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Résumé de l'article

Les pratiques de gestion de l'emploi dans les entreprises françaises et japonaises ont longtemps été caractérisées par la prédominance des marchés internes du travail. Le contexte démographique mais également des réductions de personnel récurrentes obligent ces entreprises à revoir leurs principes de gestion de la main d'oeuvre. Comment le contexte économique et démographie affecte le processus de transfert de compétences conçu et mis en oeuvre par ces entreprises ? Le papier est une analyse comparative des dynamiques de transfert de compétences dans l'industrie électrique en France et au Japon. Nous mettons en évidence une tendance commune vers la formalisation du processus de transfert de compétence et la déconnection entre les activités de travail et les procédures de transfert de compétences.



Dynamics of Skill Transfer Procedures in the Electrical Industry: a comparative study in France and Japan¹

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Transformación de las prácticas de transferencia de competencias en la industria eléctrica: un análisis comparativo Francia – Japón

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ABSTRACT

French and Japanese firms have been characterised by peculiar employment systems and HR practices, and the dominance of Internal Labour Markets. The demographic context but also successive employee reductions oblige firms to adapt their HR practices and carry out changes. How do these changes of the demographic and economic context affect the process of skill transfer? This paper is a comparative analysis of the dynamics of skill transfer in the electrical manufacturing industry in France and Japan. We underline a common trend toward a formalization of skill transfer procedures and the disconnection between work activities and skill transfer.

Keywords : Skill transfer, Internal labour markets, Japan, France, Electric Industry

RÉSUMÉ

Les pratiques de gestion de l'emploi dans les entreprises françaises et japonaises ont longtemps été caractérisées par la prédominance des marchés internes du travail. Le contexte démographique mais également des réductions de personnel récurrentes obligent ces entreprises à revoir leurs principes de gestion de la main d'œuvre. Comment le contexte économique et démographie affecte le processus de transfert de compétences conçu et mis en œuvre par ces entreprises ? Le papier est une analyse comparative des dynamiques de transfert de compétences dans l'industrie électrique en France et au Japon. Nous mettons en évidence une tendance commune vers la formalisation du processus de transfert de compétence et la déconnexion entre les activités de travail et les procédures de transfert de compétences.

Mots clés : transfert de compétences, marchés internes du travail, France, Japon, Industrie électrique

RESUMEN

Las prácticas de gestión del empleo en las empresas francesas y japonesas se han caracterizado por el predominio de los mercados internos de trabajo. El contexto demográfico y los frecuentes recortes de personal obligan estas empresas a revisar sus principios de gestión de la mano de obra. ¿Cómo el contexto demográfico y económico afecta el proceso de transferencia de competencias (diseñado e implementado por estas empresas)? Este artículo es un análisis comparativo de las dinámicas de transferencia de competencias en la industria eléctrica en Francia y Japón. Destacamos una tendencia común hacia la formalización de los procedimientos de transferencia de competencias y la desconexión entre las actividades laborales y los procedimientos de transferencia de competencias.

Palabras claves : Transferencia de competencias, mercados internos de trabajo, Francia, Japón, industria eléctrica

Knowledge is increasingly regarded as a critical resource of firms and economies (Drucker, 1993). The competitive advantage depends increasingly on the capacity of firm to acquire knowledge and to capitalize and to transform it into critical skills (Teece and al., 1997; Hamel and al., 1989).

Organizations must create procedures and mechanisms to activate permanent organizational learning processes and skill transfer. However, the skill transfer process doesn't concern only high tech firms where skills are a specific resource and the base of the competitive advantage.

1. Editor and reviewers for *International Management* provided very helpful comments on the draft first submitted. The authors have bene-

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Moreover, in the context of an ageing workforce, with the massive retirement of the baby-boom generation, the skill transfer process is becoming an increasingly crucial activity for firms to maintain a level of quality in the production process. In this case, the skill transfer process is viewed as an intergenerational process closely linked to the age management of the firm.

This question of skill transfer in an ageing context is particularly crucial in France and in Japan. Indeed, French and Japanese firms have been characterised by the peculiar employment system and HR practices, and the dominance of Internal Labour Markets (Doeringer and Piore 1971). Organizations define their own work systems which tend to favour long careers, internal mobility and training. The demographic context but also successive employee reductions oblige firms to adapt their HR practices and to carry out some changes. In the context of a weakening of these employment systems, the aging the workforce and the reducing the workforce, how have these companies changed their practices of skill transfer? How do these changes of the demographic and economic context affect the process of skill transfer?

This paper aims to investigate and make a comparative analysis of the dynamics of skill transfer in the electrical manufacturing industry in France and Japan, taking into account the differences between the two countries in terms of human resource management systems.

Problems of skill transfer accompanying the mass retirement of expert workers currently poses a critical challenge for major electrical manufacturers in both France and Japan. The background, against which this problem arises, however, differs greatly between the two countries. Electrical manufacturers in Japan face a dearth of younger full employees as a result of cost-cutting measures such as the moving of production bases overseas and increased recruitment for non-regular workers. These were the circumstances under which expert workers began to retire, posing severe difficulties for skill succession. This became a particular problem when it was expected that a large number of expert workers would leave work without having adequately passed on their skills in 2007, when the post-war baby boom generation (born 1947-49) reached the retirement age of 60. This is known as the “2007 problem” in Japan. Beginning in the early 2000s, however, many workplaces implemented initiatives with the aim of retaining the skills of expert workers in the workplace in order to prepare for the 2007 problem. We will present some of these in this paper. At the same time in Japan, the age of eligibility for the public pension is gradually being raised from 60 to 65, ostensibly due to pressures from the aging population on pension financing. The mandatory retirement age in Japanese companies is usually 60, because that was formerly the age of eligibility for public pensions. The government is encouraging continued employment for workers until 65 years of age, and re-employment of retiring

workers is occurring in response, mainly in large corporations. While pension scheme members can presently receive a partial pension while aged between 60 and 65, from 2025, they will no longer be eligible for any payments until the age of 65. For this reason, the government has been calling on companies to secure worker employment until the age of 65, and re-employment schemes for older workers have gained in popularity, mainly among large corporations.

On the other hand, France, like many other countries of continental Europe, instated the public policy of motivating older people to exit the labour market through early retirement payments, in response to rising unemployment rates in the 1980s. Due to this background, the encouragement of early retirement for older workers as a means of labour adjustment is a common workplace practice, resulting in the problem of older, expert workers leaving the workplace during recession periods, impeding skill transfer. At the same time, however, early retirement of older workers did not lower the unemployment rate, and simply resulted in an increased financial burden on the state from their early retirement payments. For this reason, the current challenge is rather to prevent the early retirement of older workers. The eligibility age for public pensions in France is to be raised from the current 60 to 62 by 2018, and the age of full eligibility from the current 65 to 67 by 2023. The government has embarked on policies to promote the employment of older people, but firms are still planning the early retirement of older people.

In this research paper, we will present the efforts being made in workplaces within the electrical industry in Japan and France, where skill transfer presents a challenge due to the retirement of skilled workers. It is assumed that the electrical industry has supported more expert workers than other manufacturing industries, and thus faces a more serious problem in skill succession.

The corporations where we conducted our research - two based in Japan, and one in France - are three major electrical manufacturers who are representative of their respective countries, being diversified electrical manufacturers with products ranging from domestic appliances to heavy machinery.

