III Third-Party Evaluation

Singapore and Malaysia

Industrial Projects

Project Sites

Singapore and Shah Alam

1. Background and Objectives of Evaluation Survey

Singapore, like Japan, is a resource-poor nation. Therefore, Prime Minister Lee Kuan Yew put priority on the promotion of industrialization while focusing on the improvement of capabilities for international competition, and makes an effort to develop of the information industry and the industrial sectors through productivity improvements modeled on Japan. In addition, the policy also sought to shift from a labor-intensive industrial structure to a knowledge-intensive one.

Malaysia adopted the 'Look East Policy" after Prime Minister Mahathir took office in 1981. This policy was modeled on the development of Japan and South Korea, and, centered on the Bumiputra Policy, which favored Malays, followed the path of heavy industrialization. Since the latter half of the 1980s, the shortage of technological capacity and delays in the response of technical training and research institutions have been revealed.

In response, JICA has made significant contributions to the development of human resources for many years through the dispatch of experts, acceptance of trainees in Japan and project-type technical cooperation in both countries in order to promote industrialization.

In this survey, interviews were carried out with those who were involved in the project, such as counterparts (including trainees who returned to their home countries), government officials and entrepreneurs in the two countries to consider the results of past Japanese cooperation in the field of industry. The evaluation was implemented with the objective of assessing the overall results of the cooperation projects, particularly the social impact, while focusing on the activities of people.

The team leader of this evaluation survey was Mr. Hiroshi AOKI, a journalist with experience in reporting on many cooperation projects[1].

2. Evaluated projects

(1) Singapore

Productivity Development Project (June 1983-June 1990, Project-type technical cooperation).

Japan-Singapore Institute of Software Technology (JSIST) (Phases I and II) (December 1980-January 1991, Project-type technical cooperation)

(2) Malaysia

Center for Instructors and Advanced Skills Training (CIAST) (FY1982 and FY1983, Grant aid)

Center for Instructors and Advanced Skills Training (August 1982-March 1991, Project-type technical cooperation)

Support for Malaysian students in Japan by various aid organizations

3. Evaluation Team

Team Leader:

Mr. Hiroshi AOKI, affiliated with Asahi Shimbun

4. Period of Evaluation

30 January 1999-15 February 1999.

5. Results of Evaluation

(1) Singapore

1) Software Technology

Mr. Ho Ta Kin, who was also the chairman of the Japan-Singapore League of Parliamentarians, was the head of the Japan-Singapore Institute of Software Technology (JSIST) established in late 1983 in order to educate and train computer engineers. The JSIST trained around 1,400 graduates for the information technology industry over a period of ten years. As the head of the JSIST for more than ten years, Mr. Ho formed a strong attachment to it saying, "Unfortunately, after the Japanese technical cooperation project ended in 1991, it was absorbed into Singapore Polytechnic as the Software Technology Department, and the JSIST name disappeared. Feeling that the ties with Japan had been severed, I also resigned in the end. Nevertheless, graduates of JSIST have higher salaries than other computer engineers, and two of the instructors who taught at JSIST later became principals at other technical colleges, so I am very proud of this."

After Singapore separated from Malaysia and became independent, it was struggling for survival, located between the two larger nations of Malaysia and Indonesia.

"We tried to model ourselves on our "big brothers" the United Kingdom, the United States and Japan, and set out to develop information engineers based on the leadership of Prime Minister Lee Kuan Yew with the idea of becoming a technopolis. When Prime Minister Lee Kuan Yew visited Japan at the end of 1979, his request for cooperation in the field of computers led to the birth of the JSIST."

The JSIST project was a technical cooperation project conducted by JICA over ten years in two phases (five years each). It carried out training of programmers (high school graduate level), system analysts and system programmers (both university graduate level), and provided training in Japan for the Singaporean instructors who taught the students. There was also a more sophisticated Artificial Intelligence (AI) Center cooperation project for an additional two years. In the later half of JSIST's second phase, until 1998, it conducted third country training programs through cooperation between Japan and Singapore in order to train computer engineers from South East Asian nations[2].

