Chapter VI

Expert Dispatch Program for Private Enterprises – The Case of JODC Experts in the Thai Manufacturing Sector –

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Introduction

Technical assistance is one of the important parts of ECOTECH. This paper focuses upon the expert dispatch program, which occupies the central part of technical assistance. Generally speaking, APEC faces difficulties when dealing with this type of program directly because of limited financial and human resources. However, it is significant to consider the possibilities that APEC can contribute to the program. Therefore, this paper intends to show the practice of expert dispatch operating in related organizations, and the current problems facing it.

For the case studies, the author selected the Japan Overseas Development Corporation (JODC) among other organizations. JODC is an organization under Japan's Ministry of Economy, Trade and Industry. Mainly, JODC has sent experts directly to private enterprises in the manufacturing sector. JODC attempts to develop industry through promoting technology transfers to private enterprises. From the national interest of Japan, technology transfers can be expected to improve the circumstances for Japanese investment and to promote trade with Japan. This conforms well with the aim of ECOTECH, that is, the promotion of investment and international trade. Therefore, the author judges that JODC is the appropriate case[1].

[1] JODC aims to provide technical assistance to private enterprises. Recently, although it expanded

Since the recent economic crisis, JODC faces a turning point in its operations in Thailand. Specifically, the budget for sending experts to Thai local enterprises has been reduced. From the demand side, the organization has made Japanese affiliates as the recipients of more dispatched experts than ever. In the near future, it is expected that requests for experts will increase rapidly in Indochina and Myanmar. From the supply side, JODC's budget will not increase as a whole. Therefore, the dispatch program to local enterprises has changed its focus from staying experts, who stay with individual companies, to roving experts, who rove around to many companies.

Section 1 deals with the outline of JODC's expert dispatch program in Thailand. Particularly, it considers the increase in the program's number of roving experts for local companies and analyzes the background of this change of focus[2]. Section 2 through Section 4 show the results of the case studies. The experts are divided into three categories, such as staying experts in individual local enterprises (Section 2), staying experts in Japanese affiliates (Section 3) and roving experts for local enterprises (Section 4). Lastly, Section 5 tries to compare the three categories and investigates the meaning and validity of the increase in the number of roving experts. In addition, section 5 considers the role ECOTECH can play in the roving experts dispatch program.

1. Recent Change in the JODC Expert Dispatch Program

JODC prepares two types of regular expert dispatch programs. One program is for business improvement (JESA-I). The other program is for industrial restructuring (JESA-II). JODC has a 2.2 billion yen budget for expert dispatch. Out of this budget, JESA-I occupies 1.4 billion yen and JESA-II 0.8 billion yen. In addition, as part of the fiscal year 1999 supplementary budget, it implemented the program for Japanese SMEs' affiliates. Experts of JESA-I provide individual enterprises instruction in production technology and management technology. Recipients must bear a quarter of

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recipients to include agricultural, fisheries and medical sectors, it still mainly dispatches experts to the manufacturing sector. Most of the experts have experiences working for private enterprises.

As for sending experts to the private sector, it is the same as the case of Overseas Vocational Training Association (OVTA) under the Ministry of Health and Labor. But OVTA aims at to train the dispatched experts. Although Japan International Cooperation Agency (JICA) under the Ministry of Foreign Affairs also sends experts into the industrial field, they cannot be sent to private enterprises.

[2] At the same time, the focus also shifted from local enterprises to Japanese affiliates. Refer to Takahashi (2000) for this.

the total expense. JESA-II started in 1999, and it requires experts to have official qualifications or high technical knowledge. They provide instruction for improving and reinforcing industrial structure in business and industrial organizations or their member companies. JODC bears all the expense for the program. Supplementary budget programs aim to support the international relocation of production processes by Japanese small and medium sized enterprises. Employees of Japanese companies are sent to affiliates in developing countries and required to improve local employees' technological and managerial abilities. As with JESA-II, JODC bears all the expense. The following are the results of expert dispatches in fiscal year 1999; JESA-I: 80 experts to Thailand (296 experts, worldwide), JESA-II: 42 experts (94 experts, worldwide), supplementary budget program experts (239 experts, worldwide). Of the total number of experts dispatched since the 1970s, Thailand has received the third most exports of any country after China and Indonesia. But in FY 1999, it is became the largest recipient of dispatched experts in the world.

For JESA-I, distribution of experts for Japanese affiliates has increased. In Thailand, before the economic crisis, about 70 percent of experts were sent to local Thai enterprises and the rest to Japanese affiliates. After the crisis, the ratio of experts to local Thai enterprises decreased to 50 percent. On the basis of requests, the ratio of Japanese affiliates is much higher.

Table 1. Main projects of JESA-II in Thailand (1999)

Content	No. of Experts	Period
Research on System Planning for SMEs	1	10 days
Smaller Enterprise Consultant Development	6	2 years
Small Industrial Finance Corporation: Improvement in Screening System	3	2 months
Research on Making Management Indicator	3	10 days
Thailand Productivity Institute: Maintenance Technology	1	1 year
Measure Environmental Preservation in Thailand: Industrial Wastes Treatment from Industrial Properties, Energy Saving and Recycling in the Garment Industry, Construction of Environment Supervisor System etc.	-	-
Bank Thai: Management Consulting for SME Customers	3	1 year
Dispatch to Model Enterprises Assigned by the Government and Governmental Organizations	7	-

Source: JODC Bangkok Office

Table 2. Main projects of JESA-II in Thailand (2000)

Content	No. of Experts	Period
Federation of Thai Industries: Construction of the Institution for Developing SMEs	1	1 year
Thailand Garment Institute and Member Organization: Roving Expert Dispatch	1	1 year
Condition Research and Improvement on Factory Safety Management	1	2 weeks
Additional Dispatch to Smaller Enterprise Consultants Development Project	3	1 year
Thailand Productivity Institute: Maintenance Technology	1	1 year
Thailand Automotive Institute: Supplier Development	9	2 years

Source: Same as Table 1

The same situation can be observed in other Southeast Asian countries. Most of the experts in Japanese affiliates are Japanese expatriates from parent companies. Therefore, it cannot be denied that the program is compensating for personnel expenditures, but it can be regarded as holding back decreases in technology transfers by preventing expatriates from going back to Japan. At this point, it has positive effects as technical assistance.

Moreover, demand for experts from latecomers such as Indochina and Myanmar is expected to increase. In Thailand, the number of local enterprises will increase in the long run.