Theoretical analysis: skill transfer procedures and age management

Some authors have proposed different models of the skill transfer process. Nonaka and Takeuchi propose a model of the knowledge creating and transferring process in order to understand the dynamic nature of knowledge creation, and to manage this process effectively. There is a spiral of knowledge involved in their model, where explicit and tacit knowledge interact with each other in a continuous process (Nonaka and Takeuchi, 1995). Szulanski analyses Best Practices of several firms and theorizes a transfer process composed of different steps (Szulanski, 2000). This

analysis especially points out the nature of both the sender and receiver (skills background, motivation for the transfer, etc.), the nature of the knowledge (individual vs. collective, tacit vs. codified), the forms of the knowledge process (oral, written, etc.) and the organizational memory (Weick, Roberts, 1993) as the collective tacit knowledge present in the organization.

The knowledge management literature attempts to identify the conditions of skill transfer. The process is viewed as an inter-individual interaction between a sender and a receiver within an organizational context. The skill transfer process also depends on organizational forms and the strategic and competitive context in which firms are embedded. Numerous studies on the learning organisation emphasise the structure of the firm is an important feature to bring about the learning organisation (Nonaka & Takeuchi, 1995). In particular, the way people are managed – selected, trained, rewarded and retained – is crucial to activate skill transfer process.

SKILL TRANSMISSION PROCEDURES : THE ROLE OF SKILL ORGANIZATION AND THE EMPLOYMENT SYSTEM

The learning process and skill transfer is highly dependent on the nature of the skilled workers concerned, the organisation they belong to and the employment system in place. Consequently, different models for the skill transfer process may exist depending on these different criteria.

Lam proposed a coherent conceptual framework integrating micro-level learning activities with organizational forms and macro-level institutions (A. Lam, 2000). Lam argues that “*the nature of knowledge and expertise, its distribution and ownership, and patterns of utilization within the firm are closely interconnected with the way work is organized and coordinated, which in turn is shaped by different societal models of skills formation, labor markets and career systems*” (1997, p. 975). According to this author, three major parameters determine the nature of knowledge and skill transfer: the dominant form of knowledge in use and its degree of ‘tacitness,’ the structure of the organization of skills within the firm and the method

of coordination and knowledge transmission. Lam’s empirical study is based on a comparison between Japanese and British firms, which represent two different forms of organization and skill transfer procedures.

The organizational model is closely connected with the existence of an internal labour market where skills are mainly formed through firm-specific on-the-job training on a long term basis. The learning principles are similar to those of apprenticeship, where individuals accumulate skills through learning by doing. This “knowledge by experience” (Nonaka, 1994) is highly ‘tacit’ and context bound. The organization of work and skills requires being flexible with broad job boundaries. Job rotation thus gives opportunities to develop a large set of tasks and skills. Skills organization makes possible the diffusion of skills and knowledge collectively, according to job rotation and work mobility. Skill transfers are therefore closely connected to job rotation, work without formal initiatives, but are human-network based.

The professional model is commonly associated with the existence of an external labour market. The main method of skills formation and transmission is through formal education and training. This refers to ‘knowledge of rationality’ (Nonaka, 1994) and tends to be more abstract and standardized. Regarding the organization of work and skills, the professional model is based on the individual level with a high degree of specialization and on the promotion and exploitation of particular talents. Consequently, skills and knowledge are stored in the individual “experts.” Skill transmission is based on the systematic codification of individual knowledge into an explicit form. It becomes necessary to develop systems for abstracting knowledge from the individuals and translating it into formal procedures accessible to a wider circle of individuals. The skill transfer process becomes in this case a specific and distinct activity of HRM and local managers. Skill transfer is disconnected from work activities.

Nature of knowledge	Knowledge of rationality	Knowledge of experience
Organization of knowledge	Individual specialization and job differentiation	Flexible and fluid utilization of skills and knowledge
Method of coordination and knowledge transmission	Systematic codification of individual knowledge into an explicit form	Transfer through mutual adaptation among members with common knowledge and shared implicit coding schemes accumulated through group interactions.
	Professional model	Organizational model

SKILL TRANSFER PROCEDURES IN FRANCE AND JAPAN AS IDEAL-TYPES OF THE ORGANIZATIONAL MODEL OF SKILL TRANSMISSION AND AGE MANAGEMENT

Employment systems in both France and Japan have been characterized by the importance of internal labour markets (Doeringer, Piore, 1971, Nohara, 1999, Koike, 1986, Rebeck, 2005) and the organizational model of creation and transmission of knowledge and skills described by Lam (Lam, op. cit.). In both cases, the wider literature describes stabilized HR practices in a long term perspective based on age criteria.

More precisely, Japanese and French companies tend to recruit young people who have just finished their education, and who have no experience of work, as full employees, and give them thorough in-house skill training once they have joined the company. Mid-career recruitment of experienced workers is not very widespread in larger corporations, where even mid-career recruitment of engineers who can be expected to have cross-company skills is infrequent.² Not only engineers but all workers who have been hired as full-time employees, including those directly involved in manufacturing processes (skilled labourers), are given a long period of education and training within the company. It is assumed that companies carry out lengthy education and training programmes on the premise of stable employment, and recoup the costs of this training over a long period.

According to the two different institutional contexts³, the renewal of the workforce is carried out by an organized substitution of old by young. In France in particular, the substitution is supported by public procedures and devices in favour of the early retirement of the oldest senior employees. This employment system has many advantages: for the company, it allows for anticipation in the employment structure and the early conception of initiatives for skill transfer. For trade unions, it is coherent with a strategy of stabilizing the level of employment.

Consequently, skill transfer initiatives are designed on coherence with the organizational model, the promotion of knowledge by experience through a horizontal mobility of workers. Skill transfer traditionally took place naturally over the course of the in-house education of young employees. At that time, it took the form of informal one-on-one exchanges at the workplace level. The diminution of productivity due to these exchanges was taken into account in a coherent way over the whole employment system. Skill transfer was designed in a collective way, taking into account the age distribution of the company's work force.

2. In the same way, head-hunting of high-calibre engineers from other companies is nearly non-existent. The background to this is that major Japanese electrical industry companies have historically taken the route, when strengthening their activities in specific fields, of spinning off relevant divisions into separate companies and merging them with

THE CONTRIBUTION OF THE PAPER: THE NEW DYNAMICS OF THE ORGANIZATIONAL MODEL OF SKILL TRANSMISSION IN AN UNCERTAIN MACROECONOMIC AND DEMOGRAPHIC CONTEXT

French and Japanese employment systems (and especially those of large industrial firms) have been defined by the predominance of Internal Labour Markets where age and tenure are the basis of the HRM practices. HRM practices are designed in order to take into account the age distribution of the workforce in a mid-term perspective. It thus contributes to the building of a stable and coherent model, based on the capacity of firms to anticipate and to design a long-term strategy.

Our objective is to consider these two employment systems in 3 industrial case studies in a unstable environment where the capacity for firms to anticipate has been altered.

We specially consider the demographic and economic contexts. Indeed, demographics and economics must be integrated into the comprehension of organizational forms of skill transmission and employment systems. In both countries, firms face new competitive challenges which contribute to a modification of the employment strategies. In the electrical industry,⁴ production bases moving overseas and fluctuations in the economy over a long period have had the effect of suppressing new recruitment, particularly of workers in operational divisions. As a result, the age distribution of skilled personnel has become skewed, and worker population is aging. This has impeded skill succession. From 2000 onwards, faced with the imminent mass retirement of the baby-boom generation, companies came up against the problem of ensuring skill succession, and set out to resolve the challenge.