In the JSIST project, the Japanese side began training software engineers utilizing experts dispatched from the Ministry of International Trade and Industry, NTT, NEC and other organizations, as well as computer equipment made in Japan. At the beginning in 1980, there were only 850 software engineers in Singapore. The national policies were to make 10,000 information engineers in 1990 and 30,000 (later revised upward to 42,000) by 2000 and, as a result, the information industry achieved a high growth rate of 38 % annually in the 1980's, increasing twenty-one fold over a period of ten years.

In 1991, the JSIST was absorbed into Singapore's secondary education system as described above, under the jurisdiction of the National Computer Board, becoming one of the departments at Singapore Polytechnic, the best of the country's four technical colleges. The JSIST name, in both Japanese and English, can still be seen in the entrance hall of the Software Engineering Department.

Mr. Song Nay Hay, an instructor from the technology institute days, joined the JSIST in 1980 and was trained by Japanese experts. The Japanese language classes of that era have disappeared, but Mr. Song says that JSIST traditions still remain.

"There have been over 3,000 graduates since the days of JSIST. They enter the technical college at 16 or 17 years of age and complete the course in three years. In the five months before graduation, they undergo on-the-job training at a company and then receive a diploma. After that, the men undergo two-and-a-half years of military service, but as the military itself is becoming more computerized, I don't think they will fall behind technologically. After military service, 25% of graduates study overseas at universities in English speaking countries, such as the United Kingdom and

Some JSIST graduates have worked at Japanese companies for over ten years

Australia and obtain bachelor's degrees. The students who are awarded scholarships at technical college are prohibited from changing jobs for three years. There is a shortage of workers in the information industry, so students are sure of finding their job," he says, pointing out classrooms overflowing with students seated in front of computers.

The successor to the Artificial Intelligence Center (JSAIC) established by JICA and the National Computer Board was part of Singapore University. It has become the independently financed company Kent Ridge Digital Labs.

President Lee Hin Yan, recently returned from a sales trip for software technology in Indonesia, said, "These days, we produce software for domestic companies and secure income with the support of the National Science and Technology Board. I also train top-level managers from the governments of China, Viet Nam and the Palestinian Authority as third country training programs. Experts dispatched from Japan, who are cooperating in information industry training in neighboring Malaysia, also pay us inspection visits. In Singapore, where the national policy is to become the "Intelligent Island", the artificial brain will replace white collar workers." He was exuding the pride that is typical of Singapore's elite engineers in a country that moved from the DAC developing countries List I to List II in January 1996.

Masao Teraoka, Vice President and Head of Sales for NTT Singapore Headquarters, is the head of the Singapore Technical College JSIST advisory committee. The members of the committee were drawn from representatives of the National Computer Board, the Singapore Productivity and Standards Boards, Microsoft Inc. of the United States and the Center for International Cooperation for Computerization affiliated with Japan's Ministry of International Trade and Industry. The role of these advisors was to examine the level of information technology in Singapore trends of demand in the private sector and Singaporean government policy. Mr. Teraoka worked for two and a half years from 1988 as the team leader of the group of experts that JICA dispatched to JSIST. Since then, he had been stationed in Singapore as the manager of NTT's Asian operations.

According to Mr. Teraoka's analysis, the reasons why the information industry support project went smoothly in Singapore are: (1) The policy of the Singaporean government, and the National Computer Bureau in particular, was clear, with the public and private sectors working toward the same end; (2) Because of special tax treatment for multinational companies which located their regional headquarters in Singapore, thereby establishing the business environment; and (3) Training institutions for information processing engineers have grown able to provide the number of engineers needed by society.

JICA reports focus on the results of JSIST and JSAIC that were supported by Japan. However, it cannot be overlooked that the Singapore government was also seeking support from the American and British governments and private sectors at the same time. The National University of Singapore obtained cooperation from IBM, Inc., and in 1982 established the Institute of Science Systems comprising the Computer Education Department and the Research and Development Department. In the same year, Nian Polytechnic established the Center for Computer Studies with the cooperation of ICL Co., Ltd. of the United Kingdom. Graduates from this center received qualifications from the British Computer Association, JSIST and the curriculum received approval from Japan's Ministry of International Trade and Industry for the information processing specialists' examination, receiving widespread coverage in the Singaporean media.