Reflecting this situation, the program for Thai local enterprises has shifted its emphasis more toward roving experts by JESA-II. For example, experts give instruction at each company for one week, once every two months. At the end of individual instruction, they give the company a theme to solve before the next visit by the expert. Two months later, they visit the company again, check the progress toward achieving the goal of the previous theme, and provide a new theme. By adopting this system, one expert can give instruction to several companies at the same time. Usually, under this system, experts belong to the industrial organization which arranges the program. This means the business and industrial organizations, which are fora for executives will be changed to one of the main actors to develop the industries.

So far, local companies have expected the experts not only to act as technical advisors but also to act as negotiators with Japanese affiliates. Management is concerned that the disappearance of Japanese experts will cause some problems for transactions with Japanese affiliates, which is one of the main reasons that they prefer experts in individual companies rather than roving experts. Although this is different

from the original goal, JODC has admitted that it is a necessary evil. However, it is difficult to maintain the previous way because of budget restrictions.

Among the JESA-II projects, the Supplier Development Project by Thailand Automotive Institute is the largest scale[3]. Nine JODC experts are in charge of technical instruction in cooperation with JICA senior volunteers. JICA experts are in charge of supervision[4]. This method shows the new direction, in that experts from different technical assistance institutions operate on the same project. In addition, the Design and Development Project of Agricultural Machinery by the Thai Society of Agricultural Machinery[5] and other projects are now ongoing (Table 1, Table 2).

2. Staying Experts in Local Enterprises

Section 2 through Section 4 show the results of field research conducted in August and September, 2000. In the research, the author interviewed JODC experts or ex JODC experts[6].

2.1. Company T-1

Company T-1 was established in 1991, and it produces parts for automobiles, electrical appliances, motorcycles and construction by hot forging. The company employs 90 people, and its paid up capital totals 50 million Baht. It is a purely Thai company. Total investment is 140 million Baht with monthly sales of 9 million Baht. 70 percent of sales come from the domestic market, and the company looks to reduce that ratio to 50 percent in the next two to three years. For the domestic market, half of its sales are to local companies. 80 percent of the raw materials are from foreign countries. Competitors in Thailand number around 10, and most of them are foreign affiliates. However, the expert expects the number of competitors to increase drastically to 100-200 companies in the next two to three years.

The crisis didn't affect the company's business very much; the number of employees, sales and rate of operation remained stable.

The company is the model enterprise of the Supporting Industry Development

[3] Refer to 4.2 for the details.
[4] JICA senior volunteers and JICA experts are in different categories.
[5] Refer to 4.1.
[6] As 4.2 and 4.3 are the joint project with JICA and because JICA experts occupy the supervisory positions, they were the interviewees for this research.

Project by the Ministry of Industry, Thailand (MOI). JODC has been active in supporting these types of companies and has sent experts intensively. Although experts are sent to individual companies, the program for the model enterprises is categorized into JESA-II. Therefore, JODC bears all the expense. In the average case, expenses total about 16 million yen per year. JESA-I requires the recipient to bear 25 percent of the cost, which is about 4 million yen. This amounts to personnel expenditures for 20 workers.

Table 3. Outline of the Case Companies (Local Enterprises)

	Established	Paid-up Capital (mil Baht)	Employees (Persons)	Main Product
T-1	1991	50	80	Hot Forging Parts for Automobile
T-2	-	-	130	Machine Processing Parts for Automobile and Electrical Appliances
T-3	1979	60	120	Stamping Mold and Stamping Parts
T-4	1973	400	740	Station Wagon, Stamping Parts for Automobiles
T-5	1970	-	250	Coloring for plastics, plastic compound

Source: Survey by the author

A system to disseminate the results of the program to the public was introduced. First of all, it is necessary to obtain a letter of recommendation from MOI. Moreover, the JODC Bangkok Office independently formed a committee to examine whether or not the company in question qualified for the JESA-II criteria. The committee consisted of JODC staffs, university professors and officials from MOI. Dispatch of experts is approved only when the company is recognized to have contributed to "structural improvement" and to have the ability to improve itself to some extent without experts. As a condition of assistance, companies have a duty to hold public seminars and report regularly to the MOI.

From now on, this form of dispatch is said to be on the decline because a shift is in the process of having roving experts go through business and industrial organizations. JODC regards the above-mentioned dispatch program through industrial organizations as a temporary situation.

Firstly, the experts are sent to an organization for a short term of one month with a supplementary budget. After a six month break, the second dispatch was admitted for one year beginning in September of 1999 because T-1 is the model enterprise. The

expert has 42 years of experience working for a forging manufacturer.

The owner plans to improve the production system within two years, but it is hard to be admitted into the JESA-II program for a second year, so he is thinking of applying for the JESA-I program.

It takes two to three years to finish the necessary training for the company. The expert has given instruction in production control and continuous improvement mainly to manager class employees. The lectures are held three times a week for three hours each session. The expert aims to standardize work, and the trainees need the lectures because they don't have sufficient knowledge. More than 10 engineers are university graduates but mid-level workers are in short supply; it seemed to be top-heavy.

Staff personnel are required to accurately write down the records and understand the problem. In addition, it is also important for the staff to keep on working on T-1's operations. Supervisors are required to make quick decisions, like whether they should stop operations or not when problems emerge. By doing that, they can effectively deal with more work. Even if work standards are established, whether or not they can make decisions based on the standards depends upon the information processing ability gathered from experiences.

Similar to staff personnel, supervisors are also the target of systematic instruction, although it is difficult to hire and keep supervisors who have limited educations. The instruction ranges from the design and processing of dies, quality control (not at the level of introducing Total Preventive Maintenance: TPM), to discipline and the history of forging. The instruction aims to cover everything that happens on the shop floor, but it still does not sufficiently cover how to deal with especially unusual situations. The instruction depends upon demonstrating or showing the products. It is impossible to teach technology and know-how systematically.

In the long run, the expert wants to make a record of abnormalities and to make a manual detailing how to solve problems like rejects and train staff personnel who can operate the equipment. However, the staff in charge moved to other companies after gaining certain knowledge. Anyway, the maximum term of two years is not enough to finish this kind of work. Even in Japan, it takes more than three years to assemble the necessary personnel. The shortages of experience and record accumulation and the language difference make it more difficult to establish the system. The expert estimated that the company needs five to ten years to obtain positive results.

2.2. Company T-2

Company T-2 is a purely Thai manufacturer of machine processing parts. All the

customers are Japanese affiliates, and all of its competitors are also Japanese affiliates. Printer parts amount to 60 percent of production, and the rest is for air conditioner parts. The latter are shipped to both electrical and automotive industries, and the main product is the shaft for both uses. In 1997, the company started to produce parts for printers, and it is now a main product. Since materials and forms of the products are similar to air conditioner parts, it was not necessary to introduce new technology for processing.

The company employs 130 people. It produces 400,000 shafts a year, which is the largest share of the company's products. Once Japan and Malaysia were the production base for shafts. However, it is moving to Thailand and China.