The specific question we wish to ask is whether change in how firms organise their skill transfer is the symptom of the transformation of employment system and HR practices. In a context of the weakening of these employment systems, an aging workforce and a declining worker population, how these have companies changed their practices of skill transfer? How have these changes in the demographic and economic context affected the process of skill transfer? Are we witnessing the transition to a more professional model or are firms managing to change the organizational model incorporating the new requirements?

Employment adjustments and initiatives for skill transfer in the Japanese case

Since World War II, Japanese employment has been built on a strong coherence principle between the industrial system and the employment system. Japan has concentrated its

relevant divisions of other companies to form joint ventures, rather than directly picking out human resources from competitors.

3. A different kind of intervention by public authorities which takes a more direct form in the case of France.

Methodology

The paper presents the results of the Comparative Research Programme NEW DYNAM regarding the new dynamics in age and gender management in labour markets in France and in Japan. Empirical analysis has been done by the two authors, in their own countries, using the same methodology. At the level of the firm, our main focus is on the modalities of skill transfer organized by these companies (past and present), the demographic situation of the company and the specific procedures used in age management. We also considered it important to include in our analysis the institutional context and especially the evolution of public policies linked to the questions of aging, skill transfer and retirement.

However, it is not always possible to carry out empirical work in a symmetrical fashion. Indeed, French and Japanese companies are embedded in a societal context that shapes the relation between actors as well as the nature and the function of actors the researchers meet. For instance, Trade Unions are in Japan an important and real participant in HRM. The boundaries between HRM offices and Trade Unions are quite difficult to establish, at the level of the firm. In large firms, the rate of unionism is very high. In France, the managerial power of Trade Union is less important. Moreover, Japanese companies used to ask to researchers the thematic and the questions before the visit in order to bring documents, tools and to prepare the visit. In both Japanese cases, companies organized a visit for us dedicated to the thematic of age management and skills transfer. In France, the exchange between the researcher and the actors of the firm were one-to-one meetings, that were recorded and transcribed.

The societal construction of the organizations must be also taken into account during the research process and we try to build the research design in order to make it comparable. (Maurice, Sorge, 2000)

Company J-A and Company J-B are Japanese companies, Company F is a French company. The research was conducted during 2010 and 2011, through interviews with the personnel department and trade union in Company J-A, and the personnel department and managers in operational divisions in Company J-B. For the French case, the research was conducted in 2011, and the research material is composed of interviews with HR managers and Trade Unions, and an analysis of internal documents (employee data and agreements concluded between the company and trade unions).

industrial activities in several big national firms specialized in different industrial sectors and highly interdependent. (Maurice, Nohara, 1999) These large firms were strongly integrated to the financial economy in order to get better access to the credit market. This industrial organization has been built on a peculiar employment system based on age and seniority that allows a collective and intergenerational management of employees. Many of the skills that are needed in the company are highly specialized and require a great deal of in-depth training.

Firms used to hire each year a cohort of new graduates, with no particular skill specification. The firm took charge of the learning process, in accordance with the firm's needs. The allocation of work positions was only carried out after this first step. It is unlikely that generalists moving between departments would be able to master their briefs in the short period of 3 years that is typical of many job rotation schemes. Under this system, after an initial period in which all employees follow the same career path, there are several different career paths that one can take in the firm, rather than just a single general career path. During the first ten years of their career, employees are relatively low-paid and they may have to wait longer for promotion. The older employees are the most experimented and they are naturally the ones who oversee the learning process

of younger employees. Wage payments in large firms are made primarily on the basis of age and seniority. The older - and less productive- employees were better paid, to reward their loyalty to the company, but also their skill transfer activities. Careers finished with the retirement pension at 60. This age management can be seen as a fluid rotation system: the learning process is based on specific needs, by the more experienced workers on-the-job training, retirement at 60 allows a massive recruitment of young workers.

Starting in 1990 and during the "lost decade"⁵, both competitive and demographic contexts obliged firms to renew the basis of these HR practices. Japanese firms were very dependent on their economy and they could no longer benefit from a significant growth rate. Many companies reduced the size of their workforce considerably, by cutting back on the hiring of new employees, early retirement schemes and workforce reduction by downsizing. Moreover, the ageing of the population and especially of the workforce obliged firms to renew their practices of skill formation, promotion and compensation. Faced with these difficulties, the challenge for firms has been to find solutions for the transfer of specialized skills in a context of transformation of employment rules.

5. It is now common to refer to this period from 1992 to 2004 as the lost decade, reflecting the loss in potential growth over this period caused by the Japanese asset price bubble.

THE ADJUSTMENT MEASURES AFTER THE LAST DECADE AS A FACTOR OF DESTABILIZATION OF OLD PRACTICES

Company A and B are both large Japanese firms operating in the electrical sector. They are the historical leaders of electrical industry in Japan. Company J-A was founded in 1921 and in 2010 had a market capitalisation of ¥175.8 billion. Its main activities are the manufacture and distribution of various devices, including heavy electrical systems (e.g. nuclear power plant equipment and elevators), industrial automation machinery (e.g. laser processing machines), information and communication systems (e.g. broadcasting equipment, satellites), electronic devices (e.g. power modules), and home appliances (e.g. LCD televisions, room air conditioners). Company J-B, founded in 1910, is Japan's largest electrical manufacturer. Our research interviews were conducted at Workplace b, a manufacturing site for electrical power systems. Workplace b mainly manufactures power generation facilities, supplying its products to power companies. Fossil fuel and nuclear power facilities make up 80% of its turnover.

As with most industrial activities in Japan, the 90's, when the Japanese economy entered a slump period, implied a reconfiguration of employment systems and adjustment procedures.

TABLE 1
Evolution of workforce – Company J-A

	Consolidates basis	Un-consolidates basis (parent firms)
1989	90 000	47000
2009	110 000	28 500
2010	109 565	28525

Source: Materials from Company J-A personnel department

In the case of company J-A, employment was adjusted by reducing the workforce in subsidiaries and related companies. Consolidated employees increased from just under 90,000 in 1989 to just under 110,000 in 2009, while the parent number decreased from over 47,000 in 1989 to 28,500 in 2009 (table 1). The decentralization of employment allowed the preservation of the firm's core internal market.

The economic difficulties implied a change in the nature and the number of new recruitment, but only in the short term. Indeed, as we see in figure 1, the number of newly-hired employees decreased strongly in 2003 and 2004. In 2005 and subsequent years, the level new recruitment increased again, reaching a higher level in 2011 than in 2002. By observing the nature of recruitment, while

many of Japan's diversified electrical industry companies have been limiting recruitment in operational divisions, the number of engineering personnel has been maintained by continuous new recruitment in this category. However, skilled employees have been used as an adjustment tool. From 2005, the number of newly-hired skilled employees increased while the number of engineers tended to decrease, by a substitution effect. In recent years it has taken on around a thousand new graduates each year, of which around half of them were engineering personnel, roughly 30% skilled workers, and 20% administrative staff (Figure 2). Engineers are recruited from university graduates and post-graduates, administrators from university graduates, and skilled workers from high-school graduates, particularly from technical high schools. The company intends to continue hiring evenly across job types hereafter, regardless of economic conditions.