2) Productivity Development
In the literature on economic cooperation program from Singapore's Ministry of Foreign Affairs, the productivity improvement project learned from Japan and its applications were clearly stated.

Prime Minister Zenko Suzuki, who visited ASEAN countries in 1982, proposed a $100 million plan towards the Association of South East Asian Nations (ASEAN) Human Resources Center. The five ASEAN countries established the human resource centers shown in Table 1. Prime Minister Lee Kuan Yew visited Tokyo in June 1981 and met with the late Kohei Goshi, chairman of the Headquarters for Japan Productivity Center (currently the Japan Productivity Center for Socio-Economic Development). He resolved to study productivity improvement and set up a new National Productivity Board (NPB), which became the Productivity and Standards Board (PSB). The top-down decision of the country's leader in fact became a long-term project which lasted from June 1983 until May 1990.

The Productivity Development Project (PDP) did not go well from the beginning, and both the Japanese and Singaporean sides have painful memories, which are recorded vividly in the reports of the Japan Productivity Center headquarters.
The Japan Productivity Center, the Japan Industrial Safety and Health Association and NHK sent long-and short-term experts to the NPB through JICA. They began their work by collecting corporate data in Singapore.

Because the Singaporean staff of the NPB could not

PSB continues to conduct Third Country Training Programs for six African countries. A Japanese expert is at the far left

Table 1   Human Resources Centers in the five ASEAN countries

Country	Cooperation project
Indonesia	Vocational Training Instructors and Small Business Educators Training Center
Malaysia	Center for Instructors and Advanced Skills Training
Philippines	Human Resources Center
Thailand	Primary Health Care Training Center
Singapore	Productivity Development Project

collect data on measuring productivity, the Japanese experts took them to registry offices and the stock exchange and showed them that there was available data. When they returned to the office, the expert directed the Singaporean side to organize the collected data, but all they did was pile it up on the office floor. The experts then directed them to put a code number on each item of information and make lists according to industry category, fiscal year and type of report.

This improvement of the skills of NPB staff was the first task of the experts. However, it gradually turned out that companies also had only a vague conception of productivity as something that seemed to be a good thing.

"Factory managers expected Japanese productivity development to work like an instant cure in dirty factories that were not even cleaned properly, where there were things to be done before productivity and quality improvement can be attempted," said one report. Likewise, the Singaporean government officials also grilled the Japanese experts about the lack of visible results merely a year after the project began. As it was a pet project of Prime Minister Lee Kuan Yew, the leaders of the NPB were probably tense and nervous.

In Japan's post-war recovery, the government and private sectors worked as one to promote industry. With the introduction of productivity development and quality control methods from America and cooperation between labor and management increased competitiveness increased, foreign currency was earned from exports, created prosperity.

In Japan, productivity development was promoted based on the assumption that everybody understood concepts such as the 5S-Method: (Seiri (Organization), Seiton (Tidiness), Seiso (Cleaning), Seiketsu (Hygiene) and Shitsuke (Discipline)), 'quality first' and 'safety first.' However, there were no such foundations in Singapore, and the Japanese side was taken aback. Ethnic Chinese society put priority on actual profit rather than slogans. In addition, there was a tendency to focus on theory and logic, possibly due to the history of British colonial rule. As a result, the methods of the Japan Productivity Center, which stressed the concept of "learning through trying," struck an obstacle.

Typically, when differences arise in ways of doing something in aid to developing countries, both sides become hesitant or one side simply gives up. However, the case in Singapore was different.

There were the decision and absolute orders of Prime Minister Lee Kuan Yew which were based on the argument, "As a result of Singapore's industrialization policy, it has succeeded in joining the ranks of the NIES. However, to do this, it had to change its industrial structure from labor intensive to knowledge intensive. As a resource-poor country like Japan, the key is to improve international competitiveness through the development and training of human resources. In order to achieve a human resources approach modeled on Japan, which achieved miraculous economic development and copying its productivity development movement, Singapore is hoping to receive technical transfers from Japan." Therefore, an attempt was made to revive the project. Mr. Kiyohiko Sakurai, the second team leader, was chosen from the private sector to take charge.

