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DIFFERENCES IN TECHNOLOGY TRANSFERS TO CHINA BETWEEN EUROPE AND JAPAN

This report analyzes technology transfers and education for local engineers within overseas subsidiaries of Japanese and European companies that have advanced into China, and examines differences among them. The local engineers nurtured in overseas subsidiaries of Japanese companies have mid-level skills similar to those of Japanese engineers at a holding company. When Japanese holding companies succeed in fostering local engineers, of course, there is a beneficial effect both for the overseas subsidiary and for the technical enlightenment of local engineers. However, these benefits may also help rivals. In comparison, overseas subsidiaries of European companies foster low-level engineers, and the division of labor with engineers at a holding company is a complementary relation, without duplication.

1. ISSUES OF DISCUSSION

This investigation began to give certain answers to the following critical questions. In the past, people in East and Southeast Asian countries including South Korea, Taiwan, and mainland China have criticized the technology transfers of Japanese holding companies, as follows. “Japanese holding companies are reluctant to offer technologies in comparison with European holding companies”, “Japanese technology transfers are slow in comparison with those of European companies” and “the technologies offered from Japan are not new ones because the unit price of Japanese technologies is cheap in comparison with those from Europe.”

However, in the case of South Korea, for example, the machine tools industry has developed based on imported technologies from Japan[1]. Moreover, some South Korean machine tools makers have become competitors of Japanese firms.

In addition, in the case of the automotive industry, Hyundai Motors and Kia Motors, which imported technologies from Japan, had higher levels of technologies than Daewoo Motors, which imported technologies from GM. After the economic crisis in 1997, Hyundai and Kia both survived. However, Daewoo, which had no technologies of its own, went bankrupt and a buyer did not readily appear.

In spite of these situations, however, the “Rumor-like knowledge” that Japan has failed to transfer technologies to Asia has become commonsense not only in East and Southeast Asian countries but also among social scientists in Japan.

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This report analyzes the contradiction that East and Southeast Asian countries receiving technologies from Japan, which is said to have been a failure in the area of technology transfers, have grown economically, and aims to give the answers to such contradiction. Therefore, two items of erroneous commonsense will be discussed in the following. First, “European holding companies provide technologies, but Japanese ones are reluctant to do so”, and second, “European holding companies transfer the technologies quickly, but Japanese ones do so slowly.” In fact, this report finds that Japanese holding companies train local engineers to mid-level skills, and as a result, sometimes make the angineers as revals.

2. TYPE OF INDUSTRY EXAMINED

In order to examine both the erroneous commonsense mentioned above, it is necessary to compare the same products from the same industry among overseas subsidiaries of Japanese and European companies. It would not be proper to compare overseas subsidiaries producing different types of products in different industries.

The data used in this paper are, thus, the findings from the elevator (lift) industry. This industry was selected because its products have to be designed with very reliable technologies, since they transport persons and move as do cars and trains. In this connection, when elevators are exported from Japan to a developed nation, there is generally a requirement for a certificate apostle to the technical career and skills of the design superintendent.

In addition, elevators are produced based on orders, and each product has to be customized for a specific building, creating a need for many product design engineers. Therefore, the elevator industry is an appropriate type of industry for investigating the state of technology transfers.

In addition, the elevator industry is one area of the machine sector where overseas advances took place comparatively early. This is because the demand for elevators in factories, apartment buildings and hotels emerges in the early stages of a country’s industrialization. Therefore, taking the elevator industry as a case study can be useful as a precedent for other machine industries.

Another good reason for selecting the elevator industry as the object of investigation is that eight of the world’s main elevator companies, including four Japanese companies, three European ones and one American one, have advanced into China and are competing one another for the Chinese domestic market. Because there are only eight main companies, obtaining information from more than five companies makes it possible to generalize the results of the survey in this report.

3. INVESTIGATION SAMPLE

The investigation was carried out using the visiting-hearing method, and an identical questionnaire was given to the elevator companies made inroads into China from Japan and from Europe and the United States.

