Technology Transfer from an Institutional Perspective*

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The human factor, or the ability of the agent, is the most essential element in economic development. The Japanese enterprises brought the economic ability of employees to a high level by forming a system called the "Japanese way of management." Through this ability, the Japanese economy witnessed very rapid growth in productivity and technology that can serve as a model for economic development today. Moreover, the Japanese enterprise has a system and method to transfer technology more efficiently than the American or European enterprises can. Successful technology transfer depends on the ability of the agent in countries receiving technology. However, economic development is acceptable only as a compromise to social reality in the age of excessive enrichment.

I. Introduction

Though I am not a specialist in economic cooperation, I can contribute to the field by showing the nature of technology transfer originated in Japanese enterprises. Economists in the world know the economic power of Japan, and several of them recognize that the power comes from a unique system of Japanese enterprises. Here, I will show a way to understand these enterprises' system and the nature of their technology transfer.

A theoretical foundation of this paper is Uno Kozo's *hatten-dankairon* (theory on the three stages of capitalist development).[1]

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[1]Uno (1954). For his entire system of economics, see *Main Works of Uno Kozo*, Tokyo, Iwanami Shoten, 1973-74. (in Japanese)

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However, Uno did not say anything about recent technology transfer. Materials for this paper were abstracted mainly from my research on factories, as well as several books and papers written by Japanese economic researchers that are cited in the footnotes.

The second section discusses the fundamental meanings of technology transfer in the *excessively enriched* age. In the third section, I point out the paths of technology transfer to show the significance of the role of economic agents. The fourth section characterizes the Japanese "company-ism" in relation to the escalation in productivity. The characteristics of "company-ism" are a separation between ownership and management, weak discrimination among classes of employees, the so-called *Genbashugi* and the long-term nature of business relations and evaluation. The fifth section emphasizes the ability and character of economic agents necessary to succeed in technology transfer. The sixth section compares the situation of NICs and that of ASEAN countries. This is a corollary to the above four sections.

In short, I will emphasize the significance of the ability of agents or the human factor in economic performance, including technology transfer. The Japanese economy today represents this human aspect most clearly in the world. Because Japan has the most productive economy, economists must analyze it as a model case.

II. The Effects of Economic Development and Technology Transfer

Economic development, the progress of technology, and the pursuit of efficiency are not unconditional virtues of mankind. Furthermore, societies that should be called "*excessively enriched societies*" have already appeared on the earth.[2] Other countries also pursue economic development, aiming at such a society. Economic development, the progress of technology, and the pursuit of efficiency are the activities to be allowed by a compromise with this reality, and do not comprise a final goal.

Economic development has thus far been considered an unconditional virtue. This has become a common belief by society in general, and economists and technicians have made efforts to develop a means to this belief's goal of development. Nevertheless, as

[2]Baba (1986).

an economist living in one of the *excessively enriched societies,* I think that strong doubt should be cast on this common sense. Below, I will attempt to point out the features of an excessively enriched society.

Those which are now called the "developed industrial countries," that is, the countries in Western Europe, USA, Canada, and Japan, are all excessively enriched societies. These countries constitute together one sixth of world population and two thirds of world income. Accordingly, their per capita income amounts to four times the world average. The per capita GNP of these countries is over thirteen thousand dollars,[3] although this figure does not have to be that exact. The problem is that these *enriched countries* show physically and mentally harmful phenomena related to excessive wealth. Daily work and consumption in a developed industrial country lead to deficiencies in manual labor and an excessive supply of nutrition. This causes fatness and other symptoms that hurt health. People are forced to look for means against these symptoms, as is the case of the proliferation of dieting and jogging. Moreover, the Engel coefficient of these countries is lower than 20%, and a considerable amount is spent for fancy and expensive vegetables, fruits and luxurious foods. In other words, as far as these countries are concerned, ten percent of living cost would be sufficient for the nutrition necessary for existence and labor. Mental labor is intensified in factories, but manual labor is decreased. The proportion of workers engaged in manual labor also becomes very low. Even at home, housework is reduced to consumer activities, and the housework itself is made easier by electric housewares. Commuting also comes to require less physical burden with the increased supply of automobiles. That is, manual labor for living becomes extremely trivial, whereas high income leads to excessive supply of nutrition. This situation is rather harmful to man, who is ultimately living being. This is the key evidence for what I call an *excessively* enriched state.

Of course, excessive richness is also mentally harmful. A society, with the people living in it, loses the purpose to live. The bond between people is broken, and individuals are isolated. Mental pressure is accumulated although the causes cannot be determined. This pressure appears in the form of increases in crime or stragglers, the spread of drugs, and an increase in nervous diseases

[3]United Nations (1986).

among intellectuals. But since this paper concerns economics, psychological aspects will not be covered.

We have so far discussed the average condition. The financial gaps between people are huge. Nevertheless, income inequality in developed industrial countries is not as extreme as that in mid-level countries such as the countries in Latin America. A large majority of the population, including the working class, can be said to have arrived at the level of excessive wealth. Furthermore, policies for income equalization, in the form of progressive tax systems or social security, have been carried out and welfare policy has helped the lowest income class, which enables us to say that few people are in poverty only for economic reasons. Though payment through the welfare policy differs among developed countries, payments must greatly exceed the average income of developing countries and exceed the average income in mid-level countries.[4] Of course, such payment does not necessarily imply that the extremely poor class in an affluent society is happier than the general public of a developing country. After all, the pathology of an affluent society concentrates on the low income class within it.

