HIGHER EDUCATION DEVELOPMENT IN ASIA

– Inter-University Collaboration and University-Industry Cooperation[1] –

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Abstract

As economies grow and labor is divided internationally, human resources development, especially in higher education, in the Southeast Asian region has become increasingly more essential to support high-value-added industries. Under these circumstances, this study explored the efficiency of Japan's development assistance in higher education in Malaysia, Thailand and Vietnam, with a focus on the possibility of utilizing inter-university collaboration and university-industry cooperation schemes. To collect significant data, this study conducted questionnaire surveys and group interviews with former students in these countries who studied in Japan, as well as interviews with the relevant government ministries and agencies, universities and private corporations. A review of selected case in the U.S., the U.K., Singapore and China was also conducted.

The major findings of this study are as follows.

- Malaysia, Thailand, and Vietnam have a strong demand for improving quality and expanding the capacity of higher education, and inter-university collaboration and university-industry cooperation schemes seem to be an effective way for these countries to overcome problems. In Malaysia and Thailand, especially, improving the quality of research and development in the advanced technology field is essential to strengthen both higher education and industries.

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1 This paper summarizes and adds commentary to the 2001 Special Assistance for Development Policies and Projects (SADEP) "Concepts of Assistance in Higher Education - Inter-university Collaboration and University-industry Cooperation". (Its preparation was commissioned from the Nomura Research Institute, Ltd. (NRI). The study team members were Ryoichi Yamagishi, Yoshihiko Iwadare and Richard Gonzalez. They were joined by Mayumi Kaneko and Izuru Kimura from the JBIC Institute.) For details of the study, see the JBICI Research Paper "Concepts of Assistance in Higher Education - Inter-university Collaboration and University-industry Cooperation", published in February 2003.
For the implementation of this project, a research group was established, with the participation of Professor Mitsuhide Shiraki of the Department of Political Economy at Waseda University, and Professor Kamchai Laismit of the International Culture Department at Kagoshima International University. Workshops at the collation stage of the project were attended by the research group members, and by many others from universities, private companies and assistance agencies, who offered valuable comments and guidance.
In addition, JBIC Institute conducted two in-house studies to supplement the main study. They are provided for additional reference in summary form, as appendices to this paper.
[1]"Japan's Record and Policy Direction in Assistance for the Higher Education Field" (the full text is included in the above JBICI Research Paper, published in February 2003). Authors: Mayumi Kaneko and Izuru Kimura.
[2]"The Situation and Challenges in the Education Sector - Towards Independent Development of Four Southeast Asian countries" (JBICI Research Paper No.17, July 2002). Author: Izuru Kimura. <http://www.jbic.go.jp/japanese/research/report/paper/pdf/rp17_j.pdf>

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- There are high expectations for Japan to play an important role in these countries' higher education development. These countries would welcome establishment of Japanese higher education institutions in their countries so that many Japanese private industries could cooperate with them.
- However, in order to realize university-industry cooperation, as well as inter-university collaboration in all three target countries, it is desirable for the existence of further more improvements in the quality of higher education and research.

In order to realize the proposed assistance project, JBIC is expected to participate through Japan's development assistance. Japan provides several assistance schemes not only the Official Development Assistance (ODA) but also via private corporations and NGOs. Since the effect of an individual program is limited, these measures should be linked together so that synergy maximizes the effects for the beneficiary countries as well as Japan. JBIC is expected to coordinate the relevant agencies, industries, and universities, to set up a common development assistance goal and strategy. In addition to the provision of equipment, facilities and loans for student exchange, JBIC can support the establishment of a cooperation coordination agency to accelerate inter-university collaboration and university-industry cooperation by utilizing consulting services.

Chapter I Foreword

1. Purpose and Background of the Study

Economic development and the advance of international division of labor in Southeast Asian countries in recent years has made human resources development, particularly at higher levels, essential to support high-value-added industries . Japanese industry is now developing overseas, and it also needs to recruit and use superior local personnel in the countries where it operates. Japanese industry looks to universities in Japan for the transference of advanced research results, but the level of university research and education cannot be described as adequate. One measure attracting interest as a way of developing socially useful human resources, and increasing the standards of university management, education and research at Japanese universities is through the support for human resources development in Southeast Asian countries, through inter-university collaboration and university-industry cooperation, including international collaborations.

Based on this situation, this study focused on inter-university collaboration[2] and university-industry cooperation[3] in Malaysia, Thailand and Vietnam, three countries where there is growing interest in higher education. The study examined the content of new assistance in higher education[4] provided by JBIC (mainly through ODA loans)[5] and other Japanese sources, with the aim of making proposals on policy

2 Higher education institutions cooperated in this study, and are working to provide high-quality education through collaborative programs such as student exchange, teaching staff exchange and credit transfer systems. Collaborative programs need not be bilateral only, as they could have three or more participating institutions. When Japanese institutions of higher education, acting singly or in cooperation, carry out activities in the target countries such as opening higher education courses, establishing branch campuses, and accepting foreign students on a non-exchange basis, it is not generally referred to as inter-university collaboration. However, in this study they are included within the scope of inter-university collaboration as support by higher education institutions for human resources development.

3 In this study, it refers to institutions of higher education, private companies and industry cooperating in activities such as internships at companies, dispatch of lecturers, joint research and commissioned research by universities, to make use of the respective characteristics of companies and institutions, supplement their shortcomings and yield mutual benefits.

4 "Higher education" is mainly taken to mean universities (junior colleges, undergraduate and graduate schools), but considering the diverse education systems in the countries covered by this study, the term should be taken to include institutions providing occupational training and tertiary education beyond secondary education.

5 ODA loans assistance in higher education to date has mainly covered Asian countries, and centered on development of facilities, provision of equipment and materials, training of instructors in their home countries or in Japan, study and training for students abroad, and foreign student loans. (See Appendix Figure A-1 in Appendix [1]).

implementation issues in Japan and the target countries. In the course of investigating the three countries, the study also examined the U.S. and the U.K. as leading examples of inter-university collaboration and university-industry cooperation, as well as Singapore and China, as benchmark Asian countries with relatively advanced university-industry cooperation and inter-university collaboration.

This study concentrated on considering support for programs and activities in which Japanese universities and companies can be the main participants in inter-university collaboration and university-industry cooperation.

2. Study Procedure

The following methods were used for data collection[6]:

i) A questionnaire survey and group interview of students from the three countries who had previously studied in Japan.[7]
ii) Interviews with experts, and with local and Japanese universities and companies.
iii) Gathering of opinions from experts through research groups and workshops.
iv) Research of literature relating to higher education.

Chapter II
The Environment for Japanese Universities

1. The Current Management Environment of Universities

Trends such as the conversion of national universities into independent administrative entities and the "21st Century COE Program"[8] affecting universities in Japan are expected to encourage independence in university management and lead to competition between universities. The population at aged 18 is declining, and the number of Japanese students studying abroad is increasing every year. Universities are competing for shares of a shrinking pie, and at the same time their student capacity is increasing, which puts them in a difficult situation, as they must struggle to secure adequate student numbers while maintaining educational standards. Facing this harsh situation, universities are starting to turn to partnership with industry to earn income from industry while carrying out research, which industry needs, and developing educational programs that meet student needs.

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6 Many cases were recorded, and a number of them are included in this report, mainly as footnotes.

7 Subjects: Students who had studied in Japan (the survey covered members of each country's associations of former students in Japan).
Implementation period: December 2001 - January 2002.
Survey method: By mail (Questionnaires were in English for Malaysia, and translated to the local languages for Thailand and Vietnam).
Number of questionnaires mailed: 1,605 in Malaysia, 2,000 in Thailand, 72 in Vietnam
No. of valid responses: 53 in Malaysia, 204 in Thailand, 45 in Vietnam
Response rate: 3.3% in Malaysia, 10.2% in Thailand, 62.5% in Vietnam

8 A program with assistance weighted towards institutions conducting research and education at the world's highest levels. The "Policy on Structural Reform for Universities" was announced by Tohyama, Minister of Education, Culture, Sports, Science and Technology, at the Council on Economic and Fiscal Policy in June 2001. Its main content is condensed into these three points:
(1) Bold reorganization and integration with the aim of reducing the number of national universities from the current 99 universities.
(2) Introduction of private sector concepts and management methods into national universities, to move them rapidly to become essentially independent entities.
(3) Introduction of competitive principles through third-party evaluation, to raise the top 30 universities to the world's highest standards.

The impact of the economic downturn on industry is diminishing its job-creation ability. At the same time the pace of change in the business environment, centered on the IT industry, is accelerating, and training and education dominated by on-the-job training (OJT) are nearing the limit of their potential for human resources development. Therefore, industry is looking to universities as external education and training institutions where employees can improve their practical capabilities and brush up their basic research and academic skills.[9] Nurturing entrepreneurs is another important task for universities. Unfortunately, Japanese universities are failing to fully meet these expectations in practice.

2. Characteristics and Advantages of Japanese Universities

Japanese universities are characterized by a nationwide spread of numerous general universities, which turn out personnel for regional industries. It is not easy to apply the same yardstick to evaluate university education in different countries, but Japanese universities have advantages in two areas. The first is a high level of research in the natural sciences. In terms of numbers of citations of papers, Japanese universities are in the world top five in fields such as physics, chemistry, biology, biochemistry and materials science.[10] The second area of advantage is in business administration, based on Japan's manufacturing industry. Several researches into the strengths of manufacturing in Japan, such as "tacit knowledge" and "ba" (situations), are attracting international attention.

This study included a questionnaire survey of foreign students who had studied in Japan.[11] When asked about their purpose for studying in Japan, the proportion of respondents who answered, "to acquire the latest in knowledge and cutting-edge technology" was as high as those who answered, "to find work after graduation". This demonstrates that Japan's advanced knowledge and technology are highly regarded (Figure 1). The target countries appear to still have a strong need to learn the knowledge and technology that supported Japan's advanced post-war economic growth. When asked what was good about studying in Japan, nearly 70% of respondents from Malaysia and Thailand listed "I was able to study Japan's advanced knowledge and technology", in addition to advantages such as "personal networking", "mastering the Japanese language" and "living in Japan" (Figure 2). Thus the experience of studying in Japan appears to have broadly met students' expectations. On the other hand, when asked what was not good about studying in Japan, many former students responded "I had less opportunity to learn English" and "the high tuition fees were difficult to pay". Among Malaysians, one quarter of respondents indicated that "Japanese universities are not highly regarded in Malaysia" (Figure 3).

The above shows that the characteristic advantages of Japanese universities, as seen from a foreign perspective, are that students can learn cutting-edge knowledge and technology, particularly in the field of natural sciences, and Japanese business administration is also attractive considering that this has been the base for the manufacturing industry that has led Japanese industry since the end of World War Two. In terms of supporting developing countries, it would be valuable to build on these Japanese characteristic advantages, while also overcoming weaknesses through inter-university collaboration, and university-industry cooperation. Therefore the following chapters will focus on these two forms of cooperation in relation between Japan and the three target countries, with reference to the U.S., the U.K. and the benchmark countries.

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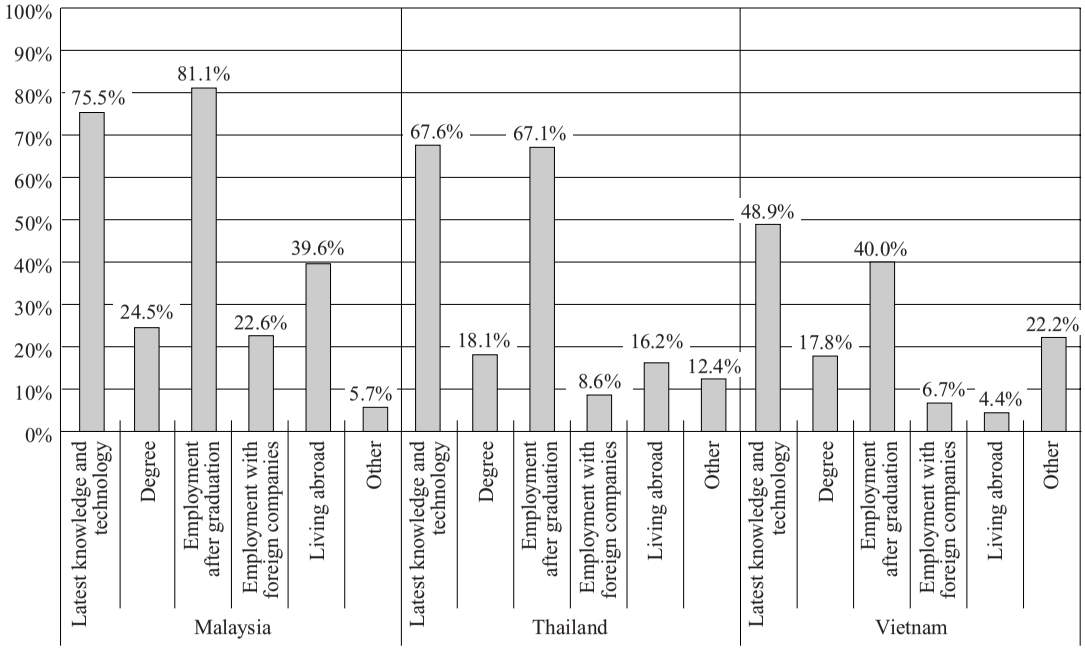
9 Japan Institute of Labor (1998).

10 Documents published by the US Institute for Scientific Information, and other homepages.

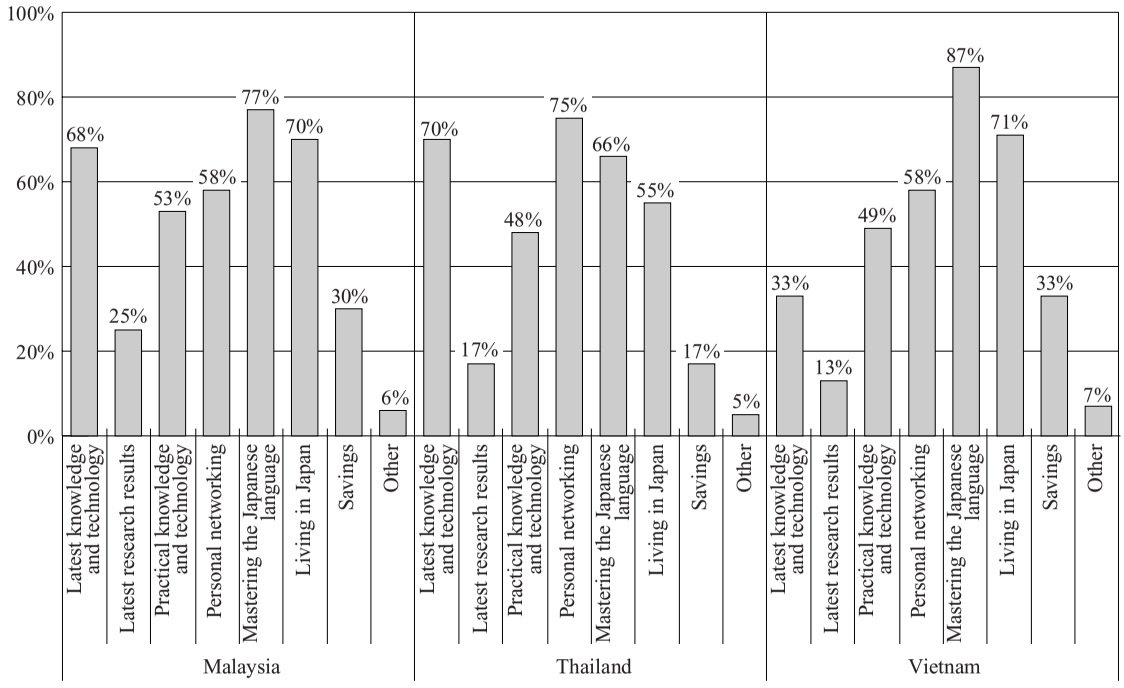
11 See the ANNEX to the JBICI Research Paper "Concepts of Assistance in Higher Education - Inter-University Collaboration and University-Industry Cooperation" for a summary of the questionnaire survey and its results.