The JODC expert was the first Japanese person to work for T-2. He is now in his middle forties and comparatively young for an expert, but he has the experience of working in Thailand for six years as an expatriate. Before that time, he was working for an automobile assembler in Japan and was in charge of designing transmissions. At the beginning of his term, he attended a Thai language school after work. Now, he can communicate in Thai regarding work. Moreover, he was the JODC expert for a die manufacturer in the Philippines for two years beginning in 1995. Although without technical knowledge of dies and molds, his knowledge of machine processing and how to reduce defect rates generally qualified him to implement the necessary instruction[7]. His term finished at the end of October 2000.

Since T-2's customers are Japanese affiliates, management decided to introduce a "Japanese production system." Before selecting an expert, management narrowed their prospects from the JODC expert list to five or six experts each for technology and sales. Finally the current expert was selected.

The goal of the instruction was to independently reduce the company's cycle time and reject rate. However, it took the expert half a year to assimilate to the company, and he didn't have enough time to take some specific measures toward attaining the goals. The expert spends most of his time improving productivity and quality. For instance, he looks for the causes and takes measures to solve problems when customers make claims or when reject rates are high in the factory. He is forced to always consider making changes to the factory layout and improvements to man and material flows. Detailed matters such as selecting the edge which conforms to the material are included into his range of work.

The experts mentioned he faces two restrictions to obtaining positive results.

[7] He sees no measurable difference in ability between the two countries' cases. Thai employees remain silent during the meetings, while Philippines are very active. It is necessary to develop a way to make Thai employees speak up.

1) Management is not very familiar with production.

Consequently, the expert encounters limited support when he has to insist that the company implement his ideas. The President's main business is real estate, and he comes to T-2 once a week. Meanwhile, the Vice President is in charge of sales and he is usually working outside of the company. The Local Factory Director does not seem to understand that changes to the production system lead to improved productivity. On the whole, the managers feel like it is enough just to make products and profits.

2) The expert's term is too short to implement company-wide instruction.

This matter is related to the previous one. The expert is required to show positive results during his limited term. Consequently, he cannot help focusing his efforts on the single-action projects, regardless of manufacturing technology, factory management, and quality control, and not on the company-wide projects. He is sure to produce short-term improvements, but he feels it's difficult to make effective long-term company-wide improvements. Although cost is the best indicator of the integrated evaluation, cost management is not introduced well. Therefore, per capita sales are tracked as the second best indicator, but this figure has not improved since the beginning of his term. The main reason is the comings and goings of the employees. The turnover rate has moved upward since June 2000, which is a reflection of the economic recovery. This is especially true in T-2's case; a large Japanese electrical appliance manufacturer in the same industrial area is very actively hiring new employees. Some employees move to the bigger companies after acquiring greater skills through training.

Two assistant managers in the manufacturing section have worked for T-2 since the company formed, and they have experience in the section doing the tasks that supervisors in major companies take charge of. The expert appreciates their ability to take charge of a wide range of work and show their willingness to improve in spite of the lack of experience. They also take charge of training newcomers.

Usually, assistant managers perform routine production control using check sheets and work standards. When they cannot perform certain tasks, for instance cannot adjust a machine for a different product, they are supposed to report to the expert.

Inventory control is one example of a success. T-2 produced in large lots, regardless of what product they were producing. At the precision forging processes for making ditches, inventories were placed in a container on a large palette. Now inventories are reduced to the size of a bucket for some processes. The final target will be to try and reduce the amount of inventory to one part per process.

The 5S concept was successfully introduced in the context of the shop floor's

continuous improvement. In July 2000, the shop implemented a competition for removing all the garbage on the floor. Previously, a customer complained about the visible flaws on the surface of the shafts. The reason for the flaws turned out to be from sand and dust in the containers used for transportation. Such an experience helps employees understand the importance of cleaning.

Reduction of setup time is also an important issue. For instance, now it takes several hours to finish setup in Thailand, although it only takes ten minutes to do the same thing in Japan. This big difference comes not only from the extent of 5S dissemination but the maintenance of the equipment. They are using machines which aren't good enough to achieve necessary performance levels, and they would never be used in Japan. For instance, although performing badly after long periods of use, milling machines are not updated, but they keep using them. Processing accuracy is unstable; sometimes processes performed well in the morning will see rejection rates suddenly rise in the afternoon of the same day. In addition, grinders are made in Taiwan and their prices are one fifth of those made in Japan. Certainly, initial costs were small. However, for setup, they have to remove all the bolts one by one. Meanwhile, Japanese machines are designed for minimizing bolt removal, and as a result, setup becomes a more complicated task in Thailand. Leaders are in charge of improving these situations.

Even if the improvement were implemented independently, the benefits can spread to the whole company by sharing the experiences. However, in fact, assistant managers and leaders directly instructed by the expert withhold the technology and know-how they learn from the expert and never disseminate the information to others either consciously or subconsciously. "Consciously" means they think of providing information to others as their loss. "Subconsciously" means they don't understand the importance of documenting results in order to achieve company-wide improvement.

The number of Kaizen (continuous improvement) ideas are gradually increasing. The next step is to document the ideas and practices and report them to superiors. In order to compile the basic data for reducing the reject rate, the expert asked employees to submit information on rejects. However, this routine hasn't taken hold. It should be recognized that deskwork is indispensable to solving problems and improving situations systematically.

It is still not enough to have the consciousness to search for the fundamental problems. Managers remain at the level of dealing with superficial problems, but the expert doesn't feel like it's impossible to change the current situation in the long run. Local employees can acquire the necessary skills with appropriate instructions, but it would take him more than one year, his term, to do so.

Although they must control subordinates, superiors won't ask subordinates to submit reports. On Japanese shop floors, periodical meetings are held, and participants are assigned to make the documents for it. It is essential to fill this gap, and the expert cannot instruct everyone. Making employees think on a company-wide level is as important as instructing individual technology and knowledge.

Whether staying experts or roving experts are better for a company depends upon the company's technological level. For instance, if the basics of Total Quality Control are not understood, roving experts cannot manage the company's problems. To a certain extent, intensive month-long instruction by a roving expert can raise the necessary knowledge of such basic methods, but it is very difficult to change managers' ways of thinking, in a sense, the basics of the basics. Only after managers acquire these things, roving experts can be effective.

In addition, roving experts cannot solve problems that range extensively. Generally speaking, staying experts are superior to roving experts in dealing with various subjects at the same time and in checking the current situation at any time. Consequently, staying experts are more necessary when companies are at the basic stage. Their only shortcoming is when they regard serious problems as a matter of fact because they face those things every day. At this point, roving experts with fresh eyes can point out problems more effectively.

