Chapter 7

JAPAN'S INTERNATIONAL COOPERATION IN INFORMATION AND COMMUNICATIONS TECHNOLOGY

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1. INTRODUCTION

The rapid development of information communications and technology (ICT) has accelerated the globalization of economic activities and brought benefits not only in developed countries but also in some developing countries. As mentioned in other chapters, Singapore and Malaysia aim to shift over to knowledge-based economy (KBE) and grapple nationwide with the development of ICT to become leaders in the competitive world market. However, a negative aspect is that many developing countries cannot enjoy the benefits of the development of ICT, and it only serves to enlarge and widen the economic disparities between advanced countries and developing countries.[1]

According to the statistics of the International Telecommunication Union (ITU), the number of fixed telephone lines exceeds 900 million worldwide, of which advanced countries such as European countries, U.S.A. and Japan make up 64%, where as the total population ratio is only 16% (see Figure 1).

The big disparity in penetration rate is evident among Asian countries which make up 25.1%. As seen in Figure 2, Japan (55.75%), Singapore (48.18%) and Korea (46.7%) excel others for number of fixed telephone lines connections per 100 people, this is followed by Brunei (24.59%) and Malaysia (24.59%). On the other hand, there are countries where the connection rate is less than 1 unit per 100 people, like for example Myanmar (0.55%), Cambodia (0.25%) and so on (see Figure 2).

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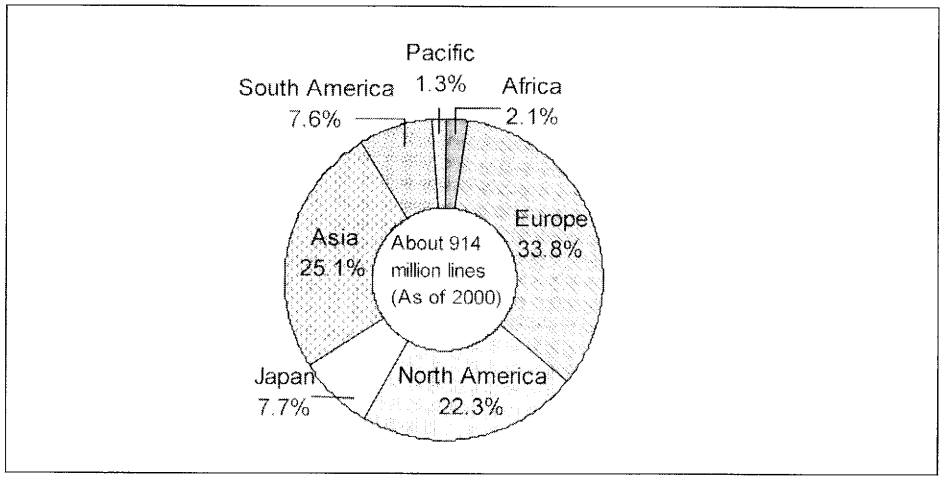
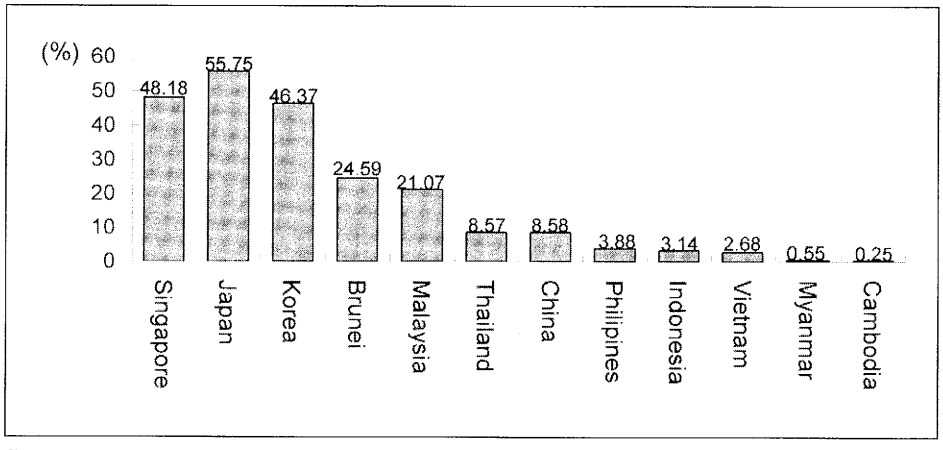
[1] Refer to the International Symposium on "IT and Development Cooperation" on 3 July 2001 in Tokyo, http://www.facid.or.jp/Others/itsymp.html.

Figure 1. Distribution of Fixed Telephone by Region



Source: International Telecommunication Union (ITU) /2000

Figure 2.Telephone Subscribers per 100 inhabitants in Asia (2000)



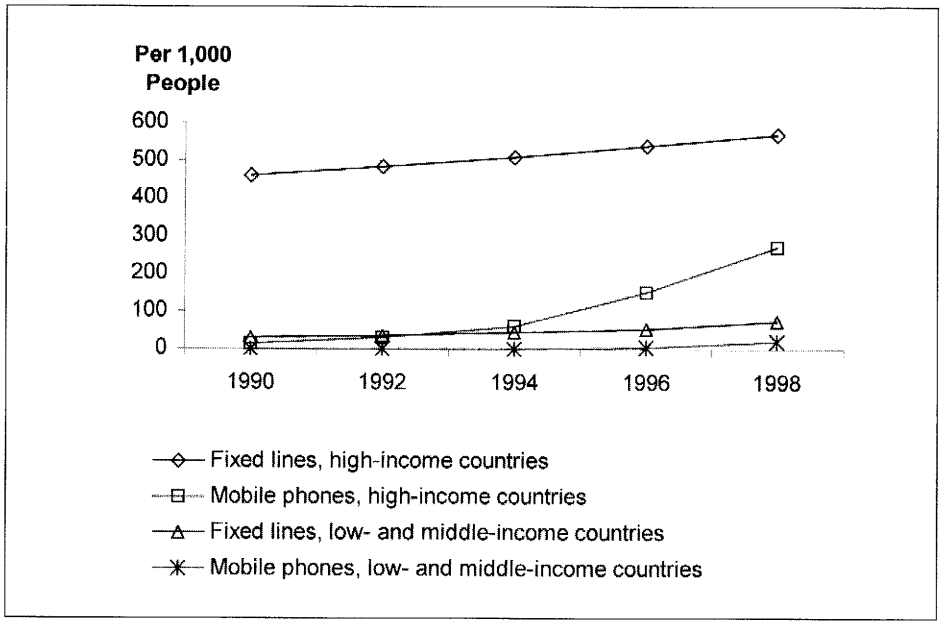
Source: ITU/2000

Recently, the number of mobile phone users exceeds the number of fixed telephone line users in some countries, and they are rapidly spreading as a basic communication tool in the information society of 21st century. In advanced countries, the growth of mobile phone usage has expanded by 20 times during the period of 1990 to 1998 (see Figure 3). In ASEAN countries, fixed telephone lines tend to be replaced by mobile phones, particularly in cosmopolitan areas, however,

the bipolarization of the region is expanding in terms of the connection rate of telephone services including fixed lines.