Excessive wealth must be understood as a threat to the existence of mankind on the earth. Socialist countries as well as developing countries seek economic development to attain the level of developed industrial countries. Suppose that a miracle has occurred and all of the countries on the earth have suddenly reached the present level of developed industrial countries. The size of the world economy would be quadrupled at that moment. Other conditions being unchanged, the speed of both resource consumption and environmental destruction would be quadrupled. The consumption of petroleum and scarce metals, the extinction of forests, food consumption, discharge of garbage, air pollution, and the number of industrial accidents would also be quadrupled. Some would be less than quadrupled, but others would be more than quadrupled. To make matters worse, floods, formation of deserts, sinking of coast and the secondary calamities would increase rapidly. How long could mankind survive under these circumstances? The level of consumption in developed countries, which was used as a standard for the above calculation, is

[4]America has a less generous welfare policy in comparison to other advanced countries. But in America, a person with less than three times the cost of food needed for adequate nutrition is called "poor". A typical example is a recipient of Aid to Families with Dependent Children, who received 1,300 dollars in 1984. The recipient can be given additional money for Medicaid, foodstamps, and aid for housing and energy.

obviously that of excessive richness.

In historical retrospect, it is after World War I that excessively enriched societies appeared on the earth. According to my calculations, the phenomenon of excessive richness begins to appear when the per capita GNP exceeds 5,000 dollars in 1982 prices.[5] From that moment on, the calorie consumption of a person stops increasing and the Engel coefficient starts to fall rapidly. At almost the same time, more than half of households owns an automobile. It is in America in the late 1920s that the state of five thousand dollars per person appeared for the first time. At that time, Western Europe was at a level of two or three thousand dollars, which amounts to a relatively low level among today's NICs. In the nineteenth century when Great Britain ruled the seven seas, her per capita income was one thousand dollars, which is about the average of today's developing countries. Japan was almost the same during the interwar period. A per capita income of five thousand dollars, the limit of calorie consumption, and the popularization of automobiles represent a pattern of living, similar to what W. Rostow expressed as the "*high mass consumption society*." Every country has wanted economic development since World War II. Though their motivations varied, including escape from poverty, political stability, and enhancement of national glory, the world economy achieved unprecedented economic growth, and many countries followed America in reaching the excessively enriched state. England, Germany and France arrived at the level in the 1960s, and Japan and Italy did in the mid-1970s. Furthermore, the income of these countries has continued to increase since then. In addition, a few developing countries, particularly some of the so-called NICs, have almost arrived at this state. Thus, excessive richness has not only been pursued as a goal by poor countries, but has been achieved by some of them. Consequently, the crisis is serious at a global level.

From this point of view, it is obvious that economic development is not an unconditional virtue. In actuality, development is unavoidable and necessary. The population suffering from poverty is estimated to be about 20%.[6] It is not only impossible but harmful to have these people depend upon aid from developed countries. Though the people of developed countries might provide a mild amount of

[5]Per capita GNP is calculated by taking 1982 as a base year and using the American CPI.

[6]By IBRD.

aid, they would resist such contribution as it would pull down their own level of living. Even if they made a sufficient contribution to aid, total dependence upon aid means that a few people in poor countries would become permanent paupers. Economic development is required in this case. On the other hand, to maintain a certain standard of living, a few countries commit an enormous consumption of resources and fearful destruction of the environment. Concerning this, high-efficiency technology or economic systems should be employed for the sake of all mankind.

Therefore, in order for mankind to survive on the earth over a long period, it is necessary to restrain the excessively enriched countries from engaging in further economic expansion. Unfortunately, I cannot find an efficient means to this end. As a result of the unprecedented economic development for more than forty years after the War, economic growth has become a convention of societies. No regime will try to stop it, and social chaos might be caused if it is indeed suddenly stopped. Only as these countries are being enriched, the growth rate of the population will fall and the population will grow older, which will lead in the long run to a decrease in the rate of economic growth. On the other hand, the population of poor countries and a few developing countries is increasing rapidly, and economic development is still necessary there. Development must be achieved through the transfer or cultivation of such technology and economic system entailing a minimal waste of resources and destruction of the environment. It is in the above sense that economic development, the progress of technology, and the pursuit of efficiency are allowed by a compromise with reality.

III. On the Paths of Technology Transfer

There are four paths by which the production technology or economic system developed in one country is transferred to another: Transfer in the form of commodities, information transfer through licensing in its broad sense, entry of companies from a developed country, and active learning by an importing country. Among these, I wish to place emphasis on human elements, particularly on the learning capacities of importing countries.

Transfer in the form of commodities refers to the trade of equipment or high-technology parts. A country enhances its average productivity and international competitiveness by importing equipment

or parts which it cannot produce domestically or whose production costs are too high. A recent example is what Professor Yaan Twujaw at Niigata University named the Pacific triangle.[7] Japan's trade with America, which focuses on manufactured goods, is in surplus, as is its trade with the NICs. Although the NICs import more from Japan, they use the imported equipment and parts to produce and export finished goods to America. Their trade with America is thus in surplus. Japan's trade surplus with the NICs often leads to a view that Japan exploits Korea or Taiwan.[8] Some Japanese economists agree with this view. However, they are totally mistaken from an economic point of view, and this becomes clear only if Ricardo's theory of relative production costs is taken into consideration. We must pay attention to the fact that Korea and Taiwan have the ability to produce and export goods to America by using the imported equipment or parts. Import is a means to enhance productivity only if the importing country has the ability.

Licensing includes transactions of legal patents, as well as blueprints or manuals. In this case, the information is usually presented in a language and documented. Its delivery is often sufficient for technology transfer insofar as the importing country has the ability. For instance, it was in the mid-nineteenth century, i.e., twenty years before the Meiji regime began to aim at Westernization, that a Western-type iron furnace was built for the first time in Japan. This was the result of a superior technician's reading of a book written in Dutch.[9] It is also possible for technology to be transferred through non-documented information. Samuel Slater succeeded in making a spinning machine relying only upon his memory. Since England prohibited the exporting of the machine or its blueprint, Slater's success began the transfer of the spinning industry to America.

