ii) operators have the potential to build them less costly.

Regarding this matter, Koike discusses the division of roles between direct operators, technicians and engineers, i.e., division of labor. The point is, provided that the operator on site satisfies above conditions, (i) "integrated system" in which the direct operator performs various tasks including dealing with changes and problems is better than "separate system" in which operator's scope of tasks is limited from a perspective of cost of division of labor and improved motivation of operators, and (ii) in the case of "integrated system," the skill distribution will be "middle-thick type" in which many mid-level workers have intellectual skills.

Japanese production workers' (blue-collar employees') building method of intellectual skills is an extensive On-the-Job Training (OJT). Extensive OJT means that one production worker experiences major posts of his/her workplace and sometimes workplace next door. However, the range is no more than workplaces both next doors, thus it is limited to when skills can be fully used for other workplaces. This has the advantage of saving opportunity cost as temporary production decline caused by the deployment to an unfamiliar role as well as OJT learning cost for obtaining unfamiliar skills.

(2) White-Collar Employees

Japanese white-collar employees are the same as blue-collar ones in the sense that they deal with changes and uncertainty based on wide-range expertise. For instance, the organizational efficiency would be largely dependent on whether the budget manager analyzes the difference between budget and performance and utilizes the result for the next budget compilation or not (Koike 2005). In order to properly analyze the difference between budget and performance, it is essential for budget managers to have an insight into noises against the plan, i.e., environmental changes and problems on site. Such insight will be cultivated by extensive experiences including experience on site. The difference between white-collar and blue-collar employees is that it is difficult for the former to monitor productivity, individual contribution and intellectual skills (Inoki 2002).

Then, how about the fact of Japanese white-collar employees' career development compared with Western countries? According to JIL Research Report (1998) prepared by Koike as a chief investigator, when asked a desirable career path for developing managers with the current function that the general manager level thinks, the most common answers were: "to experience not only the current function but also some works in other functional fields" in Japan, 56.9%, "to experience many works within the current function" in the United States, 57%, and both "to experience not only the current function but also some

works in other functional fields" and "to experience many works within the current function" in Germany, 30% level each. Therefore, it shows that Japan is headed for wide-range career development.

However, whether how much the policy on such horizontal personnel transfers is actually implemented is another story. In this research, it became obvious that the real career development is either "wide-ranging one function type" in which workers widely experience within one function such as accounting, sales, personnel and production or "primary and secondary functions type" in which functions spread peripherally centered on one function. To go into detail about work experience range of general managers and managers, while wide experience type in which workers widely experience works within the current function is the most in the United States and Germany, one function type, primary and secondary functions type and multiple functions type are about one third each and wide experience type is the most in each type in Japan (Sato 2002). The career range of Japanese general manager/manager level is slightly wider than that of Western countries. In Japan, workers hired fresh out of colleges pay their dues at work (frontlines of manufacturing or sales in the plant or branch). Though this leads to "slow promotion" which is another characteristic of Japan, if it is important to deal with uncertainty at each level of the organization, such dues-paying experiences would be reasonable (Koike 2002).

2. Vertical Career

Many workers would not obtain troublesome intellectual skills without proper incentives. The measures for the promotion of building up intellectual skills are "reward of something other than job." In particular, there are three important elements: payment-for-skills, yearly increments of payments, and merit assessment (Koike 1994). These personnel policies apply to both Western countries' and Japanese white-collar employees, and Japanese blue-collar employees. In other words, Japan's unique point is white-collar phenomenon of blue-collar employees (Ito 1994). Anyhow, Japanese white-collar employees' intellectual skills are promoted by indirect incentive effect (career concern) of promotion, i.e., vertical career. It is especially important for Japan where internal labor markets are developed on the basis of a long-term employment practice.

(1) Job Performing Ability-Based Grade System

Japanese white-collar employees' vertical career is hierarchically-structured with "position" (e.g., chief, manager, general manager, etc.) and "grade" (e.g., rank 1, rank 2, rank 3, etc.). The grade is a rank order in-house and called personnel ranking system. Koike previously identified white-collar employees' reward system in both Japan and Western countries as pay-for-ranking of wide-range rate, but the design principle of the personnel ranking system is different. Many of Japanese companies adopt a job performing ability-based grade system. This system is "a system which sets up grade classes depending on levels of job performing ability approved by the company and classifies employees into

grades to determine the promotion and wages." In contrast, American companies adopt a job grading system. The job grading system is "a system which evaluates jobs based on required skills, responsibilities, difficulties, etc. to determine the job values and sets up some classes as the base for promotion and wages."

In the job performing ability-based grade system, the base pay is provided depending on employee's grade, and when the employee is promoted, he/she gets a raise. Therefore, it shows a weak association between the grade and individual job class. In Japanese, the promotion of position and the promotion of grade are separately called "*Shoshin*" and "*Shokaku*" respectively based on such separation between treatment and assignment. In other words, persons being raised to the upper grade are determined first and persons being raised to the upper position will be chosen from them depending on the vacant position, so called "grade before position."