In recent years, internet subscribers are increasing rapidly, being estimated more than 300 million people worldwide. However, the regional mal-distribution is remarkable, North America and Europe make up more than 75%, whilst the Asia Pacific region does 20% and African countries make up less than 1%. High penetration of internet is seen only among developed countries (see Figure 4). The number of internet hosts is more than 7,240 worldwide (at January 2000), and U.S.A., the cradle of internet, makes up more than 70%.[2]

Figure 3. Mobile Phones are Connecting the World

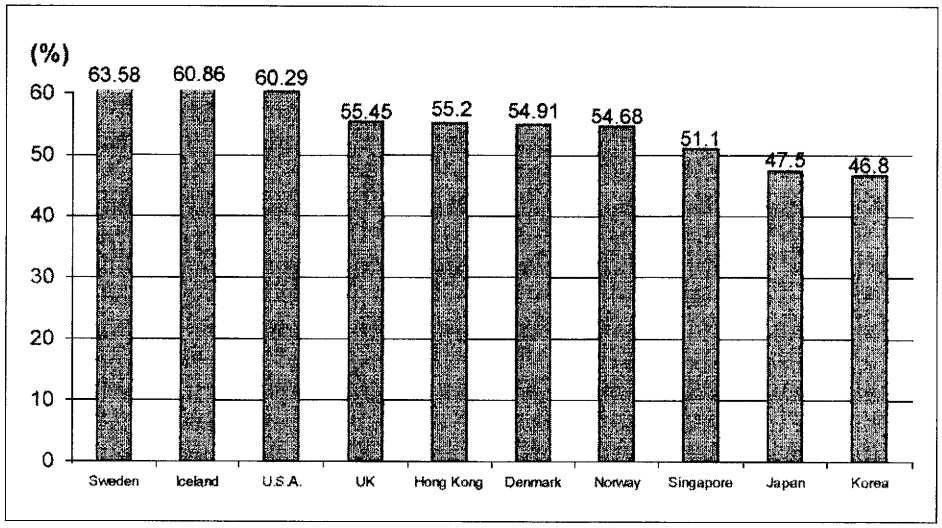


Source: ITU

With the development of ICT, the disparity between people who can utilize information and those who cannot, the so called digital divide becomes tangible at various levels in respective countries such as urban to rural, race to race, organization to organization, and individual to individual. Especially in

[2] Refer to International Development Journal Ltd. (2001), International Development Journal July 2001, pp. 60-61.

Figure 4. Internet Penetration rate



Note : Internet Penetration Rate of Malaysia is around 7.00%
Source : <Japan>: Telecommunication White Paper 2001,
Statistics Bureau & Statistics Center, CICC
<Other>: Nielsen NetRating, CIA The World Factbook 2000

developing countries, the problem is compounded and situation becomes serious.

The development of ICT brings a big transition to education and the human resources development in enterprises as well. In Singapore and Malaysia, ICT is adopted positively from the primary education level to raise children familiar with KBE. Vocational training institutions also endeavor to improve ICT skill during manpower development. If ICT is not utilized to bring up people who fully understand the development, it is feared that the digital divide may be enlarged further.

On the other hand, assisting countries or organizations have the point of view that the equipping of communication sector should be done by private fund basically because communication enterprises are expected to get higher profit and the easier cost recovery compared with other public works, the supply of official development assistance (ODA) is in a difficult situation.[3]

This chapter focuses on Japan's international cooperation to improve the negative aspects of ICT development such as digital divide and to enhance human resource development.

[3] Refer to SRIC Corporation (2001) p. 170.

It examines characteristics of Japan's ODA, reviewing her aid experience by the case studies of Singapore and Malaysia. In addition to bilateral cooperation of both countries, regional and global cooperation through ASEAN and APEC in ICT is discussed under the scheme of Okinawa Charter. The academic network of universities and educational cooperation by satellite communication are also presented. Lastly, it suggests the direction of international cooperation in ICT in cooperation with Singapore and Malaysia.

2. CHARACTERISTICS OF JAPAN' S ODA

The development of Japan's ODA to support an improvement of economic development and welfare in developing countries consists of three pillars: (a) bilateral grant (grant aid cooperation) and technical cooperation, (b) bilateral loan (generally known as" Yen Loan") and (c) contributions and subscriptions to multilateral donors. The major portion of bilateral grants is undertaken by Japan International Cooperation Agency (JICA) and Japan Bank for International Cooperation (JBIC) is in charge of Yen Loan.

Grant aid means the provision of funds to the government of developing countries without obligation of repayment. It covers general project grants like afforestation, child welfare, medical care, support for human resources development bases, non-project grants like disaster relief, food aid, and assistance for overseas students and cultural activities. On the other hand, Yen Loan is to provide developing countries with long term development funds at low interest, and is mainly for economic infrastructure.[4]

According to the ODA annual report of 2000, Japan's ODA made it the word's top donor to developing countries for the ninth consecutive year. She kept the first place with US$15.885 billion shared among 22 countries of the DAC, but the ODA rate against GNP is only 0.75% and in this ranking it takes 7th place. In addition, the grant ratio of Japanese ODA is 45.5% and the Grant Element that indicates the relaxation of the aid condition is 83.6%, which is the lowest level of all DAC

[4] See http://www.jica.go.jp.

countries. This brings about criticisms mainly that it proves the nature of Japan's ODA.

By region, Asia took 98% at the beginning of 1970s but it has expanded to the Middle East, Middle America and Africa in the 1980s, and as a result, the proportion of bilateral cooperation in Asia is lowered to 63.2% against a total bilateral cooperation in 1999. However, Asia is still the most important region to be considered because of its historical, geographical and economic relationship with Japan.

In the regional distribution of bilateral ODA which makes up the majority of Japan's ODA, ASEAN countries achieve a higher proportion within Asia scoring 37.3% of the bilateral cooperation. By country, Indonesia, Philippines and Vietnam are listed in a higher rank and Malaysia is also one of the important countries (see Table 1).