However, a company's advance is a more intensive way to transfer technology. Though a company's advance usually accompanies the delivery or licensing of equipment, it also generates the exchange of personnel. Personnel exchange brings in much more information than goods or documents. In particular, personnel exchange yields a good opportunity for useful improvements in the delicate know-how or in the management system. Of course, its utilization relies upon the importing country's enthusiasm and ability. But I wish to add

[7]Twujaw (1987).
[8]Matsumoto (1986).
[9]Nakaoka, *et al.* (1986).

that the effect of a company's advance also depends on the character of the advancing company. Generally speaking, Japanese companies are more eager to transfer technology and know-how to do it.

I have visited twenty-seven Japenese companies which had merged or technically cooperated with local companies in seven countries, Brazil, Mexico, Taiwan, Korea, Thailand, Malaysia and Australia. I had the same view of most Japanese until that time. Japanese journals have reported the criticism of local residents in strong tones. Consequently, readers think that Japanese companies are reluctant to transfer technology in fear of the boomerang effect. I had the same thought, but the visits raised doubts and changed my opinions. Of course, my observations were insufficient and did not allow for a complete comparison with Western or local companies in those countries. However, the number of prominent scholars specialized in this area is increasing in Japan, and their research is fruitful.[10] Their opinions are the same as mine with few exceptions.

Concerning technology transfer, Japanese companies have three features. They are related to language, personnel interchange, and enthusiasm. First, Japanese companies seldom enforce their language. They usually use the local language if possible, or English otherwise. In the days of imperialism, companies enforced the language of a ruling country in their colonies. Japan was the same before the war. In Taiwan and Korea, even the general public, including companies, was forced to use Japanese. American or British companies can still use English in their management thanks to the wide use of English. Japanese companies have made efforts to adopt local languages after the war. Although the use of Japanese in management will increase in the future as Japanese comes to be spoken more widely along with the growth of the Japanese economy and technology, management has not been based on Japanese until now. This helped in the rapid transfer of Japanese technology and management systems to local companies.

Second, a Japanese company's advance usually entails the exchange of many people. In addition to top managers and engineers a number of low-ranking managers or high-ranking workers, in the form of supervisors, coordinators or leaders, are exchanged. This is also the case for skilled workers serving as maintenance men or repairmen. This personnel exchange is the main feature of a

[10]Koike (1981), Koike and Inoki (1987), Ichmura (1988), Abo (1988), Shimada (1988), Suzuki (1988, 1989), Ikeda (1989a, b), Sasaki and Esho (1987).

Japanese company. There are two kinds of exchange. One is to employ local workers, from whom a few are chosen and trained in the main factory in Japan. Since the training in Japan focuses on on-the-job training, some of the workers sent to be trained as well as critical journalists think of such training as a form of low-wage exploitation of foreign workers. However, the company usually pays the costs of employment, selection, and travel, and the trained worker returns to the local company to continue as an essential worker. This is not only efficient for the company, but yields an opportunity for high-wage employment for workers, should the training of local workers and the construction of local factories be finished simultaneously. The other form of personnel exchange is the dispatching of Japanese workers who have been working in Japan to play a leading role in local factories. In some cases, a large number of persons are sent, although the number varies across companies and operation times. The costs of this exchange are also paid by the company. This kind of personnel exchange is a very effective way to transfer technology. It is a way to transfer something other than basic skills or operating methods, allowing the transfer of what can be learned only through experience, including know-how, ways to cope with changes and abnormalities, tactics to organize an efficient system of operation, etc. The company agrees to bear considerable costs, since productivity is enhanced through the rapid transfer of technology, allowing profitability in the long run.

Third, Japanese companies are in general eager to transfer technology. We can conceive of several reasons for this eagerness. As Japan's technology is highly advanced and is being improved everyday, the convention is taken abroad. In addition, skills are learned in Japan mainly through on-the-job training, and are adopted outside of Japan. Because of this, some local workers who cannot adapt themselves to such training complain and often arouse public opinion against Japanese companies. A few Japanese companies might not be in favor of technology transfer. In general, however, Japanese companies are rather excessive in their zeal to transfer technology. This zeal is ultimately due to the economic benefits of transfer. Japanese products are now preferred in the world market for their excellence and quality. Even an overseas company cannot acquire a large market unless it keeps a high level of technology. In particular, a sufficient transfer of technology is essential if the products are imported to the Japanese market. In Japan, consumers as well as companies are extremely sensitive to product quality.

Behind these features of Japanese companies regarding technology transfer, there is a special method of management developed in Japan. This method of management will be discussed in the following section. The key concept is what I label "company-ism."

IV. The Japanese Company-ism

"The Japanese company-ism" should not be confused with "Japan, Incorporated." The latter was coined by western scholars to refer to the economic development of Japan led by the government. This tendency overemphasizes the role of government. In contrast, the label "Japan's companyism" focuses on the method of organization and management in Japan.[11] With respect to economic development, an exclusive emphasis is placed on the vitality of private companies. Ordinary people often use the word "companyism" with scorn. In this case, it implies the loyalty of employees to their company. Though my concept includes this loyalty, it mainly refers to the attitude of companies and the economy. It can be expanded to represent a feature of the Japanese society as a whole, based on the entity or spirit of its economy. One author used the word "incorporationism" with an almost identical concept in mind,[12] even though I prefer the word, company-ism.