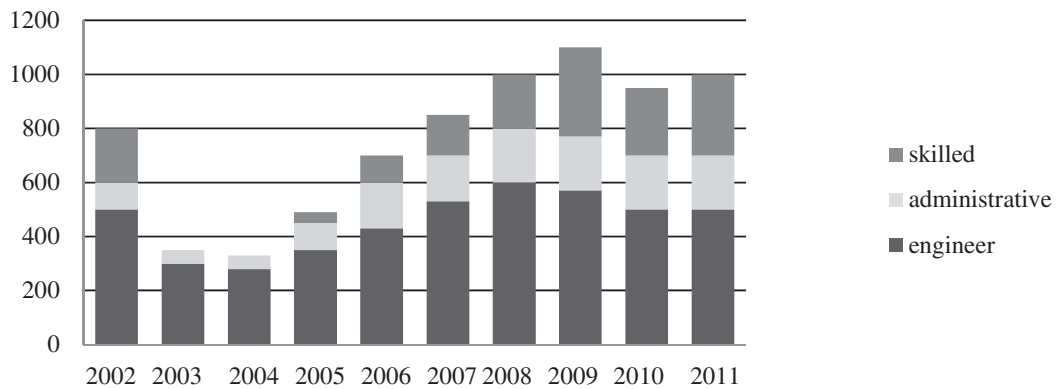
Starting in 1992, when the Japanese economy entered a slump period, the number of employees at Workplace b was decreased by freezing new recruitment. Employees are divided into direct personnel and indirect personnel: "direct personnel" are workers directly involved in manufacturing (including plant maintenance mechanics), "indirect personnel" are those employed in managerial, administrative, and other indirect departments. During the crisis, the reduction of recruitment mainly affected direct and operational workers. From 2007 onwards, however, judging the decline unsustainable when looking to the future, it took on just under 200 new workers each year, resulting in an increase in the total number (Figure 1)

In both cases, the crisis imposed adjustment measures by reducing workforce in the subsidiaries for company J-A, and by limiting new recruitment for operational workers for the company J-B. The reduction of the workforce was not structural since directly afterwards, both companies renewed their former practices.

However, the reduction of new recruitment underlines a skewed age distribution in both company cases. Due to low recruitment following the last decades, and mass recruitment during the economic prosperity from the second half of the 1980s to the early 1990s, the age composition of Company J-A' shows a skewed distribution, with few workers in their early fifties, and the greatest number in their forties. In addition, the retirement of the baby-boom generation began in the second half of the 2000s, and continues today.

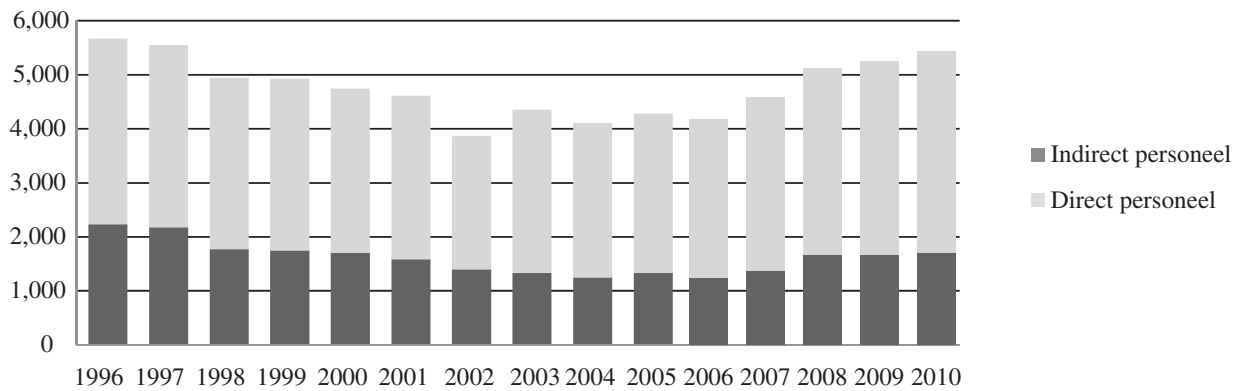
The demographic situation for company J-B is critical, especially for indirect personnel. The number of "indirect personnel" is fairly consistent across the fifties, forties, and thirties age groups, but falls off for workers in their twenties. These effects arise from recruitment numbers which rose during the economic prosperity of the second half of the 1980s and the early 1990s, and fell during the subsequent long slump.

FIGURE 1
Number of newly-hired employees (2002-2011)



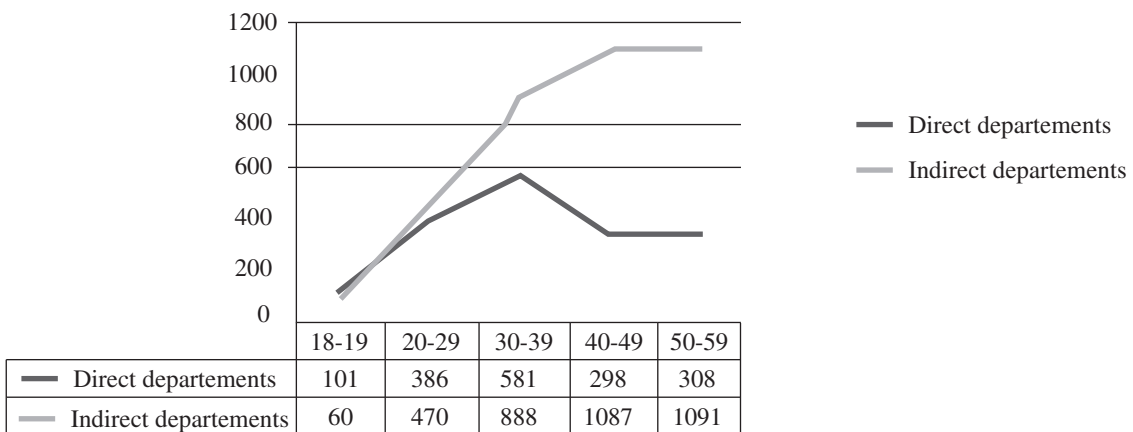
Source: Materials from Company J-A personnel department

FIGURE 2
Number of employees at Workplace b



Source: Materials from Company J-B personnel department

FIGURE 3
Number of employees by age group – 2010



Source: Materials from Company J-B personnel department

These two cases underline the economic and demographic situation of many Japanese firms. Both companies have set up new technical procedures for skill transfer, but also created new forms of employment in order to respond to the critical problems posed by retirement.

TOWARD THE FORMALIZATION OF SKILL TRANSFER

The objectives in the two Japanese companies were first to implement initiatives to ensure the transmission of expert workers' skills, which would be systematically embedded in work activities. These procedures can be dedicated exclusively for expert workers or destined for all workers. The skill transfer process may be designed as an inter-individual process: the company has to organize the meeting of and exchanges between the sender and the receiver. In a different - though not exclusive - way the skill transfer process may be also organized as a formalization and centralization process of critical skills. It works then as a kind of *skill tank* or stock of training resources, available for workers.