(2) Slow Promotion

Japanese white-collar employees' promotion pattern follows "slow promotion" in accordance with "grade before position" practice. According to above JIL Research Report, "when the first difference occurs in promotions among employees who joined the company at the same time" (primary selection) is four years or less after joining the company in U.S. companies but is eight to 10 years in Japanese companies. "When the share of persons with no more chance for promotion reaches 50% among employees who joined the company at the same time" (time of appearing a leveling-off group) is eight to 10 years after joining the company in U.S. companies but is about 20 years in Japanese companies, far behind. That is, the primary selection is late and the time of career plateau is also late in Japanese companies. The promotion of position is carried out basically in accordance with age and length of service during a certain period after joining the company, and the selection is carried out after such period. In other words, Japanese career system is a layered structure: it is a uniform seniority system during the early years, moves to a promotion race system during the middle years and becomes a tournament system when the employee becomes the level of manager (Imada and Hirata 1995).

3. Strong HR Department

Human resources (HR) department's power to shuffle personnel is strong in Japan but is weak in the United States. In U.S. major companies, HR departments have no power to shuffle personnel but heads of the relevant departments do instead. The HR departments in the U.S. major companies play a role to assist personnel decisions by the heads of the departments as a professional in charge of developing and improving personnel and education systems, but Japanese HR departments are directly involved in actual personnel transfers (Hirano 2006). Jacoby (2005) clarified, with a questionnaire survey on general managers of HR departments in Japan and the United States, that Japanese HR departments still have the power of career development by employment and relocation, personnel transfers for per-

sonnel reduction and other similar matters substantially rather than line managers. On the other hand, line managers in the United States where personnel affairs are well decentralized have much more discretionary powers to decide the employment and lay-off than that in Japan (Cappelli 1999).

III. Functionality of Japanese-Style Career System

During years from the high economic growth period to 1980s, Japanese-style career system attracted world attention as a source of competitive advantages. According to Aoki (1988) who lucidly theorized characteristics of Japanese internal organization management at that time, such characteristics were Japanese-style organization mode in which decentralized information system characteristics such as precise tuning by sharing information with peers or relevant departments are associated with a training system which is intended to develop centralized HRM characteristics, i.e., intellectual skills (wide-range career development), a merit-based incentive system (job performing ability-based grade system), and the power to shuffle personnel centralized in the HR department in a mutually complementary manner.[2]

A simple explanation of the complementarity of Japanese-style organization mode follows. Firstly, experiences of various workplaces, sharing of knowledge and increased communications between departments, i.e., intellectual skills, were necessary for successful operation of decentralized information system. Secondly, personnel with intellectual skills are developed through job rotation, and whether the particular training is successful or not depended on the mechanism of HRM. Therefore, a job performing ability-based grade system which is not related to particular jobs was suitable for giving them intellectual skills through job rotation. Thirdly, since job rotations beyond the jurisdiction should be arranged by the HR department from total optimization perspective, the power to shuffle personnel was centralized in the HR department. In short, Japanese-style career system in 1980s was characterized by "wide-range career development," "job performing ability-based grade system" and "involvement of HR department in personnel transfers." At the same time, Japanese-style career system was also associated with low liquid labor markets and strict legal system for dismissal and reorganization in a mutually complementary manner.[3] Even

[2] On the other hand, a market-oriented decentralized HRM in which the power of personnel employment/dismissal is decentralized to each hierarchy level is suitable for a vertical information system which associates upper hierarchy with lower one by information processing such as command and standard. This association mode was called as A-type organization mode by Aoki (1989) and was often the case with U.S. companies at that time.

[3] Japan's labor law established discharge restrictions by case law. Therefore, it was difficult to reduce labor force by dismissal. On the other hand, it grants employers wide discretionary powers of personnel transfers such as wide powers of job displacement inside the company (Otake, Ouchi and Yamakawa 2002).

today, this Japanese-style career system has evolved with many of such characteristics.[4]

Then how much experience is the best? Inoki (2002) explained the significance of experiencing more than one function or many areas within one function for the organization from the perspective of "efficiency."[5] Inoki divides the efficiency into two meanings: one means that duties are efficiently carried out by attaining individual proficiency, and another one means the efficiency brought about by combining abilities within the same organization. That is, the former is the efficiency in the sense that routine works can be done quickly and accurately, and the latter is the efficiency in the sense that workers can deal with uncertainty of the work with their intellectual skills.

If there is no uncertainty of things which may happen in the future, the best solution would be that each individual fully specializes in one area within one function and such specialized individual deals with possible outcomes expertly. However, provided that the uncertainty exists (e.g., sudden vacancy, etc.), the personnel substitutability increases if they have obtained a certain level of knowledge of areas between functions or neighboring areas within the function. In this regard, however, opportunity costs as temporary production decline and additional learning costs will be caused by the deployment to an unfamiliar role. The solution how to design functions or areas to be experienced should be determined by the peak point of rent which is the profit from the efficiency to deal with such uncertainty after deduction of above opportunity costs (= current profit – opportunity costs [maximum profit obtained by utilizing resource for another opportunity]). In the intellectual skill theory, therefore, since higher complementarity of skills required by more than one job facilitates the acquisition of this rent, a job rotation between technical and attributive neighboring areas is considered to be favorable.

However, as described herein below, the rationality of our survey results cannot be fully explained if the range of career development is only determined by the efficiency based on the intellectual skills. This is because technically and attributively discontinuous personnel transfers not between neighboring functions or areas were often observed. We need a different explanation other than the efficiency. There must be a surplus or shortage of knowledge/skills by the personnel deployment system intended to Japanese wide-range career development, i.e., deployment to the post or position which are less related to previous work experiences. This shows that the workers who accumulated different work experiences and have different mental programs may play a role by turns which is not always clearly provided and restructure the role based on the mental program. Knowledge is combined

[4] For changes in Japanese HRM from 1990s to present, see Hirano (2006). While Japanese job performing ability-based grade system has changed somewhat to role classification system, it is confirmed that the power to shuffle personnel centralized in the HR department is partially continued and wide-range career development is also maintained.