Japan is legally a capitalist country, but a company, especially a large, major agent in the economy, incorporates both a capitalist element and a socialist element. I call this *companyism*. The capacity for economic or technological progress is very high because of the combination of these two elements. Thus, foreigners often raise the issue of the secrecy of economic development in Japan. If the question is asked by a Westerner, the socialist element needs to be emphasized. If the question is raised by a Russian or Chinese, the capitalist element needs to be emphasized. If a Taiwanese or Korean should ask the question, the answer will be complicated but should focus on the socialist element. Thus far, the question has mainly been raised by Westerners. A general answer has been that the "Japanese way of management" or the "Japanese style of industrial relationship," entails a combination of life-time employment, wages based on tenure, and an independent labor union in each company. Though this is not an incorrect answer, it is an insufficient one.

[11]Baba (1988).
[12]Matsumoto (1983).

Below, I will make four points in addition to the above. Taiwanese or Koreans should pay attention to them.

First, ownership control is relatively weak in the large companies of Japan. They take the form of corporation, and stockholders' power is not great. It is a well-known fact that the meeting of stockholders ends in a very short time. This can be explained by the so-called "joint ownership," which means that various corporations form a group to become stockholders of other members of the group. A different explanation is also conceivable. The point is, however, that this division of ownership and management is virtually unimaginable in other countries. A corporation is not obligated to guarantee a large dividend and a high stock price. The chairman is nominated by his predecessor, and stockholders confirm the nomination only as a formality. Since few firms are sold, it seldom happens that a new owner changes the top manager. Given this weak ownership control, a firm's managers may pursue expansion or technical renovation in a reasonable and stable way.

Furthermore, it is not just the top manager who determines the style of management. Each member of the company reflects his or her opinion on company decisions. A system has been created to communicate a firm's intention down to the lowest rank of its workers, to absorb the opinion of the latter, and to encourage workers' creativity. All of the employees participate more or less in management through this system. Although the final goal of a company is to make profits, the profits are used to pay its workers more wages and improve their well-being as well as to expand the company. The workers' social status is ascending. As the company grows famous and its expansion accompanies its workers' promotions, the workers are also better received by society. Given the convention of long-term employment, this system yields the loyalty of employees to their company, and in turn, the loyalty allows the company's growth. Being managed for profits, a company is no less concerned about the interest of its employees as a whole than the private interests of its owner. This is the reason that workers are not against the rationalization and exercise of self-control regarding wage increases in the case of depression.

Second, the divisions between the different ranks of employees are not very serious, and promotion in a company is less limited. In slight exaggeration, people often say that each of those entering a company at a given time is a president-to-be. Generally, new graduates are appointed once a year. A college graduate becomes a

white-collar employee and a high school graduate becomes a blue-collar, but no big gap exists between them. As wages increase each year along with tenure, the wage for a blue-collar employee having worked four years is almost equal to the wage for a white-collar employee entering upon graduation from college. The wages for both increase with tenure thereafter, though a college graduate receives faster promotion and may more easily reach a high position, resulting in a wage gap after several years. This small gap between wages for white- and blue-collar employees is a conspicuous feature in Japan, in contrast to other countries. There is a difference in promotion, but it is not as big as in other countries. It is not a rare case that one enters a company as a blue-collar worker to retire from the company as a white-collar one. The contents of labor are of course different. Even the contents, however, are often mixed as will be explained below.

On-the-job training is of great importance. A company does not expect much from previous schooling. The fame of a school is no more than a criterion for judging its graduate's potential abilities. A newly employed worker is assigned relatively simple duties, and then moves to complicated duties as the worker gains more experience. Repeating this transition, the worker is educated with various abilities. A white-collar worker also becomes a generalist who can carry out many different duties. Thus the workers are familiar with a variety of duties in the company through experience, possess a good understanding of various aspects of the company and know many persons throughtout the company. Since a worker with more experience contributes more to the company, promotion and wage increases according to tenure constitute a reasonable system. Of course, there are differences in dexterity and adaptability among workers. The differences are reflected in promotion. The mechanically equal treatment does not last long.

Third, *genba-shugi,* or the spot-centered attitude, is an important feature. This should be emphasized in any other countries. In Japan, managers or engineers (i.e., white-collar workers) often stay at a production post. When they enter a company, they experience the job of blue-collar workers with blue-collar workers for a while, say half a year. They often form an organization including blue-collar workers as fellows and establish a camaraderie with them. As white-collar workers in Japan have many other opportunities to experience the work done in a factory, they do not hesitate to work at a production post. It is sometimes considered an honor, and an

office worker ends up knowing about the factory in detail. This attitude has something to do with the negligible gap or division that exists between them and blue-collar workers, as discussed above. It is certainly useful in introducing new technology or improving production methods. Let me give a few examples.

A big steel company introduced a new technology from America. The company sent a small number of engineers to an American company. They got the necessary documents and knowledge in an office, but did not stop there. They visited the operation site to find out its advantages and limits. Having returned to Japan, they led a study which suggested a few problems. A research team was formed for each problem and the team included a few highly skilled factory workers. When the teams' intensive efforts yielded solutions to the problems, an experimental operation of the new equipment was conducted. After a number of dangerous accidents in the experiment, it became possible to operate without accidents. The company thus introduced the new technology without the direct guidance of Americans, which turned out to be a considerable improvement over that of the American company which had provided it.[13] I want to add two items from my own experiences. I have paid visits to two Japanese factories in Southeastern Asia. Each visit was guided by the chairman or factory manager, i.e. the top manager. The manager knew the equipment and organizations very well and explained things to me in concrete terms. During the guided tour, the manager also identified problems and gave instructions to deal with them. When I visited a mid-size company in Japan, an executive for technology led the tour. Pointing out a few recently improved processes, he said that each of the improvements had been made through the creativity of skilled workers at the production site. He added that such workers' experience was much more useful than that of the young engineers educated in college.