Figure 1 Purpose of Study Abroad



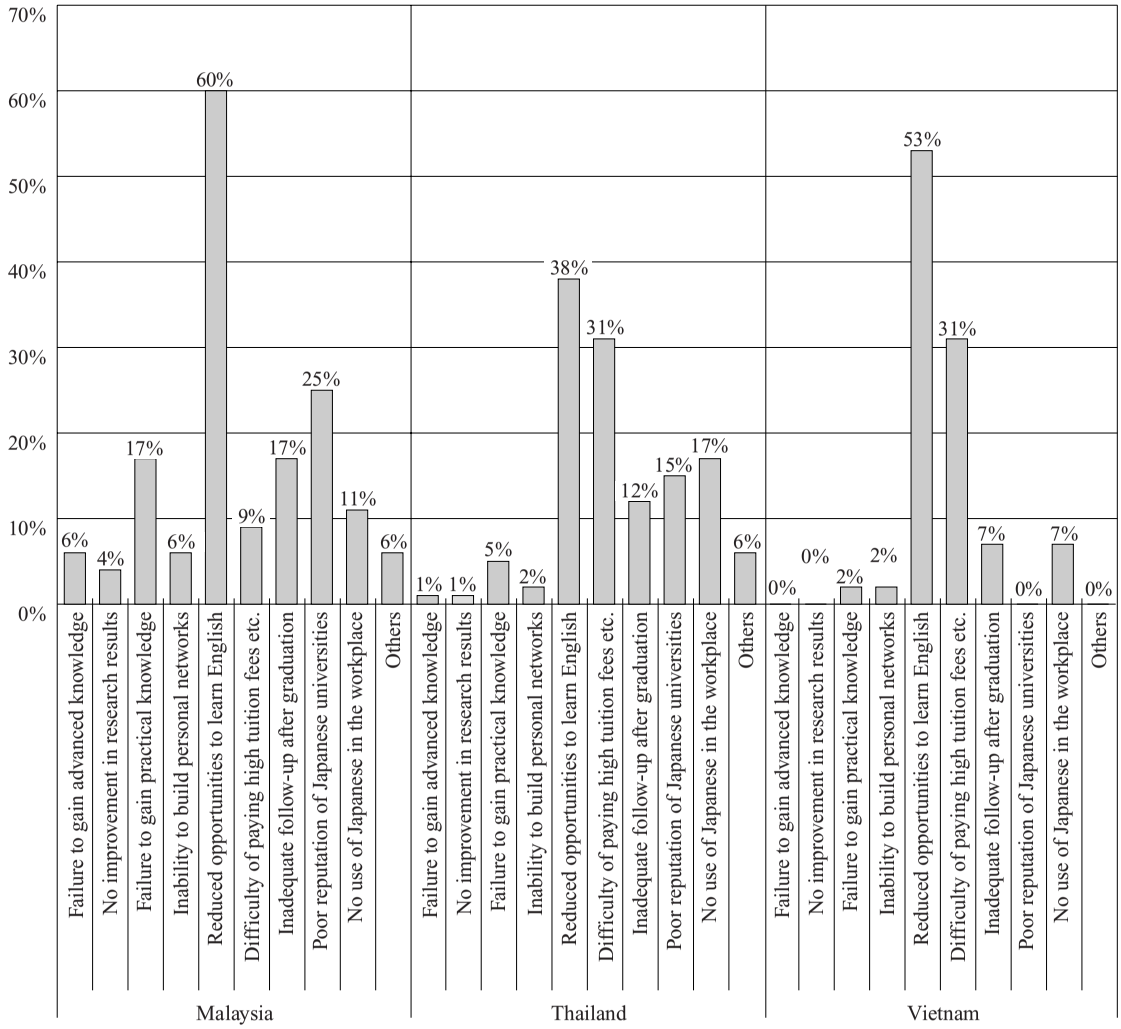
Source: Questionnaire survey of students who had studied in Japan, conducted for this survey.

Figure 2 Positive Aspects of Studying in Japan



Source: Questionnaire survey of students who had studied in Japan, conducted for this survey.

Figure 3 Negative Aspects of Studying in Japan



Source: Questionnaire survey of students who had studied in Japan, conducted for this survey.

Chapter III
The State of Inter-University Collaboration and University-Industry Cooperation in Japan

1. Inter-University Collaboration

Faced with the declining population aged 18 and increasing competition between universities, some Japanese universities are experimenting with new types of collaboration to expand their curriculum and enhance operating efficiency. Measures include credit exchange systems[12], joint education[13] (e.g. the alliance of four national universities in Tokyo[14]), and the establishment of allied graduate schools[15] (e.g. Tokyo Gakugei University Graduate School's "United Graduate School of Education").

International collaboration (particularly with developing countries) centers on intake of foreign students, but some universities promote joint research, distribution of classes and courses overseas by e-learning, the establishment of branch campuses and other more advanced forms of exchange. Examples include simultaneous satellite transmission of classes from Tokai University to King Monkut's Institute of Technology (Thailand)[16], and Waseda University's establishment of a branch campus in Singapore (preparations are under way to open the new campus, which will center on a business school, in 2004).

2. University-Industry Cooperation

Cooperation between Japanese universities and industry stagnated for a period after the War, and lagged behind that in the West, but there has been lively cooperation between non-university research institutions and companies. For example, the prefectural industrial research institutes are not universities, but they have research facilities and have worked together with small and medium regional companies, supporting regional industry.

However, over the last ten years, there has been progress in university-industry cooperation in various forms. Of the 99 national universities in Japan, 58 have joint research centers and are working with industries based in their regions. There are also an increasing number of examples of internships, intake of students to cooperating graduate schools, and cooperation in Technology Licensing Offices (TLOs) and science parks.

International university-industry cooperation includes internships for foreign students[17], joint

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12 A system that recognizes credits earned at other institutions as valid for the student's own institution. This enables students to take courses at other institutions, broadening their range of choices.

13 Under this system, multiple universities collaborate to provide students with the same courses in subjects that can be standardized across multiple universities, such as general liberal arts subjects.

14 Four national universities, Hitotsubashi, Tokyo University of Foreign Studies, Tokyo Institute of Technology and Tokyo Medical and Dental University, joined to form the "Four Universities Charter" in March 2001. The charter states that its "key concept is the establishment of research and education systems able to withstand truly international competition". It sets the following three targets: [1] To broaden students' range of options for course completion and advancement and establish a better educational system. [2] To collaborate in joint research projects and interdisciplinary research, in order to reach and maintain international standards of research. [3] To further develop and improve research and education through cooperation with foreign universities.

15 A method for multiple universities to contribute educational resources to the formation of a single graduate school. This arrangement is expected to maintain a deeper organization of teaching staff than a single university can manage, and to foster a competitive relationship between the member universities that will raise the levels of education and research.

16 Tokai University has assisted by dispatching experts since the foundation of King Monkut 's Institute of Technology. After the Institute was founded, Tokai University has accepted its students, and provided follow-up assistance for their research work after they return to Thailand. It also provides assistance in the training of teaching staff and curriculum development. In the research field, the two sides are experimenting in satellite communications systems that are used for simultaneous broadcasting of classes.

17 The intake of interns from Thailand through Japan Federation of Economic Organizations (Keidanren) is well known. It began when Keidanren and the Federation of Thai Industry collaborated in founding the Sirindhorn International Institute of Technology (SIIT, a four year engineering college) within Thammasat University, using a donation of \800 million contributed by corporate members. The aim was to solve Thailand's shortage of engineers. The curriculum specifies that SIIT students must undergo practical training of under one month in a company. Keidanren makes arrangements for around 25 students with exceptionally good academic records to train with companies in Japan. In 2001 Keidanren made internship arrangements with companies mainly drawn from its Japan-Thailand Economics and Trade Committee, so that 24 students had internships of approximately three weeks at 19 companies. A total of 149 students have been accepted as interns to date.

research with universities where companies locate overseas, and assistance in higher education by Japanese companies developing businesses in developing countries[18]. The following is a brief introduction to the organizations and status of each type of cooperation (Chapter 6 presents the details of international university-industry cooperation).

(1) Cooperating graduate schools: Under this arrangement, universities cooperate with private research laboratories and other institutions to provide graduate-level education at the laboratories[19]. Researchers at the laboratories, who have been approved by the university, act as tutors to instruct the students. The students commute to the partner laboratories and write theses based on the research they do there to earn their degrees.

(2) TLO: Intermediary agencies to transfer the research output of universities and research agencies to industry. The Law Promoting Technology Transfer from Universities to Industry ("the TLO Law"), which came into effect in Japan in 1988, enabled institutions that are approved as TLOs to receive subsidies, patent revenue and other preferential treatment.

(3) Science parks: Efforts to transfer technology to industry through science parks are being stepped up. For example, Kanagawa Science Park (KSP), Japan's first research park, has produced 146 venture companies through cooperation with the Kanagawa Academy of Science and Technology, an institution that conducts graduate-level research. The KSP also led the establishment of the Asian Science Parks Association, which brings together science parks in Malaysia, Taiwan, South Korea, Iran, China and elsewhere.

(4) Internships: Internships are expected to clarify students' perceptions of the job environment, expand and deepen their knowledge of specialist fields and encourage them in their studies. For the companies they help to have the needs of industry reflected in university education, to promote understanding of corporate activity and improve its image, and to help in selecting the best students. At present, however, companies mainly take in students from Japanese universities.

3. Hints for Japan's Assistance in Higher Education

As the management environment for universities in Japan becomes increasingly difficult, they are obliged to look for international exchanges with a view to providing independent educational programs, using cultural exchanges to raise students' academic motivation, and drawing students from wider sources, including developing countries. However, international cooperation requires substantial funding, and is not easy for individual institutions of higher education to accomplish. One practical method would be for development assistance agencies to prepare some level of framework for exchange and cooperation, and then invite participation in that framework.

University-industry cooperation within Japan has been lagging, but strong efforts are now being made on various initiatives, and they are expected to continue. From the acceptance of Thai students through internships organized by the Federation of Economic Organizations, it can be shown that foreign students are faced with problems, such as the burden of travel expenses to Japan and language barriers, and the difficulty for individual companies to take on interns. Therefore a coordinating agency is needed to link universities and companies that would select suitable students and facilitate their placement with companies.

In future, training for coordinators will be required, as well as education and training in business matters for university teaching staff and entrepreneurs. The target countries also face similar issues.

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18 Specific examples include scholarship payments by Hitachi Scholarship Fellowship to superior university teaching staff from overseas, particularly in Asia, who are invited to study in Japan, and the research subsidy paid by Asahi Glass to Chulalongkorn University. (Since 1982, Asahi Glass has been providing research subsidies, an overseas study scholarship program and a foreign student scholarship fund at Chulalongkorn University in Thailand and the Bandung Institute of Technology, Indonesia. It also funds the Asahi Glass Chulalongkorn chair of glass studies. These programs are part of the company's social contribution works.)

19 Examples of cooperating graduate schools include the Science University of Tokyo's collaboration with the NTT Basic Technology Research Institute, and that between Tsukuba University and the Electrotechnical Laboratory.

Chapter IV
Inter-University Collaboration and University-Industry Cooperation in the U.S. and the U.K.

1. Inter-University Collaboration

(1) The current state of inter-university collaboration

Inter-university collaboration in the U.S. and the U.K. involves the formation of consortia which use credit exchange systems and carry out joint research, joint development of educational methods, joint use of facilities and equipment, joint delivery of online education and other projects. Forms of consortia and partnerships include those based in the local region, in which nearby universities work together[20], cases of cooperation on a single research theme[21], and joint for-profit projects.

One notable point in comparing the U.S. and the U.K. with other countries is that there is international inter-university collaboration, under which universities accept large numbers of foreign students, branch campuses are set up in developing countries, and twinning programs are offered. These and similar efforts are all strategic in nature. Specific details include the following:

- Intake of foreign students: In the academic year 1999~2000, the U.S. accepted approximately 510,000 foreign students for higher education, while the U.K. accepted approximately 180,000. The scale of these countries' intake can be appreciated in comparison with Japan's intake of less than 80,000 students.
- Establishment of branch campuses in developing countries: Branch campuses of U.S. universities include the Singaporean campus of Chicago University School of Business and the Thai campus of Webster University[22], and those from the U.K. include the Malaysian campus of Nottingham University.
- Twinning programs: Many such programs are carried out within the framework of student exchange programs, and it is difficult to accurately grasp their content, but many universities have them[23].

Besides assisting developing countries, the aims of these activities include finding and recruiting superior personnel in Asia and carrying out research specific to that region.

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20 E.g.: The Washington DC University Consortium: A non-profit consortium of twelve universities in the Washington DC area, including American University, George Washington University and Georgetown University, which was established in 1964. It is an organization that aims to act in concert to expand higher education in ways that would be too difficult for universities acting alone. The consortium has functions for negotiation and coordination between the member universities, and also between the universities and the local community, and the state and national governments.

21 E.g.: The Center for Joint Research on Poverty Issues, USA: The Center was founded in 1996 following a decision by the US Department of Health and Human Services to fund Northwestern University and Chicago University to establish an agency that would provide suggestions on poverty issues. It is a joint research center formed from the relevant departments of the two universities to research poverty in the US.

22 Webster University has its main campus in Saint Louis (established in 1917). Outside the US it has campuses in Austria, Bermuda, China, Britain, Thailand, Holland and Switzerland. When it established its first overseas campus in Geneva, Switzerland in 1978, the new campus earned a good reputation and operated smoothly. Therefore the University then went on to open campuses in other European countries.
Its Thai campus was established in 1997 at Phetchaburi, a resort area 190km southwest of Bangkok, and became a full university in August 1999. It now has 150 students from 25 countries (approximately 10% of the students are Thai). After beginning with a set period of study at the Thai campus, students are able to receive the rest of their tuition at the main campus in the US, or any other campus in Europe, China or elsewhere.

23 The twinning program with West Michigan University (WMU) began in 1987. The first two years of education at a partner school exactly copy the WMU education program, so that students receive a WMU education while remaining in their own country. The last two years are spent studying at WMU.

(2) Hints from examples of inter-university collaboration

For inter-university collaboration to make progress and be effective, it requires these important elements.

[1] The universities participating in cooperation programs must each have fields in which their levels of research and education are high, and there must be clearly defined mutual advantages for participants.

[2] Governments and companies must provide incentives (including funding) for inter-university collaboration.

Specific advantages of cooperation that should be realized include the following:

[1] Provision of attractive educational programs to students.

[2] Improvements in the quality of education and research through the creation of a mutually complementary and competitive environment.

[3] Improved operating efficiency and cost reduction through cooperation and joint operation.

[4] Economies of scale through cooperation and joint operation.

2. University-Industry Cooperation

(1) The current state of university-industry cooperation

The following are the most common forms of university-industry cooperation in the U.S. and the U.K.:

[1] Education of company personnel by universities[24].

[2] Education of university personnel by companies[25].

[3] Research commissioned by companies to universities and university consortia.

[4] Subsidy of research costs[26].

[5] Consulting by universities for companies.

[6] Universities establishing spin-off companies.

The Massachusetts Institute of Technology (MIT) University-Industry Cooperation program is one example.

Case study: University-industry cooperation programs at the Massachusetts Institute of Technology (MIT)

Overview: MIT has set research into "science for industrial application" as its goal since its foundation in 1861, and it has always promoted cooperation with industry.

The Industrial Liaison Program (ILP), which was established in 1948, functions as the interface between the industry and MIT as a whole. The ILP has approximately 200 participating companies around the world, and approximately 30 from Japan, including Matsushita, NEC, Fujitsu, Toshiba, Kawasaki Heavy Industries and Canon. University-industry cooperation through the ILP mainly takes the form of visits to companies by university staff, joint research and commissioned research with MIT, and dispatch of company researchers to MIT.