[5] Aside from "efficiency," Inoki (2002) puts another standard, "equity" for the explanation of optimizing the range of work experiences. In order to assess the person's value, it is better to evaluate performances in many functions and areas. The evaluation accuracy increases and eventually the equity increases.

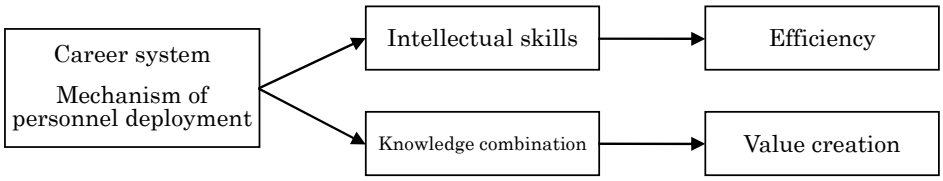


Figure 1. Functions of Japanese-Style Career System

through discontinuous personnel transfers, and the work contents are amended. In other words, the system may make a gap between knowledge/skills/mental programs of personnel and the actual role and the knowledge may be always recombined by design in the dynamics of bridging the gap. In short, the range of personnel transfers may be determined by not only the efficiency generated by intellectual skills but also the intention of value creation (including the efficiency) through new knowledge combination of individuals and roles. That is our analytical perspective (see Figure 1).

IV. Survey and Analysis Method

The survey was conducted on House Foods Corporation in September 2006. Founded in 1913, this company is listed on the first section of the Tokyo Stock Exchange. Its main line of business is production and sales of foods. It has a total staff strength of 2,400 employees and enjoys annual sales of ¥230 billion (as of March 2007). The survey was conducted in two stages. Firstly, managers of personnel and training divisions were interviewed for the company's personnel management, details of the career system and policies. Secondary, 28 senior managers (general manager/deputy general manager level) were interviewed for all roles they played since they joined the company and their skills and knowledge at the time of each role.

Career data were analyzed by two methods. Firstly, 28 senior managers' career paths were drawn using the career tree model of Rosenbaum (1984), and a macro-analysis was conducted on where and when persons with what kind of skills/knowledge were deployed to. We tried to clarify the career characteristics of senior managers in House Foods Corporation from when joining the company to the present as well as characteristics of personnel deployment based on the analysis results.

Secondary, an analysis was conducted on how they performed their duties using what kind of skills at the stage of each role from above-referenced analysis perspective based on the individual interview data. Especially focused on the relationship between skills and roles generated by the discontinuous career (gap between roles to be played and skills/knowledge), the mechanism of creating values was discussed. The analysis broke each interview into the career transition and categorized the relationship between skills and roles

of work experiences.

V. Results

1. Characteristics of Career Path

The following was found from the analysis of career range and the experiences. The persons who were assigned to research and development (R&D) and product/process management (PRD) departments developed most of their careers within the function. On the other hand, the average number of functions experienced per person who was assigned to other departments is more than two. The average percentage of the longest function of total career for 28 senior managers since joining the company was 84%. This tells, except R&D and PRD departments, that senior managers in House Foods Corporation have crossed between functions and have careers with a main function and secondary functions based on wide-range expertise. That is almost the same as Japanese-style career characteristics. See Table 1 for details. However, the difference from the dogma is that there is a major gap between skills, i.e., personnel transfers to low complementary jobs were not a little observed.

This can be confirmed by the career paths shown in Figure 2. 27 out of 28 senior managers were hired as new graduates and one joined House Foods Corporation after he experienced work in another company for one year. 13 out of 28 were firstly assigned to the sales department. When they were promoted to chief level, 4 moved to different functions. When they were promoted to manager level and to deputy general manager level, 1 and 2 moved to different functions respectively. When they were promoted to general manager level, 2 returned from the marketing department to the sales department. These results show that many of managers begin their careers from the frontline (local branches/sub-branches) and move to other departments after obtaining sales-related knowledge. In addition, new recruits are never assigned to particular functions' departments (marketing, procurement and product development). Such departments are strategically important functions for House Foods Corporation and personnel are assigned to those departments after accumulating work experiences in other departments. Particularly, persons who experienced in the sales and HR department are assigned to the procurement departments, and persons who accumulated advertisement and sales experiences are assigned to the product development department.