The above examples all show that the site-centered attitude in Japan is of great use to developing technology. Managers and engineers visit the production site very often. They thus find out what to improve by themselves. They are also apt to accept the opinions of workers. Workers themselves have the ability and the will to discover problems. Knowledge about the production site is accumulated through these paths to suggest and facilitate future developments.

[13]Yanagida (1981).

Fourth, the long-term nature of business relations and evaluation is another feature of Japan's companyism. Both the life-time employment in a company and the subcontract system between companies are well known, but these are not the only cases. This long-termness might seem to be a stable relation which is not based on the market system, but is an unreasonable element. However, it includes fierce competition over a long term, and is thus a condition for the improvement of productivity. In the meeting of the Structural Impediments Initiative last year, the American government has criticized that such activities by Japanese companies are unfair and contrary to the market institution. But this is because Americans do not understand that a business relationship with long-term stability includes fierce competition in the long run.

The life-time employment is literally employment over the life time. There exists a forced retirement called the age limit, and a forced retirement in the form of a voluntary one or dispatch to a related company when the company suffers from depression. Nevertheless, in comparison to lay-offs in America, we can conclude that the relationship between a company and its employees is far more stable. This is a method to encourage the loyalty of employees to their company and to keep the accumulated skills within the company. In addition, this long-term employment contributes to the fierce competition for promotions as the company has small gaps between ranks and limited opportunities for promotion. It should be noted that the evaluation method for promotion is very complicated. The method, which is a secret of the company, is not known in detail,[14] but it can be summarized as follows. Each worker is evaluated by more than one of his superiors. The evaluation covers various items, including personality as well as ability. This evaluation is repeated over a long time. Though subjectivity or arbitrariness could be involved, a system is created to minimize them. We may believe that the result is the promotion of such persons who can contribute to the improvement of productivity and receive the support of a group of workers.

The transactions between companies involve what Professor Jurô Hashimoto at Hosei University called the "rationalization mechanism of long-term companionship transactions."[15] In the case of the automobile industry, for instance, a car maker has a horizon-

[14]Nomura (1988-89).
[15]Hashimoto (1989).

tal relation with a maker of its material, steel. The relation between a car maker and a parts supplier is regarded as vertical, though a few parts suppliers do business with several car makers and maintain their independence. In either case, it takes a long time for a transaction relation to be established, and an established relation lasts for a long time. Each party understands the other's situation. A car maker often gathers information about consumers leading to an improvement in the quality of its material, steel. It also happens that a parts maker suggests a new design for the part and motivates a new design for the finished product, the car. Since both parties are well aware of the production costs, half of the cost reduced through an improvement by a parts supplier becomes the parts supplier's extra profit and the other half becomes the car maker's profit through a reduction in the price of the part. Thus, the transactions between companies are stable and differ from the spot market transactions in Western countries, i.e. the transactions with anybody for a lower purchase price or higher selling price. Nonetheless, a seller will be ousted ultimately if he cannot meet the buyer's demand for price reduction or quality improvement. The long-term companionship transaction is a means to give a seller time for technology improvement and is thus a mechanism yielding the faster enhancement of productivity. For those Americans who know nothing but the pursuit of short-term opportunities in business, this might be difficult to understand.

The four elements discussed above are the features of "the Japanese companyism" which I want to emphasize. It should be understood that the companyism does not belong to pure capitalism nor to pure socialism. Companyism is the best system for increasing productivity created in human history. If the utmost goal of a society is to increase productivity, it will be effective to adopt the system. It will be also helpful to accept the Japanese companies that have embodied the system. But man cannot live by bread alone. The choice of goals is up to the people of each society.

The above discussion on Japan's company-ism used the approach of Max Weber's Ideal Typus. In fact, no more than a third of workers is related to companyism. Insofar as the number of companies is concerned, many more companies are owned by a private person. Even a joint-stock company is often controlled by a person. Since many of the workers working at a same company are provisionally or indirectly employed and are fired in depression, the employment of full workers can last long. Not all Japaneses companies adopt

companyism. It is, however, the leader and model of productivity development. Japanese companies regard it as their goal and make efforts to approach it as closely as possible. Company-ism has provided a frame of reference in the style of management and the relationship between an employer and employees.

I cannot explain why the system of companyism was formed in Japan for the first time. We can only wait for progress in historical studies. All I can say is that an institution or convention coexists with competition and technological rationalization although that institution or convention should be irrational according to the common idea of capitalism and markets. It may also be said that Japan has created the system having the highest capacity in world history for economic development because Japan was the best place for this coexistence. In other words, the commonly conceived capitalism or market institution is restricting the development of productivity in some respects. The Japanese company-ism is a system which minimizes the restriction.

V. Ability of Agents in Technology Transfer

To make abstract delineations of the process of technology transfer, we can think of the following steps: selection, absorption, settlement, improvement and diffusion. This distinction is not meaningless, since there are differences between the work done in each step and in the characteristics of organizations and men to be in charge of the work. Economics and technology, however, do belong not to the arena of mere logic but to that of practice. An abstract distinction is not important. For instance, the absorption of technology has something to do with the acquisition of information, the construction of equipment, and the method of operation by the equipment. The settlement of technology is related to operation, but it is completed only when the equipment has been constructed by the technology absorber. The process of technology introduction is a continuous one, and the ability required for it is also continuous as a whole accompanying the division of labor.