Record: MIT published approximately 400 new technologies per year, of which 100 are licensed and 20~30 are the basis for new company startups. Of the assets under intellectual property managed by the MIT TLO, 20~25% are the results of company-sponsored research and 70% come from research sponsored by the federal government.

Factors for success (hints from the case study): The apparent factors for success in university-industry cooperation are [1] the high levels of ability of MIT staff and MIT's outstanding education and R&D ability, and [2] the existence of ILP as a scheme coordinator to provide well-defined services to companies. The significance of the Bayh Dole Act[27] is also emphasized.

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24 E.g.: Intake of mature students and training of company researchers at MIT.

25 E.g.: Dispatch of lecturers to universities and sponsorship of chairs.

26 E.g.: The US Research Triangle Park.

27 The Patent and Trademark Act Amendments of 1980, commonly known as the Bayh Dole Act, is the law stating that the rights for inventions produced by universities with federal government assistance belong to the universities concerned. It was enacted in 1980, amended by the Memorandum on Government Patent Policy in 1983 and the Trademark Clarification Act in 1984, and completed, as the Bayh Dole System, by the Code of Federal Regulation 37CFR in 1987. It meant that the seeds of technology creation can be concentrated and accumulated in universities, that the emphasis of university research would shift to the needs of companies, and universities and companies could establish a cooperative division of labor. (From the annotations to the 2001 edition of the Small and Medium Business White Paper).

(2) Hints from the achievements of university-industry cooperation

The following are necessary conditions for success in university-industry cooperation:

[1] Mutual advantages for companies and universities.

[2] Support policies from the government (in systems, functions and hardware).

[3] The presence of a university-industry cooperation coordinator that is closely familiar with the needs of both industry and universities.

One point that requires caution in university-industry cooperation is the risk in the leaking of corporate secrets when trainees are accepted during joint research and in similar situations.

Chapter V
The Status of Inter-University Collaboration and University-Industry Cooperation in the Benchmark Countries

1. Singapore

(1) Inter-university collaboration

In addition to collaboration between universities within Singapore, there are two types of inter-university collaboration:

[1] Singaporean and foreign universities collaborate, led by the Singaporean government.

[2] The Singaporean government leads efforts to attract top-ranking foreign universities to set up branch campuses in Singapore.

In relation to type [1], the Singapore government takes the lead role in the following initiatives:

- The Singapore MIT Alliance between Massachusetts Institute of Technology (MIT), the National University of Singapore (NUS) and the Nanyan Technological University (NTU).
- The establishment of John's Hopkins Singapore through cooperation between NUS and John's Hopkins University.
- The establishment of the Wharton-SMU Research Center[28] through cooperation between the Wharton School of the University of Pennsylvania and Singapore Management University (SMU).

In terms of type [2], the Singapore government is inviting top-ranking universities in advanced countries to establish branch campuses in Singapore to augment its education in business administration, a field where Singapore is said to have a weakness. INSEAD[29] and Chicago University have already established campuses in Singapore and Waseda University is also planning to do so.

The following points can be identified as factors in the successful functioning of collaboration with foreign universities.

[1] The Singapore government provides strong support.

[2] Singapore's universities have already reached the level of top-ranked universities in other developed countries, making collaboration attractive to both sides.

[3] There is a flexible system for exchanges of students and staff.

(2) University-industry cooperation

Research and development in universities and companies in Singapore have already reached the same level as in other developed countries. The scale of university-industry cooperation still lags behind that in the U.S. and the U.K., but it appears to have reached the same level as Japan. Thus it already involves joint research, universities consulting for companies, universities commercializing patents

28 The main work of the Center is business research on Asian countries, with particular reference to Singapore. Its R&D is focused on areas such as technical innovation, entrepreneurial spirit, technology management and e-commerce.

29 INSEAD is a graduate school established in France in 1957. It is recognized as one of the largest and most important business schools. In October 2000 it invested $60 million to establish its Asia campus in Singapore. It already cooperates with Wharton Business School (WBS) and its campuses in Philadelphia and San Francisco, so that students of INSEAD Singapore can take MBA classes at the Fontainbleu campus in France, or at the Wharton Philadelphia campus.

through spinout companies, companies setting up in university-operated science parks, and other initiatives.

The factors for success in this kind of university-industry cooperation are:

[1] Both universities and companies have superior staff and equipment.
[2] Companies provide generous funding.
[3] Government support for university-industry cooperation (the government funds university-industry joint research).
[4] Joint research has clear objectives.
[5] The Academic Linkage Office, which coordinates university-industry cooperation, fulfills its function of "matching needs and seeds".

2. China

(1) Inter-university collaboration

Many aspects of China's policies to nurture high-tech industries and high-tech ventures appear to be modeled on the U.S.. Courses for entrepreneurs commonly follow the model of US business schools, and the school of economics and management at Tsing Hua University offers an American-style MBA course. That school has been cooperating with the Sloane School of MIT since 1996, and has set up an international management MBA course. The same school of economics and management is expanding its course content through exchanges with the Wharton School of Pennsylvania University, the MIT Entrepreneurship Center and other institutions.

Besides the example of Tsing Hua University, other Chinese universities are pursuing exchange agreements with many foreign universities for activities such as staff and student exchanges, joint research, symposia and exchanges of data and documents (for example Beijing University is engaged in exchanges with 40 universities in the Americas, 46 in Europe, 65 in Asia and 5 in Africa. However, while there are many exchange activities that work towards clear objectives, there are many other exchange agreements that do not function in practice.

(2) University-industry cooperation

University-industry cooperation in China has proceeded under strong State leadership with a view to creating and developing high-tech industries[30]. Universities are engaged in many for-profit ventures in the name of university-industry cooperation, including university venture companies (companies founded by universities), building and managing science parks, establishing and managing venture capital businesses and providing staff training for companies.[31]

One important characteristic of university-industry cooperation in China is that the establishment of university venture companies is the most common form of joint research and technology transfer. The apparent factors for success in university-industry

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30 The Chinese Communist Party Central Committee resolution on reform of systems for science and technology prompted a rapid advance in university-industry cooperation. The concept aimed to promote economic progress through the practical development of research results. The realization of the concept has been encouraged through the 1984 Patents Act, the 1987 Technology Contracts Act, the 1990 Copyright Act, the 1993 Science and Technology Promotion Act and the 1996 Act to Promote Conversion of the Fruits of Science and Technology.

31 For example, the main instances of collaboration by Tsing Hua University are as follows:
[1] University venture companies: The university around hundred and fifty university venture companies, which are centrally managed by the Tsing Hua University Companies Group, a holding company.
[2] Tsing Hua Science Park: This site adjacent to the university houses the headquarters and factories of university venture companies. A number of "incubators" are set up there, and the environment is tailored to make it easy to start businesses based on technologies from the university. The Beijing Tsing Hua Science Park Development Center, another of the university's venture companies, handles operation and management of the science park.
[3] Joint research and commissioned research: The science and technology development department was established as the interface with industry for technology transfers (TLO functions). In addition to joint and commissioned research with companies, it has contracts with ten provinces, autonomous regions and municipalities, including the municipality of Beijing and Guangdong Province, and over 40 regional cities to provide information and advice on regional economic development. It carried out around 4,800 technology transfer projects in 1991~1999, with contracts said to value over RMB1.03 billion. It works internationally with many famous companies.
[4] Commissioned training of corporate staff (technology and business administration).

cooperation include the following:

[1] China is a country with a powerful government, which realized the importance of high-tech industries at a relatively early stage and aimed to harness the abilities of universities to promoting such industries.

[2] Universities had strong potential and were able to catch up quickly in high-tech fields.

[3] The government set strong and specific policies for the systems and facilities of universities to make the most of their abilities for building high-tech industries.

[4] Clear rewards were set for technology transfers from universities.

Chapter VI
The Status of Higher Education, Inter-University Collaboration and University-Industry Cooperation in the Studied Countries, and Related Challenges[32]

1. Malaysia

(1) The status of higher education and related challenges

[1] The status of higher education

Malaysia's school education system is divided into six years of primary education, seven years of secondary education, and then higher education. Students in secondary education complete lower secondary education (three years) and upper secondary education (two years). Then those who aim for university can proceed to two years of university preparatory courses and preparatory education, or they can enter teacher training school (2.5 years), polytechnic (two or three year systems) or KTAR (Kolej Tunku Abdul Rahman).

In 2000 Malaysia had 14 national universities, one international Islamic university run by a number of Islamic countries and Islamic councils, seven private universities, and five Malaysian campuses of foreign universities, for a total of 27 institutions. The total number of students is 259,000 enrolled in universities, and approximately 344,000 when students of teacher training colleges, polytechnics and KTARs are included (in 2000). Tens of thousands of students are regarded to study abroad, who are mainly of Chinese ethnicity, bringing the university education rate to 20%.[33]

Malaysia's Higher Education Law, passed in 1996, reformed universities and permitted the establishment of private universities and foreign capital institutions of higher education. The new law was prompted by the growing enthusiasm for higher education. The government called for the establishment of new universities, and seven private universities were founded by public limited liability companies[34] and five by foreign capital in response.

[2] Challenges in higher education

- There is an access problem because the universities lack the capacity to take in the increasing numbers of prospective university entrants. As mentioned above, Malaysia has only 27 universities, and the impact of the Asian Currency Crisis has slowed moves to set up private universities.
- One challenge on the quality of higher education services is to improve science and technology education. The Multimedia Super-Corridor is an example of Malaysia's aim to develop a knowledge economy (k-economy), but there is room for improvement in the quality of the country's graduate-level science and technology education[35]. Such improvement is required, together with an adequate number of science and technology

32 JBICI research paper No.17 "The Situation and Challenges in the Education Sector - Towards Independent Development of Four Southeast Asian Countries", which was carried out as a supplementary study to this SADEP, gives a detailed description of the situation and challenges in the education sectors of the target countries.

33 The Malaysia-Japan Chamber of Commerce (1998) "Malaysia Handbook "98/'99".

34 Multimedia University (MMU), University Tenaga Nasional (UNITEN), University Technologi Petronas (UTP), International Medical University (IMU), etc.

35 From interviews with knowledgeable people.

graduates, to meet the needs of industry.
- One challenge facing the administration of higher education is the need to improve qualification systems on graduation from private secondary schools. The qualifications received on graduation by graduates of private secondary schools are not recognized as meeting the conditions for entry to Malaysian universities (they must also sit a separate standard examination). As a result, such students tend to filter into foreign universities. The system must be improved to prevent a brain drain of superior students.

[3] Priority areas for assistance of higher education
- Relieve the shortage of higher education capacity. The academic fields prioritized by Malaysia are in science and technology, particularly those that contribute to the k-economy, such as data communications. Malaysia has high expectations for Japanese assistance in that field.
- Improve the undergraduate education of engineers in science and technology (training of personnel that Japanese affiliates could entrust with the management of local operations after graduation).
- Raise the level of research by teaching staff and graduate students in graduate schools.

(2) Inter-university collaboration

[1] The state of inter-university collaboration

The Malaysian government recognizes the importance of inter-university collaboration, including foreign universities, for the development of higher education, and it strongly promotes such collaboration. Under the Look East Policy proposed in 1982, Malaysian students and trainees were dispatched to Japan and South Korea to learn from those countries' experience and apply it to building Malaysia. By 1998 over 5,700 students and trainees had been dispatched. The Look East Policy is still in effect[36]. Its content is broadly divided between the dispatch of students to universities and specialist colleges and the dispatch of mature engineering students and management trainees. A high proportion of Malaysian overseas students study at the State's expense, as the government strongly supports study abroad. JBIC has also supported the policy through the Higher Education Loan Fund Project (HELP) I and II. The HELP projects are summarized below.

Case Study: Overview of the Higher Education Loan Fund Projects (HELP) (I) and (II)

These projects aimed to educate the core engineers needed for Malaysia's economic development through study abroad at the scientific and technical undergraduate and graduate schools of Japanese universities. To that end they provided education loans to those who wanted to study abroad. The first phase began in 1992, and phase II, its improved successor, began in 1999. One of the main improvements made in phase II of the project was the introduction of a twinning program for undergraduate exchange[37].

Undergraduate student numbers for phase II were scheduled for five years, 1999 to 2003, with 60 in 1999 and 2000, and 80 in 2001 and 2002 (the number for 2003 has not been set). Students majored in eight engineering fields, such as mechanical, electrical and electronic, and computer engineering.

Education in Malaysia under the projects is carried out at the YPM Kolej Bangi, which is owned by Yayasan Pelajaran MARA (YPM)[38], an educational foundation. Japan's system for student

36 This project was implemented with grant aid from the Japanese government in 1998, immediately after the Asian Currency Crisis, and continued with an ODA loan from 1999.

37 Under the first phase, students attended preparatory school in Malaysia for two years (studying Japanese language and necessary course subjects) before sitting the entrance examinations for Japanese universities and entering from the first year of Japanese university. Under the second phase, students study university-level classes in Malaysia for three years, and the credits are transferred to Japanese universities, enabling them to join from the third year of Japanese university. The period of study in Japan is shorter, reducing the cost.

38 One agency of the Malay Credit Corporation, under the jurisdiction of the Ministry of Entrepreneur Development. It was established in 1969 and mainly runs educational projects.

intake was to establish a consortium in 1999 from 13 private universities[39], prepare content for education in Malaysia, dispatch teaching staff and cooperate in student intake and other assistance. Eighteen national universities[40] became associate members of the consortium. They mainly assist in the intake of students.

At the level of individual universities, some are enthusiastically promoting inter-university collaboration through measures such as establishing their own specialist organizations. (See the later case study of the University of Malaya). The inter-university collaboration programs by individual Malaysian universities are summarized below.

- Twinning programs: Over 120 private-sector schools have twinning programs, mainly with the U.K. and Australian universities.
- "3+0 programs": These programs are an expansion of the "1+2" system (one year of university education in the home country, then two years abroad) and the "2+1" system (two years of university education in the home country, then one year abroad), so that students qualify for graduation without studying abroad. Such courses are being run by 32 private colleges in collaboration with universities in Australia, New Zealand and the U.K., mainly in the fields of business administration, engineering and IT. One advantage is access without payment of high living costs for staying abroad.
- Establishment of branch campuses of foreign universities: These branch campuses provide the same levels of education as the main campuses. There are five, including Monash University (Australia) and Nottingham University (U.K.).
- Completed credit transfer and recognition programs: The systems allow course credits and records earned at other universities to be accepted as equivalent to those earned at the student's own university. These are similar to twinning programs, but they do not follow the syllabus of a specific foreign university.
- Off-campus programs: Universities set matriculation requirements, syllabi and examinations, but in contrast to on-campus students who attend the campus, off-campus students make their own study programs, either independently or with educational assistance from the university.

[2] Challenges in inter-university collaboration

The above measures for promoting inter-university collaboration have a strong tendency to operate as isolated projects. They are not strategic policies to encourage universities to take independent action. Strategic policies, such as incentive systems for inter-university collaboration, are anticipated.

(3) Industry-university cooperation

[1] The state of cooperation

One major characteristic of university-industry cooperation in Malaysia is that, since 1996, public limited liability companies have set up private universities, as prompted by the government, and are assisting their operation. The public limited liability companies, which set up the universities, subsidize the operating costs from their own profits, and are generally deeply involved in university operation. Therefore there are strong cooperative relationships between the universities and the companies and the companies that founded them.[41]

Individual universities are taking steps such as setting up their own specialist organizations, and are

39 Okayama College of Science, Kinki University, Keio University, Shibaura Institute of Technology, Takushoku University, Tokai University, Tokyo Institute of Technology, Tokyo Electrical Engineering College, Science University of Tokyo, Musashi Institute of Technology, Meiji University, Ritsumeikan University and Waseda University.

40 At the beginning they were Kyushu University, Gunma University, Kobe University, Chiba University, Tokyo University of Agriculture and Technology, The Technological University of Nagaoka and Nagoya University. New universities that have joined since 2001 are Hiroshima University, Hokkaido University, Kyoto University, Niigata University, Nagoya Institute of Technology, Osaka University, Saitama University, Tokyo Institute of Technology, The University of Electronic-Communication, Yamaguchi University and Yokohama National University.