2.3. Company T-3

Company T-3 was assigned as a model enterprise for die and mold production by the Ministry of Industry, Thailand. Thanks to this qualification, the expert could stay in T-3 for four years (two years each term). Even after completing his term in March 2000, the company made a contract with the expert privately. The president strongly felt that the expert was necessary. Therefore, the owner decided to pay all of the expenses which JODC subsidized previously. Since this cost is quite high for a local Thai company, the owner is investigating the possibilities of getting the JODC expert by way of the industrial organization, of which he was once the president.

The stamping parts section and mold section are different companies. Electrical appliances manufacturers and auto parts makers are the customers of both companies. The mold section was separated in 1990; it already had orders until the end of 2000. 50 molds were ordered a month and the factory couldn't produce them immediately. This is mainly because many companies changed their molds from the ones made in Japan to those made in Thailand, considering the cost and maintenance.

The stamping parts section produces at a little less than 70 percent of peak capacity

because of the decline in demand for truck parts, which is the section's main products. Originally the expert was in charge of the mold section, but the president asked him to take care of the stamping parts section. In order to increase orders, he is asking for tie-in orders from the customers.

The expert had worked for a clutch manufacturer for 43 years. During that time, he coped with the startup of the factory in Indonesia for 10 years and stayed there for four years. He first went to Thailand as a JODC expert.

At the beginning of the expert's term, visitors from Japanese affiliate customers would soon notice after passing through the factory's gates that the 3S[8] concept was not well implemented. Instilling 3S into everyone took two years. Now, they are introducing the 5S concept. Production management has many stages such as 3S (5S), standardization, data collection, cause investigation and measure taking. It is indispensable to make employees understand why every stage is necessary. For instance, when Japanese pointed out "Seiri" isn't introduced well, it won't take root if employees don't understand how to do that and why that is necessary.

In order to teach essential knowledge, the expert lectured staff members and line managers twice a week for two hours each session. Sometimes the president attended. Each lecture discussed problem cases. For instance, purchasing raw materials in bulk seems to reduce costs at the moment, but if most of them are not used for months, the cost doesn't remain low. Material might be of no use by that time due to rust or some other deterioration. Moreover, when some materials remained in inventory, interest during that time raises costs. Making everyone more conscious of this matter in daily work gradually leads to penetrating the concept into the whole company.

As a result of these efforts, 80 percent of products are supplied to Japanese affiliates. However, the expert is not satisfied with the present level and worries about what will happen after he leaves. Managers and assistant managers cannot act on their own initiatives, and Japanese affiliates seem to do business with T-3 because there is a Japanese expert working there.

2.4. Company T-4

T-4 is a purely Thai company. Their main business is to produce and remodel station

[8] 5S is short for Five Japanese words that describe workplace and individual cleanliness activities.
1. Straighten up your workplace or desk. *(Seiri)*
2. Sort your equipment. *(Seiton)*
3. Sweep and clean your workplace. *(Seiso)*
4. Spotlessly maintain your appearance and character. *(Seiketsu)*
5. Self-discipline to follow rules, procedures, and standards. *(Shitsuke)*

wagons and small size buses and stamping parts for automotive bodies and chassis. They also make stamping molds for internal use. 80 percent of sales come from one Japanese car assembler, in spite of no capital relationship. Although sales in 1998 decreased to half of 1997, they recovered to 75 percent of 1997 totals in 1999. This recovery came from exporting parts to the Japanese parent company of the main customer and its affiliates in China, selling molds, jigs and parts to electrical appliances manufacturers and auto parts makers in Thailand. But employees have been cut from 1,400 in 1997 to 740 in 1999.

The expert had worked for a Japanese car assembler for 33 years and stayed in Thailand a total of eight years in the 1980s and late 1990s. As T-4 was once the dealer of the assembler, he also had a relationship with them. Therefore, he privately made a contract with T-4 in 1995 to become a technological consultant. In January 1998, he became a JODC expert with a term of one and a half year. After the completion of the term, he moved to a Japanese steel plate manufacturer in Thailand.

He discovered the following problem areas needing improvement in the production division.

1) occurrence of rejects and dispersion, deriving from inappropriate processes and method plans
2) occurrence of low productivity and products with low quality, deriving from inappropriate design of jigs and tools
3) schedule delays, deriving from insufficient planning and management of schedules for jigs and tools production
4) high cost, schedule delays and short inventory, deriving from insufficient production plans and controls for stamping and assembling lines
5) Continuous production with low productivity and quality, deriving from inactive kaizen activities at the shop floor level

In order to solve these problems, he made the following teachings and obtained these results.

1) Process and method plan

Firstly, he discussed ideas with the staff and let them make the plan as to what processes and methods should be used to form the product based on their experiences. He checked their plans on dispersion, cost, and even expression. After discussing incorrect parts of the plans with the staff, the expert then had the staff make modifications to the plan.

The company made such plans for about 200 products. At the beginning, the staff

could make them only for simple products, but by the end of his term, the expert evaluated that they could make these plans for almost all products.

2) Design of jigs and tools

Instruction was divided into three stages. At the design framework stage, the expert mainly gave instruction about stamping places, methods and directions, rough structure and size, and relations with stamping machines. At the structure decision stage, the expert gave instruction about strength, the propriety of machine processing, how to place molds and products. At the detail description stage, the expert gave instruction about the relationship between product standards and stamping standards, mold shut height and measure for fitting precise harnessing of molds.

Finally the mold design standard was established for mold structure and standard parts for mold.

3) Schedules for jigs and tools production

Although T-4 had a tally system to record man hours, it couldn't be used for making production schedules using a complicated data collection method. Therefore, the expert first tried to reconfigure the system by simplifying data collection and changing man hour units from every five minutes to 15 minutes.

At the end of his term, the expert was still collecting the necessary data and could not begin schedule planning.

4) production standard and basic data arrangement

The company had no production standards for stamping and assembly lines, basic data like man hours for each part and component or process ability. At first, the expert completed time observations and cycle time settings. However, the project didn't last because at that moment a decline in orders changed the line structure, and the decrease in employees brought about personnel shortages.

5) Kaizen activities

Line leaders were the main targets for the instruction. The expert taught them cause investigation, temporary measures, and permanent measures as troubleshooting methods based on the 3G principles.[9] As for causes of problems, the expert instructed them to investigate for everything from jigs and tools (method), materials, machines and equipment, and man. Temporary measures and permanent measures are different, and the latter often requires cooperation with other sections.