Table 1. Major Recipient Countries of Japan's Bilateral ODA

(Net disbursement basis: $million)

	1996		1997		1998		1999	
Rank	Country	Amount	Country	Amount	Country	Amount	Country	Amount
1	Indonesia	965.53	China	576.86	China	1158.16	Indonesia	1605.83
2	China	861.73	Indonesia	496.86	Indonesia	828.47	China	1225.97
3	Thailand	664.00	India	491.86	Thailand	558.42	Thailand	880.26
4	India	579.26	Thailand	468.26	India	504.95	Viet Nam	679.98
5	Philippines	414.45	Philippines	318.98	Pakistan	491.54	India	634.02
6	Pakistan	282.20	Viet Nam	232.48	Viet Nam	388.61	Philippines	412.98
7	Mexico	212.84	Jordan	139.63	Philippines	297.55	Peru	189.12
8	Egypt	201.32	Sri Lanka	134.56	Sri Lanka	197.85	Pakistan	169.74
9	Bangladesh	174.03	Bangladesh	129.98	Bangladesh	189.05	Brazil	149.36
10	Sri Lanka	173.94	Egypt	125.40	Malaysia	179.10	Syria	136.17
	Total above 10	4529.30	Total above 10	3114.87	Total above 10	4793.70	Total above 10	6083.43
	Bilateral Aid Total	**8356.26**	**Bilateral Aid Total**	**6612.59**	**Bilateral Aid Total**	**8605.90**	**Bilateral Aid Total**	**10497.76**

Source: Japan's Official Development Assistance Annual Report 2000

Note : As the figures in the table are rounded off, they do not necessarily add up to the totals.

With respect to sectoral distribution of bilateral ODA, Table 2 indicates that the share of Japanese economic aid overwhelms, as big as 31.5%, while Europe and the U.S.A give greater importance to the social infrastructure. The social infrastructure includes many Basic Human Needs (BHN) such as education, health, population planning, sanitation and so on, while the main thrust of economic infrastructure is the

Table 2: Sectoral Distribution of DAC Countries Bilateral ODA (1998)

(Commitment basis, %)

Country / Sector of Destination	Japan	USA	UK	France	Germany	Australia	Average
Social Infrastructure and Service	18.9	31.3	29.2	39.2	34.7	52.5	29.9
Economic Infrastructure and Service	31.5	12.9	12.2	9.0	25.8	2.3	17.2
Agriculture, Forestry and Fisheries	7.6	2.3	9.4	5.7	3.9	14.3	5.5
Industry and Other Production Sectors	11.2	10.0	7.6	8.6	11.0	6.4	10.0
Emergency Assistance	2.9	25.8	9.9	0.2	6.0	15.0	11.1
Program Assistance and Others	27.9	17.7	31.7	37.3	18.6	9.5	26.3

Source : Japan's Official Development Assistance Annual Report 2000

Notes : 1. Emergency assistance includes food aid.
2. Not including assistance to Part II (Aid to Countries and Territories in Transition).

preparation of transportation, harbor, and energy and so on. Therefore, it is said that Japanese economic assistance is mainly for hard infrastructure. There is an aspect in that the preparation of economic infrastructure propelled the economic development of Asia-centered developing countries, but the technical cooperation needed to educate people as the base of development in developing countries should be strengthened as well.

The technical cooperation aims to propagate technology by initiating people (counterpart), who play a leading role in developing countries, into Japanese technology and knowledge. JICA annually accepts about 8, 000 participants for technical training courses in Japan. The main aim of the program is to transfer specialized knowledge and technologies. The program includes training conducted in Japan and third country training held in host countries other than Japan. The latter is applicable to countries with high-income levels to where the grant and loan aid is not applicable such as Singapore.

Technical cooperation is classified into receiving trainees from developing countries, dispatching Japanese experts to transfer and disseminate technical knowledge, supplying equipment and development surveys and so on. International cooperation of ICT, which is mentioned in this chapter, is also one area of technical cooperation. In implementing technical cooperation concerning ICT, the role of the private sectors in

building communication infrastructure and educational institutions for human resources development seems the key factor for the success. As cases of Japanese technical cooperation, instances of Singapore and Malaysia are examined as follows.[5]

3. JAPANESE TECHNICAL COOPERATION WITH SINGAPORE

Owing to expansion of multi-national corporations (MNCs) in electric/electronic parts and so on, Singapore attained double digits growth through 1970s trough provision of an infrastructure base to undertake manufacturing and service operations. From late 1970s, ASEAN countries tried to catch up with Singapore utilizing their abundant labor and cheaper wages, and the governments announced high industrialization policies, promoting research & development (R&D) in high-tech industry. Especially emphasis was put on education/skill training and some domestic industries came to encourage Japanese management techniques. Japan's technical cooperation with Singapore was remarkable as if responding to the accelerated advancement of Japanese firms.

Singapore, a resources-poor country just like Japan, has strived for a growth of intelligence intensive industry and productivity improvement, modeling on Japan.

Some examples of Japan's technical cooperation with Singapore and new relationship for both countries are presented as follows.

Japan-Singapore Institute of Software Technology (JSIST)

Being urged to transit from labor intensive industry to knowledge-based industry, Japan-Singapore Institute of Software Technology (JSIST) was established in 1980 as a technical training center for software in the data processing field. The JSIST project ran for 10 years with the technical cooperation of JICA. During this period, experts were dispatched from the Ministry of International Trade and Industry (MITI; presently Ministry of Economy, Trade and Industry), and Japanese

[5] Refer to 'Singapore and Malaysia' in Evaluation Report 1999, JICA.

industries such as NTT, NEC, cooperated in the training of Software technology in Singapore, utilizing Japanese made computer equipments. Graduates from JSIST were approved to enroll into master course in many universities abroad and MITI provided them with the Diploma qualification in System Analysis Programming and an Advanced Diploma in Software Technology. Applicants for admission to foreign universities were favored with benefits such as scholarship. In the background of the establishment of JSIS, there was a serious shortage of Software Engineers as there were less than 1,000 in 1980, and the technology transfer was demanded in step with increase of Japanese direct investment. The government targeted for the training of 10,000 Data Processing Engineers by 1990, and the goal was achieved in 1998. Throughout the 1980's the Information Industry achieved a high growth rate at 38% annually. JSIST has produced more than 3,000 graduates, and it can be said that it has contributed the rapid growth of information industry by fostering engineers who supported it.

After the completion of the Japanese technical cooperation in 1991, JSIST has been merged into Singapore Polytechnic and became a developer of Software Technology. Currently, technical cooperation such as E-Commerce is conducted in Singapore Polytechnics as third-country training program (what is called "south-south cooperation") which is development assistance by economically robust countries to other less-developed countries. Based on Singapore, it is expected that the experience of JSIST would help a techno-logy transfer to developing countries.

Singapore Artificial Intelligence Center (JSAIC)

In response to the needs of high information society, the Singapore government has established Singapore Artificial Intelligence Center (JSAIC) in 1990, aiming for human resources development in the Artificial intelligence (AI) technology field to transit to more advanced specialized technology. It may be said that the Singapore government who set about propelling training of advanced engineers in a forefront field, was foresighted. Japan's technical cooperation by

Japanese experts was carried out over five years. Then, JSAIC transmuted to a private company, that is to say, Kent Ridge Digital Labs that runs on a stand-alone basis. It acts in various aspects such as software development for domestic enterprises, third-country training, training for the less developed surrounding countries based on the government entrustment.