The Japanese company-ism was discussed in detail in the prior section, in which the following points were made: 1) Economics and technology are in the arena of practice, rather than science. Otherwise, it might not have happened that some parts of the Japanese economy surpassed the American economy, although the Nobel prize

has been awarded to an American economist almost every year, but none to Japanese economists; 2) Economics and technology, however, are a more intellectual process than has so far been considered to be. The intellectual ability lies in practice; 3) This intellectual ability is required even for workers of a low rank. Workers' intellectual ability is of critical importance; 4) It is conducive to economic development for workers and managers or technicians to have similar ability and share common technological knowledge; 5) For the above-mentioned enhancement of workers' ability, each rank of workers should behave actively as a subject, and the link between various ranks should be strengthened; 6) Activeness and linkage demand a management system different from that of the Western countries, or China and Russia. Moreover, the system should economically and socially benefit each worker in the long run.

The Japanese economic development after the Second World War is a result of intellectual development with an emphasis on practice and of an approach that enhances the ability of each worker. This proposition may be generalized concerning the introduction of new technology or technological development.

A correct choice of technology requires the knowledge of worldwide conditions for technology and practical judgement about the economy and technology of the country. It is meaningless to try to obtain the most advanced techniques without considering the prosects for the adaptation of imported technology. It has been the case that a developing country asked for advanced technology simply to enhance national prestige, causing financial loss and antagonism against the country providing technology. The attempt to maintain high technology entails the danger of continued technological subordination. On the basis of a practical judgement of a nation's conditions, it should be considered whether an organization may develop soon to absorb the high technology. In this broad sense, the ability to make a correct choice of technology is applicable to the acceptance of the companies of a developed country, as well as to the importation or leasing of products. It is this ability that should be invoked to judge what is necessary or harmful to the nation, now and later.

The absorption and settlement of technology form an inseparable process. The acquired technological information is no more than academic knowledge if it is not implemented in the production. The technology is learned by technicians through experience. Managers or workers experience it through production. As more people ex-

perience this technology, it is absorbed and diffused in the society. The technological independence of a country cannot be achieved without absorption and diffusion. In absorbing technology, it is important to experience and overcome failure. It should be kept in mind that the introduced technology does not always function smoothly. In particular, if technology is operated by the people of the importing country alone, failure is quite natural. To overcome failure is the best way to learn and absorb technology. They should respect the experience of failure.

We can think of the process of technological improvement as similar to that of technological settlement. The technological environment is not the same in offering and importing countries. That is, the introduction and settlement of technology necessarily accompany a partial improvement on the technology. Localization of technology does not happen in a country devoid of the ability to improve it. Furthermore, production-employing current technology often brings about the abnormal situation in which the technique is forced to be changed under current international competition. The response to this abnormal situation or change, and the localization in a different environment give an opportunity to learn such things as overcoming failures. Learning in these situations enhances the ability to develop new technology.

I have so far discussed an active ability of the recipient to introduce and develop new technology, while keeping in mind the case of the post-war Japan. In Japan, the subject consists of prominent companies competing against each other, as well as each rank of their constituents. According to a recent study by Professor Woo-Hee Park,[16] however, the government has led technology imports in Korea, choosing a company from each industry which will absorb the imported technology. In this light, "Korea, Incorporated" would a more appropriate label than "Japan, Incorporated." Since the study by Professor Park is limited to a few industries, I am not sure if it gives a complete picture of technology introduction in Korea. But it is common that economic development is led by the government in its early stage, as was the case with the early period of the Meiji restoration in Japan, as well as that of Brazil, Thailand and Malaysia. When only a few people have the ability to lead economic or technological development, it might be effective for the government to absorb technology and initiate development. It is a

[16]Park (1989).

common experience of world history that a government leads economic development, and the leadership of a government might be strong in less developed countries.

A government, however, cannot be the permanent agent of economic development. In the modernization period of the Meiji, the main player of the Japanese economy was a group of private companies. In the process of development led by the Korean government, a group of large corporations or medium-size companies called "*Jaebol*" appeared. Taiwanese development was also first led by a government, but many private companies contributed much to development even at its early stage. These small- and medium-size companies grew to be exporting companies, and enhanced international competitiveness through mergers with, or technological assistance from, foreign companies. Though Taiwan has more companies controlled by the government than Korea, these companies do not seem to be growing fast.

What interests us is the case of Brazil. As my study was done in 1982, it is as outdated as the material. Nevertheless, the features of firms have undergone little change since then. Brazil has a few large firms, and some of them are large even by international standards. On the other hand, there are many small firms that are often managed for the sake of subsistence. The large firms are controlled by the government, foreign capital, or financial groups. Among them, the foreign capital firms alone have internationally competitive power. Few private firms attempt to compete with foreign capital firms. Even a subcontract relation is seldom sought by the private sector. The managers of Japanese firms in Brazil deplore their inability to find a subcontractor from local firms. The number of small- or medium-sized firms is not large, probably because of this lack of vitality in the private sector. Brazilian entrepreneurs do not try to adopt the high standards and management systems of foreign capital firms. Besides, engineers are the same. A large firm sent technicians to a firm of the same kind in Japan for the purpose of training. The technicians understood what they learned in Japan. However, they did not think of further improvements. Furthermore, some of them took advantage of the techniques they learned as their assets and were scouted by other local firms. The top manager of this large firm had no further desire to become technically independent from Japan.

This example from Brazil shows that even development led by government cannot be sustained unless the vitality of private firms

is mobilized in a relatively short period of time. Nonetheless, the development capacity of Brazil is as strong as that of other Latin American countries. Compared with this, the development of East and Southeast Asian economies is much more dynamic.

From the Western point of view, the subject's ability is mainly formed through school education. We cannot deny the value of school education. School education is almost excessive in Japan, and elementary education seems to be more widely spread in the East Asian countries than in Brazil. According to the experience in Japan, however, economic ability can be developed most effectively through on-the-job training in firms. We will discuss in Section VI how far this will spread in the Asian countries. In this section, I will comment on China and the Soviet Union.