As a specific theme for improvement, the expert selected the yield rate of steel plates,

[9] 3G Principles are as follows: Genba (go to the spot), Genbutsu (look at the actual things), and Genjitsu (grasp the facts and take realistic action)

for which he expected a large rate of improvement. The expert organized the project team with five members, and the project was led by a chief in the production section and included others from the maintenance and design sections. The expert selected a product with a low yield and taught kaizen methods for the product considering mold structure and occurrences of creases. In the process, effect calculations, descriptions for record sheets, and monthly aggregate tables of kaizen were introduced. At the beginning, the goal was a 10 percent decrease in total weight and cost for 150 parts. In fact, they attained a 5.86 percent reduction in weight and a 6.18 percent cost reduction.

At the end of the expert's term, occurrences of the problem decreased by 30 percent, handling time for problem solving by 50 percent, and re-occurrence rate by 80 percent. But honestly speaking, local employees contributed almost no ideas for improvement. Although they have enough ability to do so, at least to some extent, they were inactive. This is because more efficient work means busier work to them, and consequently, they also tend to not discuss things that trouble their colleagues.

The following problems remained for each rank and kind of occupation. Upper class managers still cannot make unerring judgments and cannot provide direction on investigating cause, taking measure and preventing re-occurrence, when problems arise in quality or function. The problems tend to be chronic. Management by objective system was introduced but only halfway. Action plans are not achieving the objectives very well.

As for middle managers and staff, the shortage of experience and motivation cause problems with their performances. For example, the lack of forecasts based on technology account for the schedule delays of new projects. Plainly speaking, they can collect the data, but they cannot comprehend its objective and necessity. Therefore, they are not good at utilizing the data from the past and analyzing it properly.

On the shop floor, motivation doesn't spread to others, including the foreman class. Although rewards were offered for productivity improvement and cost cuts, it hasn't worked well. They are insensitive to tools, measures and parts and don't show any reaction to shortages and inconveniences.

In addition, engineers in the design section average only three years of experience. Insufficient knowledge and perceptions of basic items lead to schedule delays. 70 percent of the standards were made at the end of the term.

Generally, persons with experience and technology tend to move to other companies, which is one of the company's most serious problems. Recently, the expert had the chance to visit T-4. He noticed some of the kaizen cases implemented during his term were not practiced because the core member of the project team left the company. For

one year after the currency crisis, job changes were very rare. However, job changes gradually increased to previous levels, and it is serious because technology and knowledge are likely to be stored by individuals and not transferred to their colleagues and subordinates.

2.5 Company T-5

Company T-5 is the manufacturer of coloring for plastics and employs 500 persons. Customers amount to more than 350 and include many types of processors from convenience goods to high-grade parts for PCs, electrical appliances and automobiles. While 20 percent of output is exported to Southeast and South Asian countries, foreign affiliates and local enterprises purchase 40 percent each, but some of the local customers supply foreign affiliates such as Japanese car assemblers. Therefore, the ratio of sales to foreign affiliates is substantially higher. Materials are made in Thailand but 80 percent by Japanese and the rest by Taiwanese because imports from Japan have become high cost since 1999.

Since its establishment in 1970, the expert worked in T-5 for five and half years because he was working for T-5's technology supplier in Japan. After leaving T-5, the expert's personal relationship with the president continued, and he was asked to work for T-5 again at the time of his retirement. Beginning in 1998, he stayed on as the JODC expert for one and a half year. After a half year break, he was reappointed by JODC. Now, he is the technical advisor for the president. After the currency crisis, it was difficult for local enterprises to hire foreign experts at their expense. He investigated the JODC scheme and registered himself with the institution.

Among the various problems to solve, one of the most pressing problems is how to renew machines and equipment that are more than 25 years old. The export ratio of final products is rising and the technological demand is stricter. In accordance with a change of materials, new processing technology, new machines and equipment are required. New color development is also necessary. The types of products amount to 6,000, based on the differences in color, material and processing method. Moreover, product lifecycle averages two years and some of the competitors are so small that they can easily change products. Quick response is a must for staying competitive in the industry.

Targets for direct technology transfers are section managers, managers, assistant managers and staff in the QC section. There are three section managers in the compound section, three in the coloring section and one in the QC section. Managers just under section managers total about 25 persons. They are internally promoted as

they gain certain necessary experience, while managers in the sales section are newly employed. Three managers were promoted from operators, although this is not the usual career path.

The expert intends to train section managers, but he expects it to take about five years. It is impossible to finish the training during his term.

Since they produce intermediate goods, they usually cannot solve problems by talking to customers, but it is impossible for T-5 employees to grasp peculiarities of every machine for all of its customers. Two things can help grasp peculiarities. One is experience. A great amount of experience can enable them to cope with problems swiftly. The other way is to collect data on production and statistical management. Neither of these has reached an acceptable level. Cause investigation on the basis of data is not carried out. When a problem occurs, they then collect the data for the first time. In the long run, they need a system that helps them grasp present conditions. As it is better to clearly set the target, they are trying to get ISO 9002 certification and arrange the production system during this process.

Difficulties in checking causes come from problems with investigating factitious reasons. A Japanese affiliate made complaints about iron powder in products. Company T-5 couldn't find out why it happened, even though they recorded the serial numbers and the data on production conditions. Anyway, iron powder was there, and someone on the shop floor of either T-5 or the customer knows the facts. The expert asked the manager to specify the cause, not to blame anyone in charge but to prevent reoccurrence. But the effort was in vain.

Table 4. Outline of the Case Companies (Japanese Affiliates)

	Established	Paid-up Capital (mil Baht)	Employees (Persons)	Main Product
J-1	1996	25	30	Nuts for Automobile
J-2	1958	20	220	Galvanized Iron Sheets
J-3	1997	33	30	Blow Molded Parts for Automobiles

Source: Survey by the author

According to the expert's understanding, Thai companies in the industry are left behind their counterparts in advanced countries regarding technology. Especially local enterprises cannot easily keep up with them. After the crisis, while foreign affiliates coped with the changes to customers' requests immediately, locals tended to remain in the same manner without adjusting to the changes. In order for local enterprises to face

competition with foreign affiliates, the help of experts from advanced countries is a valuable opportunity. In this sense, the JODC scheme should be evaluated highly. However, it is also a fact that many companies don't know much about JODC, and T-5 is a rather unique case in which a Japanese acquaintance registered himself and was smoothly sent to the company.

3. Experts in Japanese Affiliates

3.1 Company J-1[10]

The economic crisis happened just when company J-1's production began to move into high gear. Although orders suddenly stopped as a consequence, business recovered gradually during 1998.

In order to upgrade the level of production management, it is indispensable to maintain the requisite number of Japanese expatriates on a long term basis and use technological specialists from Japan on a short term basis. But the cost of doing so is heavy for a small-sized company. Hence, the decision to develop the JODC scheme. Although the monetary crisis made it difficult for the company to pay for Japanese expatriates, the Japanese production manager was able to remain with the company in Thailand between March 1997 to September 1999 because he became a JODC expert.