At the same time, private cooperation was remarkable. The Institute for System Science (ISS) was established in co-operation with IBM at the Singapore National University as a training centre (later a research institute), while the Center for Computer Studies (CCS) was established with British ICL, and private sectors as well. The Precision Engineering Institute (PEI) was also established in 1988 where a technical education such as precision machine processing, and numerical control, was conducted by foreign advanced enterprises including Japanese firms.

Thus, it can be said that Singapore effectively utilized technology transfer by international cooperation and foreign enterprises including Japan and it propelled the advancement of domestic industries.

New Relationship as Partner

Japanese Loan Aid to Singapore was terminated in 1972, then a provision of grant aid in 1988 is owing to more high amounts. Furthermore, in response when Singapore moved to the DAC list part II ("graduate" from aid receiving country) in January 1996, Japanese technical cooperation was terminated except to the third country training program in fiscal 1998. The relationship between Japan and Singapore shifted to an equal partnership in regional cooperation.

In this process Japan concluded an agreement of Japan Singapore Partnership Program (JSPP) with Singapore in 1994. Under this program, training is provided in various fields in which Japan originally had the technical cooperation above mentioned. As examples, intelligent technologies, computer software, and productivity management training course are running for trainees from more than 35 countries of Asia Pacific, Africa, Middle East, and East Europe. This approach

is regarded useful in transferring Japanese technologies to third countries because such training frequently relies on facilities built with Japanese aid for the purpose of human resource development, and on developing country personnel who have received through technical cooperation.

The program was extended again in 1997 in the name of Japan Singapore Partnership Program for 21st Century (JSPP21).[6] Singapore, an advanced country in Asia, is expected to play a leading role in transferring her technology to less developed countries utilizing its own experience in development. In promoting the cooperation in this program, Japan should assist in solving the problems and to suggest the improvements in planning and implementation of the joint project. In highly-advanced field of ICT or something else, Japan is expected to deepen the cooperation with Singapore where it shall stand as a regional core.

As an epoch-making relationship, the Japan government concluded a bilateral free trade agreement (FTA) with the Singapore government in 2001, which was named Japan-Singapore Economic Agreement for a New Age Partnership. It is the first agreement of FTA for Japan though Singapore already concluded FTA with New Zealand.

As for bilateral cooperation, major issues to be dealt are as follows.

(a) Financial service: liberalization of trade, capital market linkages, improvement of market infrastructure, development of regional bond markets and technical assistance to third countries.

(b) Information and communication services: protection of personal data and privacy, cross-recognition of privacy marks, e-commerce legislation, cross-certification for the interoperability of the key public infrastructure and its security.

(c) Regulatory cooperation to manage competition in the info-communication sector.

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[6] See http://www.mofa.go.jp/region/asia-paci/singapore/econo_b.html.

(d) Interactive broadband multimedia (IBBMM) collaboration: the establishment of physical broadband linkage, the exchange of media-rich multimedia.

(e) Collaboration on e-Government projects.

(f) Science and technology: life science and environmental technology.

(g) Trade and investment promotion: organizing missions, joint business seminars, database sharing through electronic linkage (electronic business matching) by Japan External Trade Organization (JETRO) and Trade and Development Board (TDB).

(h) Small and medium enterprises (SME): promoting SME in markets, technology, human resource, and financial resources.

(i) Human capital management and development.

(j) Media and broadcasting: broadcasting technologies and programming.

(k) Promotion of tourism and working holiday to encourage visits and exchanges by young people.

Japan might use Singapore as a gateway to re-package and distribute Japanese content to English and Chinese-speaking markets by building high-capacity broadband networks like IBBMM, which are growing in demand in both countries. As for e-Government, the Japanese government announced that submission of many central and local government forms would come online form fiscal 2003, except for approval for unemployment benefits and the issuance of residency permits for foreigners that requires face-to face interview. Singapore government already adopts online government service, but it does not necessarily require public demand besides submission of income tax form. It is expected to share the experience with one another for desired online services.

4. JAPANESE TECHNICAL COOPERATION WITH MALAYSIA

Since 1980s, Malaysia has positively invited multi-national corporations of electric/electronic industries mainly and achieved industrialization of an export-oriented industry. In the 1990s, a comparative advantage in labor cost has been weakened and a dependence on foreign workers became excessive. Presently the change from industrialization with a manufacturing-base to an industrial structure with an intelligence intensive industry-based on ICT is being developed. Therefore the introduction of new technology and fostering of highly skilled engineers are urged.

Because of this, the technical cooperation and the technical transfer from Japan to train engineers in respond to the sophistication of industry and economy are demanded.

Following are some examples of Japanese technical cooperation with Malaysia.

Center for Instructor and Advanced Skill (CIAST)

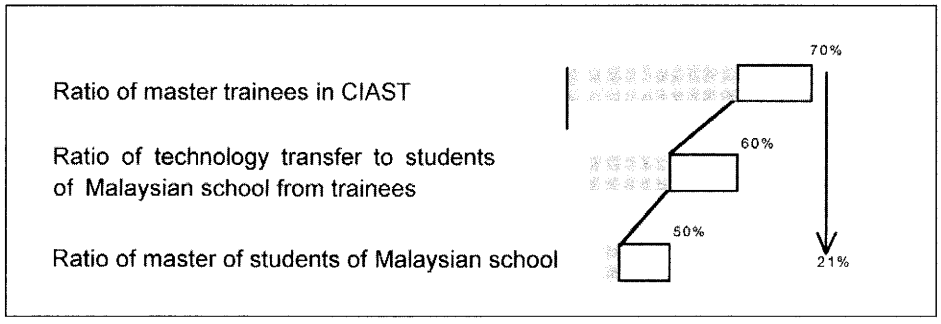
In Malaysia, a "Look East Policy", which aimed to learn socio-economic developments or senses of work ethic in Japan or Korea, was propelled in 1981 after the ascendance of Prime Minister Mahathir Mohamed. Responding to the request for human resources development in Malaysia, the Center for Instructor and Advanced Skill (CIAST) was established by Japanese grant cooperation in 1982 to train vocational training instructors and experts/professional workers necessary for industrialization in Malaysia.

In CIAST, the technical cooperation by Japanese experts has been ongoing for ten years and more than 10,000 students in total graduated. It can be said as it has played a role of supporting training for engineers who were indispensable to the rapid industrialization in Malaysia. It shows another aspect of contribution to the improvement of industrial technologies in Malaysia that the module materialized as a result of technological transfer.

However, according to the repercussion effect survey by JICA, the skill acquisition ratio of trainees at CIAST was 70%.

Malaysian teacher transfers 60% of their acquisition to students, and they mastered only 50% of their learned skill at the school. As a result, it means that only 21% of the training contents by JICA experts could be transferred to Malaysian students (see Figure 6). In case of Japanese technical co-operation, the current adopted system is that Malaysian counterparts (lecturers in vocational school) are trained first, then, they transfer the skills to their students. The improvement in training method such as direct teaching from experts to students may be required in the case of high technology transfer.