He says, "I was a fireman. I played the role of an intermediary between the two sides which had become estranged from each other to get the project back on track. Specifically, I made adjustments to the JICA or the Japanese approach to aid. Normally, the Japanese experts would teach the counterparts, expecting that the counterparts would teach the people of the developing country. The Japanese experts were usually advisors, but in this case, their role was changed to that of an assistant. In other words, we changed the method of the technology transfer so that the Japanese experts visited factories together with PSB's Singaporean staff, and taught factory managers and employees directly, step by step."

Mr. Sakurai is a shipbuilding engineer who joined Ishikawajima-Harima Heavy Industries, Co., Ltd. in the year World War II ended. During the early years of overseas expansion by Japanese companies, in addition to establishing the Brazilian joint venture Ishibras, he worked as chairman of Julong Shipyard, which was at the frontier of Japanese companies in Singapore in the early 1960s. During his 18 years of work experience in Singapore, he had earned the trust of Singapore's public and private sectors.

The once-retired Mr. Sakurai seemed to be a good choice for everybody as an advisor for the troubled PDP who would put the project back on track by negotiating between the NPB and the Japanese side. Speaking frankly in English and

Table 2 Concrete results produced by PDP (May 1990)

- 196 Singaporeans received training in Japan.
- 4,000 participants received training using educational materials developed by PDP.
- Over 200 Japanese experts conducted on-site training of counterparts in Singaporean industry. Further, about 15,000 Singaporeans attended various seminars held by experts.
- Approximately 100 training manuals and audio-visual educational materials were developed.
- Over 200 small and medium-sized companies were able to benefit from the training by Japanese experts and NPB consultants.
- Small and medium-sized companies were able to make use of 191 outside consultants and 30 associate consultants through introductions from NPB.
- 70 Singaporeans received training in the Japanese language.
- 5.4 % of the total working population became members of QC Circles.
- Approximately 100 companies have adopted and implemented the 5S-Method System under the guidance of the NPB and the long-term experts.
- At the educational material production center, technicians and engineers received training from the PDP in the production of video materials for promotion and education and training using producers.

reporting candid opinions directly to JICA, he turned the tide.

Model factories were selected, and both the Japanese and Singaporean sides went to the factories and promoted the 5S-Method. As a result, defective products and breakage decreased, and profits of factories were improved. 5S competitions were held among model companies, raising the standard levels. In addition, 5S study missions were sent to Japan, increasing the level of interest. Later, November became the Productivity Development Month of each year. Prime Minister Lee Kuan Yew also appeared at award ceremonies for outstanding companies and the productivity development movement became part of the Singapore industries through the media. (Refer to Table 2).

"Human relations that bridged the gulf."

Mr. Yasu Fukuda, the third team leader, wrote in his report at the end of PDP in 1990: "Thanks to the PDP, we have been able to gain valuable experience in creating the expertise needed to transfer Japanese-style productivity development techniques to foreign countries. The central issue in the later half of the project was the establishment of management training departments in the field of management consulting in NPB."

Mr. Fukuda, who still works in Japan and overseas as a management consultant, describes the usefulness of his Singaporean experience as follows: "Once a month, the Japanese and Singaporean managers got together to hold a forum for the airing of complaints and listening to each other. Singaporeans were very assertive, and the Japanese side easily became emotional, taking the attitude that those who were being taught were not really entitled to complain. But counterarguments without logic were ineffective. We began to explain things logically, and by doing that, gradually gained trust."

"Some computers arrived from Japan. However, the

voltage was different. The Singaporean side insisted that they could not accept them as they were, because adaptors should have been included. The Singaporeans had logic on their side, and the Japanese side paid for the adaptors."

"We translated Japanese educational materials into English and distributed them. However, there were complaints that it was not proper English. Certainly, just making direct translation does not make for good educational material. The Japanese side wrote the materials again in English from the beginning."

The creation of "eye-to-eye" human relations, in Singaporean terms, closed the gulf between the two sides.

"The PDP was the first in Singapore to get a karaoke machine. The local music industry objected that karaoke in the streets would damage their business. Arguing that it would be all right carried out indoors then, we held a karaoke competition in the PDP building. Taught by the teachers (Japanese experts), the students learnt some songs."