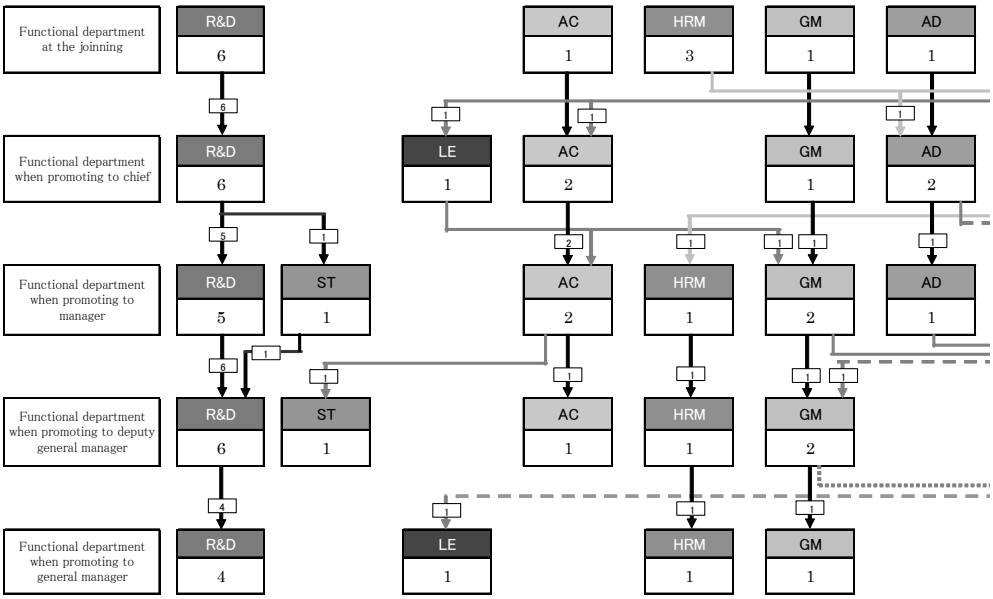
Table 1. Career Tracks of House Foods Corporation's Senior Managers

Present position (length of service)	Duration of experienced functions							
	ST	LE	AC	HRM	GM	AD	MK	SL
ST 1 (26/8)	3/4		23/4					
LE 1 (28/8)		6/6			9/8		1/2	6/11
AC 1 (27/8)			27/1					0/7
HRM 1 (32/7)				29/7				
GM 1 (31/7)					5/4		5/0	11/11
MK 1 (28/6)							9/3	
MK 2 (30/7)							1/7	
MK 3 (29/7)				1/11		23/4	4/4	
MK 4 (28/8)							4/7	24/1
MK 5 (25/7)							3/9	4/11
SL 1 (30/8)							3/0	27/8
SL 2 (30/7)								30/7
SL 3 (29/8)								29/8
SL 4 (29/7)							2/5	27/2
SL 5 (29/7)							6/9	22/10
SL 6 (27/7)				2/11			2/7	2/4
SL 7 (24/8)								24/8
SL 8 (23/7)							1/9	21/10
TR 1 (27/7)					26/0			
PRC 1 (28/7)								6/5
PRD 1 (30/9)								
PRD 2 (29/7)								
P&D 1 (24/9)						13/3		
R&D 1 (30/7)								
R&D 2 (29/1)								
R&D 3 (26/7)	4/0							
R&D 4 (26/8)								
R&D 5 (23/10)								

Notes: 1. ST: Strategic planning, LE: Legal affairs, AC: Accounting, HRM: Human resource management, GM: General management, AD: Advertisement, MK: Marketing, SL: Sales, TR: Trade, PRC: Procurement, PRD: Product/Process management, P&D: Product development, R&D: Research & development, Blank: Not allocated yet.

2. A: ratio of the years of longest experienced function to entire career, B: number of experienced functions, C: ratio of the years in present function including present post to the entire career, D: average A for every function, E: average B for every function.

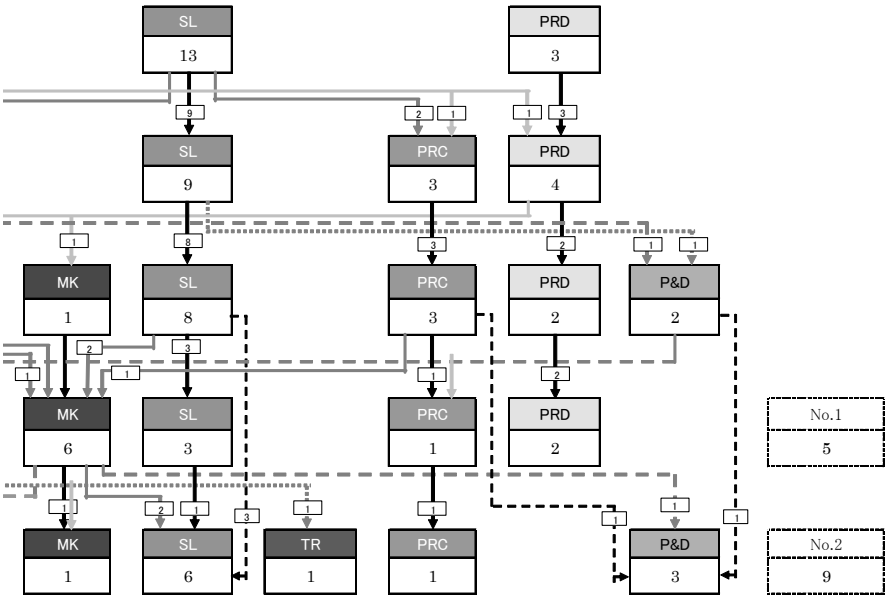
(years/months)						A	B	C	D	E
TR	PRC	PRD	P&D	R&D	Other					
						0.88	2	0.13	0.88	2
					4/5	0.34	5	0.23	0.34	5
						0.98	2	0.98	0.98	2
		3/0				0.91	2	0.91	0.91	2
			9/4			0.38	4	0.17	0.38	4
		15/3	4/0			0.54	3	0.33		
				29/0		0.95	2	0.05		
						0.79	3	0.15	0.75	2.6
						0.84	2	0.16		
	16/11					0.66	3	0.15		
						0.9	2	0.9		
						1	1	1		
						1	1	1		
						0.92	2	0.92	0.9	2
						0.77	2	0.77		
	18/4		1/5			0.66	5	0.08		
						1	1	1		
						0.93	2	0.93		
1/7						0.94	2	0.06	0.94	2
	22/2					0.78	2	0.78	0.78	2
		30/9				1	1	1	1	1
		29/7				1	1	1		
			11/6			0.54	2	0.47	0.54	2
				30/7		1	1	1		
				29/1		1	1	1		
				22/7		0.85	2	0.85	0.97	1.2
				26/8		1	1	1		
				23/10		1	1	1		