- The e-Meister program, (Company J-B)

Company J-B established a special manufacturing division in 2002, one of whose stated activities included the transmission of skills and expertise. It devised the e-Meister programme as a tool for skill transfer, and has implemented the programme throughout the company. The e-Meister program entails preserving the knowledge and skills held by expert workers, either by quantifying them or presenting them diagrammatically, or by recording them as digital or image data, with the aim of "making tacit knowledge explicit." The programme is dedicated exclusively to expert workers, and requires specific technology.

For instance, the workplace previously relied on diagrams to illustrate assembly tasks, but with the e-Meister program, it is now possible to capture the data into 3D-CAD software and demonstrate the assembly steps using three-dimensional images and animations which allow the worker to understand how to carry out the task. These step-by-step images are also printed out and posted in the task area. Similarly, for welding tasks, all the relevant information - from basic skills to theory - has been compiled and recorded in video format. People trying to acquire welding skills first watch these videos to ascertain the process step-by-step, and then learn directly from expert workers in a dedicated area of the factory, termed the "welding *dojo*."⁶ Participants have insufficient free time during work hours; training in the *dojo* takes place outside of regular hours. The training is given by the most expert workers in the workplace (people at the highest technician grade, of which there are only seven in the workplace.)

Furthermore, it is possible to record and save the expert's performance of the task in video form and play

it back on a monitor, adding markers to key points on the body (such as shoulders, hips, ankles) in order to inspect their movements. By also recording the learner's movements in the same way and overlaying the video images on each other, it becomes possible to identify in detail where the learner is making wasteful movements, or taking up strained positions. Finally, by fitting the expert worker with an eye-movement camera, it also becomes possible for the learner to study the position of the eyes and the movement of the gaze. In this way, the learner acquires and becomes proficient in the skills of expert workers through video data.

Before the e-Meister program was instated, skill transfer normally took place through on-the-job training. There were no educational materials, and younger workers learned through close observation and following the example of older experts. This meant that skill acquisition took considerable time. The e-Meister program has put the key aspects of the skills being transmitted into focus, and allowed the experts to use video content as teaching material. The e-Meister content has also been converted into English and Chinese editions, so that it can also be used at overseas sites.

At present there are more than two hundred entries in the e-Meister program, each one a skill which it was judged important to retain in its workplace. Managerial staff in each workplace select operational tasks to add to the e-Meister program according to the "skill map." For each task in the operational process, the skill map notes the workers who carry out this task, their skill level (A = able to carry out this task, B = able to teach this task, C = able to make sophisticated judgments relating to this task, i.e. expert), the importance accorded to the task (⊙ = must be retained in the workplace, ○ = may be outsourced in future, Δ = under consideration, × = not needed), and the number of workers with this skill needed in each age group (Table 2).

At Company J-B, skill maps have been compiled for each task in every manufacturing process, and they are reviewed and revised each year. The number of workers needed is a key entry in the map: If the number of people performing the task is fewer than the number needed, this will mean a future shortfall. In such a case, on-site managerial staff consult on an appropriate response to this problem. There are three main possibilities: 1) Add the task content into the e-Meister program, and promote skill transfer; 2) Automate (mechanize) the task, and use it as a point of labour reduction; or 3) ensure skill transfer through on-the-job training. This decision calls for an evaluation of the long-term importance of the skill or technique to the manufacturing process.

- Skill assessment chart (Company J-A)

In the company J-A, firstly, areas in which skill transfer was lagging were identified in each workplace. The

6. In Japan, a *dojo* is a space intended for physical training and practice, originally in the context of martial arts.

TABLE 2
Contents of the “skill map”

Task	Workers, according to age group and skill level					Importance	Number of workers needed
	20s	Skill level	30s	Skill level	40s ...		
Press brake forming	Worker name	A	Worker name	B	...	⊙	3
	Worker name	B	Worker name	B	...	○	
...	...	A	...	C		△	2

company carried out a thorough skill appraisal of workers involved in all operational processes, detailing the amount of know-how and skill held by the workers for each task. The results were collated in a skill assessment chart, which can be used by managers and HR managers, to identify tasks for which only a few people have the relevant know-how, or where skilled workers are to retire in a few years. It helps to proceed next to the selection for the horizontal mobility on individual and skills bases. Indeed, when finding tasks for which skill holders are soon to retire, on-site managerial staff consult on the extent to which these skills ought to be retained in the workplace, and draw up a programme for their transmission. At the same time, they individually select younger workers who are to succeed the expert workers by acquiring their skills. Finally, the expert workers and the selected younger workers are removed from regular assembly line work and undertake intensive one-on-one training following the programme. Their progress is monitored periodically by on-site managerial staff. In this way, Company J-A has established a systematic programme for skill transfer.

Meanwhile for engineers, in addition to on-the-job and off-the-job training as in the above, there is another initiative, designed to accumulate and collate expertise via an intranet. Company J-A has set up a “Technical Helpdesk” on the company intranet, where engineers from different workplaces can post questions or problems, and receive help from engineers in other workplaces or fields, with their differing points of view. The site also carries case studies, focussing mostly on things that went wrong, which are then collected into an archive of past mistakes for engineers to draw on. These features serve as a foundation for the accumulation of knowledge and the transmission of know-how among engineers and other workers in technical fields. This system was put in place from the belief that in technical fields as well, there are key instances where expert judgments must be made, and that it is important to make a record of the experiences of people who have this faculty.

SKILL TRANSFER AND NEW OLDER PEOPLE’S EMPLOYMENT SCHEMES

As can be seen from the above, since 2000, both Company J-A and Company J-B have implemented skill transfer systematically, creating skill maps to monitor progress across their organisations. They have also made changes in the way that skills are acquired by workers, and have succeeded in reducing the time needed for transfer by introducing new training methods that take advantage of audio-visual and communications technologies in addition to existing on-the-job training. As a result of these initiatives, the personnel departments of both companies say that skill transfer is proceeding smoothly, without any particular problems. The other factor that has allowed successful skill transfer is the widespread adoption of re-employment schemes for older workers, which has prevented the mass retirement of the expert (older) workers whose skills the companies wish to transfer.

Both Company J-A and Company J-B introduced re-employment schemes in 2001, in step with the raising of the public pension eligibility age. Through these schemes, roughly 50% of retiring workers in Company J-A and 80% of retiring workers in Company J-B continued to work after the age of 60, as of 2010. This enabled both companies to avoid mass retirement in 2007, gaining some time during which to further skill transfer. It is also not unusual for workers to be asked to stay on by the company for the express purpose of transmitting their skills.

However, the working conditions of older workers, including employment status, working hours, pay, and job security, differ greatly between companies, including between Company J-A and Company J-B. In Japan, only a small number of companies raised their retirement age in line with the raising of the public pension age, with most, Company J-A and Company J-B included, choosing instead to first terminate workers’ employment before re-employing them.⁷ This is because by having them first leave their positions, it becomes easy to re-employ them under

7. Many companies are selective in re-employing workers, but in the companies presented in this paper, it is a demand

of the trade unions that the company re-employ all workers who desire re-employment, and this has been the case.

a different employment status, pay structure, and working conditions. In Company J-A, workers are asked at the age of 54 to express how long they would like to continue working (the maximum age is 65), and then, taking the age of 60 as a baseline, retire early by the same length of time that they would like to continue working. Thus, for example, if a worker chooses to work until 65, he must leave his position at 56 before being re-employed, while if he wants to work until 61, he will firstly retire at 59, and then be re-employed. Once re-employed, pay levels drop to around 80-50% of the previous level, but other working conditions remain similar. Thus, re-employed workers working full-time, are organised into trade unions, and receive the same levels of employment security and benefits as before retirement. The applicable pay scale also remains the same, but multiplied by 80% or 50%. Finally, most people have the same duties and responsibilities as before retirement.