Events like these gradually established a sense of a "productivity family." At the end of the project, a commemorative report entitled "Always Reaching for Tomorrow" was published both in English and Japanese. In it, Prime Minister Lee Kuan Yew wrote, "Productivity means ceaseless improvement. We may reach our goals in ten years' time. However, by that time, we will no doubt discover that there is another tomorrow waiting after that."

In the PSB headquarters building, there is a slogan that reads "Another Ten Years of Productivity 1991-2001". Although the Japanese experts have left, the challenge of PSB continues.

Talking to many Singaporeans, I got the feeling that the training of computer software engineers (JSIST) and the Productivity Development Project (PDP) were inseparable. Both of the projects, which were carried out more or less in parallel during the 1980s, were major factors in changing the industrial structure of Singapore. And the background of all this was the leadership of Prime Minister Lee Kuan Yew.

Meanwhile, JICA, which conducted the two projects, has produced detailed reports concerning each project, but there has been no overall analysis and evaluation of Japan's contribution to Singaporean nation building and what the problems were. Singapore is a unique city state with non-corrupt, strong leadership and motivation. In other words, it had good governance and ownership, so it provides a positive example of successful cooperation with developed countries including Japan.

(2) Malaysia

Malaysia has adopted the so-called "Look East Policy" advocated by Prime Minister Dr. Mahathir Mohamad. Japan's economic cooperation projects have included not only technical cooperation by JICA but also the development of an extensive range of aid for human resources development by other aid organizations in Japan. In order to acquire industrial technology, the Malaysian government sends large numbers of students to Japanese universities and technical colleges, and

Although the cooperation with Japan has finished, the productivity development project has continued. In the PSB headquarters building

Malay entrepreneurs have begun to appear, so an overall evaluation is needed.

Learning "attitude" from Japan.

Before going to Malaysia, I first met with the Malaysian Ambassador in Japan at the Malaysian Embassy in Minami-nanpeidai, Shibuya-ku, Tokyo. Here, in addition to the political affairs, trade and consular departments found in other embassies, there is a human resources development department. Ambassador Tan Sri Khatib (Former), in his ninth year of tenure, said, "I am a member of the human resources development department. Human resources development is the backbone of the Look East Policy."

The Ambassador explained, "Although the policy is "Look East," we do not want people to wrongly think that we are rejecting the West (Europe and America). We are looking East, for example to Japan, for what we cannot find in the West. For example, Japanese-style values such as the work ethic, discipline and the importance of the family cannot be found in the West. The Malay people, who were accustomed to Western colonial rule, do not have these values either. We can get technology from the West as well. What we are looking for in Japan is attitude, a mindshift. We could also call it a change of ideas. It is discipline, the work ethic and also management techniques. We hope to get the attitude and spirit of independent motivation from Japan. That is the aim of the Look East Policy." The human resources department at the Malaysian Embassy has provided support for over 5,000 Malaysian students and trainees in Japan since the early 1980s to learn new values through training at research institutes and companies.

When I visited Malaysia, it became clear that there are a variety of routes for study and training in Japan. In addition, the Malaysian government finances overseas study in Japan, which is a major difference from other countries, and is a unique feature of the Look East Policy.

1)   Undergraduate Students in Japan
By 1999, this program had a fifteen-year history. Normally, overseas students come to Japan, study the

Japanese language for a year, and then enter Japanese universities. However, Malaysian students study Japanese language and the state of affairs in Japan for two years in the University of Malaya's Preparatory Education Department in Kuala Lumpur before they proceed to universities in Japan. The Preparatory Education Department is also known as the "Japanese Cultural Research Center".

At any given time, there are three dozen Japanese teachers at the University of Malaya: The Japanese Ministry of Education assigns science and mathematics teachers from Japanese public high schools providing a Japanese teaching team, and the Japan Foundation assigns Japanese language teachers. The building at the Preparatory Education Department was constructed and extended using nearly 800 million yen in grant aid. Malaysia is the only country that sends students to Japan with such a thorough preparatory education. Malay students from all over the country graduating from high school with good grades are selected by the Public Service Department (PSD) and the University of Malaya.