Three overseas subsidiaries of Japanese companies and two overseas subsidiaries of European companies agreed to cooperate with the investigation. Two of these overseas subsidiaries of Japanese companies were makers of completed products, while the third subsidiary was a maker of major parts, with plans to establish a maker of completed products. One of the two full product makers filled out the questionnaire, but did not allow the visit of author.

On the other hand, two of the four overseas subsidiaries of European companies agreed to cooperate with the investigation. Both produce completed products.

Because the questionnaires included many questions on details, none of the companies replied to all of the questions. Under a situation where companies are competing in the same market, they worry about leaking information to rivals, and typically are reluctant to answer all questions. As a result, there were some questions that were answered by only one overseas subsidiary.

3.1. PERIODS OF ADVANCE INTO CHINA

It was after the middle of the 1990s that the three Japanese holding companies advanced into China. The average year for the advance of the three companies is said to be 1996.

In comparison, European holding companies began their advances in the first half of the 1980s, more than a decade earlier than their Japanese counterparts. As a result, they had already finished the technology transfers by the time when the Japanese firms moved into the market. Consequently, the persons who had been in charge during that period were no longer serving in the same positions.

One person from each of the two European advance companies cooperated with the investigation. One was a manager at the overseas subsidiaries, and the other was an engineer from the holding company in charge of technological guidance.

On the other hand, at the overseas subsidiaries of Japanese companies, there were Japanese engineers who had been involved in technological guidance from the beginning and who were still playing an important role. In these overseas subsidiaries of Japanese companies, information on the initial period of the advance was obtained, together with demonstrating a major difference with the overseas subsidiaries of European firms. In short, the managers and engineers dispatched from two Japanese holding companies answered the questionnaires at the same time, in great detail.

3.2. INVESTMENT RATIO

The investment forms of the five companies can be divided into joint investment forms and wholly (100%) owned forms. Of the three overseas subsidiaries of Japanese companies, two are joint enterprises where the Japanese side holds a majority of equity, and the third is a wholly-owned investment, with the Japanese side holding 100% of equity.

One Japanese joint venture subsidiary is working with a Chinese elevator company. The other Japanese joint venture subsidiary is working with a Chinese company that is not related to the elevator industry.

On the other hand, the two overseas subsidiaries of European companies have both adopted fully-owned investment forms. However, they did not adopt this form at the outset. In the beginning period, they both took the form of joint ventures. During the period when they made their investments, the Chinese government required them to be joint venture forms with a Chinese partner, for example the Chinese ministry of construction, which has an elevator company. Because the Chinese government lacked experience with joint ventures, however, there were many complex, opaque elements. Later on, 100% investment by foreign capital was accepted by the Chinese government. One of the overseas subsidiaries of European companies bought stocks from the local company in 2001 and made it a fully-owned subsidiary. During the time of the joint management form, the overseas subsidiary of European company was a joint enterprise with a minority stake.

At that time, the Chinese government did not permit foreign investors to be majority investors, because it aimed to use the right of management to acquire technologies. However, the European holding company was not able to meet the Chinese government's request for technology transfers, because it thought that it would not be able to prevent the leakage of technologies if it only had a minority stake. As a result, the plans for the Chinese partner to use its management rights in the joint venture to absorb and assimilate the technologies were not successful.

In response to the failure, the Chinese government changed its policy to permit Japanese companies to advance into China and to compete for the Chinese market with overseas subsidiaries of European companies, in an attempt to create a situation where firms had no choice but to transfer technologies.

3.3. COMPARISON OF THE PRODUCT TECHNOLOGIES

Elevators can be categorized by the speed of operation and weight–carrying capacity. This analysis distinguishes products into five levels based on the speed of operation. Needless to say, the technical level required for a super-high-speed elevator is higher than for both medium- and low-speed ones.

Table1 shows that the holding companies have mainly transferred technology for medium-speed elevators. Here, we use this case to compare the technology transfers, human resources development and international division of labor about these five overseas subsidiaries.