In Company J-B, meanwhile, workers who desire re-employment after retiring at the company's retirement age of 60 enter into an employment contract with a staffing agency that is an affiliated company of Company J-B, and return to work as temporary workers. Under these circumstances, their work remains much as before, but working conditions, including the level of job security and welfare benefits, are utterly different. They have a different employer, and are not unionized in the company-based union. It is typical for working conditions to decline sharply in this form of re-employment.

A challenge facing companies at present is how to maintain the motivation of older workers, given that their working conditions upon re-employment suffer markedly compared to before retirement, while their duties usually remain the same. As re-employed older workers have gained recognition as significant contributors in the workplace, there have been calls to reconsider their pay levels and working conditions, and it is possible that changes will take place in future.

Initiatives for skill transfer: France

The modalities of skill succession are strongly linked to the employment and HR strategy dedicated to the senior workers of a company. Indeed, the nature of such initiatives and their efficiency depend on the capacity of firms to anticipate the departure of expert workers.

Company F is traditionally characterized by an employment system focused on age. It is coherent with the ideal type of internal labour market. According to the French institutional context, the renewal of the workforce is carried out through an organized substitution of older workers by younger colleagues supported by public procedures and mechanisms in favour of early retirement for the most senior

employees. This employment system has many advantages: For the company, it allows anticipation in the employment structure and the early conception of initiatives for skill transfer. For trade unions, it is coherent with the strategy of stabilizing the level of employment. Consequently, until 2003, skill transfer initiatives were linked to the horizontal mobility of workers and took the form of informal one-on-one exchanges at the workplace level. The diminution in productivity due to these exchanges was taken into account in a coherent way in the overall employment system⁸. Skill transfer was designed in a collective way at the level of the company, and in coherence with the French training system. In the case of Company F this traditional system has been disturbed by several factors which make it difficult to anticipate employment levels and to design collective skill transfer procedures.

COMPANY F: AN EMPLOYMENT SYSTEM IN TRANSFORMATION AND CONNECTED TO A CORPORATE AND INDUSTRIAL STRATEGY

The electric industry has been historically dominated in France by several big firms operating a wide range of activities. However, between 1980 and 1990, the industrial structure was modified in an important way; some of these firms merged and the electrical sector's productive activities were concentrated. Company F, considered in this paper, has increasingly become an international electrical company. Their corporate strategy consists in developing activities outside France and Europe in favour of Asian/Pacific countries and the North America economies. Consequently, these different events have contributed to a transformation in the old employment system. The different mergers, which resulted in the actual formation of company F, led to a standardization of the employment rules to ensure their diffusion throughout the different departments of the firm. Moreover, the new corporate strategy implies a reduction of the workforce in France and the internationalization of HR management and employment rules.

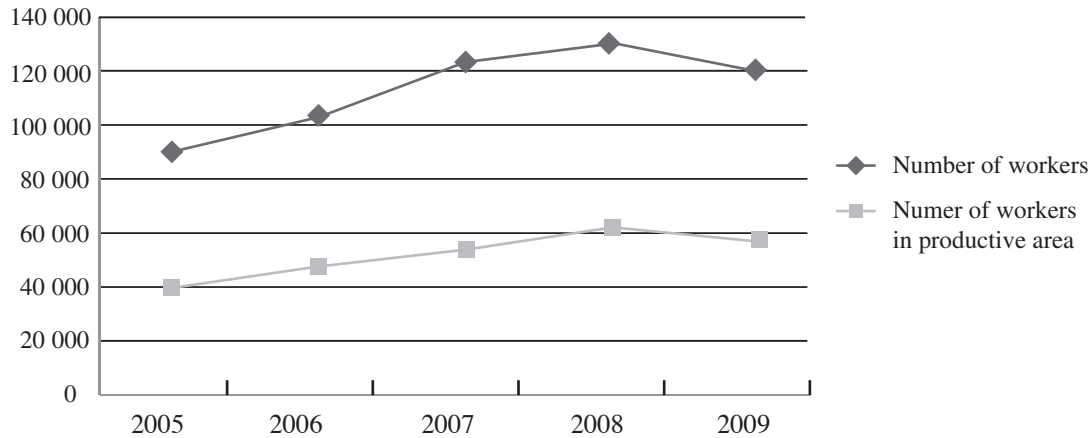
The analysis of the entrance and exit flows of the company shows a growth of entrance into the company which was reduced to almost half between 2005 and 2009 (-44%). On the contrary, the exits increased particularly during 2007 and 2008 (11.65% during the whole period). In 2008 the company had a small debit of entrances and exits at 7.5%.

The employment situation in French industrial production units was difficult at the beginning of the 2000's. To be precise, between 2003 and 2007, the number of employees in France was reduced by 10%. This workforce reduction was possible by organizing the early retirement of senior workers.⁹ Indeed, the distribution of employees by age of Company F is typical of big groups in France and in Japan, a significant part of which is composed of senior workers (from the baby-boom generation). In 2007, employees over

8. In particular, the cost of the productivity diminution was supposed to be distributed over the whole professional life

of workers as diminution of wages.

FIGURE 4
Total number of employees (2005-2009)



Source: Materials from Company F personnel department

TABLE 3
Flows of entries and exits from 2005 to 2009

	2005	2006	2007	2008	2009
Recruitment (entries)	16 070	21 092	26 972	20 995	8 977
Exit	15 820	15 764	21 117	21 504	17 663
Difference	250	5 328	5 855	-509	-8 686

Source: Materials from Company F personnel department

45 years of age represented 56% of the total workforce of Company F, of which senior employees over 55 made up almost 20%.

After 2008, the pre-retirement initiatives allowed a renovation and a stabilization of the workforce, but were expensive for the company, which did not benefit from any public funds. Moreover, the early departure of senior workers made the automatic and traditional skill transmission process difficult.

This workforce stabilization was first reached and the problem of skill transmission first treated by a stable strategy of recruitment (from 7 to 10% of the employees per year). This mainly concerned engineers and managers. The recurrent recruitment in this category can be understood in the context of the delocalization of productive units. The structure of work organization in France is changing and is becoming more and more a centre of decision making than

a productive unit. The majority of new workers are hired with long-term contracts.

The new economic and strategic situation towards an international group, the new international division of labour and the workforce reduction in France, as well as the critical situation with age distribution contribute to a transformation of employment rules, especially age management and the procedures of skill succession.