In the teaching team, Malaysian teachers teach lessons in the Malay language for the first year, except for English language and Japanese language lessons. In the second year, apart from English language, both Japanese and Malaysian teachers teach in Japanese. Students who wish to study science are mainly taught mathematics, chemistry and physics by teachers from Japanese high schools. Students who wish to study humanities are taught mathematics, world history and social sciences in Japanese. Both courses study Japanese language, English language and Japanese affairs. After the two years, the students take the Japanese Ministry of Education's examination and those who pass could go on to study in Japan. Those who fail have the option of continuing their study at the University of Malaya. Some of the students are selected as Japanese government scholarship students. Going to Japan with this level of preparation assures that he or she is an excellent student. Still, they are often subjected to comparison with privately-funded Chinese students, indicating perhaps that long-standing ethnic disparities may remain even in the field of education.

2)   Technical College Students
This program is also restricted to Malay students who receive two years of preparatory education at the Mara Institute of Technology. After studying at technical colleges in Japan, the majority of graduates are employed by Japanese companies. The Japanese Ministry of Education also assigns science and mathematics teachers to this project and the Japan Foundation has dispatched nearly 20 Japanese language instructors.

3)   University Students Majoring in Science
This program began in 1993 using a yen loan from the Overseas Economic Cooperation Fund (OECF). It is a program that aims to train the key engineers necessary for Malaysia's economic development, and the first students graduated in the spring of 1999. After receiving two years of preparatory education at the Mara Institute of Technology, the students are required to enter an undergraduate course of

Mr. Tan Sri Khatib, former Malaysian Ambassador to Japan, visiting Bumiputra students in Japan (in Tokyo)

science or engineering at a Japanese university. Humanities and graduate school courses are not eligible for this program.

This course is called the Higher Education Loan Fund Project (HELP). It is reserved for particularly outstanding students, which was stressed by Ambassador Tan Sri Khatib, and is supported by the Mara Education Foundation, an institution dedicated to the development of Malay human resources. It receives assistance from Prime Minister Dr. Mahathir Mohamad, who seeks to develop a technological elite even if it means borrowing money. Only students who score over 90 in mathematics and over 85 in physics and chemistry in the selection examination can enter the preparatory education center.

4)   Training for Industrial Technology Trainees
In this program, students receive two to three months of on-the-job training at private companies. They embark on the training after studying Japanese language for six months at the Mara Education Foundation's technical college language center. By the time of this evaluation, JICA had dispatched several Japanese language instructors, including senior overseas volunteers.

5)   Training for Government Officials
This program began in 1993. It is a two-month course which is helped by the cooperation of the Japanese Chamber of Trade and Industry in Malaysia (JACTIM) with two weeks training in Malaysia followed by training at a company in Japan. JACTIM also provides its own scholarships for students.

6)   On-the-job Training for Managers
This is a three-month short-term training program at Japanese companies and government offices aimed at improving management-level employees in the government and private sector.

7)   Training of Malaysian Japanese Language Instructors
In order to increase the number of Japanese language instructors, the students enter university after studying for one year at the International Students Institute Japanese Language School. This program sends ten students a year.

The above programs constitute the special education system for Bumiputra (Malay youth). It can be said that the attempt to put the next generation of Malays, who are handicapped both economically and academically, at the center of nation-building, is the backbone of the Look East policy.

In terms of training in Japan, in addition to trainees accepted by JICA (about 250 trainees per year) the Association for Overseas Technical Scholarship (AOTS) has also conducted training for business people (300 per year) for many years. The Japanese government usually pays all of the expenses for JICA training; but for AOTS training, the Malaysian side, either the company or the individual trainee, pays 25% of the total expense.

The JACTIM believes that a considerable number undergo in-house training at Japanese companies operating in Malaysia, either on the Malay Peninsula or in Japan, although exact figures are not grasped. The number of this type of trainee is probably higher than in government programs. This kind of training is not limited to Malays but covers all Malaysian employees. With self-funding for 25% of the cost of AOTS training in Japan, students work very assiduously to get their money's worth. There is great interest in the practical themes of training such as 5S, *Kaizen* (improvement) and quality control, learned through the Japanese productivity development movement. A Malaysian version of the 5S poster has been produced and sold. Seminars for entrepreneurs are also popular.