Notes: 1. ST: Strategic planning, LE: Legal affairs, AC: Accounting, HRM: Human resource management, GM: General management, AD: Advertisement, MK: Marketing, SL: Sales, TR: Trade, PRC: Procurement, PRD: Product/Process management, P&D: Product development, R&D: Research & development, No.1: Those who were promoted to the general manager without going via a deputy general manager, No.2 not allocated yet.

2. Boxes are 28 senior managers' belonging functions at the times of joining the company, appointed to chief, appointed to manager, appointed to deputy general manager and appointed to general manager.
3. Arrows indicate the paths of personnel relocation between functions.
4. The numeric unit is the number of persons.

Figure 2. Career Paths of House Foods Corporation's Senior Managers


SL
13
PRD
3
SL
9
PRC
3
PRD
4
MK
1
SL
8
PRC
3
PRD
2
P&D
2
MK
6
SL
3
PRC
1
PRD
2
No.1
5
MK
1
SL
6
TR
1
PRC
1
P&D
3
No.2
9

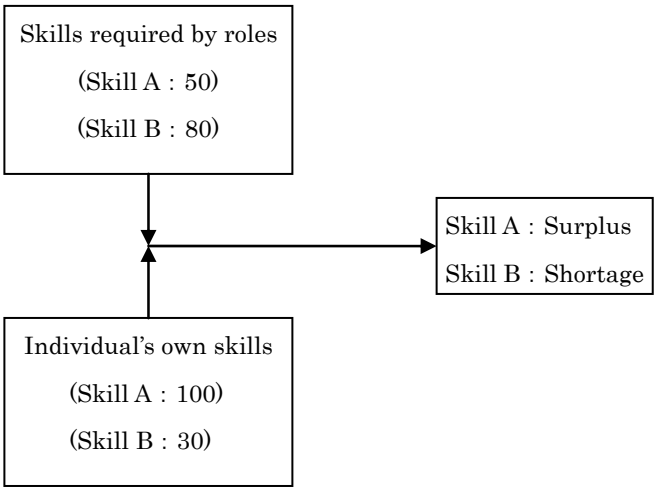


Figure 3. "Surplus" and "Shortage" in the Relationship of Roles and Skills

2. Analysis on Relationship between Roles and Individual Skills

(1) Value-Creation Mechanism

Next, the relationship between roles and skills of individual careers was analyzed. There are two patterns of the relationship. One is when the individual does not have enough skills to play a required role and another one is when the individual has more than enough skills to play a required role. The former is called "shortage" and the latter is called "surplus."

Although surplus and shortage are determined by the relationship between roles and skills, required roles are not just played by one skill. The relationship between skills required by one role and individual own skills may be "shortage," but another relationship between them may be "surplus." Therefore, by using case units, the relationship between skills required by such role and individual own skills can be regarded as a bundle (see Figure 3). The discontinuous career will make a gap between such roles and skills. Some value-creation mechanisms were shown as an effect brought about by such gap. The analysis divided such mechanisms into two as to value-creation types. One is "continuous expansion," another one is "utilization of combination."

(2) Continuous Expansion

"Continuous expansion" is a value-creation type which derives from not discontinuous career but continuous career (personnel transfers among high complementary roles) and tries to play a role more than required. If the relationship between roles and skills is "surplus," the individual can play a strong enough role, and may extend his/her role more than required with the surplus by applying surplus skills to the role (knowledge combina-

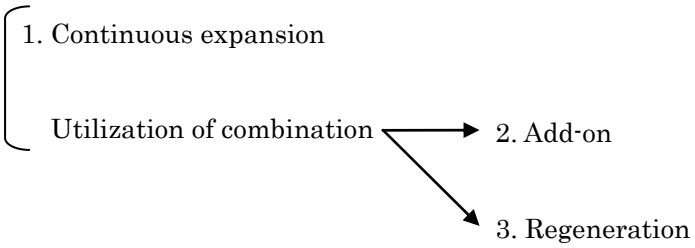


Figure 4. Knowledge Combination Mechanism towards Value Creation

tion).

For instance, Mr. A who has accumulated his career in general affairs and accounting departments was once involved in a project to set up a company-wide accounting information system and was reassigned to the general affairs/accounting department in the branch. Since he carried out a company-wide job and was returned to the original function, he got a broader point of view and undertook various efforts in the branch. Since his supervisor at that time was not familiar with accounting, he was put in charge of many tasks. Under the circumstances, he made the budget planning alone which is usually made through a division of labor in a large branch and compiled the budget in consideration of sales policies, etc. which were never considered before. As in this case, "continuous expansion" is to extend the role utilizing the surplus skills.