41 The MMU cooperates with many companies besides its founders. Its 37 partner companies include Japanese-affiliated companies such as Matsushita, NTT and Fujitsu.

keen to promote university-industry cooperation (see the University of Malaya case study). They are also taking in interns, receiving donations of experimental equipment from companies, providing company scholarships to set numbers of students and conducting joint university-industry research. Joint university-industry research is limited, but it mainly involves companies that have close links with specific universities.[42] Japanese and other foreign companies assist Malaysian universities by providing scholarships and donating to specialist professorial chairs (sponsored chairs), donating experimental equipment and assisting research.[43]

(Cases of universities setting up their own organizations, and strongly promoting inter-university collaboration and university-industry cooperation).

Case study: University of Malaya

The University has established the two organizations below for inter-university collaboration and university-industry cooperation, to carry out the following programs.

- International and Alumni Affairs Unit
- Institute of Research Management and Consultancy

[Inter-university collaboration]

- Student Exchange Program: Exchanges with over 100 universities in Malaysia and abroad. Exchange partners in Japan include Waseda University and Asia University.
- Ronpaku Doctoral Studies: A system for teaching staff of Malaya University to acquire doctorates through the Japan Society for the Promotion of Science[44]. The Japanese partner is Kyoto University.
- Staff Exchange Program: A program to exchange teaching staff with overseas universities. Expenses are paid by the Fulbright Foundation, the Asian University Network and others.

[University industry cooperation]

- Research expenses, equipment, materials etc. received from companies (Motorola, Hertz Semicon, Hitachi etc.).
- Corporate training: The Department of Engineering is obliged to acquire training at companies selected by the university. Other departments are encouraged to do the same. The duration of training consists of ten weeks of orientation and at least three months of practical training.
- Research and consulting commissioned by the government and companies from the teaching staff and students of graduate schools.
- Commercialization of research results: The Technology Transfer and Commercialization Unit of the Institute of Research, Management and Consultancy commercializes research results (however, the number of patents acquired in the last five years is not high).

[2] Challenges in university-industry cooperation

The levels of research and development in Malaysian universities are not high, and with a few exceptions, universities have not yet reached the stage of organized joint research with companies. Full scale university-industry cooperation beyond the personal level will require improved R&D abilities in universities and better coordination abilities to promote cooperation.

42 E.g.: Petronas Research Services with UTP, Telecom Malaysia with MMU, Tenaga National with Uniten, etc.

43 Cooperation with the MMU by Matsushita Group companies includes the following:
[1] Matsushita multimedia seminars (held three times a year).
[2] Implementation of commissioned research (starting in April 2001).
[3] Provision of scholarships, and lectures at Matsushita laboratories.
[4] Technical support for distance learning at the MMU.

44 A special corporation under the jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology, to promote international academic exchange.

(4) Potential for Japanese assistance focused on inter-university collaboration and university-industry cooperation

[1] Basis for promoting inter-university collaboration and university-industry cooperation

- Experience of cooperation between private universities and the companies that founded them: university-industry cooperation is making progress in Malaysia between private universities and the public limited liability companies that founded them, and the universities are learning what companies want from university-industry cooperation, and how to raise the incentives for companies to cooperate. This experience will be very useful in smoothing the progress of university-industry cooperation with other companies.
- Strong English language ability: Malaysia strongly emphasizes English language education and most people advancing to university level can use English comfortably. This ability is a great advantage in cooperating with foreign companies and building deeper cooperation with foreign universities, but it also means that Japanese universities are kept at a distance when looking for partners in Malaysia, compared to universities in Europe and the U.S.. However, if everyone else has mastered English, ability in that language is no longer a decisive advantage. Therefore there is some demand from students wanting to master Japanese or other languages as a third language, to make themselves stand out.

[2] Expectations for Japan

- High expectations for Japanese data communications technology: Malaysia is emphasizing more advanced and widespread information technology as it promotes its k-economy policy, and it expects to bring in Japanese technology to that end. Therefore Malaysia has high expectations for technology transfer from Japanese companies, more students at Japanese universities and expansion of Japanese universities to Malaysia. The Malaysian government is likely to be an enthusiastic partner in relevant plans to assist inter-university collaboration and university-industry cooperation.
- High expectations for expansion of higher education through Japanese assistance: The questionnaire survey of students who had previously studied in Japan found that approximately 72% were in favor of Japanese university campuses in Malaysia (see Chapter VII, Figure 8), and over 89% said that they recommend such universities to their children, acquaintances and relatives. There are also high expectations for the Higher Education Loan Fund Project (II), which provides Japanese assistance for measures such as twinning projects in undergraduate science and technology education.

2. Thailand

(1) Higher education

[1] The status of higher education

Thailand's school education system is divided into six years of primary education, six years of secondary education, and then higher education. The available institutions of higher education include universities (4~6 years), teacher training colleges (2 or 4 years), occupational training colleges (2~4 years), military and police colleges (5 years) and music and drama colleges (2 years). There are 74 universities, comprising 24 national and 50 private universities. There are also 34 regional general universities, which have been upgraded from teacher training colleges.[45] The growth in private and regional general universities is increasing the total number of universities, and the number of students entering university is rising even faster (by 25% in 2001).

Thailand is now in the midst of educational reform, including the following actions on higher education:

(a) Improving the quality of teaching staff.

(b) Improving access to higher education (target university enrolment is 40% for 2020, with encouragement for opening new campuses and community colleges).

45 All figures are from 2000.

(c) Pursuit of higher efficiency in university operation[46] (greater income from industry, privatization of university management systems).
(d) Stronger relationships with local communities, other universities and other stakeholders.
(e) Internationalization (raising the level of universities to international standards, opening universities to international society).[47]

[2] Challenges in higher education
- There is an access problem because the universities lack capacity in scientific and technical education. Compared to countries such as Japan and the U.S., there are not many leading scientific and technical universities, even in proportion to the country's population. In 1997 the rated capacity of engineering departments in domestic universities was around 8,000 students per year (not including the regional general universities), which is less than one tenth of the capacity in Japan or the U.S..
- There are also four qualitative problems with higher education services:
  (a) Applicability to the needs of industry.
  (b) Improvement of educational quality in new universities.
  (c) Development of educational programs and training of teaching staff.
  (d) Improvement of the quality of science and technology education.

(a) Applicability to the needs of industry: In Thailand to date, research and education has been specialized in academic disciplines, centered on the national universities. There are comments from industry that graduates start work with no understanding of manufacturing facilities, and many graduates, even among engineers, do not enter factory areas because they are "white collar" workers, making it difficult to train managers who can be put in charge of factories. Therefore it is hoped that university-industry cooperation will raise understanding of corporate management methods.
(b) Improvement of educational quality in new universities: As the numbers entering higher education rise, universities are shifting towards a "mass market". To cope with this demand, many of the teacher training colleges in the regions have been upgraded to regional general universities since the first half of the 1990s. There is also an increasing number of new private universities. However, compared to longer-established national universities, the level of research and education at these new universities is inferior. The graduates of these universities are officially university graduates, but employers do not treat them in the same way as graduates of the long-established top universities, resulting in harsh employment situation.
(c) Development of educational programs and training of teaching staff: Some of the new universities, which is central to the education policy, and even universities that were founded decades ago, have asked Japanese universities for assistance in curriculum and syllabus preparation, staff development and other areas.
(d) Improvement of the quality of science and technology education: Much of the machinery, materials and equipment of science and technology departments are antiquated, and companies are dissatisfied because new graduates who have trained on such equipment and machinery are not immediately of use when they join companies.

[3] Priority areas for assistance of higher education
- Raising the level of teaching staff and education curricula in newly established or upgraded private universities and regional general universities.
- Fostering and raising the level of engineers (expansion of capacity for educating engineers, and the introduction of skill and qualification examinations).

46 The conversion of national universities into independent administrative entities obliges the universities to reach greater budgetary independence.
47 From interviews at the Ministry of University Affairs, and the Ministry homepage (URL http://www.inter.mua.go.th/).

- Improvement of management personnel (making managers aware of their position as key personnel, and improving the management abilities of graduate-level staff).

(2) Inter-university collaboration

[1] The state of inter-university collaboration

Inter-university collaboration takes forms including exchange programs, exchange of researchers, twinning programs and distance learning. The cooperation between the National Institute of Development Administration (NIDA) and Indiana University is one example of an exchange program. The International Student Exchange Program (ISEP), which is an exchange program between Thammasat University and US universities, is an easy program for Thai students to use[48]. One example of distance learning is the distribution of classes over the Internet from the Tokyo Institute of Technology to the Asian Institute of Technology (AIT).

Government-supported projects include the Japan-Thailand Technology Transfer Project[49], which is supported by an ODA loan from JBIC, and the establishment of the International Program[50] in universities to gather students from within Thailand and neighboring countries.

[2] Challenges in inter-university collaboration

- Clarification of objectives: In many cases inter-university collaboration involves comprehensive cooperation, with exchanges of documents with many universities, but many collaboration agreements are dormant, and it is doubtful whether they are actually carrying out any meaningful activity. Exchanges where specific objectives are stated and the roles of the partners are clearly defined are relatively effective.
- Matching the needs of both sides in academic exchanges: In exchange programs there is a mismatch between Japanese students wanting to study in Thailand and Thai students wanting to study in Japan, which has forced some exchange systems into suspension. For an exchange system to function well, Japanese students wanting to study in Thailand should not be handled by individual universities, but rather they should be gathered from multiple universities to produce a student group of adequate size. There are large numbers of students who want to study in Japan, but without scholarships, which should cover living costs, it is very difficult for them to actually attend Japanese universities. It is difficult for students to go to study in developed countries unless they are supported by comprehensive scholarships that cover their living costs as well as their tuition fees.
- Government initiatives: Inter-university collaboration projects by the government are implemented in isolation, and they do not go as far as being a major tide of support for education and research. There are limits to what individual universities can do towards inter-university collaboration. Therefore there is a need for policies that increase incentives for inter-university collaboration.

(3) University-industry cooperation

[1] The state of university-industry cooperation

The government aims to raise the autonomy of university operations, and it encourages university-industry cooperation as a way of funding university operation. It also operates joint research projects.

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48 Students can choose the period of overseas study, between one semester and one year. Thai students must only pay Thammasat University the normal tuition fees and living costs (cost of dormitory board and lodging) it specifies. Tuition fees and living costs at the US universities attended by students are usually higher, but there is no need to pay the difference, making study abroad an option even for students without scholarships.

49 Joint research between Japanese universities and the departments of science and engineering at Chulalongkorn are supported through overseas study at Japanese universities and research institutions, invitations to Japan for teaching staff, and expansion of educational and research facilities. Japanese university doctorate courses are attended by around 40 students from Chulalongkorn University, and another 109 are dispatched to Japanese university and research institutions (short term secondments which do not earn degrees), while 273 members of the teaching staff have been invited from Japan (as of the end of March 2002).

50 An international program is one that provides courses at Thai universities that count for normal credit units, so that Thais and foreigners can study together. Classes are conducted in English, and there are now 387 courses from national and private universities (counting undergraduate and graduate levels).

Examples included the Excellence Center Project (an ABD-supported project)[51], and university-industry joint research projects (government funded)[52 53].

Universities are now realizing the importance of university-industry cooperation to prepare for independent management, but the systems for such cooperation are still inadequate. For example, Chulalongkorn University has established the Intellectual Property Institute (IPI) as an organization for promoting the transfer of technology to industry, but it only has one full-time staff member, and the university's so-called cooperation relies almost entirely on the lecturers' personal networking. The concerns of the universities tend to be focused in the pursuit of academic output, and the concepts of applied research and joint research with companies are not well rooted. Against that background, the Asian Institute of Technology (AIT) aims to build close cooperative relationships with European companies (see the case study below).

Japanese-affiliated companies, which are centered on the manufacturing industry, want to see expanded and improved science and technology education in Thailand. Examples include the Toyota Foundation's donation of a set of training equipment for automotive engineering design to Chulalongkorn University, and the establishment of the Sirindhorn International Institute of Technology (within Thammasat University) by Keidanren. However, joint research with Japanese-affiliated companies often amounts to no more than donations and may not be sustainable.

Case Study: University-industry cooperation at the Asian Institute of Technology (AIT)

- Siemens (Germany) has provided automation machinery and other Siemens equipment to the AIT, provided it with scholarships and opened an International Summer School. The company's engineers also teach at the Institute, and conduct joint research with its teaching staff.
- Lyonnaise des Eaux (France), a water treatment company, provides financial assistance, such as covering the costs for one AIT researcher to pursue investigative research related to its technology, and paying research costs.
- Most of the partners in university-industry cooperation are European companies. There is almost no cooperation with Japanese industries and companies at present.

[2] Challenges in university-industry cooperation[54]

- Identifying the needs of industry: In Thailand people commonly graduate from university and move directly into managerial posts without ever setting foot on the factory floor. Companies want managers to enhance their managerial abilities by understanding the factory floor, quite apart from their academic accomplishments. Universities and students in Thailand today are, in general, strongly oriented towards academia, and in most cases lack understanding of what the industry needs. It is hoped that university-industry cooperation will give them

51 The project was implemented in 2000 with $53.2 million of assistance from the ADB. Seven projects have been decided to date. An Excellence Center (EC) is usually academic, but ECs in this country aim to research themes that can be applied to industry. Three or more universities form consortia to respond to planning documents submitted by private companies. Fields include biotechnology, materials, environment, energy and chemistry. The companies cooperate by providing funding and opening their own laboratories to the commissioned researchers.

52 The budget for the project was 30 million Baht in 2000 and 100 million in 2001. The basic concept is the same as the above ECs. This project is implemented separately to reduce the burden of operating ECs, and to increase their number. The aim is to provide the member companies of the Federation of Thai Industry with studies, analysis and research to increase their productivity, and transfer technology from universities to companies. It mainly targets small and medium Thai businesses to raise their level (but foreign companies are not necessarily excluded). One project involving a Japanese company is the joint research between Panasonic (National Thai) and King Monkut's Institute of Technology. The state covers 70% of the costs, with the other 30% covered by the companies.

53 Mainly from interviews with universities and the Ministry of University Affairs.

54 Mainly from interviews with knowledgeable people.

a greater understanding of the methods of corporate management.
- Government initiatives: There are limits to what individual universities and companies can do through promoting university-industry cooperation to solve the various problems of higher education in Thailand. The full support of the state is required. There is a need for policies that increase incentives for inter-university collaboration and university-industry cooperation.
- Development of skill and qualification examination systems: Graduates of regional universities, which have only recently been upgraded from single-subject colleges to general universities, may not have abilities to match their degrees. The existence of examination systems for skills and qualifications make it easier to gauge abilities with a view to promoting mid-level managers with experience of the factory floor. Such systems are now lacking in Thailand, in terms of both quantity and quality. An examination and qualification system is needed so that people can learn higher-level abilities and have those abilities certified.

(4) Potential for Japanese assistance focused on inter-university collaboration and university-industry cooperation

[1] Basis for promoting inter-university collaboration and university-industry cooperation

The Japanese language has been gaining popularity in Thailand recently as a second foreign language, and the language barrier has started to come down slowly. During group interviews held in Thailand of students who had studied in Japan, some interviewees indicated that degrees earned at Japanese universities were more important than they had been in the past.

[2] Expectations for Japan

In the questionnaire survey of students who had studied in Japan, over 90% of respondents were in favor of Japanese universities setting up Thai campuses (see Chapter VII, Figure 7), and most wanted to cooperate in the educational and operational aspects. They also recommended such universities to their children, acquaintances and relatives.

3. Vietnam

(1) Higher Education

[1] The status of higher education

Vietnam's school education system is divided into five years of primary education, seven years of secondary education, and then higher education. Institutions of higher education are universities (colleges and general universities, 3~6 years) and technical secondary schools (1.5~2 years). In 1999, Vietnam had 131 universities and 735,000 students (comprising 421,000 regular and 314,000 non-regular students) and 246 technical secondary schools with 196,000 students[55]. The higher education enrollment rate, which grew rapidly in the 1990s, now stands at around 10%.