The NGO OISCA also has a deep relationship with Malaysia. The Mara Education Foundation, which seeks to develop Bumiputra human resources, has sent 2,400 industrial trainees to OISCA's training centers in Japan and small- and medium-sized companies affiliated with OISCA since 1967. In the field of agriculture, around 300 people from Kelantan state and Sabah state on Borneo have trained at Japanese farms. OISCA established a training center in Malaysia which is now run independently by Bumiputra. In 1998, people concerned with OISCA from eight Asian countries came together with the help of a Japanese grass-roots Grant Aid project, to support the Entrepreneur Training Seminar.

It is clear that the Look East Policy focuses on a range of fields to train Malay human resources and create entrepreneurs. However, overall, the United States, the United Kingdom, Australia and Canada rank higher as overseas study destinations than Japan (fifth place), so the preference for the West remains strong. The government has tried to increase the number of Malay managers in its economic development plans. Its target was for 30% Malay ownership of Malaysian companies' stocks by the second half of the 1990s, but the actual result was 20%. This shows that the influence of the ethic Chinese is still strong, including in small- and medium-sized companies.

In technical cooperation fields, I also observed human resources training projects. In response to the ASEAN human resources center concept, proposed by Prime Minister Zenko Suzuki who visited ASEAN countries in January 1982, JICA

Students studying in Japan also include company presidents. This is Mr. Zulkifli, president of a diesel engine repair company

Table 3   Cooperation with CIAST (August 1982-March 1990)

Dispatched experts	Long-term: 92 overall
	Short-term: 36 overall
Acceptance of trainees	66 overall
Provision of equipment	316 million yen
Grant aid (for buildings, facilities, etc.)	3.8 billion yen
Number of students (end of 1993)	10,826

decided to establish the Center for Instructors and Advanced Skills Training (CIAST) in Shah Alam, the district of the Kuala Lumpur metropolitan area. The critical shortage of skilled and specialist workers was a bottleneck to Malaysia's industrialization. Actual training began in May 1984.

The CIAST project, as a result of cooperation shown in Table 3, has operated since 1990 as an independent training institution affiliated with the Malaysian Ministry of Human Resource. It has a fairly large campus, by Japanese standards, with dormitories as well as school buildings, for students who come from all over the country. The Japan-Malaysia Technology Institute (JMTI), which began training in July 1998, is also temporarily located at CIAST, and the first students are attending courses held on this campus. The JMTI's own school building will be completed by the end of 1999 within the Bukit Minyak Industrial Park in Penang State, where the institute is scheduled to begin full-scale high-level training of technical workers.

Nobuhiro Uehara, chief advisor to JMTI, is a JICA expert dispatched to the Ministry of Human Resources after helping CIAST.

He says, "The JMTI was established based on Prime Minister Murayama's agreement with Prime Minister Dr. Mahathir Mohamed during the former's visit to ASEAN countries in August 1994. The project was threefold and

comprised the provision of large equipment such as industrial robots, the dispatch of experts, including myself, and training in Japan for Malaysian counterparts. The Malaysian government provided the funds for the construction of the school building and the majority of the computer equipment as well as personnel and operating expenses. The Malaysian side has borne more costs than the Japanese side and, despite the Asian economic crisis, the Malaysian Government took precedence over the budget for it."

In a questionnaire of the 58 highschool graduates who enrolled as the institute's first students, many said that they wanted to work at Japanese companies or study technology in Japan.

Although Malaysian government officials do not relish comparisons with neighboring Singapore, the ASEAN Human Resources Center in Singapore, after the Japan-Singapore Institute of Software Technology (JSIST) project finished, evolved into the Artificial Intelligence Center (AIC), achieving success in the training of information industry workers. In the case of Malaysia, there was an interval of several years between CIAST and the establishment of JMTI. The disparities between the two countries have resulted in the difference between specialization in computer technology and across-the-board technology training.