(3) Utilization of Combination

"Utilization of combination" is also a mechanism of creating values by using surplus knowledge and skills, but the difference from "continuous expansion" is that the value is created when the surplus skills compensate the shortage of skills. In short, "utilization of combination" derives from discontinuous personnel transfer. Under this mechanism, due to shortage of the required skills, the knowledge is combined by playing the required role using the surplus skills that was originally not necessary for the role, and a new value which was not generated in the previous role may be created. The utilization of combination can be divided into "add-on role (add-on)" and "regeneration of the existing role (regeneration)."

(4) Add-On

"Add-on" is to add values which never existed in the previous roles or jobs. Examples of add-on include the following: Mr. B in the procurement department for packing materials changed the shape of 2-liter PET bottle for drinking water from cylindrical to square for the first time in the industry. The reason why he did so was because a square bottle just fits the storage space of the refrigerator at home. Why did Mr. B get an idea of such shape? Mr. B experienced sales for a general merchandising store at the local sub-branch for six years. He

learned a lot about the importance of sales focused on not only price but also quality and customer value creation (House Foods Corporation's corporate culture) there. Then he was assigned to the procurement department for raw materials for eight years and after that he was assigned to the procurement department for packing materials. Although the personnel transfers from raw materials to packing materials was within the same procurement department, it was very rare discontinuous personnel transfers sine completely different skills are required. Mr. B combined and added the power to imagine the consumption scene of company's products cultivated when he was a salesman and skills to collaborate with business partners over a long period of time with the role of procuring packing materials. Although it was technically difficult to form a square shape since a PET bottle is formed by injecting air into it, as the result of trial and error with a can manufacturer, he succeeded in developing a square PET bottle and made a substantial contribution to increased sales.

(5) Regeneration

"Regeneration" is a mechanism of knowledge combination to play a required role in a completely different manner (mental program cultivated by the previous career) not adding or utilizing knowledge or skills to the existing role.

After college, Mr. C worked for a commercial production company for one year and moved to House Foods Corporation. Since then he carried out advertising work for 13 years, and was assigned to the product development department in charge of main products of House Foods Corporation. These main products had maintained more than 60% of shares and dominated the market. Therefore, the company had not released a new product for 10 years for fear of going against the Antimonopoly Act, and the measures for competition was to review the prices of existing products and the merchandising. Accordingly, the idea of moving the product out tended to be strong inside the company. It just so happened that when Mr. C was assigned to the product development department, one competitor released a new product and took a market share of 10% in the short term. Under the circumstances, Mr. C analyzed the market using knowledge on the interface between products and consumers which were cultivated when he carried out the advertising work and knowledge of the marketing and strategies obtained by self-education. Then he realized that the competing product met customer needs in which House Foods Corporation's existing products could not, and suggested the need for the development of a rival product to upper management. After obtaining approval from them, he released a new product in the short term utilizing the power of market research and concept development capability of a leading advertisement agency cultivated when he carried out the advertising work. This product became a huge hit and he succeeded in suppressing competitor's new product. This shows that new knowledge and technologies based on a customer's perspective were brought from different departments against the role of conventional idea of moving the product out and the role itself was reviewed from its very foundation.

VI. Conclusion—Meaning of Analysis Results

This paper proposed a new framework which explains a value-creation effect on the organization brought about by Japanese-style career system. For that purpose, we focused on the relationship between roles and skills at that time (surplus and shortage) in individual career paths and analyzed the value-creation mechanism brought about by it. From the data analysis, a mechanism, knowledge combination, was found and its three patterns, continuous expansion, add-on and regeneration are shown. Based on this framework, we would like to discuss from three perspectives:

1. Japanese-Style Career System as Knowledge Combination Equipment

For Japanese-style career, it was previously explained that personnel transfers to high complementary jobs brings about a benefit called efficiency to the organization based on the intellectual skill theory. That is, "wide-range career development → intellectual skills → improved efficiency," in other words, "personnel transfers → learning (obtaining inference ability of exceptions by understanding the whole process) → performance (improved capability to solve problems) hypothesis" was the only hypothesis and actual proof to explain the rationality of Japanese-style career system. Under this relationship, personnel transfers to high complementary jobs are only rational. However, according to the relationship, "wide-range career development → knowledge combination → value creation" in which we insist, the hypothesis to explain the rationality of Japanese-style career system will be "personnel transfers → utilization of surplus knowledge (decline in additional learning cost) → performance (review and reform of roles by various mental models)." In this case, personnel transfers to low complementary jobs which appear deceptively irrational lead to value creation. Japanese wide career system which puts personnel through more than one function has a functionality to bring about more new or similar knowledge/skills to this role continuously, encourages changes in the role and create a new value.

2. HR Department as a Leader of Value Creation

The survey results show the presence of Japanese companies' power of corporate changes which is different from that of Western management style which considers all as strategy sources. It means that personnel departments continuously encourage the development, accumulation and utilization of internal resources all over the company through the career system, and the innovation will be made through the emergent process.

In fact, the HR department of the headquarters of House Foods Corporation is deeply involved in this value-creation process. It is carried out through annual regular personnel transfers (every April) in which the HR department demonstrates its initiative. In this company, the HR department comes up with a personnel transfer proposal every November based on requests on personnel transfers from officers in charge and department managers. All personnel transfers are announced by the general manager of HR department of the

headquarters (board approval is required for manager or higher posts). The reason why personnel transfers is regularly made is because when the time of personnel transfers is unified company-wide, the population of candidates and posts targeted for personnel transfers becomes large and the options of knowledge combination increase.