The Ministry of Education and Training has set an education and training development strategy extending to 2010. The main elements of the strategy are:

(a) Extension of mandatory education to secondary education by 2010.
(b) Raising the number of university students per 10,000 of the population from the current 95 to 140 by 2005 and 200 by 2010.
(c) Concentrating efforts on raising the quality of Vietnamese universities to the level of the world's major universities.
(d) Setting automation, IT, biotechnology, new materials and business administration as the priority fields to be emphasized in future.

[2] Challenges in higher education

- University capacity must be expanded to enable access for the growing student numbers.
- One challenge on the quality of higher education services is to educate the personnel who will support economic development on the basis of market economics. Research and education in Vietnamese

55 Statistical Yearbook 2000 (Vietnam).

universities at present are biased towards theory, with practical research and education lagging far behind. Furthermore, many of the key posts in government ministries and universities in Vietnam today are held by people who studied as exchange students in former communist countries, and they may be working on policy, education and research without an adequate understanding of market economic systems. Therefore there is an urgent need to educate people with the business mindset, executive-class managers for companies, superior candidates for high-level civil servants, and mid-level workers with the ability to make decisions. To do so efficiently will require inter-university collaboration and university-industry cooperation, and particularly cooperation with foreign agencies, because Vietnamese universities alone will not be able to keep up with the demand for such personnel.

[3] Priority areas for assistance of higher education

- Education of managers for the private, public and government sectors (education, public policy and administrative management on the market economic system and how to manage companies within it).
- Enhancement of engineers' abilities (people able to make independent decisions, who can be entrusted with management in the field).
- Qualitative improvement in education (particularly education of teaching staff in regional universities).

(2) Inter-university collaboration

[1] The state of inter-university collaboration

Inter-university collaboration within Vietnam is conducted by Hanoi University as the center of excellence for the north of the country, with Ho Chi Minh City University for the south. They assist education and research at regional universities through curriculum sharing, dispatch of lecturers, sharing of equipment and facilities, and other measures. The master's course in development economics at the National Economics University, Hanoi, is one of the examples of long-term, high-quality education that has continued since 1994 through inter-university collaboration with foreign universities. The Royal Melbourne Institute of Technology is one foreign university with a branch campus in Vietnam.

The Vietnamese government is aware of the necessity of inter-university collaboration, and it provides a small amount of support for collaboration, including the following:

(a) Multiple universities are encouraged to cooperate in the preparation and marking of entry examination questions, and to share experimental laboratories, as measures to encourage collaboration between universities and departments specializing in the same fields.

(b) Collaboration programs with foreign universities are encouraged by paying the salaries of related personnel and providing premises where the programs can be conducted.

Case Study: The master's course in development economics at the National Economics University, Hanoi

The master's course in development economics at the National Economics University, Hanoi, was established in 1994 with assistance from the Institute of Social Science (ISS) in Holland[56]. The ISS has provided grants worth $8 million over eight years since 1994. The grants covered the establishment of the course, management and usage costs for the facilities, and student expenses (tuition fees for 60 students).

There are 24 Vietnamese lecturers (60% of the teaching staff, who also teach other courses at the National Economics University, Hanoi). From Holland there are two full-time instructors and others on short-term secondment (comprising 20%), and the remaining 20% are American, British and Danish, who, on another visit, were found to be assisting classes at the university. Lectures by foreign speakers are held every two weeks on themes of the Vietnamese economy and

56 A Dutch university eminent in development economics and other development fields.

the world economy. Speakers include staff from agencies such as the UNDP, World Bank and IMF who are in Vietnam at the time.
All speeches are presented in English. Students are awarded Vietnamese and Dutch master's degrees on completion of the course. Dutch support was originally scheduled to continue until 2002, but it has been extended until December 2003. Since 2001, Luxembourg has provided $15,000 of scholarships for students on the course. The cost is $3,500 per student, and once the aid from Holland ends, the course will have to be funded by a combination of government funding, payments by students and foreign aid.

[2] Challenges in inter-university collaboration
The Vietnamese government and universities take the position on collaboration with foreign universities that they will accept financial assistance from foreign governments or universities if it is offered. There is a government-funded system for study abroad, but it is on a very small scale and, for the present at least, there is little positive action towards using government or university funds for collaboration with foreign universities. If inter-university collaboration is to be used to provide efficient support for human resources development, the government must independently take the initiative and direct the universities so that they can build relationships strategically and selectively.

(3) University-industry cooperation

[1] The state of university-industry cooperation
The current state of university-industry cooperation is that there are cases of companies commissioning research from universities, mainly in scientific and technical areas, but there is no leading edge R&D, as the work does not go beyond outsourcing work for industry (such as testing computer software). There are examples of Japanese-affiliated companies supporting higher education as an element in their social contribution. For example, Toyota Motors Vietnam has a scholarship and overseas study system[57], and Panasonic Vietnam accepts interns.

The Vietnamese government is aware of the necessity of university-industry cooperation, and it provides a small amount of support to promote such cooperation, including the following:

(a) When tenders are invited for government research projects, teams based on university-industrycooperation are favored in the evaluation.
(b) When foreign companies run educational projects in Vietnam, the same tax system for general foreign companies developing in the country (tax exemptions and reductions, etc.) is applied to them.

[2] Challenges in university-industry cooperation
The government, companies and universities all lack adequate funding and expertise, so no practically effective measures have been implemented to date. If university-industry cooperation is to be used to advance support for human development, the government must act independently to build the environmental infrastructure for universities and companies to engage in university-industry cooperation, and it must provide incentives and ensure that they take effect. The level of R&D in the universities will have to be raised if full-scale university-industry cooperation is to be encouraged to the level where companies can approach them with research commissions and joint research proposals.

57 Toyota Motors Vietnam provides the following assistance:
[1] Scholarship system: Around 200 students per year in Hanoi, Ho Chi Minh City and Da Nang are paid $100/ year.
[2] Overseas study system: The Ministry of Education and Training recommends students, and two per year can study at the Toyota Institute of Technology. To date, six students have attended Toyota Institute of Technology.
[3] Establishment of an automobile repair course: The automobile repair course was established within the automobile maintenance engineer course at the national vocational training college. The latest equipment is used in classes. The total cost was $8 million. In 2001, nine students who attended the course found jobs with Toyota dealerships.

(4) Potential for Japanese assistance focused on inter-university collaboration and university-industry cooperation

[1] Basis for promoting inter-university collaboration and university-industry cooperation

The cost of commissioning work from Vietnamese universities is lower than that in Japan. Therefore there is an advantage for Japanese companies in commissioning outsourced work to Vietnamese universities as the first stage of cooperation.

[2] Expectations for Japan

Major Vietnamese universities already have some experience of collaboration with foreign universities, including some in Japan, and, in common with Malaysia and Thailand, over 90% of respondents to the questionnaire of students who had studied in Japan approved of opening Japanese universities in their country (see Chapter VII, Figure 7).

4. The Developmental Stages of Inter-University Collaboration and University-Industry Cooperation in Each Country

(1) The development stages of inter-university collaboration

The development status of inter-university collaboration in Japan, the U.S., the U.K., Singapore, China and the three target countries can be summarized as presented below.

There appear to be two types of inter-university collaboration, the "benefactor type", in which the counterpart enjoys greater benefits from the collaboration, and the "beneficiary type", in which the benefits received from the counterpart are greater. In the "benefactor type", the university initiating the collaboration is commonly at a high level, and the counterpart university is relatively inferior. Typically, a university in a developed country initiates the collaboration and the counterpart is in a developing country. Conversely, in "beneficiary type" collaboration, the initiating university is relatively inferior to the counterpart.

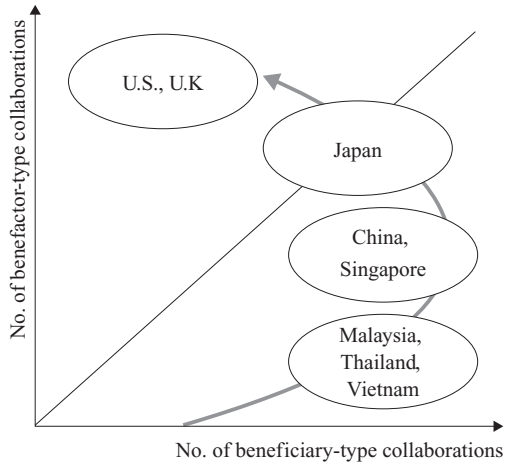
In general it is anticipated that the higher a university's level of research and education, the more opportunities it will have to seek exchanges with universities in other countries. Figure 4 broadly represents the development stages of inter-university collaboration. Thus the benchmark countries and the three target countries are engaged in beneficiary collaboration.

(2) The development stages of university-industry cooperation

In the university-industry cooperation seen so far in the various countries, there is a wide range of cooperation levels in which the level of research and technology industry expects from universities ranges from low (having students perform outsourced work) to high (technological transfer etc.). Figure 5 compares the level of research and the number of partnerships in each country.

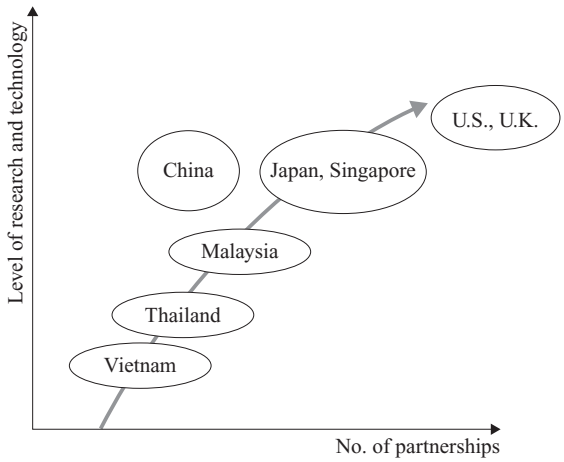
From this perspective, instances of high-level cooperation involving the transfer of technology to industry, such as by TLOs in the U.S. and the U.K., are numerous and widespread, but the number of high-level partnerships in advanced fields declines in order from Japan and Singapore down to Malaysia and Thailand. University-industry cooperation in Vietnam has not gone beyond the level of outsourced work. In China some superior colleges have reached a certain standard of research and technology, and they often set up university venture companies. Therefore the trend is for them to emphasize starting businesses rather than cooperating with them, which is an unusual position compared to other countries. This mapping of the relative status and levels of university-industry cooperation offers many hints for Japanese universities and companies providing assistance for higher education in developing countries.

Figure 4 Levels of International Inter-university Collaboration in Each Country (schematic)



Source: Prepared by Nomura Research Institute, Ltd.

Figure 5 Levels of University-Industry Cooperation in Each Country (schematic)



Source: Prepared by Nomura Research Institute, Ltd.

Chapter VII Consideration of Programs for Inter-University Collaboration and University-Industry Cooperation

1. Preparing a Menu of Measures

Examination of the above issues has identified the following main challenges in higher education in the three target countries:

[1] Training of corporate executives
[2] Training of high-level civil servants
[3] Training of engineers in scientific and technical fields
[4] Training of mid-level workers
[5] Expansion of higher education capacity

Furthermore, stronger inter-university collaboration and university-industry cooperation to solve these challenges clearly requires:

[6] Improved levels of education and research at universities

This chapter classifies methods that are likely to be effective according to the problems they are meant to solve in each country. Table 1 summarizes the classifications. The ◎○△ marked in the country columns on the right side of the table indicate the order of priority based on the status and needs of higher education in the country.

2. Summary of the Package of Measures

The preceding section examined the content of assistance for each objective. This section proposes a package that combines individual measures. Figure 6 shows an overview of the proposed measures. The individual measures include many simple and earnest efforts, each of which has only limited effects. Therefore linkage between such measures should be able to realize synergistic effects within the overall scope of Japanese assistance. A practical approach would be to start with low-risk measures and extend to larger measures while securing profitability at each stage.

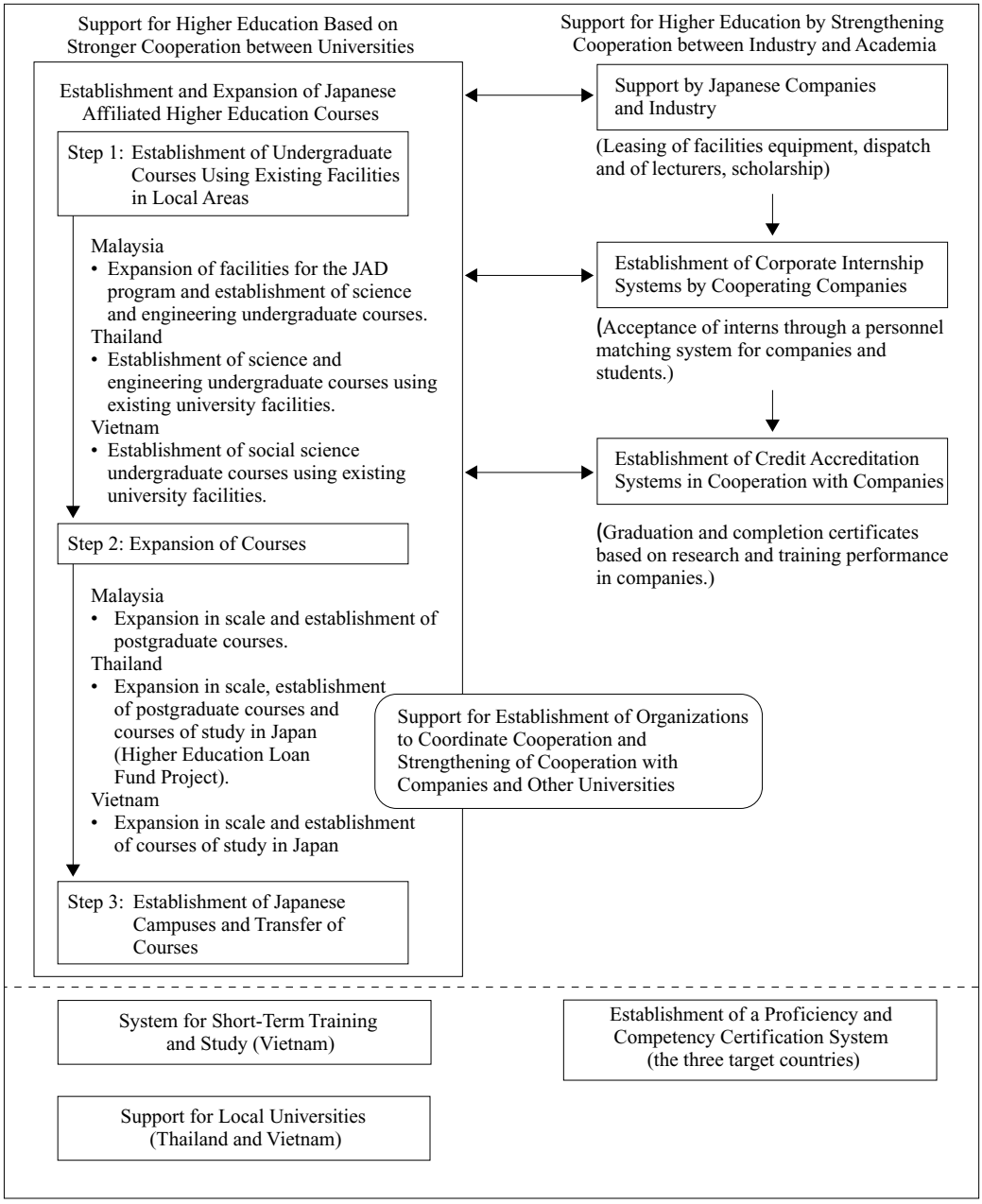
The core policy of the package of measures is "opening and expanding Japanese-affiliated higher education courses". The questionnaire survey of students who had studied in Japan showed a high level of support for such measures (Figure 7). The basic process for following such an approach is to open Japanese-affiliated higher education courses using equipment borrowed from local universities (Step 1), then, as the operation of the courses settles down, expand them in quality and quantity, while strengthening university-industry cooperation (Step 2), and finally establish independent Japanese-affiliated institutions of higher education (Step 3).