Figure 6. The Effect of Technology Transfer in CIAST (%)



Source: JICA

Currently CIAST is under Malaysian Government control, however, the technology transfer such as automobile/construction vehicle maintenance, automatic control technology and so on is utilized as a place of third-country training for Asia Pacific countries. It is desirable to be utilized as a technology transfer center, closely connected with Japanese advanced enterprises and so on.

Japan-Malaysia Technical Institute (JMTI)

After the 1980s, the Malaysian economy achieved a rapid growth with an increase of direct investments as well. However, the deficiency of manpower was serious and she had to rely on foreign labors. Therefore, since the beginning of 1990, the Government has adopted a policy that aimed for the development of a labor-saving economy by high-industrialization with

the introduction of high-tech, and propelled the establishment of vocational centers for training skilled engineers who would become leaders of cutting-edge techno-logy. In such a background, the Japan-Malaysia Technical Institute (JMTI) was established in 2000. Japan plays a role of provision of large training equipments such as industrial robot, dispatch of experts and training of Malaysian teaching staff, while Malaysia bears the construction of school buildings, purchase of most of training equipments such as computers, labor cost for staffs and the institute's operating costs. The training of JICA commenced in 1988, prior to the completion of the school building, using a part of CIAST, and will last for five years. The purpose of CIAST is the training of leaders, while JMTI aims to train highly skilled engineers (L4 of NVTC) and endeavors to strengthen English ability to be familiar with overseas information.[7] In addition, JMTI conducts third-country training inviting overseas trainees from Asian countries.

Like CIAST, all the instructors are sent from the Ministry of Labor. To keep up with the remarkable pace of technical development, cooperation with private enterprises and researchers in universities is vital. Since JMTI is near from Penang Industrial Estate, dispatch of technical experts such as lecturers and positive utilization of factory-based training is effective. In Malaysia, as the technical level between multinational enterprises and local enterprises is quite different, there is no organic technology transfer or linkage effect, and it is also a criticism that an enclave economy apart fr9m domestic economy is thus formed. It is expected that CIAST and JMIT would accomplish a role in promoting technology transfer locally, deepening the cooperation with multinational enterprises.

By the way, based on the deliberation between the respective government of Japan and Malaysia in 1993 and because of its high wage level, it is said that Malaysia has graduated from an aid receiving country, however, the Japanese government decided to continue giving aid to specified issues in

[7] A student who has completed a diploma course is awarded a Diploma of Technology in the relevant field, which is considered as equivalent to a Malaysian Skills Certificate (Level 4) of National Vocational Training Council (NVTC) within the Ministry of Human Resources.

Malaysia such as an environment conservation, human resource development, small-medium sized enterprises development, improvement of regional differential and so on.

Important targets of Japanese technical cooperation based on the Eighth Malaysia Plan (2001-2005) are: (a) technical cooperation to strengthen economic competition, especially development of supporting industries, (b) human resources development, (c) the environmental issues, and (iv) improvement of differentials. Each item includes positive utilization of ICT. Especially human resources development is an important issue. The deficiency of engineers in the nation becomes a bottleneck as Malaysia proceeds to high-industrialization. Above all, there is a serious situation for the electronics related field, R&D for process engineering is also serious, and technical cooperation mainly in vocational training and human resources development by Japan is urgently requested. On the other hand, the introduction of leading-edge technology by inviting multinational enterprises has been promoted, while the development of domestic industries such as supporting industries was insufficient. To develop high-industrialization, the development of supporting industries and expansion of engineers for the base will be inevitable.

5. EVALUATION OF TECHNICAL COOPERATION

Terminal evaluation has been studied by JICA from the viewpoint of efficiency, effectiveness, impact, relevance and sustainability.[8] According to its reports, the activities, methods and duration of the projects evaluated are in general appropriate. However, a few exceptional cases to be improved such as above-mentioned CIAST are pointed out. The importance of coordination between capital grant and technical cooperation is stressed. It is estimated that project-type technical cooperation projects and assignment of teams of individual experts achieved their objectives of using technology transfer to raise the technical capabilities and reinforce the organizational strength of new technologies suited local conditions.

[8] See http://www.jica.go.jp/english/evaluation/eval.html.

In Singapore and Malaysia, third-country group training programs had worked to improve knowledge and technical capabilities of trainees from neighboring countries was able to raise effectiveness. It may have a kind of impact to diffuse the technologies developed and improved by the local enterprises, but further cooperation with the business sector will be requested.

Project sustainability is a crucial element in assuring an enduring impact in the future. Most of the evaluated projects were able to achieve sustainability in terms of both technology and personnel, owing much to the success of technology transfer. However, developing countries may face severe fiscal constraints, and the ability to secure budgetary resources for operations and activities become a key factor in project sustainability. Providing additional support for follow-up and aftercare in order to sustain and develop ICT project will be needed.

6. REGIONAL COOPERATION AND GLOBAL COOPERATION

6.1 e-Japan Strategy and Okinawa Charter

It is often pointed out that Japan has trailed behind in the IT revolution. According to the "Potential Economic competitiveness Ranking in Asia and Japan" by Japan Center for Economic Research, she holds 14th ranks far behind U.S.A (1st), Norway (2nd) and Singapore (6th). In order to create an internationally competitive IT nation, the "IT Strategy Head-quarter" was established within the cabinet of Japan in July 2000. Through several discussions in the IT Strategy Council which was constituted from opinion leaders, the "e-Japan Strategy" was adopted to implement priority policy program to form an advanced Information society. [9]

The e-Japan Strategy aims to make Japan the world's most advanced IT nation within five years. Major visions are as follows.

(1) Infrastructure: Providing 24-hour connection to high-speed Internet access networks for at least 30 million

[9] For a more detailed discussion, refer to Kagami (2001) pp. 31-33.

households and ultra high-speed internet access networks for 10 million households. In addition, increasing internet penetration rate to over 60 percent by 2005.

(2) Industry: Strengthening international competitiveness of industry and create new industries by utilizing IT.

(3) Daily lives: Realizing e-government by 2003 and promote e-commerce. The latter is targeted in 2003 to be 10 times that of 1998.

(4) Human resource development: Promoting distance learning and telemedicine and also increasing the number of masters and doctors in IT-related field and acceptance of around 30,000 outstanding foreign IT experts.

It is expected Japan will contribute more to the development of a global internet society, through attaining the most advanced nation status in IT within five years. According to the Japanese government's initiative, the need for dissolution of the international digital divide was discussed in Kyushu/ Okinawa Summit in July 2000. The need to narrow the digital divide, strengthening co-operative efforts between government and private sector was addressed as the "Okinawa Charter" on the Global Information Society. It was confirmed that IT development should be spearheaded by the private sector, with the role of the public sector being to complement private sector initiatives by focusing on human resources development and policy matters. At the same time, a Digital Divide Task Force (Dot Force) was organized to cooperate at a global level. To eliminate the Digital Divide, Japan expressed a Co-operation Package by non-ODA and ODA public funding extending a total of US$ 15 billion over five years. Included in this package were, e-commerce, measures concerned with high-tech crime, international ruling on intellectual property protection through international organizations, together with building IT infrastructure and providing assistance for network establishment.