Categorization of Technology Level
(1) Low-speed elevator (Less than 45 meters per minute)
(2) Medium-speed elevator (60-105 meters per minute)
(3) Medium high-speed elevator (120-180 meters per minute)
(4) High-speed elevator (210-300 meters per minute)

(5) Super-high-speed elevator (More than 300 meters per minute)

(1) Low-speed elevators are installed in comparatively low-rise buildings such as factories or hospitals for the purpose of ensuring stability of movement.

Table 1. Number of Transferred Product Technologies by Company

	Product technology	J1	J2	J3	E1	E2	Total
5	Super-high speed elevator (More than 300 meters per minute)			x	x		2 Companies
4	High-speed elevator (210-300 meters per minute)			x	x	x	3 Companies
3	Medium high-speed elevator (120-180 meters per minute)		x	x	x	x	4 Companies
2	Medium -speed elevator (60-105 meters per minute)	x	x	x	x	x	5 Companies
1	Low-speed elevator (Less than 45 meters per minute)			x	x	x	3 Companies

Source: Mizuno J. (2003)

However, because office buildings and symbolic high-rise buildings were being constructed in China in the beginning of the 1990's, the demand for elevators was mainly for high-rise buildings. This demand later ran out. By contrast, the demand rose for elevators in factories, in apartment buildings with more than seven floors, and in middle-rise commercial buildings.

(2) Medium-speed elevators are installed in commercial buildings and apartment buildings with more than seven floors.

(3) Medium high-speed elevators are installed in a high-rise apartments and high-rise buildings.

(4) High-speed elevators and super-high-speed elevators are typically installed in hotels and in symbolic buildings.

Table1 shows that all five overseas subsidiaries have received technologies for medium-speed elevators from holding companies.

For the next rank, four of the overseas subsidiaries have received technologies for medium-high-speed elevators. Three overseas subsidiaries have received technologies for (1) low-speed elevators and for (4) high-speed elevators, whereas two have received technologies for (5) super-high-speed elevators.

In short, all the five overseas subsidiaries have mainly received technologies for medium-speed and medium high-speed elevators.

These results fail to demonstrate the unbalanced technology transfers, under which some holding companies concentrate on technology transfers for low-speed elevators and others concentrate on technology transfers for high-speed elevators. It is found, rather, that all five holding companies transfer a very similar level of technologies to overseas subsidiaries.

From this, we can conclude that there are no major disparities in the product technologies transferred by the five holding companies. Because all five holding companies transferred technologies for medium-speed elevators, which have the largest domestic demand, the comparison of product technology transfers in this category can serve as a comparative study.

4. EXAMINATION OF THE FIRST ERRONEOUS COMMONSENSE

As seen from the cross-analysis in Table 1 using the level of technologies and capital ties, there are clear differences in technology transfers between the form of joint ventures and fully-owned subsidiaries.

Generally speaking, in any industries, fully-owned subsidiaries tend to receive transfers of a wider range of technologies because of the confidence that the technologies will not be leaked.

Looking at Table 1, we find that J1 and J2, which are joint ventures from Japan, seem at first glance to have been transferred a narrow range of product technologies by holding companies. By contrast, J3, E1, and E3, which are fully-owned subsidiaries, despite being subsidiaries from Japan and of Europe, seem to have been transferred a wide range of product technologies, from low-speed to super-high-speed elevators.

From Table 1, we can state that the apparent quantity of product technologies transferred depends not on the nationality but on the investment ratio. In other words, the transferred product technologies from holding companies to overseas subsidiaries of joint venture form are for medium-speed and high-speed elevators, whereas the transferred product technologies to fully-owned overseas subsidiaries are for a wide range of technologies from low-speed to super-high speed elevators.