Table 1 Preparing a Menu of Measures

Purpose	Educational level	Target level to attain	Measures	Malaysia	Thailand	Vietnam
Training of company executives and high-level civil servants	Undergraduate level	• Education at the level of top universities in developed countries.	• Creation of twinning programs in the social sciences. • Opening Japanese-affiliated courses in the social sciences. - Full use of distance learning.	○ ○	◎ ◎	◎ ◎
	Graduate level	• An MBA learned in English. • Mastering sufficient Japanese for everyday life.	• Opening graduate courses in the social sciences. - Targeting students from neighboring countries as well (with the addition of a scholarship system). - Use of Japanese business people as external speakers. - Running Japanese language classes in parallel. - Full use of distance learning.	○	◎	◎
Training of engineers in scientific and technical fields.	Undergraduate level	• Education at the level of top universities in developed countries.	• Establishment and expansion of the Higher Education Loan Fund Project (student numbers etc.). • Opening Japanese-affiliated undergraduate courses in technical subjects - Full use of distance learning.	◎ ◎	◎ ◎	○ ○
		* Practical work experience.	* Reinforcement of the company internship system	○	○	○
		• Professional education in a specific field.	• Assistance by industry for local universities and agencies (establishment of courses in specific fields - software development, CAD etc.).	○	○	◎
	Graduate level	• Education at the level of top graduate schools in developed countries.	• Opening Japanese-affiliated graduate courses in the technical subjects - Full use of distance learning.	◎	○	○
		• Experience of joint research with companies.	• Creation of a degree recognition system based on research accomplishments in local companies. • Expansion of the Higher Education Loan Fund Project and addition of an overseas study system for Japanese corporate research agencies.	◎ ○	○ ○	△ ○
Training of mid-level workers.	Occupational training school level	• Learning basic techniques and professional ethics. • Mastering sufficient Japanese for everyday life.	• Assistance by industry for existing local universities and institutions. - Provision of Japanese language education as well. • Creation of an examination system for skills and abilities.	△ ○	○ ○	◎ ○
Expansion of higher education capacity	–	–	• Establishment and expansion of the Higher Education Loan Fund Project (student numbers, fields). • Establishment and expansion of Japanese-affiliated undergraduate and graduate courses.	◎ ◎	○ ○	○ ○
Reinforcement of inter-university collaboration and university-industry cooperation	–	–	• Establishment of a cooperation coordination agency. - Take responsibility for optimizing the strategic allocation of resources when the leading universities of the country carry out collaborative programs with foreign universities and companies.	○	○	○
Raising the education and research levels of universities	University instructor level	• Education at the level of top universities in developed countries.	• Expansion and improvement of the short-term overseas study system for the teaching staff of regional universities, and the staff dispatch system (visiting researchers and instructors).	○	◎	◎
Other general raising of educational levels			• Expansion of the overseas study system (increased numbers, wider selection of study destinations, wider selection of foreign students). • Integration of multiple exchange study systems to improve the balance of supply and demand.	○ ○	○ ○	○ ○

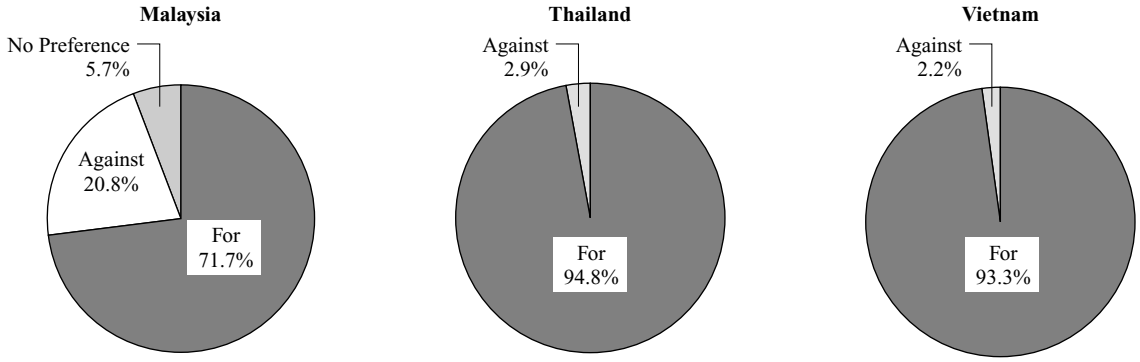
◎: Measures that are especially effective in providing assistance in higher education for that country and should be implemented with priority.
○: Measures that are expected to yield some level of effect but have a lower level of priority.
△: Measures which have little prospect of efficacy in the current situation.
Source: Prepared by Nomura Research Institute, Ltd.

Figure 6 Summary of the Package of Measures



Source: Questionnaire survey of students who had studied in Japan, conducted for this survey.

Figure 7 On the Establishment of Japanese-affiliated Educational and Research Institutions in the Respondent's Country[58]



Source: Questionnaire survey of students who had studied in Japan, conducted for this survey.

Each stage uses a combination of support measures to strengthen university-industry cooperation (industry support for existing local universities and agencies, reinforced company internship systems, creation of credit accreditation systems in cooperation with Japanese companies), and official assistance, such as Japanese grant assistance and technical cooperation (Table A-2 in Appendix 1). This approach secures profitability, which would be difficult to achieve through assistance from individual companies and universities, and enables the provision of attractive courses that incorporate the strengths of Japanese companies and universities. Cooperation and division of roles between stakeholders, such as local and Japanese universities and companies, governments and donors, is important for the implementation of this package of measures. Therefore "a cooperation coordination agency" must be established.

In Figure 6, "short-term overseas training system", "assistance for regional universities" and "creation of an examination system for skills and abilities", which are underlined, are measures which for individual implementation, apart from "opening and expanding Japanese-affiliated higher education courses" (measures will be described later in this chapter).

3. The Content of Each Measure

(1) Support through reinforced inter-university collaboration

[1] Opening and expanding Japanese-affiliated higher education courses

Considering the high expectations of Japanese higher education courses and the difficulty of establishing and operating universities on new campuses in the short term, it appears to be more practical to take a phased approach, starting with Japanese-affiliated higher education courses in the facilities of existing universities, expanding them gradually and, when the time is right, developing a new campus and moving into it.

The overview of measures below follows this scenario.

<Step 1: Opening undergraduate courses using existing local facilities, with maximum use of distance learning>

The first stage in local implementation of Japanese-affiliated higher education courses is to open undergraduate courses using existing higher education facilities in the country. Course content should target fields in high demand in the country concerned, and

58 This was the response to the question "Would you welcome the establishment of a branch campus of a Japanese university, or another university or research center closely linked with Japan, in your country?"

the assistance of Japanese universities and private companies should be used for curriculum preparation, development of facilities, dispatch of lecturers and other needs. Distance learning should be used to the full to present the same lectures as Japanese universities.

(a) Malaysia: Expanding JAD Program facilities and opening scientific and technical undergraduate courses

Higher Education Loan Fund Project (HELP) (II) is now under way in Malaysia, with ODA loan funding, and the JAD Program (Japanese Associate Degree Program) has been established within YPM Kolej Bangi to provide education intended to join with the third year of studies in Japanese undergraduate engineering departments. (See the case study in Chapter 6 for a summary of Higher Education Loan Fund Project (HELP) (I) and (II)). The process of transferring and expanding the facilities and curriculum, extending to a four-year or five-year university, and establishing HELP courses and general university courses, appears to be one of the most efficient ways of operating Japanese-affiliated higher education courses.

(b) Thailand: Opening scientific and technical undergraduate courses using existing facilities

(c) Vietnam: Opening social science undergraduate courses, using existing facilities, to educate company executives and top civil servants.

<Step 2: Course expansion>

Once the Japanese-affiliated higher education courses opened in the target countries under Step 1 are operating smoothly, the quantitative and qualitative expansion should be planned

(a) Malaysia: Expand the scale of the program and add post-graduate courses

Increase student numbers for the scientific and technical undergraduate courses started in Step 1, and, at the same time, establish a graduate school and begin advanced education and research. At the same time, according to the questionnaire survey of students who had studied in Japan, approximately 20% of respondents in Malaysia specified management as the subject they wanted to study. This is a relatively high level of demand, so the establishment of engineer-oriented MBA courses should be considered.

(b) Thailand: Expand the scale of the program, open graduate courses and establish courses for study in Japan (overseas study loans).

The summary of scale expansion and opening graduate courses is as for Malaysia. The establishment of engineer-oriented MBA courses should be considered for the future. The kind of twinning programs with Japanese universities that are included in Higher Education Loan Fund Project (II) for Malaysia are not operated in Thailand, but they could be set up in the same way if the Thai government needed them.

(c) Vietnam: Expand the scale of the program and establish courses for study in Japan (overseas study loans).

Once the established courses are running smoothly, the content of the education courses should be deepened. The set student number should be increased when the number of applicants grows, increasing the scale of the program. At the same time, twinning programs should be set up because it is easier to understand market economics by studying in the environment of an advanced market economy.

<Step 3: Establishment of an independent campus, and relocation>

After Steps 1 and 2, when there is the realistic prospect of independent operation, a separate campus should be built with the management of courses transferred to this campus, opening a new Japanese-affiliated university. At this stage, consideration should be given to further expansion, tailored to the situation in each country. For example, undergraduate and graduate

studies in the social sciences should be expanded in Malaysia[59].

[2] Assistance for regional universities (Assistance for training teaching staff in the regional universities of Thailand and Vietnam)

Regional universities in Thailand and Vietnam have limited funds and personnel for education, and their quality needs improvement. One measure to assist them would be short-term overseas training for their teaching staff (lecturers and researchers). The teaching staff could be dispatched to Japanese universities to learn aspects of the Japanese education system, such as curricula, syllabi and teaching methods. The regional universities have always been weaker than the central, national universities as research agencies. Assistance for them is expected to center on the teaching staff at the undergraduate level. The subjects targeted for assistance would mainly be scientific and technical, with some humanities subjects included.

The extensive use of distance learning systems proposed under "Opening and expanding Japanese-affiliated higher education courses" could include lectures at Japanese universities, and the schemes for students studying in Japan could also be applied to support of regional universities, so that assistance to regional universities would be a condensed version of "Opening and expanding Japanese-affiliated higher education courses". The JICA SEED-Net (Southeast Asia Engineering Education Development Network) scheme could also be employed[60].

(2) Support for higher education through reinforced university-industry cooperation

[1] Assistance by industry for existing local universities and agencies (in the three target countries)

In addition to assistance for individual local universities and agencies from Japanese companies operating in the target countries, companies who support such assistance could be recruited so that Japanese industry would assist local universities and agencies. That would strengthen the appeal of contributions by Japanese companies, and allow more appropriate allocation of resources. The Japan Chamber of Commerce and Industry has begun this type of activity in the area of scholarships in Vietnam, in line with the wishes of the Federation of Economic Organizations. In future it is hoped that the scope of JCCI activities will be extended to include donation or lending of equipment and materials, dispatch of lecturers and even opening courses.

[2] Stronger corporate internship systems (in the three target countries)

The findings of the questionnaire survey of students who had studied in Japan show strong demand for corporate internships and other university-industry cooperation programs, as students want to build their practical experience through relations with companies.

On the other hand, companies are commonly reluctant to accept trainees. The main reason is apparently because training is sought by both highly able and motivated students , and also by incompetent students. Unable to distinguish between the two, the benefit for the company when taking on both groups of trainees does not outweigh the burdens. Considering that situation, one solution would be to build a system that would enlist companies interested in taking in trainees, sort students who would do well in corporate training from those who would not, and introduce the right students to the right companies. Ideally this system should be run by the cooperation coordination agency, which will be described later.

[3] Creation of credit accreditation systems in cooperation with companies (in the three target countries)

Experience of research activities in company research

59 The "Japan-ASEAN Initiative to Support University Foundation" was announced at the January 2002 Summit between Prime Minister Koizumi and President Mahathir. This initiative aimed to found a Japan-ASEAN University in Malaysia that would draw students from Japan, Malaysia and neighboring countries, giving Malaysia a hub role in education.

60 SEED-Net aims to cooperate with the ASEAN University Network in the ten ASEAN countries to raise the level of the region's universities. It trains teaching staff as part of its work.

facilities is precious for students, because they can research themes close to market needs and accumulate experience of using advanced research facilities. For companies there is the burden of providing training, but they can also use superior personnel at low cost, and sometimes they would be able to employ those personnel. For that purpose, Japan's system of cooperating graduate schools could be important if it was transferred to the target countries.

[4] Short-term overseas training system (Vietnam, for mid-level bureaucrats)

A short-term overseas training system should be provided for the next generation of mid-level bureaucrats to deepen their understanding of market economy systems and Japanese production systems. In particular, it is important to help focus trainees' impressions of the workplace, for example, by showing them actual factory floors.

The actual training could use the framework of domestic training courses of 7~10 days by the Association for Overseas Technical Scholarship (AOTS), or it could take place in the Japan Center set up in the Vietnam Foreign Trade University.

[5] Creation of an examination system for skills and abilities (For the three target countries)

University degrees do not adequately express the graduate's ability level, and the examination and qualification systems for technical subjects are inadequate in both quality and quantity. Given this situation, it would be very significant to create a qualification and examination system (an examination system to gauge the abilities of administrative scriveners, bookkeepers and manufacturing workers).

The system would target groups such as those who enter companies after completing secondary education and want to move up to management on the basis of their practical experience, or students and graduates who lack practical knowledge despite receiving higher education at university.

The Japan Overseas Development Corporation (JODC) and Japanese companies could provide their expertise and advice in matters such as standards in ability, with the assistance of the Japanese government, JICA, JETRO and the Japan Chamber of Commerce and Industry, leading to proposals for the adoption and preparation of a national system by the government of the country.

(3) Measures to support higher education by reinforcing inter-university collaboration and university-industry collaboration: Establishment of a cooperation coordination agency (for the three target countries)

[Background and necessity]

- Aspects of inter-university collaboration: As collaboration cannot be stimulated at the level of individual universities, the existence of an integration system that matches the "needs" and "seeds" across multiple universities, or, if possible, at the national level, is required.
- Aspects of university-industry cooperation: In Malaysia and Thailand, where industrial structures should be taken to a more advanced level, methods should be built for creating and nurturing new industries using the fruits of university research, as seen in developed countries and the benchmark countries. The governments and universities of the target countries are beginning to be aware of the necessity of university-industry cooperation, but at present they have few staff for the purpose, and their activities are ineffective.

[Proposals for the establishment of a cooperation coordination agency]

- Multiple universities can group together, forming a "critical mass" for cooperation and exchange activities.
- The functions the agency would be responsible for are as follows:
  - Coordination between industry and universities: The agency would place specialist staff (coordinators) to gather information on the needs of industry and the seeds produced by universities, and match them together. The agency would also take on the role of coordinating corporate internships, as described above.
  - Coordination with foreign universities: The agency would also gather information and provide effective matching of "needs" and "seeds" for

international study between Japan and the target countries. It would also manage joint overseas study scholarship funds, group Japanese applicants for overseas study and allocate them to universities in the target countries. The integration of multiple exchange study systems would improve the balance of supply and demand.
- Education and dispatching of coordinators: Coordinators from the agency would be dispatched to TLOs, science parks and other institutions in Japan for practical training.
- Adult education: A management school should be established within the agency to teach business practice to train staff to link "seeds" to businesses. In particular, we suggest that this education should be combined with skill and qualification testing to produce personnel of practical use in company management.

[How the agency would be established]
- The agency would be established as a government agency within the ministry in charge of higher education.
- In Thailand, an existing cooperation organization such as the Intellectual Property Institute (IPI) of Chulalongkorn University should be used as the basis around which the related organizations and staff of other universities could join together into a single organization.
- Coordinators could be dispatched to TLOs or other organizations in Japan for training.