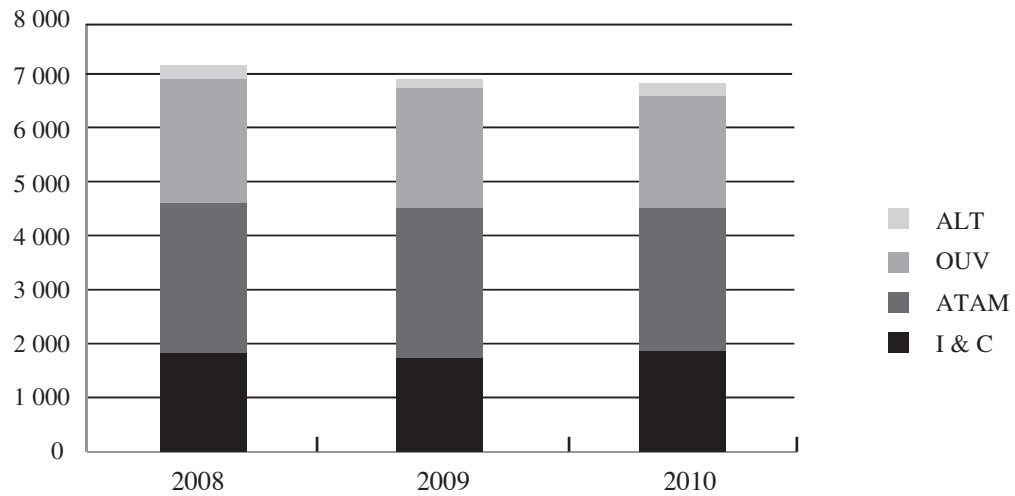
THE NEW PROCEDURES OF SKILL TRANSFER IN COMPANY F FROM 2007

The significant reduction of the workforce and the massive departure of seniors and expert workers made the former skill transfer system of the firm inefficient. The redesign of skill transfer initiatives was carried out in the larger context of the redefinition of employment rules at the level

9. PRT (Pré-retraites Totales): The company organized the early retirement of senior workers without any public funds, CFC (Vacation for

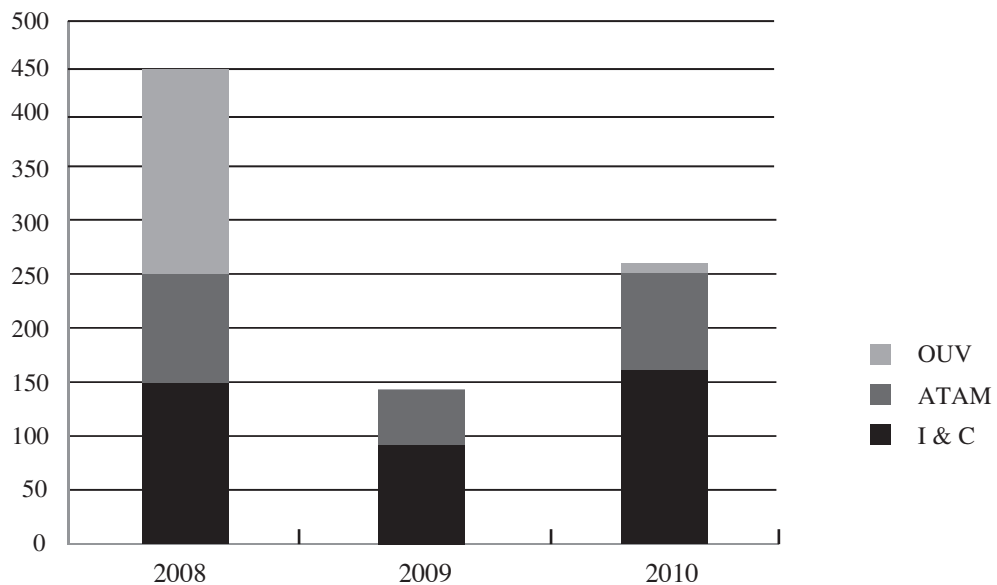
long career) allows workers to retire before the age of 60.

FIGURE 5¹⁰
Number and repartition of workforce in the F company (2008-2010)



Source: Materials from Company F personnel department

FIGURE 6
Newly-hired workers by worker categories



Source: Materials from Company F personnel department

of the firm. These transformations, supported by public authorities and by law, aimed to improve the capacity for firms and organizations to anticipate employment changes, and especially to anticipate workforce reduction. The plans (designed to operate over three years) contributed to changing the usual category of the French employment

system from a collective based approach to an individual one. Individual careers and mobility would not be based on collective criteria such as tenure and work position, but would be the result of individual evaluation and results.

In this new perspective, the procedures of skill transfer have to change towards an individual form. An agreement

10. I&C: Engineers and Managers, ATAM: Technical staff and foremen, OUV: blue-collar workers, ALT: workers in learning.

between the company and trade unions was concluded in 2010, dealing notably with the theme of senior employment and skill transfer. *“During their professional activity, seniors benefited from different kinds of training. They have accumulated know-how in a workplace through the work experience during their professional lives. The work experience and the accumulated skills are a form of capital for workers and also for the firm.”*¹¹

While the accumulation of knowledge and skill was first internalized in the employment system, the new strategy of the firm consists in designing a new and specific process of accumulation and transmission of skills.

This process of transmission begins with the identification of critical and specific skills during the professional interview in “mid-term career.” Critical skills are defined as “skills whose transmission will allow the preservation of the know-how in a workplace.” At the collective level, the company has to be able to create a dictionary of critical skills.

The purpose of the meeting between the manager (n+1) and the senior is to identify the likely date of departure of the workers, the nature of their critical skills and the modalities of the skill transfer. The senior is requested to participate in different forms of activity for this transmission.

Some activities are compulsory and are not the object of particular rewards, such as workshops where experience is shared between seniors and young workers, and workshops dedicated to the collective formalization of the know-how acquired by the practice.

The company also invites seniors to be “tutors” for younger workers during the last year of their professional activity. This corresponds to a formal mission: *“To transfer their knowledge, work methods, and know-how, and to follow the pedagogic progression and estimate the acquisition of knowledge by the person(s) involved.”* This contributes to a change in the nature of the work position of the seniors. The objectives of the mission are also estimated and are taken into account for the attribution of special additional and individual bonuses.

Comparative analysis

The organizational forms of skill transfer in both French and Japanese firms are undergoing important changes. Indeed, the demographic situation, with a massive departure of the oldest workers, and the successive reduction of employees have forced firms to adapt their traditional tools of human resources management, based on seniority, collective job rotation and horizontal mobility to transfer skills and knowledge, and to generate new methods of transferring skills.

The objective is to compare the change of skill transfer practices in the context of French and Japanese firms, and to determine how it affects HR practices. While French and Japanese firms were characterized by the prevalence of an organizational model of skill transfer over professional training programmes, we wonder if these new procedures of skill transfer set up in the three firms reveals a trend towards a professional model of skill transfer and a kind of disintegration of the coherence of HR practices. The analysis points out, firstly, the individualization of skill transfer procedures and a *disembeddedness* of these procedures and work activities.

A COMMON MOVEMENT TOWARDS THE RATIONALIZATION OF KNOWLEDGE AND THE INDIVIDUALIZATION OF SKILL TRANSFER PROCEDURES

As ideal types of an organizational model, French and Japanese firms were characterised by a strong link between skill transfer activities and work activities. Firm didn't dedicate any specific tool, time or space for this transfer; the learning process was integrated into work activities and is active by the socialisation between more and less experienced workers. Skills are not formalized and keep their tacit form. However, the firm has to organize teamwork according to the intergenerational criterion. The costs of skill learning (in terms of reduction of work productivity) are distributed along the professional career. For the youngest that benefit from the learning process, their remuneration is lower than the level of effective work productivity. On the contrary, the efforts of learning and skill transfer accomplished by the sender are awarded by a bonus in the remuneration.

The transformation of skill transfer procedures has to be considered in reference to this model.