Before the WTO period, generally in East and Southeast Asia, governments of developing countries aiming to absorb technologies from foreign direct investment have adopted policies to regulate the investment ratio of foreign capital to less than 49%, with the aim to hold management rights. For example, the South Korean government did not allow foreign investment, especially from Japan, to have more than a 49% stake, only exception being cases where technologies were recognized as high technologies. Therefore, almost no Japanese holding companies could have overseas subsidiaries with more than 51% shares. In East and Southeast Asia, Japanese foreign direct investments were only permitted to make 100% investments in extremely limited types of industry, which were approved as pioneering industries. Although this was not the intention of the host governments, the limitation to 49% of the investment created a situation where holding companies hesitated to transfer technologies to developing countries.

This investigation discovered that one of the overseas subsidiaries of European companies, which is now a fully-owned subsidiary, was a joint venture, following the policy of the Chinese government, before becoming a fully-owned subsidiary. This overseas subsidiary of European company reported that the range of technologies transferred to China at the time was not as wide as at present.

With regard to the technology transfers, the interactions between the holding company and the host government begin from the question of whether the holding company will carry out an independent investment or be a joint venture. European firms seem to go as far as to enlist the support of the home government in an effort to get permission for 100% investment. Because the Japanese government offers relatively little support in this area, Japanese firms invest as joint ventures. As a result, it appears on the surface that holding firms of Europe transfer a great deal more product technologies than their Japanese counterparts.

Therefore, the first item of erroneous commonsense, that “European holding companies provide technologies but Japanese ones are reluctant to do so,” should be modified as follows. “Overseas subsidiaries of joint venture forms seem to receive few transferred technologies, but fully-owned overseas subsidiaries seem to be offered comparatively many.”

Up until now, Japanese holding companies making investments in East and Southeast Asia have adopted not 100% investment but joint venture forms, with less than 49% stakes, based on the foreign investment policies of East and Southeast Asian host governments.

In many East and Southeast Asian countries, and particularly South Korea and China, joint ventures with less than 49% stakes held by the holding companies were common, due to the authorization policies of the host governments. As a result, the quantity of technology transfers has been relatively small in this area. This, in fact, is the source of the misunderstanding that “Japanese holding companies are reluctant to transfer technologies.”

5. EXAMINATION OF THE SECOND ERRONEOUS COMMONSENSE

When making technology transfers to a developing country, the nurturing of talented personnel is a key. Many cases of technology transfers to developed nations begin with an offer of drawings and related data, but most developing countries have few engineers who are able to understand the drawings. As a result, the technology transfers have to begin with the education of local engineers.

Engineers do not establish in a uniform quality. There are some who have deep understanding of technologies, and others whose understanding is much shallower. We must, therefore, examine the skill level of engineers trained by the overseas subsidiaries.

In judging the level or qualification of engineers, a clear difference in the depth of technological understanding can be measured by examining whether the engineer can make independent judgments or has to rely on an instruction manual.
For reference, the quality level of machine tools engineers can be gauged.

Division of technical level (quality) of machine tools engineers, which is evaluated by the depth of understanding of the assembly drawing.

(1) Shallowest level: only understands the components consisting of a product and the connections between them.

(2) Shallow level: only understands information displayed by a drawing, and understands the ease of part processing, procedures for disintegration and assembling, and difficulties in such activities.
(3) Moderate: has understanding of the need for product compactness, grass root-like know how for cost reduction as indicated in drawings, but still requires of considerable experience and knowledge.
(4) Slightly deep level: is able to imagine the three-dimensional configuration by using the information obtained from the two-dimensional drawing.
(5) Deep level: by reading the explicit and implicit information on a drawing can get a grasp of the new contrivance carried out by, and understand the intentions of the designer, who produces the drawing.
(6) Deepest level: can understand the concept and philosophy of the product designer, and based on a drawing, conduct "Drills on Drawing", i.e., virtual simulation based on "Thought Processes of Engineer". By the "Drills on Drawing", the functionality, performance and weak points of the product should be pre-estimated without having the real one. [3]. In the case of an elevator engineer, there is rough judgement criterion of skill presently, although the construction of the detail criterions is required.

5.1. METHODS FOR TRAINING LOCAL ENGINEERS

One of the questions asked in this survey was what methods companies advancing into developing countries used to educate local engineers for technology transfers.