I do not know the details of their economies. In particular, I have inspected no firm in the Soviet Union. I wished, but failed, to inspect firms when I visited the Soviet Union in 1969. According to my own analysis of the information gathered so far, however, the national firms in a socialist country are no more than a part of public office. They cannot be said to be independent firms. They do not have the authority to make decisions about extension or technical innovation. I even doubt if they have any intention to innovate their technology. Though I asked twice a Russian economist the question on which class desires technical innovation, the question was not explicitly answered. I inspected a few factories when I visited China in 1978 and 1979. The staff members of the national firms had little knowledge about technology and little desire to innovate. Rather, collective firms had stronger desire.

Generally speaking, an official organization is not fit for technical innovation, and is sometimes harmful to it. I have learned from my experience working in a national univeristy that this is the case in Japan as well. Thus, it might be an effective means for technical innovation in the Soviet Union or China to change the ownership of firms. More importantly, employees must participate in the development of firms. The Japanese corporationism which I explaind above illustrates this. Workers would not behave as subjects, simply because it is mandated that workers are the subjects of a nation. Rather, they would assert their right to less work. The precondition for making workers subjects is to create a management system in which workers are highly evaluated by a firm if they contribute to the firm's development, and in which workers receive economic benefits as a group commensurable to the growth of their firm.

VI. NIEs and ASEAN

This section concerns Korea, Taiwan, Thailand, and Malaysia, since I have no knowledge of other countries whose factories I have not visited.

A very interesting contrast is to be found between Korea and Taiwan on the one hand, and Thailand and Malaysia on the other. There exist a number of managers of great ability and ambition in the former. However, both countries suffer from a shortage of labor supply. In Thailand and Malaysia, labor supply is still sufficient, and workers are unexpectedly competent. But these countries lack managers. They have only an extremely small number of excellent managers, most of whom are from Chinese families. This contrast corresponds to the difference in economic development between NIEs and ASEAN.

NIEs have more experience with economic development, which alone has produced many managers. Otherwise, their economies have been developed to the extent that they had excellent managers. Some of the managers studied technology or management diligently and have compared the American and Japanese ways to adopt the latter. They have been learning the Japanese language, buying books about management or technology from Japan, and making contacts with Japanese managers to absorb their knowledge. They make efforts to find out what is inferior compared with Japan. Some of them repeatedly investigate the Japanese market to produce what can be sold in that market. Their attitude resembles that of the Japanese managers who tried to learn from America in the 1950s and 1960s. This is different in Thailand or Malaysia. The number of managers is small. A government official of Malaysia has frankly said to me that the most important weakness in the Malaysian economy is the shortage of managers. The managers are incompetent, less ambitious and impractical. They do not inspect their factories, and pay no attention to what should be improved. A few are aware of Japanese management, but their knowledge is no more than a superficial or academic one.

In Korea and Taiwan, I have met a great number of managers to respect. Their misfortune is that they cannot give full play to their ability because of tight ownership control and lack of interest among workers.

The control by owners might be the driving force in the period of business foundation. It is because owners actively conduct their business to multiply their wealth. The economies of Taiwan and Korea have been developed in this way. However, the time has arrived to promote the separation of management from ownership. There are several cases in which the will of an owner precludes the reasonable, long-term judgement of a manager from being put into practice. If many a manager of ability are not promoted to the top position of a firm, the manager will not stay at the firm much longer.

What is more important, but difficult, is to make workers keen on developing management. In both countries, ownership control has still been strong whereas worker participation has been legally restricted. The economy has grown, and the supply of labor is now in shortage. In Japan, the shortage of labor supply was preceded by the democratization of the owner-worker relationship through reform following the War. This helped to create the companyism in Japan. In the two NIEs, export-oriented industrialization proceeded while worker rights were restricted, which accompanied a more rapid absorption of labor supply than in Japan. Further, a rapid increase in income resulted in the tendency to have fewer babies. Consequently, when worker rights came to be acknowledged, the labor supply became short and a worker could change jobs easily. Though excellent managers have been produced, it becomes more difficult to settle workers at a company, train them, or involve them in management in comparison to the case in Japan.

Furthermore, the shortage of labor supply accompanied inevitably a rapid rise in wages. On the other hand, export-oriented development called for a rapid rise in foreign exchange rates. These two difficulties cannot be overcome without an increase in productivity. As technology imports have progressed, the continuous accumulation of independent improvements in technology is required. Technology improvements require worker involvement, but the macroeconomic conditions for this have been lost. The managers' ability must be enhanced a lot. We may also claim that the transition to a mature economy has already begun in these two countries.

In Thailand or Malaysia, labor supply is still sufficient. Moreover, the quality of labor is unexpectedly good. Workers are obedient and industrious, as well as patient and talented. They also learn very quickly. The managers of Japanese companies in these two countries evaluate local workers very highly. The problem of these

two countries is that there are only a few local managers, and these lack entrepreneurship, which seem to be the reason that few, strong local enterprises are founded. Entrepreneurship or management ability may be cultivated as economic growth continues. Otherwise, these countries can only rely on foreign capital for technological development. Technological dependency would last forever, and the excellent labor force would continue to be used arbitrarily by foreign capital.

East and Southeast Asia form the center of industrialization in the world. This is a big event in world history. Few could concede this situation a quarter century ago. Here are located Japan, the NIEs and the ASEAN countries, which have different but high capacities for development. The technology for industrialization came mostly from America, and partially from Europe. Japan finally has the ability to develop technology by itself and to become country exporting technology. Recently, the NIEs have begun to export capital and technology. Thus, a mixture of technology of different origins appeared in Southeast Asia. It depends upon the ability of government, managers, and workers of an importing country to combine and absorb the various technologies. The political situation might allow this sort of technology mixture to happen in China or the Soviet Union. However, there are several difficulties even in this most promising area. These difficulties can also be valid in Japan, which has arrived at the highest level.