In the different cases, the organization of skill transfer is adopting more and more attributes from the professional model with a disconnection of skills transfer activities and work activities. The characteristics are summed up in the following table.

The three cases show a movement towards the formalization and the individualization of skill transfer. The common objectives are to “make explicit the tacit knowledge” in order to improve the capacity for knowledge to be diffused through formal and technical media (particularly in the Japanese cases). Firms design specific tools and supports in order to identify and select the critical skills before then organizing their transmission. The transmission tools are not organised per se as an inter-individual process; the objective is to capitalise on critical skills and to make them available if necessary. The objectives are to shape skills and knowledge into a rational and explicit form. The rational

11. From the company agreement on the management of seniors and skill transfer.

	Japan		France
	Company J-A	Company J-B	Company F
Procedures for identification of critical skills	By workplace for all workers with critical skills	Only for expert workers	For senior workers by an individual interview
Transmission tools	Skills map; Coupling a senior with a young worker; Intranet interface	Video and technical tools	Skills map; Coupling a senior with a young worker

form of knowledge thus allows the disconnection of knowledge from the worker, and enables firms to face economic uncertainty and the massive departure of expert workers. There is no doubt that the knowledge management literature associated with cognitive science has been diffused to HR managers (Chiva R., Alegre J., 2005).

Consequently, the activities of skill transfer are no longer embedded in work activities. Learning, skill transfer and work activities tend to be disconnected activities. Skill transfer initiatives are designed on an individual level as a particular moment between the employee and the manager. The French case is particularly relevant: the skill transfer process is based on individual interviews with senior workers. The aim is to identify critical skills and to create a specific procedure, adapted to workers and their skills. Participation in skill transmission is paid on an individual basis. The French case shows, more specifically, how the new skill transfer procedures are integrated into general methods of work organization and work enhancement. Individual interviews with seniors do not represent a special and single moment. Hence, the procedure of the “individual interview” has to become a usual and annual moment between employees and managers to estimate the success of individual objectives and to determine the level of bonuses and specific awards. In a similar way, procedures created by Japanese companies are designed as a systematic skill transmission programme. The particular issue of senior workers’ skill transfer has been taken over by a renewal of the conception of skills and knowledge. The individualization of skill transfer is consequently coherent with the transformation of HR practices towards a codification of skills and individualization.

The efficiency of such procedures is strongly linked to the capacity to anticipate and to design a mid-term productive strategy. Indeed, firms have to select critical and strategic skills to be transmitted and those that are not necessary. The amount of skill and knowledge held by retiring workers is immense, but retaining all of it would be difficult, and not necessarily worthwhile. In electrical manufacturing, it is not easy to distinguish whether a skill should be kept in the workplace, because of rapid changes in the field. It

becomes important to take into consideration the extent to which welding processes will be needed in the future.

DIVERGENCES IN THE SUPPORT OF SKILLS SUCCESSION

All three cases reveal the emergence of specific tools for skills management that are consistent with a broader individualization of HR practices. These methods make it possible to capitalize on critical skills, even if the recipients are not there anymore (made redundant or retired). They are a response to the situation of non-renewal of the workforce and optimization of production processes.

However, the *disembeddedness* between skill transfer procedures and work activities involves mobilizing resources and specific tools. This is the case in particular in the organizational model of skill transfer, where the transmission becomes individual and is disconnected from work activities, new forms of employment may be required to support skills succession. Consequently, the nature of employment contracts, the estimation method of skill transfer and its monetary exploitation have to be considered. On this point, important differences appear between the French and Japanese cases.

In the Japanese case, faced with the critical situation of massive departures of the baby-boom generation, both company J-A and company J-B (as in the vast majority of big Japanese industrial firms), supported by public authorities,¹² planned and set up re-employment schemes for retired senior workers in 2001. The re-employment system, which takes different forms depending on the firm, is used as a support for skill transfer between senior and young workers. This enabled both companies to avoid mass retirement in 2007, gaining some time during which to further skill succession. Senior workers are asked to stay on by the company for the express purpose of transmitting their skills. Through these schemes, from 2010 onwards, roughly 50% of retiring workers in Company J-A and 80% of retiring workers in Company J-B continued to work after the age of 60. However, the working conditions of older workers, including employment status, working hours, pay, and job security, differ greatly between companies, including

12. In step with the raising of the public pension eligibility age.

between Company J-A and Company J-B. A challenge facing companies now is how to maintain the motivation of older workers, given that their working conditions upon re-employment suffer markedly compared to before retirement, while their duties usually remain the same. In these cases, the re-employment system comes as a supplement with the other skill transfer procedures.

The French company is not planning any new form of employment for senior workers (or for younger workers) that is especially dedicated to skill transfer. Skill transfer is organized within the existing forms of employment. It must be organized before the retirement of seniors, and has to be anticipated. The mission of skill transmission is added to the productive and executive missions of senior workers. The objectives of the mission are also estimated and are taken into account for the attribution of special additional and individual bonuses. However, some employment forms especially those dedicated to learning and the skill succession have been designed by public authorities for young people. It creates the possibility for firms to hire young people as part of a training programme (dividing their time between learning at school and learning at the workplace) for one year. The mechanism is focused on the 'receiver' of the skill transmission; the young person has to receive skills and knowledge from the 'sender,' the expert and senior worker. Company F is increasingly using this kind of contract for hiring young workers on short-term contracts. While the employment contracts are supposed to be transformed to long-term contracts, the company benefit from a kind of "windfall effect".

Conclusion

The objective of this paper was to investigate the dynamics of skill transfer in the electrical manufacturing industry in France and Japan, taking into account the organizational context but also the demographic and economic context. The massive departure of the baby-boom generation and the reduction of the workforce obliged firm to renew their traditional skill transfer procedures. This demographic context constitutes the main internal failures of the Internal Labor Market and the organizational model of skill transfer. Indeed, Japanese and French firms were characterized by the importance of an organizational model of skill transfer, consistent with the model of the Internal Labor Market. Organizations define their own work systems which tend to favour long careers, internal mobility and training. This model is built upon a specific type of age management. Several studies point to the weakening of these HRM models, highlighting the development of short-term and atypical contracts (Lefresne, 2002). Our paper contributes to the thesis of the weakening of these employment systems, but specially by focusing on the internal dimension of skill transfer and age management. Firms have been obliged to renew their HRM practices because their former practices were built on a specific age distribution which is not

possible anymore in Japanese and French society. We can observe, consequently, how firms adapt their skill transfer procedures to keep their crucial tacit skills and how firms transform their procedures to adapt to the reduction in the workforce.

We underline a common trend towards a professionalized model of skill transfer by a formalization of skill transfer procedures and the disconnection between work activities and skill transfer.

It implies a broader transformation of both the role of HR managers and the employment structures of firms. The new kind of procedures, in order to be efficient, implies a mobilisation of new resources and employment support.

Both Japanese cases set up new employment contracts specially dedicated to skill transfer activities for senior and experienced workers. To solve the intergenerational skill transfer problem Japanese firms, encouraged by public authorities, decided to create a new category in their internal market, (for the oldest workers), defined by age criteria. The French case doesn't show the same trend. The skill transfer activities are still integrated into one's professional career, without specific employment support. However, public authorities have just created a new form of employment contract to encourage the hiring of young people and ensure the continued employment of older workers, while, at the same time, ensuring skill transfer.

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