Answers were prepared for multiple choices, as follows, for comparison.
The answers provided were as follows:
(1) Educating local engineers using drawings and other design documents
(2) Educating local engineers using drawings, other design documents and extra textbooks
(3) Training using OJT conducted by a local senior engineer or manager (not somebody dispatched from the holding company)
(4) Training local engineers using OJT by an engineer from the holding company, based on a plan made in the holding company (using a manual)
(5) Training local engineers using OJT by an engineer from the holding company
(6) Sending a local engineer to be educated in the home country of the holding company or foreign firm with capital ties to it
(7) Having, from the beginning, local engineers who have the experience to understand drawings, with no need to reeducate the engineers.

The answers are shown in Table 2. In the cases of overseas subsidiaries of Japanese companies**,** J1 and J2, methods (2) and (5) were used simultaneously. This shows that the companies endeavored to give the engineers both theoretical and practical education. They also implemented method (6) in cases when no machinery was available on site for training, and sent them to places where such machinery existed. By contrast, in the case of E1, an European subsidiary company, method (6) was used initially. However, normally it uses method (4). It appears to be education not based on drawings or other materials, but rather standardized education to indicate the engineer how to work.

Table 2. Education of Local Engineers for Technology Transfers from Holding Companies

		J1	J2	J3	E1	E2
6	Sending a local engineer to be educated in the home country of the company or foreign firm with capital ties to it	x	x		x	x
5	Training local engineers using OJT by an engineer from the holding company	x	x			x
4	Training local engineers using OJT by an engineer from the holding company, based on a plan made in the parent company (using a manual)				x	
3	Training using OJT conducted by a local senior engineer or manager (not somebody dispatched from the parent company)					
2	Educating local engineers using drawings, other design documents and extra texts	x	x			x
1	Educating local engineers using drawings and other design documents					

Source: Mizuno J. (2003)

5.2. TRAINING TARGET LEVEL OF LOCAL ENGINEERS

In the interview investigation, another question was what level of local engineers the company was hoping to train through the education. Respondents were asked to choose the corresponding one from the pre-determined answers of four levels to the question, “What level of local engineer are you aiming for?”

The four levels were as follows:

(1) The local engineer can grasp the needs of a market and can develop products independently (product plan level).
(2) The local engineer has a wide range of knowledge, and can solve most problems (experience in designing and manufacturing).
(3) The local engineer can understand a drawing/document and manufacturing processes, and can revise them to meet the local needs and suggest improvements. If there are instructions, the engineer can respond to them (person of general engineer/skill level)
(4) The local engineer can somehow manage to follow orders (technician level).

As shown in Table 3, the answer was clearly different between J1, J2 and E1.

In fact, J1 and J2 responded that they aimed for (2), whereas E1 aimed at level Thus, though the overseas subsidiaries of Japanese companies are joint enterprises with the possibility of technology leaks, they are willing to invest time and money, so that the local engineers could establish to be of a comparatively high level. By contrast, E1, which takes the form of a 100% investment, has little worry about technical leakage, but in comparison to the overseas subsidiaries of Japanese companies, the local engineers whom it plans to train will only be low-grade engineers.

Because it is only aiming to develop low-grade engineers, E1 can bring them up in a short term. If a problem occurs on the manufacturing floor, it will bring a senior engineer dispatched from the holding company to solve it, using local low-class engineers. This is a similar system to that in the home country, where engineers are organized into hierarchical structure.

Table 3. Training Target Level of Local Engineers

	Levels	J1	J2	J3	E1	E2
1	The local engineer can grasp the needs of a market and can develop products independently (product plan level)	-	-	x	-	-
2	The local engineer has a wide range of knowledge, and can solve most problems (experience in designing and manufacturing engineer level)	x	x	-	-	x
3	The local engineer can understand a drawing document and manufacturing processes, and can revise them to meet the local needs and suggest improvements. If there are instructions, the engineer can respond to them (person of general engineer/skill level)	-	-	-	-	-
4	The local engineer can somehow manage to follow orders (technician level)	-	-	-	x	-

Source: Mizuno J. (2003) *"X" means yes.