Taking into account that education and training by technical experts is essential for promoting IT in developing countries, and it is vital to develop human resources responsible for formulation in order to promote IT dissemination and to

incorporate IT into development plans, human resources development is much focused on among the specific action. There are various aspects such as a development of IT engineers, creation of an external accredits system for engineers education, acceleration of IT utilization in broad based industry, promotion of remote education and so on.
In implementing co-operation, Japan collaborates with the World Bank, the United Nations Development Programme (UNDP), the International Telecommunication Union (ITU) and other international organizations, such as contributions to World Bank IT innovation initiative.

Some examples of regional and global cooperation are as follows.

6.2 Cooperation with ASEAN

In order to plug the Association of South East Asian Nations (ASEAN) into the global network, the e-ASEAN Framework Agreement was concluded at The Fourth ASEAN Informal Summit held in November 2000. It aims to develop the basis for ASEAN's competitiveness into the future, to promote computerization, trade of ICT products and services, and to strengthen the cooperation in dissolving the regional digital divide.

The Agreement takes a holistic approach to achieving digital readiness and acts as a binding mechanism for action in six areas. Those are as follows:

(a) Construction of ASEAN information and telecommunication infrastructure (AII) in the next generation.

(b) Development of local content.

(c) Preparation of legal and technical system for e-Commerce development.

(d) Liberalization of IT related trade and investment.

(e) Raise the level of human resources/IT ability.

(f) e-Government.[10]

[10] Refer to Japanese Chamber of Commerce & Industry (JCCI) Singapore, "Monthly Report:" PP17-20, August 2001.

As to the internet traffic within ASEAN region, it is pointed out that it is too depended upon access to contents from outside the region, such as the U.S.A. or the traffic from home countries to neighboring countries routes via third countries like the U.S.A. More efficient flow of internet traffic including regional mirroring and hubbing and the setting up of national and regional internet exchanges and internet gateways should be explored. Together with this effort, production of regional and locally relevant contents such as digital libraries and tourism portal sites should be developed.

To foster the growth of electronic commerce (e-Commerce) within the region, it is important to create a seamless favorable legal and regulatory environment in order to get buyers and sellers to do business online. It involves measures to establish a system of mutual recognition of digital signatures, secure electronic transactions, payments and settlements protection of intellectual property rights, promoting personal data protection and consumer privacy, and dispute settlement mechanisms. Many issues on legal frameworks including ratification of the World Intellectual Property Organization (WIPO) agreements and dispute-settlement concerning e-Commerce must be negotiated.

ASEAN governments also commit to facilitate the flow of ICT goods and services in the region and promote investment in the sector. Duties and non-tariff barriers on intra-ASEAN trade in ICT products are expected to be eliminated. Liberalization for most goods will be completed over a three year period beginning January 2003. Cambodia, Laos, Myanmar, and Vietnam that are less developed in the sector are going to undertake the same measures beginning on January 2008. It is expected to cover mutual recognition arrangement of ICT products.

As to regional co-operation for education, skill development and worker training related with ICT, Singapore has carried out a five-year technical assistance with Cambodia, Laos, Myanmar and Vietnam, providing IT "Train-the-Trainers" courses and training attachments with its educational institutions. Singapore is going to increase the number of existing Singapore scholarships given to the ASEAN nationals. Singapore with its advantage in ICT literacy and Malaysia, coming next to it, will take an initiative to realize a regional e-Society.

Japan proposes in collaboration with China and South Korea, to support e-ASEAN, aiming to work toward an "Asian IT Belt" to link up cites of IT excellence in Asia. As an engagement of e-ASEAN, Japan expresses a regional cooperation with a framework of Co-operation Package. She supports the e-ASEAN Task Force in the creation of the ASEAN School Net Pilot through a grant of Japan Social Development Fund in the World Bank.

The grant is aimed at providing five ASEAN countries consisting of Cambodia, Indonesia, Laos, the Philippines and Vietnam, with the opportunity to pilot the World Links for Development (WorLD) Program, so that e-ASEAN can draw upon WorLD's experience and create School Net successfully.

Although a regional cooperation under ICT in ASEAN has just begun, further cooperation will be necessary to narrow the digital divide in the region. Especially, positive support in Japanese technical education in the ICT field is expected.

6.3 Academic Network (SEED)

ASEAN University Network (AUN) was created in 1995, based on the initiatives of the Fourth Meeting of ASEAN Head of Government held in 1992, which emphasized the need to promote human resource development by strengthening the network of leading universities in the ASEAN region.

By the support of Japanese government in 2001, SEED-Net was established as a sub-network of AUN in order to upgrade higher engineering education by way of creating engineering institutions' networks ASEAN wide. SEED-Net is, in principal, an autonomous network, although it is under the auspices of AUN. It is an academic network named from capitals of Southeast Asian Engineering Education Development Network and intends to facilitate human resource development in the field of engineering by making a network of top level universities from all ASEAN countries (see Table 4). It seeks to activate internationally competitive personnel in leading engineering educational institutions in the region not only for advancing academic cooperation among them but also for providing educational and technical assistance to less advanced engineering institutions in the region. It is also

anticipated that cross-border and region-wide development of engineering education and research capability would promote collaboration and solidarity between academic and professionals in the region. Implementation of SEED-Net is mainly provided through technical cooperation of JICA and the active utilization of ICT is expected. There are programs such as: (a) Dispatching Japanese professors to member institutions and JICA experts to the Secretariat, (b) Funding assistance for the researchers' participation in international academic conference, (c) Dispatching International level teachers of ASEAN to the region as third country expert, (d) Supporting overseas study within the region to obtain a Master Degree, (e) Supporting short-term study and Ph.D. programs in Japan and ASEAN countries, (f) Supporting Master's program and short-term training within member institutions, (g) Funding support for ASEAN-wide special projects, and (h) Support for publications of academic periodicals and the establishment of a Web site, and so on.

The activity of SEED-Net is decided through deliberations between the steering committee of each country and Japanese parties concerned. Regional research cooperation and development of creative research activities through spontaneous proposals and discussion among the member institutions are desired. From Singapore, two universities like National University of Singapore and Nanyang Technological University, and from Malaysia, two universities like University of Malaysia and Multimedia University, participate in SEED-Net. From Japan, eleven universities including Hokkaido University, Tokyo University, Tokyo Institute of Technology participate in it. Although the relationship with universities in ASEAN countries was not active before as compared with Western countries, this can be addressed through the promotion of research network and enhancement of human resource development in the region through the framework of SEED-Net.