In 1999, orders increased rapidly because they are mainly supplying two Japanese assemblers who produce automobiles for export. Employees work overtime for one hour on weekdays and come to work even on Sundays. Output reached twice as much as that at the bottom of the recession. The ex-expert is still in Thailand and all the expenses are paid by J-1. Thanks to the JODC scheme, he could take the lead during the crisis. In this sense, he appreciates the scheme very much.

To increase production, they constructed a new factory in a remote area. It started operation in August 2000. The area is twice as large and production capacity increased by 50 percent. Business conditions are relatively good, and the production line is at work from 6:00 to 20:00. Its customers are 50 first tier suppliers of car assemblers. In considering the final product, the top assembler occupies 25 percent of sales, while the Japanese parent company supplies almost 90 percent to one assembler.

The ex-expert regarded the assistant manager as the key position in the factory. In

[10] The author visited J-1 in January 2000. Some of the descriptions are based on the interview at that time. For details, refer to Takahashi 2000.

fact, he is in charge of manager's work. In spite of being a university graduate, he first experienced operator's work for about two years. That is the same case as in Japan. Taking into account the feeling of graduates in Thailand, this is not a clever way to start college graduates' careers. There was actually a case of one graduate who left the company because of this, but this experience is necessary for the line manager's job. During this "training period", they are required to learn the structure of machines, tool changes, modifications in case of machine trouble, and setup for model changes. They are producing nuts of complicated form such as ones with flanges and projections. Subtle adjustments are indispensable for these products. For model changes, productivity can be improved by changing the order. For instance, one type of product needs five processes. When changing from a six millimeter in diameter nut to an eight millimeter nut, all the processes need setup, while changing to a different type of six millimeter nut only requires three processes to setup. Setup time can be reduced three fifths by using a simple calculation.

There is another example. Although extended use of tools brings about round angles, no problem occurs if the dimensions of the product are within a permissible range. That means the tools can still be used regardless of the round angle. Here, the important point is not whether the angle is round but whether the range is permissible. Excessive quality is a factor that increases costs. Operators should be conscious of these sorts of matters.

The expert aims to teach employees that they need to acquire the above mentioned knowledge through experience at the shop floor, but operators are not capable enough. The temporary objective is to make sure they do not produce rejects based on the directions of the draft.

Twice in 1999, experts came from the Japanese parent company and gave instructions on the 5S concept, quality control, production control to 10 employees under manager class. The contents of the training was for Japanese line leaders. For example in quality control's case, they instructed operators about what points they should care for in certain processes and how to deal with complaints from customers. The first time, they received instruction on how to prevent tools from breaking and workers from being hurt. The second time, they received instruction on how to reduce defects. Managers in the Japanese parent company invited experts from outside the company to give lectures, such as a material expert might discuss the ingredients of iron. They will try to obtain tips for reducing costs, like using cheaper material which is sufficient for certain products. The gap between the two countries' cases is still quite large. Therefore, the ex-expert recognized that technology transfers from Japanese are

still essential to improving production in Thailand.

3.2 Company J-2

Japanese expatriates are the Managing Director (MD) and JODC Expert for Company J-2. The company was established in 1998 and employs 30 people. It produces blow injection parts for automobile air ducts and spoilers, and it supplies first tier suppliers with Japanese capital. After renting a place in a customer's factory for one and half year, they began operations out of their own factory in August 1999. All capital is paid by a Japanese company, although it was first planned to be a joint venture. In February 2000, Company J-2 increased its capital in order to reinforce machines and equipment. The company attempted to successfully introduce the Toyota production system in Thailand.

Aside from exports to the Japanese parent company, sales are for the domestic market. In Thailand, there are two competitors with almost the same scale capacities. Both of them are Japanese. Sales have increased favorably. All the injection machines are made in Japan.

The MD thought a Japanese full-time expert would be indispensable in starting up the production system. He couldn't take care of everything, such as management, production and sales, but the expenses for Japanese are extraordinarily high compared with locals' expenses. The JODC scheme enabled him to have more Japanese in Thailand.

The expert began working with a car assembler in 1993 right after graduation from college and was in charge of production control. He then entered J-2's Japanese parent in 1997 and was in charge of production control in the production section, specifically kaizen, setup, preparation for production and productivity control.

He introduced the method of management with indicators. While in October 1999, the reject rate after molding was four percent, and it has reduced to 0.9 percent now.

The necessary documents were not well arranged to develop various formats to possibly improve efficiency. For instance, it took one day to order material products because of manually calculating them one by one. By making and using a table with the number of items in inventory and using orders from customers, they could obtain the number to order immediately after inputting the data from the production plan. Many work standards are also off the mark. He improved them by adding pictures to explain important points. Since September, the company began preparing for getting ISO9002 certification. After that, QS9000 becomes the next target. Even if certification is not necessary, they have to standardize documents and utilize process controls.

So far, 80 percent of the objective has been accomplished, but he is not sure whether locals will be able to maintain the same level after his term. It is difficult for them to pay the expense for long-term dispatch without the JODC scheme. So there is no way except to invite Japanese on a temporary basis, for example, at the start up stage of preparing for new products.

3-3. Company J-3

Company J-3 was established in 1958 and started operations in 1960. Company J-3 was the pioneer in its industry. The company produces galvanized iron sheets with cold roll steel plates made in Thailand by Japanese affiliates. They galvanize the iron sheets to less than 0.2 millimeters thick, form them with wave shapes and paint part of the products. The main market is Thailand, and their products are used on the roofs of farmers' houses and storage buildings in the North and Northeast regions, and exterior goods for the construction industry like fences of construction sites and walls of temporary buildings. In 1992, Company J-3 closed the factory in Bangkok and moved to the suburbs. Paid up capital is 20 million Baht and 52.3 percent is held by the Japanese side.

The economic crisis seriously affected their business. In 1999, sales decreased to half of the company's peak, and they were forced to stop operations for about two months. Sales recovered to 70 percent of peak levels during January and June 2000. The number of employees has not decreased much from 240 to 220.

The expert started his term in December of 1998. He also has a year and a half experience as an OVTA expert from October 1996 to early 1998, and he stayed in Thailand for more than four years overall. J-3 used machines which the expert's former company had made, and they asked for help in instruction of machine operation. He was sent to J-3 in response to their request. A variety of things could improve productivity such as yield rate improvement, stable quality, unit cost reduction and safety. As for the industry specific technologies, a difficult problem comes from adjusting pressure to control zinc quantity during plating.

Although the expert already tried to take measures to change the structure of the nozzle and maintenance method, they still cannot manage the process delicately.