5.3. WHEN TECHNOLOGY TRANSFER WAS FINISHED

Within this context, an interesting question is “What is the criteria for deciding when an engineer who has been dispatched by the holding company can return to the home country?” The overseas subsidiaries of European companies were not able to reply to this question, because it had happened in the distant past. In contrast, the overseas subsidiaries of Japanese companies answered a several options as follows;

(1) The guidance on drawings about machinery was completed.
(2) The time of completion of guidance on drawings and of design/document including standards on machinery.
(3) The time of completion of guidance on drawings and design documents about machinery and concerns.
(4) When the local engineers and local workers are able to manufacture the products with stable quality and a low defective article ratio, after the completion of guidance such as drawings about machinery.

(5) When simple revisions or improvements of design were possible.
(6) When be capable of carrying out the variant design that grasped correctly local needs.
(7) There was no necessity of dispatching a person from the holding company.

The overseas subsidiaries of Japanese companies, which educate their local engineers using OJT, chose answer (4). It seems, thus, that they consider the technology transfers to be completed once the real production has become stable. This answer does not contradict to it that ~~s~~ they gave regarding local engineers education. In such an education,
an engineer from the holding company provides education in theory and practice in OJT to the local engineers, and she/he returns to the home country after training local engineers who can “solve nearly all problems” when something happens .

Let us now summarize the differences of technology transfers between overseas subsidiaries of Japanese and European companies. The European system trains lower grade local engineers, who do not go beyond the range of interpreting a manual, but overseas subsidiaries of Japanese companies bring up intermediate-level local engineers, who can manage and contrive something by themselves to solve problems, working together with Japanese engineers.

6. DIFFERENCES IN THE INTERNATIONAL DIVISION OF LABOR

Next, based on the assumption that if the qualification of the local engineers trained by holding companies is different, the international division of labor must also differ from each other, and thus an analysis was carried out to unveil how these factors differ between Japanese and European companies.

There are four basic patterns of international division of labor: (1) division of labor among products, (2) division of labor among processes, (3) division of labor among markets, and (4) division of labor with a mixture of outsourcing, and thus, first these basic elements will be discussed in the following.

(1) The division of labor among products is a type where products are divided between, for instance, low grade and high grade ones, or low priced and high-priced ones. For example, a holding company may produce color television sets while an overseas subsidiary produces black and white television sets.

In this case, the holding company rules the sale market, and simultaneously, an overseas subsidiary takes responsibility for production and quality control, so it must train engineers to take charge of production and quality control.

(2) The division of labor among processes is one where an overseas subsidiary is provided with parts and components from all over the world and fabricates items, such as personal computers, using a supplied drawing.

A holding company rules the sale market and divides a part of the process to transfer to an overseas subsidiary and train a few workers and quality control engineers.

(3) The division of labor among markets is one where a holding company and an overseas subsidiary both work to meet the needs of their own respective users. In this case, both companies design, produce and sell based on their users’ needs. The

markets are divided according to purpose, specifications of users, income hierarchy, or area.

Under this type, since the subsidiary maintains its own market, she has engineers for product planning and designing. The two companies have a somewhat independent relationship. This pattern is commonly seen in the dies and molds industry.

(4) In the division of labor based on a mixture of outsourcing, the holding company is in charge of marketing and product planning for a market, and an overseas subsidiary has product design engineers. The holding company and subsidiary both have production and quality control engineers, and each company totally outsources orders to outside firms depending on cost. In other words, in this case, neither company produces products on its own.

As shown by Table 4, one of the European holding companies seems to have provided its overseas subsidiary, E1, with production technologies from a low speed elevator to a super-high-speed elevator, and seems generous in offering technologies. However, it is actually employing one form of the division of labor among processes, because it does not carry out product planning or product design.