VII. Concluding Remarks

I have tried to discuss objectively the strong points of the Japanese economy. I have had no intention at all of praising the strong points or boasting of them as a nationalist. Thus, I may make another observation about the strong points — that is, the coexistence of different kinds of high technology. This might be called the thickness of industrial structure. For instance, extremely pure water and air are necessary to produce a high-density semiconductor. Japan has the technology to produce the pure water and air. Good-quality steel is essential to produce a light but strong car. The Japanese steel producers can supply such steel. Fine electricity is required as the computer is widely used. The Japanese electric companies can supply it. There are internationally famous firms to produce NC milling machines or minute ball bearings. That is, pro-

duction using high technology requires different kinds of high technology. It can be easily supplied in Japan. This coexistence of different kinds of high technology cannot be easily achieved even in America. This is a reason for the strong international competitiveness of the Japanese industry.

However, a weak point might emerge in Japanese industry in the near future. As a result of excessive rationalization and affluence, Japan might lack the skilled workers heeded for high technology. In the extreme, if there is one worker in each factory, huge factories can continue production. A worker has excellent skills, but he has no apprentice to teach his skills. That is, rationalization has proceeded to the extent that on-the-job training is impossible. Excessive affluence has led the youth to have a different way of thinking from the previous generation. The children of workaholics grew up without experiencing labor. When they reach the age to start a job, they first avoid agriculture and then construction work or factory work. They prefer the third industry, which appears nice. Though firms want to hire apprentices, fewer people apply. Thus, the passage of high skills among workers becomes more and more difficult.

In addition, the three years of prosperity might yield a fall in the quality of Japanese products. Workers and white-collar employees are growing weary of prolonged extra work. Death from overwork is now a problem. There is a voice among workers hoping for depression, which might allow them a rest. In this exceptionally busy time, the quality of products is difficult to maintain, not to mention its improvement. There is no other way to solve the shortage of labor supply than depression or massive import of foreign workers. But if the latter course is taken, the maintenance of skills is difficult and requires the invention of a new system. In short, the dialectical process of strong points becoming weak points has appeared in Japanese industry.

Within the technology or management system created by Japan, there is something beneficial to mankind. These benefits should be sustained by teaching the technologies and systems to the Asian countries.

References

Abo, Tetsuo. *Production of Japanese Enterprises in the United States*. Tokyo: Toyo-Keizai, 1988. (in Japanese)

Baba, Hiroji. *Mass-enrichment and Financial Capital*. Kyoto: Mineruba-shobo,

1986. (in Japanese)

_____. *The Economics of Educational Crisis.* Tokyo: Ochanomizu-shobo, 1988. (in Japanese)

Hashimoto Jurô. "Enterprise Management and Industrial Relations." In H. Baba (ed.), *Series World Economy* IV: *Japan.* Tokyo: Ochanomizu-shobo, 1989. (in Japanese)

Ichimura, Shinichi (ed). *The Japanese Way of Management in Asian Countries.* Tokyo: Toyo-Keizai, 1988. (in Japanese)

Ikeda, Masayoshi. "Comparison of Production Systems in the Automobile Industry between Japan and France." *Chuô-Daigaku Keizai-Kenkyu* 19 (March 1989). (a) (in Japanese)

_____. "Recent Trends in British Automobile Parts Suppliers." *Jidosha-Sangyo* 23-1, 24-1 (1989). (b) (in Japanese)

Koike, Kazuo. *Skill in Japan.* Tokyo: Yukikaku, 1981. (in Japanese)

Koike, Kazuo, and Inoki, Takenoki. *International Comparison of Manpower Training.* 1987. (in Japanese)

Matsumoto, Koji. *Economic Dispute between Japan and Korea.* Tokyo: Toyo-keizai, 1986. (in Japanese)

_____. *The Rise of the Japanese Corporate System.* Tokyo: Nihon Seisansei Honbu, 1983. (in Japanese)

Nakaoka, Tetsuro. *et al. Technical and Technological Policy of Modern Japan.* Tokyo: University of Tokyo Press, 1986. (in Japanese)

Nomura, Masami. "Industrial Relations in the Automobile Industry I, II, III." *Okayama-Daigaku Keizagaku Zasshi* 20-2, 3, 4 (1988, 1989). (in Japanese)

Park, Woo-Hee. *The Development of Technology in Korea.* Tokyo: Bunshindo, 1989. (in Japanese)

Sasaki, Takao, and Esho, Hideo. (eds.) *Overseas Advance of the Japanese Electronic Industry.* Tokyo: Hosei University Press, 1987. (in Japanese)

Shimada, Haruo. *Economics of Humanware.* Tokyo: Iwanami Shoten, 1988. (in Japanese)

Suzuki, Naotsugu. "The Advance of Japanese Automobile Enterprises to the United States." *Senshu Daigaku Shakaikagaku Geppo* (March 1988). (in Japanese)

_____. "Production of Japanese Automobile Enterprises in America." *Senshu Daigaku Shakaikagaku Geppo* (December 1989, April 1990). (in Japanese)

The Institute of Social Science. *Local Production of Japanese Automobile and Electronics Firms in the United States.* Research Report 23, Tokyo: University of Tokyo, 1990.

Twujaw, Yaan. *NICs and ASEAN: Tradition and Modernization.* Tokyo: Ochanomizu Shobo, 1987. (in Japanese)

United Nations. *National Accounts Statistics: Analysis of Main Aggregates.* 1986.

Uno, Kozo. *Economic Policy*. Tokyo: Kobundo, 1954. (in Japanese)
Yanagida, Kunio. *The Day When Japan Reversed*. Tokyo: Kodansha, 1981. (in Japanese)