The ability for 3S and 5S, standardization, data collection, cause of the problem investigation and solution building are formed step by step. J-3 is introducing 5S on a voluntary basis with incentive rewards for excellent workplaces. Data collection progressed so that they can arrange data by week. But investigation of the cause doesn't work well. They are afraid to recognize their mistakes because they think they

must take blame. Even if it seems clear that rejects came from their faults, they tend to say something was wrong with the machines. Consequently, they won't talk about others' mistakes, which would lay the blame on them.

4. Roving Experts for Local Companies

4-1. Design and Development of Agricultural Machinery Project

The project started in November 1999 and lasted for one year. It was planned based on the perception that while production technology reached a certain level in spite of problems in cost and quality, design technology should be upgraded substantially in order to progress toward future development of the industry. Project participants are five member companies of the Thai Society of Agricultural Engineering (TSAE), the industry organization of the agricultural machinery manufacturers and two governmental organizations in the related field. According to the interim report by the expert, three companies achieved good results.

The expert moved to a university after working for a car assembler. Since 1968, he had been concerned with technical assistance of JICA. He was sent to developing countries as the expert seven times. His students exceed 500 persons, with more than 30 in Thailand, but he is afraid that almost no one will make use of the technology in the industry, because most were government officials or researchers in universities. Although he admits they should learn as well, he felt this would not be enough to develop industry.

Right after retiring from the university in 1996, he became concerned with JODC without any hesitation. He personally prefers the JODC scheme because he can transfer technology directly to employees in private companies.

TSAE enlarged its building and made training rooms. It began conducting regular training courses twice a week, and 15 trainees from seven companies and organizations took part in the courses. They are all graduate engineers in their 20s and 30s. All attendants from private companies are owners' relatives. Although traffic congestion interrupted trainees from two remote area companies, others could obtain knowledge on design planning and practice using the tractor cultivator. At the year's end, every attendant could start design planning of one model. However, in 2000, some companies complained about dealing with new model development processes in the training course with outsiders. Therefore since February, training at TSAE has been held only once a month to continue lecturing and practicing general knowledge and

know-how of design planning. In addition, the expert visited each company for one week at a time. Participating companies regarded this change as a positive move. Some increased the number of members in the design team and built a new design room. As a result, trainees increased to more than 20.

During the process, the difference in the extent of technology transfer has emerged among the participating organizations. Three companies performed well. The expert estimated that locally designed new model tractor cultivators will be announced publicly. In consideration of the number of trainees, diversity of the models for development, necessity in prototype manufacturing technology after the completion of design development, additional dispatches of JODC experts are desirable. The Thai side also needs a one year extension of the project.

However, four organizations had troubles. The reasons differ among the cases. For instance, although trainees of one company attended lectures, they cannot afford to do other things at the company. They work overtime day after day designing other products. The company doesn't have any plans to develop new model tractors for two or three years. At another company, dealing with urgent work interrupts the training. At these two companies, the president sometimes comes up and starts talking with trainees in a loud voice during the training. The practice of design cannot commence as of now. In another case, management won't send trainees to take part in the project because they have no engineers among relatives of the owner. The company makes it a rule that only relatives can be promoted to executives. This is the usual custom among the privately owned companies.

The expert judges that trainees who cannot perform well as engineers for design and development should not be retrained. The important thing is to execute technology transfer properly on the basis of special education for gifted employees and to make efforts to achieve good results from the practical project. Roving experts don't need to stay with one company and detain inferior trainees unreasonably. In this sense, a roving expert functions better than a staying expert.

4-2. Supplier Development Program by Thailand Automotive Institute

The Thailand Automotive Institute (TAI) is the organization which was once the service section for the automotive industry in the Ministry of Industry and separated from it in July 1998. In fact, it is not a research institute but an organization for promoting the industry, and it started operation in April 1999. Half of the board members are from the government, and the rest are from the private sector.

Many car assemblers in advanced countries, including Japanese assemblers, set

Thailand as a production base in the region under the global strategy. Production base means 100 percent localization, excluding design, as the first step. But in the long run, design function is indispensable to making full localization possible. In addition to certain levels of production management, design function is necessary. The more technology is transferred, the less costs become. Thailand is competitive enough with advanced countries where the personnel expenses are much higher. TAI aims to develop the Thai automotive and auto parts industry into becoming competitive globally. Because Thailand doesn't have any "national car project", foreign assemblers enjoy the fruits of promotion, and investors' national interest isn't damaged.

TAI has the following five programs in progress mainly by Japanese cooperation.

1) Supporting Industry Development Program
2) 100% Localization Support Program
3) Product Development Capability Building Program
4) Thailand Automotive Industry Certificate Development Program
5) Testing and Certification Capability Building Program

Among them, JODC sends its experts to 1) and 3). Here, the author picked 1) as the case study because nine experts were sent, and it has a large delegation as its scheme.

Aiming to improve quality, cost, delivery, engineering and management of Thai automobile suppliers, a rating of the company's level and technical instruction based on the rating is implemented. Operations would start in October 2000, and the target is purely Thai or Thai majority suppliers. Adopting a roving expert system and repeating short-term instruction, it intends to maintain the recipients' sense of independence and efficiently utilize limited resources.

Although the project is promoted as being open to any company, non-Japanese assemblers are not so active to take part in the project, in consideration of the large Japanese presence in the project operation[11]. However, some suppliers to American assemblers have already applied.

150 suppliers are the targets. Among them, 90 are recommended by assemblers, and the remaining 60 are independent applicants. There are two types of suppliers in the assembler's recommendation. One is group A; TAI will be responsible for the instruction. The other is group B; The assemblers make instruction independently, and TAI only does the rating.

JODC sent the following nine experts and each of them is a specialist in a particular

[11] American assemblers assisted their suppliers mainly through matchmaking. They have not been active in technical assistance.

field; such as casting, forging, stamping, machine processing, painting, molding, gum, plating/heat treatment, die and mold. Most of them are retired and about 60 years of age. They belong to a private organization, the Federation of Thai Industries (FTI) for convenience sake. The Thai side provides three counterparts per one expert, and they formed a team to give instruction to target companies.

In addition to QDC, general production control indicators, E (engineering), M (management) are adopted as the indicators for the rating. Every indicator has its own target, which finally aims to achieve the production control levels of the Japanese companies. The final target of Q is to achieve a reject rate of 10-15 ppm, the same level as Japan's case. Purely Thai suppliers of one Japanese assembler performed with an average reject rate of 400 ppm and aim to improve it to 100 ppm in 2000. The target of D is also solidly set for no delay of delivery. The C of machine and equipment and raw materials are not so different between Thailand and Japan. Ultimately, personnel expense causes the difference. The current problem is that most suppliers rely on "human-wave sweep".