Chapter VIII
Challenges for Policy Implementation and the Role of JBIC

1. Challenges for Japan in Policy Implementation

Japan's challenge in the realization of the measures described in the preceding chapter is not simply to promote international inter-university collaboration and university-industry cooperation as a way of conferring benefits on the universities and industries of counterpart countries. It must also find ways to enhance the international competitiveness of Japanese universities and industry. Considering the environment affecting Japanese universities, a change of perspective is required, from assistance to developing countries, as in the past, to cooperation and collaboration. The specific challenges for each group involved are summarized below.

(1) Challenges for Japanese Universities

Japan's universities are now in a stage of major transition, as they must establish flexibility in education and research to respond to an environment that is changing with amazing speed, and build an environment where they can act quickly in international exchanges. If Japanese universities and students are to survive amid international competition in education and research levels, they must boost their English language ability and make much greater use of English in lectures . If they are going to deepen their international exchanges, they must attain the ability and reputation of first-rate universities in the world.

(2) Challenges for Japanese Companies

If the measures proposed by this study are to be realized, an industry-university cooperation system for Japanese industry as a whole must be established, going beyond the scope of efforts by individual companies. For the training of personnel who are actually useful to industry, it is important to acquire positive comments from the standpoint of private companies. At the same time, to attract superior human resources, hiring and promotion systems must be reformed to enable people hired abroad to function effectively.

(3) Challenges for those in the Japanese Government

Japanese public agencies such as the Ministry of Education, Culture, Sports, Science and Technology, Ministry of Foreign Affairs, JICA and JBIC, as well as private companies, provide various forms of assistance for higher education in developing countries. However, these support measures do not have shared and consistent objectives and strategies, and coordination between the agencies are inadequate.

In some cases there is overlap in the content of assistance.

It would be desirable for the agencies involved in the measures proposed in this study, and in other forms of assistance, to coordinate and share ideas among themselves, enabling strategic and efficient assistance from Japan as a whole. Where necessary, existing systems should be improved or new systems established, and action should be taken in a flexible and apt manner, with references to trends beyond the higher education field.

2. Challenges for the Target Countries

(1) Challenges for the Governments of the Target Countries

The examples of the US, Britain, Singapore and China suggest that government assistance in funding (both direct and indirect), systems and infrastructure (R&D parks, e-learning infrastructure etc.) are indispensable for promoting inter-university collaboration and university-industry cooperation, and for providing high-quality education. Governments must provide direct assistance such as scholarships for overseas study, but sustainable and efficient human resources development requires the development of an environment in which the government takes the lead and strategies are shared.

(2) Challenges for Universities in the Target Countries

Universities in the target countries must substantially raise their standards of education and research, improve their external negotiation abilities and unify their contact points for external negotiations.

3. Challenges and Roles for JBIC in Policy Implementation

Many of the measures proposed in this study should be realized through cooperation between various stakeholders besides JBIC and the counterpart government, such as other related agencies, companies and universities. Therefore the role and challenges for JBIC in policy implementation can be summarized into these three points.

[1] JBIC's role as a body for intellectual assistance: To develop policies, it is important to do the following:
(a) Survey the key fields for improvement in higher education in major Asian countries and the fields in which Japanese higher education services enjoy comparative advantages internationally. This investigation is intended to ascertain the supply and demand relationships for research and development in each field, with a view to develop collaboration between Japanese and Asian universities and companies.[61]
(b) Narrow the range of investigation and conduct project formation surveys to investigate at the level of specific projects.

[2] As an agency of intellectual assistance with executive ability in development assistance, JBIC has an important role as a development facilitator in Japan and developing countries:
Based on the survey results from [1] above, JBIC should take the role of a facilitator and work with multiple companies and agencies in Japan to draw up shared objectives and policies on ways to support higher education that will yield synergistic development effects. Specifically, in addition to encouraging collaboration with domestic grant assistance and technical cooperation, JBIC should discuss with private companies other available forms of collaboration, such as payment of scholarships, assistance with equipment and materials, internships, academic credit recognition systems. It should also assist in the realization of such collaboration.

[3] Role as a development assistance-executing agency: Finally, once there is a realistic prospect of success, the results of [1] and [2] should be linked to actual proposals for development in higher education. The content should include the

61 NRI is now conducting a study on "Development and Internationalization in Asian Higher Education Markets".

types of cooperation previously provided through ODA loans, such as expansion of overseas study loans and provision of equipment and materials (expected to involve distance learning), and support, through the provision of consulting services, for the establishment of a cooperation coordination agency. Measures to firmly embed cooperation between multiple related agencies, companies and universities in the related systems are also expected.

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Appendix [1]: "Japan's Record and Policy Direction in Assistance for the Higher Education Field" (Summary)

1. Background to the Study

- To complement the 2001 SADEP "Concepts of Assistance in Higher Education - Inter-University Collaboration and Industry-University Cooperation".
- This study, which examined Malaysia, Thailand and Vietnam, focused on inter-university collaboration and industry-university cooperation to find better human resources development policies in Japan and elsewhere for the future.
- The study took its themes as assistance in higher education, with particular reference to inter-university collaboration and university-industry cooperation, and explained their current significance.

2. Purpose of the Study

- The purpose of the study is to investigate the issues of Japan's policies on assistance in higher education for developing countries, which have until now centered on ODA, and make suggestions for future policy directions.
- Specifically, the aim is to position assistance in higher education relative to Japan's assistance for education, examine the advantages and disadvantages of the assistance schemes employed by each agency, and try to identify better assistance policies.

3. Study Method

- The necessary information was gathered from publications and through interviews with relevant people in government agencies such as the Ministry of Foreign Affairs and the Ministry of Education, Culture, Sports, Science and Technology, ODA executing agencies such as JICA and JBIC, and private companies.

4. Study Findings

(1) Japanese assistance for education: General tendencies and characteristics, with regard to track record (Table A-1)

- Much of the assistance is directed to Asia. In recent years it has been directed increasingly to basic education, but past records show large amounts allocated to higher education and occupational training.

Table A-1 Japanese Assistance for Education: General Tendencies and Characteristics, with Regard to Track Record

Executing agency	Form of assistance	Fields with strong records	Fields with strong records
Ministry of Foreign Affairs	General project grant	Primary and secondary education	Asia
	Assistance grant for overseas study and research	Higher education	Economies in transition to a market economy
JICA	Intake of trainees	Vocational training	Asia, Africa and Latin America
	Dispatch of individual experts	Higher education, vocational training	Asia
	Japan Overseas Cooperation Volunteer Program	All close to uniformity	Asia, Africa and Latin America
	Project-type technical assistance	Higher education, vocational training	Asia, Africa
	Provision of equipment and materials	Higher education, vocational training	Asia, Africa and Latin America
Ministry of Education, Culture, Sports, Science and Technology	Student exchange	Higher education	Asia
JBIC	ODA loan	Higher education	Asia

(2) Japanese assistance for higher education: General tendencies and characteristics, with regard to track record (Table A-2)

- Besides the main ODA executing agencies, which are the Ministry of Foreign Affairs, JICA and JBIC, there are various other executing agencies such as Ministry of Education, Culture, Sports, Science and Technology, the Ministry of Economy, Trade and Industry, and private companies, employing diverse schemes.
- However, if individual executing agencies and schemes can be replaced by a shared assistance strategy, and the numerous executing agencies can work more closely together with combined schemes, synergistic effects can be anticipated.

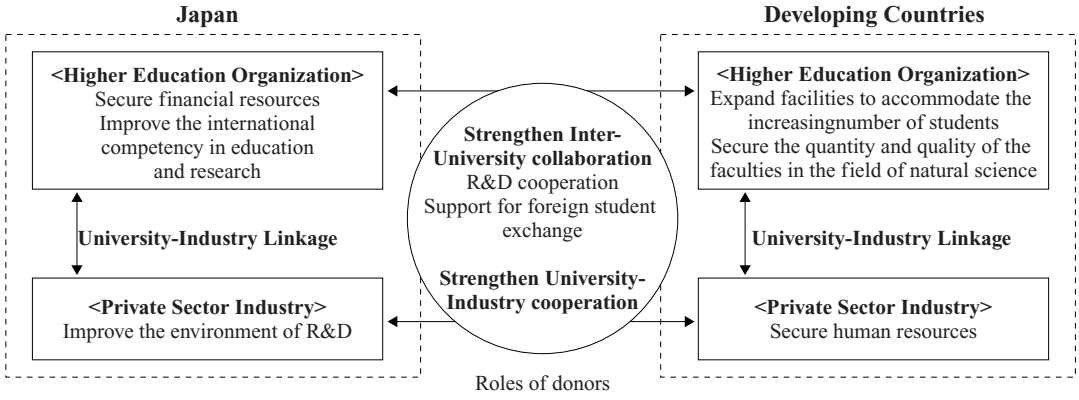
Table A-2 Overview of Japan's Assistance in Higher Education

Executing agency and form of assistance			Characteristics of assistance content
Grant assistance	Ministry of Foreign Affairs	General project grant	Mainly construction of facilities and provision of equipment and materials.
		Grant assistance for foreign students	Bear costs for preliminary education in the home country, travel to Japan, living in Japan, tuition fees and other expenses.
		Grant assistance for research	Assistance for new technical development and research etc. by researchers from Japan or developing countries.
Technical cooperation	JICA	Intake of trainees	From 1999 the standard training period was extended to two years, making it possible to earn a degree from a Japanese university.
		Dispatch of experts	Short-term experts are more numerous than long-term experts.
		Japan Overseas Cooperation Volunteer Programs	
		Provision of equipment and materials	
		Project-type technical cooperation	[1] Cooperation with grant assistance is common. [2] Support is being provided for networking between institutions of higher education.
	Ministry of Education, Culture, Sports, Science and Technology	Student exchange	Development of systems for intake of foreign students: [1] Payment of scholarships for foreign students studying at their own or their country's expense. [2] Dispatch of Japanese teaching staff to provide students who will be sent for study in Japan by the governments of developing countries with preparatory education in Japanese and other necessary subjects, before they leave their home countries. [3] Providing accommodation for foreign students.
		Exchange by the center university method (through the Japan Society for the Promotion of Science).	Establishment of university centers as hubs for exchanges between Japan and the assisted countries, formation of groups, built around university centers, of universities and researchers participating in research, and exchange of researchers for joint research and other activities.
		Assistance to those wishing to earn dissertation doctorates (by the Japan Society for the Promotion of Science).	Submission of dissertations based on degree regulations rather than graduate school curricula, so that superior researchers from Asian countries wishing to earn their doctorates at Japanese universities can receive guidance in their research.
	Ministry of Economy, Trade and Industry	Trainee student intake project (by the Association for Overseas Technical Scholarship (AOTS)).	Training for industrial technology trainees from developing countries.
		Project for the Dispatch of Experts (the Japan Overseas Development Corporation (JODC)).	Dispatch of Japanese engineers or management experts in response to requests from private companies and bodies in developing countries, for technical guidance within local companies.
		Research cooperation promotion project (by NEDO).	For technical development challenges (technical needs) that are peculiar to developing countries and are difficult to overcome with the unaided R&D abilities of those countries, install research equipment in local plants and use joint research and analysis with the research institutions of the counterpart country.
		Cooperative projects to promote trade with developing countries (by JETRO).	Carry out projects such as studies and information provision, exhibitions, dispatch and reception of experts and missions and invitations to business people, in order to nurture local small and medium businesses and build the infrastructure for exporting.
Loan assistance (ODA loan): JBIC			The central measures are [1] construction of facilities and provision of equipment and materials, [2] loans to foreign students, and [3] Domestic and overseas training and education of teaching staff.
Cooperation by private companies			Payment of scholarships, provision of equipment and materials, joint research, creation of sponsored chairs in developing countries, etc.

Note 1: There are a total of six programs for state-funded foreign students, three at the graduate level and three at the undergraduate level. The regions covered by the programs vary (some target Asian countries, and some target developing countries).

Region subject to assistance	Fields subject to assistance
Most assistance to Asia. In recent years the scope of assistance has spread to Africa, the Middle East, Europe and Oceania.	Scientific fields (medicine, dentistry, science and technology, agriculture) were the most, but the range of targeted fields has broadened in recent years, with the addition of social sciences.
Developing countries, and particularly countries in economic transition (Cambodia, Vietnam, Laos, Uzbekistan, Mongolia, Bangladesh and Myanmar) are covered.	
Implementation began in 2001. The first project was in Indonesia.	Assistance to Indonesia is for "policy proposals for decentralization".
Most assistance to Asia.	Scientific fields are the most numerous, but social sciences have been increasing in recent years.
Most assistance to Asia.	Scientific fields are the most numerous.
Most assistance is directed to Asia, but compared to other forms of JICA assistance, there is more dispatch of experts to Latin America, Africa and Europe.	There are diverse fields besides technical fields, including Japanese language teachers, music and physical education.
Most assistance to Latin America.	Medical fields are the most numerous.
Most assistance to Asia.	Scientific fields are the most numerous.
As of May 2001, the five countries sending the most students abroad at state expense were, in descending order, China, South Korea, Thailand, Indonesia and Bangladesh. The numbers of students accepted in a single year were 4,145 graduate students and 980 undergraduate students (note 1).	As of 1999, the fields most commonly selected by state-funded foreign students are engineering (30% overall), social sciences (16%), humanities (13%), agriculture (12%) and medical subjects (10%). The breakdown of state-funded foreign students by educational level is 80% graduates, 14% undergraduates and 4% technical college students (as of May 2001).
Asian countries (in 2000 the countries were China, Indonesia, Malaysia, the Philippines, Singapore, Thailand, South Korea and Vietnam).	There is a wide range of fields, including medicine, environmental engineering, social sciences and next-generation semiconductor development. The themes and content of research are not restricted.
Asian countries (in 2000 the countries were Bangladesh, China, Indonesia, Malaysia, the Philippines, Thailand, South Korea and Vietnam).	
Of the 4,547 students in 2000, 3,900 came from Asia.	General training includes Japanese language classes, an orientation to Japan and study trips etc. There are also field studies at private companies (special-purpose programs).
Of the 515 students in 2000, 496 came from Asia.	The fields of technical instruction within local companies include improvements in productivity and quality, management reform and human resources development.
In 2000 and 2001, the counterpart countries for joint research were from Asia (the Philippines, Thailand, Indonesia and China), Latin America (Chile), Europe (Kazakhstan) and the Middle East (Saudi Arabia).	Fields where Japanese technical ability can be used to the full, such as "Research collaboration in technology to improve environment-oriented water recycling and reuse" (an example of research collaboration with Thailand).
In 2000 the total value was ¥2.46 billion, including ¥1.09 billion for Asia, followed by ¥240 million for Latin America, so the most cooperation was directed to Asia.	In 2000, the total amount was ¥2.46 billion, including ¥2.01 billion for trade and investment projects, followed by ¥280 million for mining production, ¥140 million for energy, ¥20 million for administration and ¥10 million for agriculture. The most cooperation is directed to trade and investment projects.
Centered on Asia.	Science and engineering, medicine and agriculture are the most numerous fields, but the range of subject fields has been expanding, with the addition of assistance for social sciences.
Regions with local companies. China and the ASEAN countries receive the most assistance.	There is a large amount of assistance from manufacturing companies, and most fields are in the science and technology departments.

Figure A-1 Main Elements in Inter-University Collaboration and University-Industry Cooperation Between Japan and Developing Countries



5. Issues and Suggestions

(1) Issues

- General issues facing the higher education sector in Southeast Asia: [1] The quantitative build-up of facilities and staff is not keeping up with rapidly growing demand for higher education, creating access problems. [2] As a qualitative challenge facing education, there is a shortage of teaching staff able to provide education and research in fields the market needs (business administration, IT, computers). Lecturers and researchers must be trained and developed, and curricula must be improved.
- Challenges facing higher education in Japan: [1] Numbers of university applicants are leveling off due to the declining birthrate. Universities will be competing increasingly fiercely for survival. [2] When national universities are turned into independent administrative entities in 2004, they will have to secure sources of funds for the shift to a self-supporting system. [3] Greater international competitiveness in levels of education and research.