It may be that in Malaysia human resources development could not keep pace with the speed of economic growth. In 1986, Malaysia approved the establishment of 100% foreign-owned companies. As a result, investment from Japan, the United States and Europe increased, and in 1987, the electric and electronic manufacturing industry exceeded agriculture for the first time. In 1989, exports of products such as consumer electronics and semi-conductors exceeded that of palm oil and petroleum. The industrial structure had been completely transformed, while the content of occupational training and the education of the workforce lagged behind.
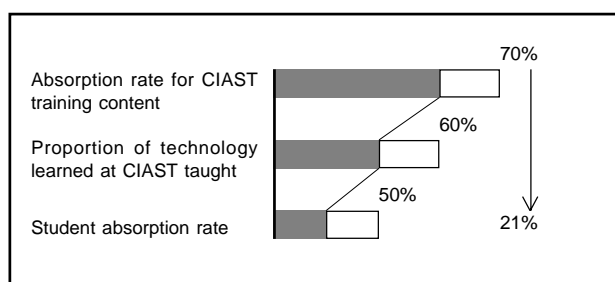
While the establishment of JMTI was delayed, Germany and France established technology institutes called GMI and MFI for training high-level engineers at the request of the Malaysian government. The United Kingdom also began the establishment of a similar institution (BMI) in 1999. While the content of the training differs from that at JMTI, there is fierce international competition in the training of technicians, thus the Look East Policy was not the exclusive devotion of Malaysia. The technology institutes of Germany, France and the United Kingdom are in the Kuala Lumpur region, while JMTI is located in Penang State, where there are many Japanese companies. Over a three-year training period, students study Japanese for one year from the second half of the second year until the first half of the third year. With the cooperation of JACTIM, JMTI plans to implement high-tech training in line with the need for skilled workers at Japanese companies.

Incidentally, measurement and evaluation of results is difficult both for training of skilled workers and for general technology transfer. In Malaysia and Indonesia, JICA has carried out impact surveys for the ASEAN human resources

A senior overseas volunteer conducting practical sand-casting training at the Bumiputra occupational training center

Table 4   The technology transfer results of CIAST

Absorption rate for CIAST training content	70%
Proportion of technology learned at CIAST taught	60%
Student absorption rate	50% → 21%

development center projects.

To summarize, in the case of Malaysia's CIAST, as shown in Table 4, Japanese experts teach trainees and the level of acquisition at this stage is 70%. After receiving training, the trainees return to their own occupational training schools and teach students. Only 60% of the technology they mastered could be passed on to students, of which students only absorb 50%. This means, as the analysis shows, that only 21% of the technology that the Japanese experts attempted to communicate is absorbed by students going to become members of society.

In addition, a calculation of the cost of technology transfer per student and benefits shows a value of 1 for costs against a value of 0.74 for benefits. This figure is considered in the survey as not particularly bad. From the point of view of a third party, it is desirable to conduct close to 100% technology transfer, allowing an effective use of taxes for international contributions. However, it depends on the partner country. The report accurately indicates the need to extend support to management methods of training centers into future projects.

Malaysians are very proud of the domestically produced Proton Saga and Wira as symbols of a nation built on

industrialization. However, they use Japanese-made engines and components, so there is a target for 100% domestic production together with an electronics industry. In order to achieve that, metal mould technology, which is a key technology for all products, is needed. Therefore, the Malaysians have requested the transfer of metal mould technology from Japan. Training in metal mould technology is being carried out by JICA experts at the Standards and Industrial Research Institute of Malaysia in Kuala Lumpur, and two senior overseas volunteers at the Technical College for Bumiputra in Perak State and the State Technology Development Center in Penang State, but there has been little horizontal liaison among them. On the Malaysian side, different channels simply look for metal mould engineers without coherence. It seems important that both sides work together to build a comprehensive strategy for metal mould technology transfer.

JICA's country specific Aid Research Committee on Malaysia indicated in 1993 that aid to a semi-developed country should be implemented not by reacting case-by-case to sporadic requests for training, but with a systematic strategy. This is still relevant today.

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1) This survey is based on the following three reports:
   • The Productivity Development Project in Singapore/Report on Ideas and Practice in Technology Transfer (Japan Productivity Center, 1990)
   • Labor, Education and Development of Occupational Skills in Malaysia/Bumiputra and Look East (JICA, 1984)
   • Research on Appropriate Forms of Human Resources Development Cooperation in Asia-Pacific Nations (JICA Institute for International Cooperation, 1989)

2) Using expertise and equipment transferred with the cooperation of JICA based on the new Japan-Singapore Partnership Program, the commencement of a third country training program entitled "Electronic Commerce" is scheduled to commence in 2000.