Table 4. Member Institutions of SEED-Net

Country	Institution
Singapore	National University of Singapore Nanyang Technological University
Malaysia	Universiti Malaya, Universiti Sains Malaysia Chulalongkorn University
Thailand	King Mongkut's Institute of Technology Ladkrabang Bruapha University
Philippines	University of the Philippines De La Salle University
Indonesia	Institute of Technologi Bandung Gadaja Mada University
Burunei	Universiti Burunei Darussalam Institute Teknologi Brunei
Vietnam	Hanoi University of Technology Ho Chi Minh City University of Technology
Cambodia	Institute of Technology of Cambodia
Laos	National University of Laos
Myanmar	University of Yangon Yangon Technological University

Source: JICA

6.4 Cooperation with APEC

Asian Pacific Economic Cooperation (APEC) economies are diverse in size and level of development and ICT development remains in their different stages of access and usage. The digital dividend and digital divide has become urgent issues with the advent of the new economy which is being driven by ICT.

Initiatives on human capacity building in new economy were declared at the APEC Leaders Meeting in Brunei in November 2000. It is the policy framework to enable all people in the APEC economies to have individual or community-based access to the services of the internet by 2010 and to treble the number with access in the APEC economies by 2005. The action agenda stressed on promoting the right policy environment and building capacity to help to create a framework to strengthen

markets, e-commerce, infrastructure, knowledge and skills development and providing affordable and more efficient access to communication and the internet.

In order to give effect to the Action Agenda with a concrete action plan in new economy, Ad Hoc Task Force for e-APEC (e ATF) was established in February 2001.

The e-APEC strategy, which is the blue print by eATF, is as follows.

(a) Strengthening market structures and institutions to enable new and existing forms of trade and investment in goods and services to flourish in the new environment.

(b) Developing a conductive policy environment for investment in infrastructure and the development of technology.

(c) Inducing innovation and entrepreneurship and built human capacity and knowledge through comprehensive and high-quality education, training and skills development programs.

In 2001, e-APEC strategy to develop and expand the action guideline for a new economy has been formulated, and Japan expressed cooperation in every field. Japanese technical cooperation in human resources development has mainly been directed at vocational training in the APEC Economies, but intensification of cooperation in the ICT field will be required hereafter. Distance learning using internet, satellite communication is expected to improve the effectiveness in the delivery of training and ensure consistence of instruction in the region.

As to the internet traffic, Japan shall positively support the request from ASEAN countries for internet connection charge defrayal should be changed from the connecting system of back hauling connection via U.S.A to Asia Pacific region. Presently, the development of ICT has elevated various issues such as intellectual property rights, the protection of consumers, protection of privacy, taxation in cyberspace, and so on which are discussed not only at APEC but also at international organizations like WTO, ITU and OECD.

In the ICT fields such as E-Commerce where the speed of technology development is remarkable, new evolution would be taking place while the matters are discussed. Issues like internet connections charge which cause their own interests among countries, should be managed for an early solution among international organizations, while the substantive deliberation for technical issues such as control/operation, security and certification of domain name should be carried out, setting up project team. It is expected that Japan would take an positive initiative to arrange adjustment among countries concerned.

7. EDUCATIONAL COOPERATION

7. 1 Japan's Satellite Education

Satellite communication is used to transmit the same information to multiple areas at the same time. The Satellite communication has come to be utilized in a Distance-Learning as it can secure a broadband and enable interactive communication between tutors and students with comparatively realistic ambiences.

In Japan, the first education utilizing information communication was educational programs on the FM band and TV conference in 1970s. A mobile personal computer started in 1980s and a mobile network terminal was diffused rapidly in 1990s, and then since the mid-1990s. TV conferencing through desktop computers became popular.[11] Utilization of a satellite for educational purpose has been conducted experimentally since early in 1990s. Universities have come to use it since the second half of 1990s because owing to the revision of university establishment criteria, Distance-Learning is allocated up to 60 credit points in the case of simultaneous mutual use. Currently it is adopted by Nihon University and Waseda University that possess campuses in many places in Japan, and some universities reciprocally utilize it for interactive lessons. In this section, satellite education is focused as multimedia education in the information age. Followings are examples of the Japanese research network and Distance-Learning utilizing satellites.

[11] Refer to Takahashi (2001).

Science Information Network (SINET)

The National Institute of Information (NII) was established as an inter-university research institute of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). NII forms academic networks such as the Inter-university campus network, the university library network and the university medical information network. In order to promote the exchange of information amongst researchers, NII operates Science Information Network (SINET), connecting universities and research institutions in Japan by using network nodes such as ATM switches and IP routers which are interconnected with high speed digital circuits (6Mb/s). NII is formed from an internet backbone network which interconnects LANs in about 750 universities and research institutions in Japan. In addition, as to overseas, it has a research network (150Mb/s) with academic institutes in U.S.A, Europe, and Thailand. It is expected to expand academic network in Asia.

Space Collaboration System (SCS)

The National Institute of Multimedia Education (NIME) is a core institution under MEXT for supporting collaborative use of information technology by national universities. NIME focuses on the promotion of networking by means of inter-university Satellite communications, and dissemination of research findings to higher education institutions. It operates the Hub station which controls the VAST stations set up in universities and colleges which provide satellite channels and support joint studies. To enhance multimedia education, Space Collaboration System (SCS) was established in 1996 for creating and enhancing a higher education system suitable for the multimedia society. It conducts collaborative classroom, joint research and training among membership universities through satellite communication.

Global Information Telecommunication Consortium

Waseda University in 1998 established the Global Information and Telecommunication Institute (GITI) with the objective of international collaboration for educational and research activities. GII organizes the Global Information Telecommunication Consortium inside and outside of Japan using telecommunication tool, such as internet and communication satellites with video distribution over networks. The Digital Campus Consortium is conducted through collaboration with 18 universities and global multipoint seminars with 14 of the universities that are in the Asia Pacific region. Distance learning through a 128Kb/s ISDN link has been conducted in cooperation with major universities and government in Asia including the Multimedia University and the University Malaysia Sarawak (UNIMAS). It is expected that GITI will take a central role in the Information and Communication Institute as a global on-line university and virtual research institute.

ANDES

In 1983, Tokyo Institute of Technology University became a pioneer in implementation of a satellite education, the so called Academic Network for Distance Education by Satellite (ANDES). As the first satellite education system for Japanese national universities, Tele-Lecture exchange with Hitotsubashi University was conducted by support of NIME. A Satellite Communication Station is placed in the campus and it includes 4.5 m diameter satellite antenna. It can transmit analog pictures at 6Mb/s on a digital video channel, a 1.5Mb/s band-compressed video channel and student response channel. Tele-Lecture between campus and the Tele-conference system are encouraged. In addition, refresher education by communication satellite is available nationwide on the internet. Adult education in this way soon will be widely used.