Table 4. Division of Labor among Processes and Human Resources in E1 and J1

Type of division of labor among processes	Possession of human resources			
	Holding company		Overseas subsidiary	
	E1	J1	E1	J1
Maintaining markets and product planning	x	x	nil	nil
Engineers of product design	x	x	nil	nil
Production and quality control engineers	x	x	a few engineers with low-level	a few engineers with higher than intermediate level
Skilled workers	x	x	shortage	some shortage
Non-skilled workers	shortage	shortage	x	x

Source: Mizun (2003)

On the other hand, in the case of J1, as shown in Table 5, the holding company has all levels of engineers, ranging from product planning and product design engineers to non-skilled workers, just like E1. There is neither product planning nor product design engineer at J1, the overseas subsidiary, as with the case of E1. Unlike E1, however, the local production and quality control engineers at J1 are those ranked above intermediate level (see Table 5).

Table 5. Differences between E1 and J1

	E 1	J 1
Capital investment ratio	100%	Joint venture
Products produced at overseas subsidiary	Full line	Partial
Time required for technologies transfers	Short	Long
Local engineers educated at overseas subsidiary	Low-level engineers	Higher than intermediate level
Engineers at holding company	Higher than intermediate level	Higher than intermediate level

Thus, there is redundancy with the engineers at the holding company.
Even if there is a hollowing out of high-level engineers at the holding company, this does affect the overseas subsidiary.

If the participation ratio of foreign capital in the joint enterprise is less than 49 percent, the local side, which holds at least 51 percent, can increase its share and in practice divest itself from the foreign capital or develop into a rival company.

7. CONCLUSIONS

The result of our analysis of the first erroneous commonsense, that “European holding companies provide technologies, but Japanese holding companies are reluctant to do so,” is as follows.

Whether or not the holding company transfers technologies, it depends on the investment form, i.e., whether it is a 100% subsidiary or a joint venture. We confirmed that actually, Japanese holding companies with 100% subsidiaries provided many more technologies than did by European holding companies.

The result of our analysis of the second erroneous commonsense, that “European holding companies transfer technologies quickly, but Japanese ones slowly” is as follows.

It does not take much time for technologies to be transferred to local subsidiaries from European holding companies, because the technologies that they transfer are low in grade, and the engineers that they train are low-ranking ones, who work according to a manual. In comparison, because Japanese holding companies foster mid-level skilled engineers, it takes time to transfer technologies. Because the local engineers trained by overseas subsidiaries of Japanese and European companies are different qualification, it is expected that the system of the international division of labor will also be different. In fact, however, the form of the international division of labor is basically the same type, i.e., a division of labor among processes, in both Japanese and European companies.

With regard to the division of labor of engineers between the holding company and a subsidiary, the European holding companies need to maintain higher-ranking engineers to provide assistance to the local low-level engineers as they advance into a multitude of countries. Under this structure, the holding company has to train its own senior engineers.

In contrast, Japanese holding companies train engineers with a higher rank than intermediate level, even when they are joint venture forms and there is a possibility of leaks of technologies. In the case of J3, which is a fully-owned subsidiary of a Japanese company, the aim is to train engineers of the highest level. However, if local engineers are fostered to that level, they may end up overlapping with engineers at the holding company. In addition, if an engineer at an overseas affiliate of a Japanese company quits and finds a job in a competing company, that new company may develop into a rival. Furthermore, when the joint management contract expires, there is a danger that the local side will increase its capital ratio and become a rival as well.

European holding companies insist on maintaining 100% investment in order to protect leaks of technologies, and only train low-grade engineers at their overseas subsidiaries. These differences lead to employment and income effects, and in turn to market (demand) creating effects.

SUPPLEMENTARY

This report is a part of investigation carried out by the author while staying, as a visiting research fellow, at Fudan University in Shanghai, China. The company-visit investigation was carried out from September 2004 to September 2005.

The investigation was carried out, provided that the names of individual companies are not specified. Therefore, the overseas subsidiaries of Japanese companies are described with the initial “J” substituting for the individual company name, and European subsidiaries are described with “E”s.

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