Employees' personnel information is centralized in the HR department for adequate personnel transfers. The contents and routes of information gathering include many things such as self-assessment system, career interviews with employees by the HR department and career interviews with managers and employees. The HR department of the headquarters discerns individual employees' vocation and potential capacity and makes an inference how they connect to a new role.

The framework of the personnel ranking system of House Foods Corporation is basically a job performing ability-based grade system with 12 grades. The promotion system is based on personnel evaluation whether ability improves as time advances and is one by one.[6] The job performing ability is evaluated by two elements, "work performance" and, this is a unique perspective of House Foods Corporation, "human capacity" (behavior, attitude, leadership, personal magnetism, etc. required for work). Therefore, the evaluation for promotion is not based on the performance for the predetermined target but the ability evaluation is translated into the ex-post assessment of newly created value (extension of work performance and human capacity). The HR department is also involved in the determination of personnel to be promoted. That is, characteristics of House Foods Corporation are exactly that of Japanese-style career system which combines wide-range career development, job performing ability-based grade system (role grade system for manager or higher posts) and a strong HR department. Our research, therefore, confirmed that Japanese-style career system functions as a system which motivates members in the organization to combine knowledge and create values, although there is only one company sample.

3. Remaining Issues

Finally, we touch on the limit of this paper and future research. This paper searched for positive significance of the gap between roles and skills. Since senior managers were surveyed and they have achieved relatively satisfactory performances, any negative aspect provided by such gap was not found. However, it is highly likely that surplus and shortage create waste of human resources, delay of personnel development and slumber of organization capability. How should continuous and discontinuous personnel transfers be arranged as a practical management i.e., how to combine "intellectual skills - efficiency" with "knowledge combination - value creation?" In order to get an answer, it is necessary to further explore the requirements in the case whether the latter functions effectively or not. It is

[6] Since 2004, based on this system as a framework, the grade system for manager or higher posts is called role grade, standard annual earnings reflecting market rates by grade are determined, pay raise by age is abolished and job size is reflected in the standard of grade.

also required to analyze what kind of personnel information parameters the HR department involved in discontinuous personnel transfers collects and processes to forecast "knowledge combination - value creation" and the accuracy of such parameters. These are future research issues.

References

Aoki, Masahiko. 1988. *Information, incentives and bargaining in the Japanese economy*. Cambridge, NY: Cambridge University Press.

———. 1989. *Nihon kigyo no soshiki to joho* [The organization and information of the Japanese firm]. Tokyo: Toyo Keizai Shinposha.

Becker, Gary S. 1964. *Human capital: A theoretical and empirical analysis, with special reference to education.* National Bureau of Economic Research Series, no. 80. New York: National Bureau of Economic Research.

Cappelli, Peter. 1999. *The new deal at work: Managing the market-driven workforce*. Boston, MA: Harvard Business School Press.

Gibbons, Robert, and Kevin J. Murphy. 1992. Optimal incentive contracts in the presence of career concerns: Theory and evidence. *Journal of Political Economy* 100, no. 3:468-505.

Hayek, Friedrich A. 1945. The use of knowledge in society. *American Economic Review* 35, no. 4:519-30.

Hirano, Mitsutoshi. 2006. *Nihon-gata jinji kanri: Shinka-gata no hassei prosesu to kinosei* [Japanese human resource management: Its emergent process and functionality]. Tokyo: Chuo Keizaisha.

Imada Sachiko, and Shuich Hirata. 1995. *Howaito kara no shoshin kozo* [Promotion structure of white-collar workers]. Tokyo: The Japan Institute of Laour.

Inoki, Takenori. 2002. Howaito kara moderu no riron teki fukumi [Theoretical implications of the white-collar model]. In *Howaito kara no jinzai keisei: Nichi Bei Ei Doku no hikaku* [A comparison of personnel development among white-collar employees in four countries: Japan, Germany, the United Kingdom and the United States], ed. Kazuo Koike and Takenori Inoki, 15-34. Tokyo: Toyo Keizai Shinposha.

Ito, Hideshi. 1994. Japanese human resource management from the viewpoint of incentive theory. In *The Japanese firm: Sources of competitive strength*, ed. Masahiko Aoki and Ronald Dore, 233-64. Oxford, New York: Oxford University Press.

Jacoby, Sanford. M. 2005. *The embedded corporation: Corporate governance and employment relations in Japan and the United State*. Princeton: Princeton University Press.

Japan Institute of Labour. 1998. Kokusai hikaku: Daisotsu howaito kara no jinzai kaihatsu koyo shisutemu: Nichi, Bei, Doku no daikigyo (2) Anketo chosa-hen [International comparison: Personnel development and employment systems for college-educated white-collar employees in Japanese, German and U.S. Companies (2) Questionnaire survey]. JIL Research Report, no. 101. Tokyo: The Japan Institute of Labour.

Koike, Kazuo. 1994. Learning and incentive systems in Japanese industry. In *The Japanese firm:*

Sources of competitive strength, ed. Masahiko Aoki and Ronald Dore, 41-65. Oxford, New York: Oxford University Press.

———. 2002. Mondai, hoho, imi [Problems, methods and meanings]. In *Howaito kara no jinzai keisei: Nichi Bei Ei Doku no hikaku* [A comparison of personnel development among white-collar employees in four countries: Japan, Germany, the United Kingdom and the United States], ed. Kazuo Koike and Takenori Inoki, 15-33. Tokyo: Toyo Keizai Shinposha.