As for E, the target is to design and estimate parts independently. Narrow specialization is not enough to do so; multiple abilities are necessary. In the case of an instrument panel, knowledge of only plastics is not sufficient because many types of materials are used. Another problem is excessive dependence on Computer Aided Design (CAD). CAD enables engineers to design without the ability to read the draft. They can simulate on the PC and understand the shape of the designed product sensitively without the draft, but when trouble happens, they cannot deal with it.

To evaluate M, experts should check which lines of work management places an emphasis on. If the work contributes to attain either of the QDCE targets, it must be appreciated. It is hard to use quantitative indicators. Whether management actively enters the factory can also be one qualitative indicator.

In reply to criticism that only Japanese assemblers eventually make profits, TAI emphasizes that it try to develop E, as well as QDC.

4-3. Smaller Enterprise Consulting Project

The project aims to transfer Japanese "Smaller Enterprise Consultants to Thailand and consists of consultant training and consulting. JODC sent nine consultants as trainers. Like TAI's supporting industry developing project, JICA also sent two experts as supervisors of the whole project. As for the consultant training project, six month preliminary courses were finished, and 29 were qualified as "Assistant Smaller Enterprise Consultants". By the end of 2000, full-dress courses began. The

Department of Supporting Industry Development, Ministry of Industry, which is organizing the project from the Thai side, plans to turn out 200 consultants every year.

The Consulting project has been implemented tentatively into training programs. This consulting is basic and general. More specialized matters are supposed to be delegated to specialists in the related field. Therefore, the consultants take on the complementary role of roving experts in industrial organizations, through consulting and rating their target companies. Cooperation with the TAI project is the pilot case.

To give the consultants higher social status, those who complete the course are registered as formal "Smaller Enterprise Consultants" only after certain experiences. Specifically, it requires them to consult more than 10 times in three years[12].

In 1999, intermediate and basic courses began for the preliminary requirements. In the former, any college graduates were qualified to take part. The course started at the end of June and lasted for six months. The training took a total of 840 hours, including 120 hours of lecture, 360 hours of practice instructed by the expert and 360 hours of supplementary lecture. This curriculum was made based on the Japanese case, excluding about 300 hours of lecture on financing by governmental institutions. Participants totaled 99 (46 are female). Two thirds of trainees didn't belong to any organizations, and most of them couldn't find jobs after graduation.

In the latter case, trainees were assigned from the government, instructing organizations, financial institutions and manufacturing companies. The majority came from private companies. The first group started in August and the second group in September. The course consists of lectures and case studies and takes 160 hours, which is divided into 25 weekend days. Lecturers are mainly Thai. Although the fixed number was 100, 100 and 145 attended for each respective group.

For those who completed the preliminary course and intended to become consultants, the following course was held from March to September 2000 to cover more specialized knowledge and know-how. The program takes 280 hours and consists of lectures and practice consultings mainly regarding industrial engineering and production plans. 29 people attended the training course, and most of them completed the intermediate course.

[12] Usually consulting takes one week to ten days.

Table 5. Consulting Recipients by Industry in 1999

Type of Industry	No. of Companies
Food Processing	8
Garment and Textile	15
Wood Processing	9
Electrical Appliances	36
Machinery and Metalworking （Automotive Parts）	56 (28)
Plastic Processing	19
Chemistry Product	15
Others	13
Total	171

Source: Secretary of Smaller Enterprise Consulting Project

Consulting has been implemented, mainly for practice for trainees. In 1999, 171 companies were consulted for 10 days each; 162 were part of practice for trainees. In practice, JODC experts usually instructed 5 trainees. In 2000, 45 cases received consultation through September. The contents include work study, work management, process control, quality control, general production control, marketing, personnel management and general consulting. Aside from a trainee's report, the expert writes a report and sends it to the company after the formal procedure by MOI. As authorized, some financial institutions are investigating the possibility of reducing interest rates to companies that receive consulting.

5. Concluding Remarks

5-1. Consideration on the Change to Roving Expert

First of all, the author would like to emphasize that a more industrialized Thailand in the region still expects good results from the expert dispatch. Redistribution to the latecomers will surely be necessary. It is also a fact that a more industrialized Thailand needs to make room for latecomers' development.

If this is the case, then we can proceed to the discussion of how to utilize resources in Thailand. As for the distribution between local enterprises and foreign affiliates, in the context of this paper, three standards can be set for Japanese affiliates. One standard involves the gap in technology levels. With official assistance, priority should be given to cases with lower levels of technology. In the case studies, the author tried to compare the technology level of the two by arranging the content and result of experts'

instruction. However, it was difficult because it was impossible to find appropriate indicators. In this sense, it is difficult to affirm that locals are being left behind and that it's necessary for them to receive more experts.

The second standard involves whether official assistance affects the number of Japanese expatriates. Japanese affiliates have maintained the necessary levels, apart from the period after the economic crisis and startup stage. Local companies are more sensitive to the expense of using expatriates. One case is still actively looking for official assistance in some way, in spite of making a private contract with the expert after the expert's term. Another case didn't make a private contract, although continuous instruction seemed necessary.

Thirdly, dispatch to Japanese affiliates in Thailand is favorable in consideration of efficiency. After all, both of the experts for local enterprises and Japanese affiliates are meaningful for industrial development. At the very least, locals should not be made light of.

Locals are likely to increase in the long run. On all the conditions, they inevitably cannot expect the resource distributions like before the economic crisis. In order to utilize limited resources for possibly many companies, the roving expert system is reasonable second best option.

Staying experts in local enterprises emphasized that only companies already with basic abilities can use the roving expert system efficiently, while those without basic abilities need staying experts, and many Thai locals still don't have enough abilities. However, returning to international comparisons, Thai locals can be said to have more basic abilities than their counterparts in Indochina and Myanmar.

The roving expert system also has its own strong points. It is better at preventing the company from fully depending on the expert. Another point is the company can invite several experts regarding their weak points, if the project is arranged appropriately.

5-2. Implication for ECOTECH

Lastly, the author would like to consider the implications of roving experts dispatch projects in Thailand to ECOTECH. As an ECOTECH project, Business Volunteer Program (BVP), of which JODC is one of the participant organizations, started in 1998. It has not obtained good results in matchmaking and database functions for staying experts. The situation seems to be not so different for roving expert. It might be more difficult because it is often necessary to arrange many experts systematically at the same time.

Rather, exploiting its neutral standpoint, ECOTECH should investigate the

possibility of setting up discussions for related agencies, subsidizing the evaluation of projects and promoting dissemination of the related information. Through these measures, ECOTECH looks to help upgrade each agency for expert dispatch. This method seems to apply to the staying expert scheme, and it is relatively efficient for APEC to play a meaningful role with limited financial and human resources.

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