TV broadcasting for education

In 1993 the University of the Air was founded as an open university which offered a university education utilizing the medium of TV and radio. After five years it had expanded broadcast coverage to the whole country through Communication Satellite (CS) digital broadcasting on Sky Perfect TV and this enabled students to study in their own homes. It operates a campus network system and TV telephone system that link 49 study centers to university headquarters. A student who attends all the required courses for more than four years and obtains the specified level of credits is entitled to graduate with Bachelor's degree. A distance-learning graduate school, aiming at nurturing highly skilled professionals, is scheduled to be founded in 2002.

To further develop adult education and distance learning in Asia, the strengthening of cooperation with Asian universities and the Association of Open Universities (AAOU) is expected.

Satellite Vocational Education

In 1997, the Employment and Human Resources Development Organization (EHDO) established Ability Garden Network (AG Net), as a satellite vocational education system to develop the creativity of workers and elevate the quality of their working lives; it was supported by Ministry of Labor and Welfare. Various development seminars are conducted for mainly white-collar workers of small and medium-sized enterprises who found it difficult to access and fund their training development. AG net distributes programs produced at the headquarters to local areas in Japan in real time through a satellite communication link (6 Mb/s). The Bilateral TV conference system is used for interactive communication between lecturers and students. PC terminals equipped with answer buttons and wireless microphones are installed for every student and five way simultaneous discussions are possible. Many of the lecturers are consultants or distinguished persons from the business world. Transmitting time was about 400 hours in 2000 and this was a public Distance Learning milestone for Japan.

Corporate Satellite Education

NTT EAST, private enterprise, utilizes STARTs (Satellite-based Remote Training System) for its Distance Learning. STARTs covers 3 centers (Hubs) in Tokyo and another 2 cities, 46 remote sites and 80 classrooms countrywide. About 1000 students can participate in this distance learning (6Mb/s) by real time satellite education. A Bilateral TV conference system is used for communication between lecturers and students. Multimedia teaching materials can be viewed on each student's PC. STARTs covers 23% of the training course within NTT group. It seems to be very effective as corporate education tool within the NTT group which is widely dispersed. There are also rare cases in the private sector that utilize Distance-Learning on a large scale like NTT EAST.

7.2 Networked Multimedia Education System

Networked Multimedia Education System (NMES) is a project type technical cooperation by JICA who conducts a satellite-based Tele-education System, connecting core centers set up in Tokyo/Okinawa with satellite centers set up in developing countries. Satellite centers are planned to be set up as bases of human resources development in Thailand, Indonesia, Malaysia and Philippines within 2002. In Malaysia, Multimedia University (MMU) – Cyberjaya Campus becomes the central site and five institutions will be set up as remote sites. Those are MMU Malacca Campus, Penang Skills Development Centre (PSDC), University Sarawak, Telecom Training Center in Sabah and Vocational Training Center in Kelantan.

It is an idea to increase the number of recipients of lectures through an interactive distance education system because the number of professors or specialists in science and technology are still very limited. For transforming from a low-skilled and labor-intensive industrialized economy into knowledge-based and high-skilled economy, there is an urgent need to develop sufficient knowledge workers for national development, particularly in the areas of engineering, IT and multimedia.

The project involves a real time interactive multimedia tele-education distance learning system network for providing the necessary infrastructure to enhance teaching and learning through a satellite distance learning mode. Further improvement of the regional differential in Malaysia through this utilization is expected.

8. CONCLUSION

It may be said that Singapore is successfully going to transit to a KBE owing to the Singapore Government's leading policies such as ICT-oriented education, invitation of venture capital and foreign talent and so on. In spite of some problems like the lack of entrepreneurial zeal and weakness of creativity that will affect the generation of content and other software in ICT, the favorable infrastructure and a pool of qualified ICT manpower will become competitive advantage. Singapore aims to be regional information and communication hub including e-learning in the recognition that future economic growth lies in the region. Singapore will take on a more active role to promote ICT development in the region. They will be certainly suitable counterparts in implementing Japan's technological cooperation in the ICT field.

On the other hand, Malaysia develops a policy to change a current labor-intensive economy depending on foreign workers to an industrial structure suitable for the Malaysian population of 22 million. Through support to e-Commerce related matters and ICT oriented education, it initiated an accumulation of IT ventures in a core city of the Multimedia Super Corridor (MSC). Much of the activities in the national initiative to leapfrog into the K-economy will be expansion of Flagship Applications like E-government and Smart Schools and other projects to broaden the adoption of ICT in all sectors of the Malaysian society. At present, high skilled engineers and human resources are the most important factors for the successful transition to a K-economy. However, it is expected that Malaysia, a middle-income country, will grow

to be a counterpart of Japan for third-country training through the utilization of her ICT capability.

By the way, as to Japan's cooperation on human resource development in the ICT field, the following cooperation is suggested:

1) Program development on educational materials for Distance-Learning
2) Training for teachers in developing countries who utilizing ICT
3) Fostering of experts and/or engineers in ICT
4) Overseas study through satellite communication and/or the internet.

As to Distance-Learning by a communications satellite, it is planned that satellite centers will be set up in Malaysia, Thailand, Indonesia and Philippines within 2002 and those will be connected with the core center in Tokyo and Okinawa. In the implementation of Distance-Learning, it must consider time difference, language (English shall be a common language), program structure, technical support and so on. Also, the need of future maintenance should be taken into consideration because satellite communication might cost great deal. Malaysia has engaged in ASTRO education, a satellite television network.[12] It is expected that her experience will contribute to the ongoing satellite education project.

Hereafter, rapid progress of university and graduate education through satellite and/or internet can be predicted. It enables applicants from developing countries seeking overseas study to obtain a part or all of credits from an overseas university through Distance-Learning by satellite or the internet. Even if schooling in overseas university for a period is needed, the living expenses in a developed country shall be a drastic cut. From now on, the evolution of free competition among universities of each country is forecasted. The entry of universities in Japan and other educational institutions into international Distance-Learning utilizing ICT gives not only

[12] See chapter 5: p. 185.

intelligent support to developing countries but also contributes to an improvement in the academic level of higher education in Japan. Digital campus between universities in Japan and Singapore or Malaysian ones would soon be realized.

As for other ICT field, CICC has conducted such projects as standardization of information technology and multilingual information technology. [13] It is to promote computerization in Asian countries that use languages with many characters, having inbuilt multilingual support in the software. In addition, it works on drafting joint proposals on character codes such as Myanmar, Khmer scripts with those concerned counties to set international standards. Enhancing of the cooperation with Singapore and Malaysia, multiracial countries are expected to further development of the region.

In January 2002, Japan concluded "Japan Singapore Economic Agreement for a New Age Partnership" with Singapore and expressed reinforcement of the cooperative relationship with ASEAN. In the ICT field also, it is expected that Japan will continue to play a leading role for the human resource development in the region in cooperation with Singapore and Malaysia.

[13] CICC: The Center for the International Cooperation for Computerization, non-profit organization to assist developing countries in the computerization under the auspices of the Ministry of Economy, Trade and Industry (METI). http://www.cicc.or.jp/.

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