———. 2005. Shigoto no keizaigaku [The economics of work in Japan]. 3rd ed. Tokyo: Toyo Keizai Shinposha.

Otake, Fumio, Shinya Ouch, and Ryuich Yamakawa, eds. 2002. Kaiko hosei wo kangaeru: Ho to keizaigaku no shiten [Dismissal regulation in Japan: Legal and economic perspectives]. Tokyo: Keiso Shobo.

Rosenbaum, James. E. 1984. *Career mobility in a corporate hierarchy*. Orlando, FL; Tokyo: Academic Press.

Sato, Hiroki. 2002. Kyaria keisei to noryoku kaihatsu no Nichi Doku Bei hikaku [A Comparison of Career and Skill Development among White-Collar Employees in Japan, Germany, and the United States]. In *Howaito kara no jinzai keisei: Nichi Bei Ei Doku no hikaku* [A comparison of personnel development among white-collar employees in four countries: Japan, Germany, the United Kingdom and the United States], ed. Kazuo Koike and Takenori Inoki, 249-67. Tokyo: Toyo Keizai Shinposha.

JILPT Research Activities

International Workshop

The JILPT held a research workshop under the theme "Work Sharing: Economic Crisis and Policy Responses in Korea and Japan" in cooperation with the Korea Labor Institute (KLI) on June 9 in Seoul, Korea. The submitted papers will be published and are scheduled to be posted on the JILPT website. The list of Speakers and submitted papers are as follows:

Kazuya Ogura, JILPT, *Current Situation and Future Challenges on Work Sharing in Japan.*
Changwon Lee, KLI, *Directions for Developing Labor Policy through Work Sharing in Korea.*
Hirokazu Fujii, JILPT, *A Policy Argument on Work Sharing in Japan.*
Heon Hyeog Ha, KLI, *Cases of Work Sharing: Current Situation and Policy Challenges in Korea.*

Research Reports

The findings of research activities undertaken by JILPT are compiled into Research Reports (in Japanese). Below is a list of the reports published from December 2008 to February 2009. The complete text in Japanese of these reports can be accessed from the JILPT website.* We are currently working on uploading abstracts of reports in English onto the JILPT website as well.

Research Reports

No.109 *Continued Working at the Time of Childbirth and Child Care and Child-Care Leave—Centered on Comparison between Large Enterprises and Small and Medium-Sized Enterprises* (May 2009)
No.108 *Job Search and Transfer Process of Provincial Youth* (May 2009)
No.107 *Action Researches on Career Counseling* (May 2009)
No.106 *Research and Studies on Diversity of Workplaces and Working Time* (May 2009)
No.105 *Retirement and Reemployment at the Time of Marriage, Childbirth and Child Care—Women's Career Development and Issues* (May 2009)

Discussion Papers

DPS-09-04 *Career Development and Career Guidance for Adults—Considerations Centered on a Preliminary Analysis on Lifeline Method* (May 2009) Hideo Shimomura
DPS-09-03 *Thinking of Potential of Career Development for Registered Temporary Workers—From Preceding Research Surveys and Enterprise Case Researches* (May 2009) Akiko Ono
DPS-09-02 *Reality of Interregional Labor Transfer by Attribute—Focused on Transfers between Urban Areas and Countryside* (May 2009) Go Otani

DPS-09-01 *Analysis on Difficult Situations of Career Counseling* (April 2009) Kimiko Nishimura, Jun Kayano

Research Series

No. 53 *Research on Employment System and Personnel Strategy (Surveyed in 2007)* (April 2009)

No. 52 *Basic Findings for Considerations on Changing Wage and Employment Systems and Male-Female Wage Disparities—"Survey on Enterprises' Wage and Employment Systems" and "Poll of Labor and Management Leaders"* (March 2009)

Research Material Series

No. 55 *Survey on Users of an Individual Labor Dispute Prevention and Resolution System Outside Company* (June 2009)

No. 54 *Research on Revision of Occupation Classification I—Centered on Reviews of Subclassification Items* (April 2009)

No. 53 *Comparison of Performance-Based Pay Systems between Japan and Korea* (April 2009)

No. 52 *Employment Policies in Two Ageing Societies: Japan and Finland Compared* (March 2009)

No. 51 *Construction of a Vibrant and systematical Human Resources Market: Seventh Northeast Asia Labor Forum* (January 2009)

No. 50 *Minimum Wage System in Europe and the United States* (January 2009)

*JILPT website: http://www.jil.go.jp/english/index.html

Japan Labor Review Order Form

The Japan Labor Review is published four times a year and is free of charge.
To receive the Japan Labor Review on a regular basis, please fill out this form and fax to the Editorial Office at : +81-3-3594-1113.
(You can also register via our website: http://www.jil.go.jp/english/JLR.htm)

NAME: Mr. / Ms.

TITLE:

ORGANIZATION:

ADDRESS:

ZIPCODE: COUNTRY:

TEL: FAX:

EMAIL:

Soliciting Your Opinions

To improve the contents of the Review and provide you with the most useful information, please take the time to answer the questions below.

What did you think of the contents?
(Please check the most appropriate box.)

☐ Very useful ☐ Useful ☐ Fair ☐ Not very useful ☐ Not useful at all

(If you have additional comments, please use the space below.)

What issues do you want the Review to write about?

❖ If you wish to unsubscribe the Japan Labor Review, please send an e-mail to jlr@jil.go.jp placing the word “remove” in the subject line.

The Japan Institute for Labour Policy and Training