(2) Suggestions

- Change of perspective: Japanese universities need to shift from an attitude of assistance to universities in developing countries to cooperation and collaboration between both sides and industry.
- The role of donors: Development of the international environment for inter-university collaboration and university-industry cooperation is one of the options for assistance. (Figure A-1, the details are examined in SADEP). Thus it would be effective to move on from support directed exclusively to universities in developing countries, and mainly in the form of ODA, and devise cooperative policies that involve Japanese universities and industry.

Appendix [2]: The Current Situation and Challenges in the Education Sector - Towards Independent Development of Four Southeast Asian Countries (Summary)

1. Purpose and Background

Socio-economic progress in Southeast Asia has brought changes in industrial structures, and changes in the type of human resources sought. This study aimed to investigate the issues and challenges in the education sector in four countries, Thailand, Vietnam, Indonesia and Malaysia, and at the same time, to investigate effective human resources training policies for each country's development, with reference to industrial structures and labor market needs. The study also examined how JBIC, and by extension Japan, should provide assistance.

2. Study Method

This study examined each of the target counties, and conducted a comparative examination across the four.

The first part examined the future needs and direction based on the historic progress of the establishment of modern education, the state of education at each academic level and related development plans. The second part examined the current situation from three aspects:

(1) Access/ Equity: Access for students and fairness between them (in university enrolment etc.).
(2) Quality: the quality of educational services (of curriculum content, teaching staff etc.).
(3) Management: Administration and financing of education.

A comparative study was based on classification of school education types, and their suitability towards different industrial structures, and other aspects in a framework of educational and sociological research.

The information for this study was mainly gathered through research into existing publications and documents, and through interviews. For Thailand and Vietnam, there was an interview survey of related government agencies, mainly concerning broad government policies. For Indonesia and Malaysia, there was no field study, and the study relied on existing secondary documents, which meant that the quantity of information was undeniably smaller than for Thailand and Vietnam.

This study was not intended to verify a hypothesis, but rather to define future scenarios for human resources development needs. As such, the conclusions are suggestions based on qualitative findings of the investigation.

3. Study Findings

See Table A-3 (summary of challenges in each country at each educational level).

4. Conclusions (suggestions)

This study yielded the following suggestions for human resources development policies and key fields:

(1) In cases where the industrial structure is dominated by labor-intensive industries - Emphasis on basic education (elementary and lower secondary).
(2) In cases where industry is in a phase of rapid progress, centered on manufacturing - Secure an adequate volume of personnel with some degree of technical skills from secondary education and occupational training, and develop systems for transferring smoothly from educational institutions to the labor market (such as the group hiring used in Japan's high growth period).
(3) In cases where the industrial structure is shifting to dominance by knowledge-intensive industries - Shift the emphasis to higher education.

(However, due care should be placed on the following points):

- Assistance for primary and secondary education - Unless care is directed towards regional disparities (urban and rural, remote areas etc.) and differences in social environment in both access and quality, assistance will result in greater disparities.
- Assistance in higher education and occupational training - Even if national and regional governments are capable of establishing policies and assistance in these areas, it will not be sustainable unless the operational stage is considered and schemes are adopted that can bring in private sector funding. The content of assistance and policies should include joint programs.

Table A-3 Summary of Challenges for the Four Studied Countries

- Left column for each item: ●: Urgent problem, △: Problem that should be solved in the medium term, –: No problem or a problem that should ideally be solved in the long term.
- Right column for each item: Main challenges.
- The "*" marked on the right of the education level indicates mandatory education.

Country	Educational level	Access/Equity: Problems of access and equity for the recipients of education (school enrollment situation etc.).		Quality: Quality of the educational services provided (quality of curriculum content, teaching staff etc.).	
Thailand	Pre-school education	△	Close to full school enrolment has been achieved. Education reform moves towards full access to preschool education, built around education systems rooted in local society.	—	(Not examined)
	Primary education*	—	Close to full school enrolment has been achieved.	△	• Establishment of a qualification system for teaching staff. • More English language teaching staff. • Development of a scholastic aptitude test system.
	Secondary education	●	Response to rapid growth in school entry (Education reform makes education mandatory up to lower secondary education, and education to upper secondary is made free of charge).	△	• Establishment of a qualification system for teaching staff. • More English language teaching staff. • Lack of work aptitude among graduates.
	Higher education	●	• School enrollment rate is approximately 25% (mass enrollment level). • The number of students completing secondary education is expected to double by 2005. In addition to expansion of facilities at existing universities, there is a need for development and more teaching staff in community colleges and similar institutions.	●	Maintenance of levels of education and research at 24 state universities through university reorganization (including budgets and staff allocations).
	Occupational training	△	Access to one year of free occupational training is being expanded for those who have graduated from secondary education. Facilities must be developed and teaching staff numbers increased to expand capacity.	●	• Retraining of staff. • Curriculum reform. • Establishment of an ability-based examination system.
Vietnam	Pre-school education	△	77% enrollment rate. Expansion centered on metropolitan areas.	—	(Not examined)
	Primary education*	●	• Close to full school entry has been achieved. The enrollment situation must be improved among minority peoples and in geographically difficult regions. • Over 90% of the elementary schools operate on two shifts due to limitations on the capacity of the facilities. A switch to a the full-time system is under consideration.	●	• More flexible curricula: The system will be changed to one where the central government sets the core, and regional governments and schools set the details to suit local conditions. • Development of a scholastic aptitude test system.
	Secondary education	●	• Enrollment rate was 82% for the lower secondary and 45% for the upper (2000). • One lower secondary school for each commune and one upper secondary school for each district must be built.		
	Higher education	△	• School enrollment rate is approximately 10% (elite enrollment level). • Revision of the entrance examination system: A change is under consideration from entrance examinations at individual universities to a single nationwide system, which would expand access and reduce costs for entrants (follow-up is needed for propriety of the system revision).	●	• Securing the quality and number of teaching students: To accommodate widening access and the changing social needs (management and IT-related fields etc.) that accompany the Doi Moi Policy.
	Occupational training	△	Expansion of facilities: Many want to enroll, but the capacity of the facilities is falling short.	△	• It is difficult to renew facilities and equipment. • Cooperation with companies: To secure sources of funding and match training content to market needs. • Increased numbers of teaching staff and retraining: To meet the growing numbers of students and changing technical needs.

	Management: Management and finance administration of education (education budgets, school management etc.)	Points to note and ODA loan needs	Common issues across the sector
●	• The keys to success or failure for decentralization policies in education reform are the establishment of regional financial support schemes and the abilities of local governments for educational administration. • Securing budgets to raise the levels of pay for teaching staff.	• For quality enhancement, improvements through systematic reform by the Thai government are needed first, and there is no need for ODA loans at present.	• The status of measures to be implemented under educational reform (based on the National Education Act 1999 enacted in 99 and now in preparation for implementation from October 2002) must be watched closely. • Follow-up of the state of reorganization of education-related and employment-related ministries and agencies is required. • An unemployment insurance system should be established to give workers who have completed secondary education and found jobs but been made redundant the opportunity for re-education.
●	• Education reform will make education free of charge until upper secondary school. Therefore the issues are whether an adequate education budget can be obtained, and whether the financial management abilities of local governments are adequate. • Securing budgets to raise the levels of pay for teaching staff.	Educational reform will bring in rapid increase in access first to lower secondary education. Upper secondary education is also expected to expand gradually, so facilities and staff must be expanded urgently, in that order of priority. If there is a need for ODA loans, it would occur when educational reforms make steady progress and access expands rapidly.	
△	• Securing financial resources for expanding facilities and staffing to accommodate increasing student numbers entering higher education. • It is important to secure autonomy (authority over personnel, organization and finances) for the 24 state universities, as a measure to secure levels of education and research.	The rapid increase in lower secondary school enrollment due to educational reform is expected to be followed by an increase in students advancing to higher education. Therefore facilities and staff will have to be expanded. If there is a need for ODA loans, it would occur when educational reforms make steady progress and access expands rapidly, but later than the need for loans to secondary education.	
△	• Cooperation with employment-related ministries and agencies. • Lack of funds to replace training equipment: Cooperation with companies should be reinforced through joint programs, to secure funding sources not dependent on public subsidies. • Functional and dynamic linkage to market needs: An information station system must be built.	• ODA loan support will be needed in fields where sustainability can be secured, such as the building of information networks to encourage cooperation with the private sector. • When the system of one free year of occupational training after secondary school graduation takes root, the related facilities will have to be expanded. However, as a precondition, systems will have to be in place to link training to employment after graduation.	

△	Review of financial resources and budget allocation in central and regional governments to secure budgets for education.	–	• Overall improvement is necessary in administrative and fiscal systems. One particularly prominent problem is the vertical division between departments within the Ministry of Education and Training. Is the Planning and Finance office the contact point between the MPI and the Ministry of Education and Training when providing assistance? (The sub-sector authorities are not well coordinated with other departments and agencies, and the International Relations Department only has coordination functions, with no decision-making authority). • The "Educational Development Strategy for 2010" must be monitored to see whether it maintains consistency between CDF and CPRGS. • The World Bank, ADB, UN agencies and many bilateral donors are involved, so coordination between donors is important.
		• JICA has drawn up a master plan (completed in March 2002). • If it is realistic to move from grants to ODA loans as the solution proposed by development studies for major problems, that could be requested in future. When providing assistance, would it be effective to use projects specialized for poor regions with the secondary aim of strengthening the administrative abilities of local governments as the executing agencies?	
		• The ADB has prepared a master plan. • If assistance is provided, in the same way as for primary education, would it be effective to use projects specialized for poor and remote regions with the secondary aim of strengthening the administrative abilities of local governments as the executing agencies?	
△	• Preparation of education statistics: The situation must be monitored to provide information for future policy debates. • Cooperation with the private sector: There is an absolute public budget shortage. Future revisions of budget allocations will emphasize primary and secondary schools, so consideration must be given to joint programs and other measures as funding sources.	Now, while developments to expand secondary education and occupational training are unready, caution is necessary in assistance for higher education.	
●	• Cooperation with employment-related ministries and agencies (MOLISA etc.): To implement a comprehensive human development policy including other education sub-sectors. • Cooperation with regional governments: Government is now highly centralized. For geographical coverage and to encourage cooperation with local industries.	• Fields that are directly affected by the market expansion caused by Doi Moi Policy. Now that state-owned enterprises are moving towards privatization, cooperation with the more numerous and expanding companies must be reinforced urgently. • Grant aid is appropriate for the provision of equipment and materials, but if ODA loans are needed, the facilities for occupational training schools should be expanded and an information system should be built for organic cooperation with companies.	

Country	Educational level	Access/Equity: Problems of access and equity for the recipients of education (school enrollment situation etc.).		Quality: Quality of the educational services provided (quality of curriculum content, teaching staff etc.).	
Indonesia	Pre-school education	△	Expanding in urban areas. (Private institutions are more numerous).	—	(Not examined)
	Primary education*	△	• Regional disparities: Full school enrollment has almost been achieved (the enrollment rate is over 100%), but the enrollment situation must still be improved in some areas that suffer geographical difficulties. • Lack of school facilities: Many elementary schools operate on two shifts due to limitations on the capacity of the facilities.	●	• Textbooks: Textbooks are to be distributed free of charge, but distribution is incomplete in practice. • Quality of teaching staff: Many staff members do not satisfy the teaching staff qualifications that were revised in the 1990s.
	Secondary education*	●	• Regional disparities: The overall school enrollment rate is rising (72% for lower secondary and 39% for higher secondary education), and lower secondary education has been mandatory since 1994, but there are serious regional disparities and full enrollment has not been achieved. Regional disparities are even greater at the upper secondary education stage.	●	• Curriculum flexibility: The system does not allow regional governments and schools the flexibility to suit local conditions.
	Higher education	●	• School enrollment rate is approximately 14% (elite enrollment level). • Facilities do not satisfy the need for geographical coverage.	●	• Quality of teaching staff: Few have master's or doctorate degrees, or knowledge and experience of management. • Matching of educational content and programs to social needs: Few students major in engineering subjects, and beyond that there are few universities where it is even possible to study computer science. The reason is the shortage of staff able to teach those subjects.
	Occupational training	△	Lack of facilities: Students enrolled at occupational colleges (equivalent to upper secondary education) are approximately 55% of enrollment to normal high schools. Facilities are unable to accommodate the growing student numbers. Polytechnics and academies, which are equivalent to higher education, do not satisfy needs for geographical coverage.	△	• Lack of funds: It is difficult to renew facilities and equipment. • Cooperation with private companies: Necessary to match training content to market needs. • Increased numbers of teaching staff and retraining: To meet the growing numbers of students and changing technical needs.
Malaysia	Pre-school education	△	• Mainly spreading in urban areas. The overall national enrollment rate is approximately 70%.	—	(Not examined)
	Primary education	—	• Primary education has almost reached full enrollment, with no disparities between ethnic groups.	△	• Curriculum flexibility: Curricula are now uniform for all ethnic groups. The system should be changed to one where the central government sets the core and regional governments and schools set the details to suit ethnic and regional conditions.
	Secondary education	—	• Neither upper nor lower secondary education are mandatory, but enrollment rates are high (lower: 85%, upper: 73%).	△	• Curriculum flexibility: (as for primary education) • Impact of the emphasis on IT and English: The importance of English has been growing since the 1990s as the language of economics, including the IT field. The position of the Malay language for ethnic Chinese and Tamils, end the impact of softening the Bumiputra policy should be considered. At present, elementary school graduates of Chinese and Tamil ethnicity are required to go through one year of preparatory education before entering secondary education, but that policy is likely to be reviewed soon.
	Higher education	●	• School enrollment rate is approximately 20% (mass enrolment level). • Lack of facilities: The establishment of private universities has been permitted since 1996, but new universities have not kept pace with the rapid rise in applicants. Expansion would be particularly desirable for agencies and programs in the natural sciences.	●	• Teaching staff problems: There is a shortage of staff able to teach in fields such as management and IT, which have become necessary in the market. The shortage is both cause and effect of the "brain drain". • Maintenance of the quality of education and research: Since a number of higher education-related laws came into effect in 1996, many new institutions have opened, but the challenge is to maintain a certain level of standards in education and research.
	Occupational training	△	• Numbers of students enrolled to occupational training institutions, which are equivalent to upper secondary education, are approximately 12% of the numbers enrolled to normal high schools. The overall shift to more advanced education means that the stage when students diversify towards fields of employment is gradually getting later. The polytechnics, which are equivalent to higher education institutions, should be expanded.	△	• Lack of funds: It is difficult to renew facilities and equipment. • Cooperation with companies: To secure sources of funding and match training content to market needs. • Increased numbers of teaching staff and retraining: To meet the growing numbers of students and changing technical needs.

	Management: Management and finance administration of education (education budgets, school management etc.)	Points to note and ODA loan needs	Common issues across the sector
●	Response to decentralization policies: Since January 2001, administrative and financial authority over primary and secondary education has been transferred from central government to regional (district) governments. These are the challenges to avoid expanding regional disparities in the capacities of local governments: (1) Clarifications of the support functions of central government during the transition period. (2) Reinforcement of the fiscal powers of local governments. The administrative abilities of local governments control whether the aims of "school-led management" and "community participation", as stated by the government, are promoted.	– • The progress and impact of the decentralization policy must be considered carefully as a general factor in assistance for primary and secondary education. • JICA has carried out a development study (REDIP) aimed at regional development assistance for lower secondary education (Phase II is now under way). • If there is demand for ODA loans to include construction of school buildings, such construction for primary and secondary schools would be effective if targeted on poor regions, and if the local government was the made executing agency with the aim of strengthening its financial and administrative abilities. For upper secondary education, it would be effective to provide assistance once the regional disparities in lower secondary education have been closed to some extent. • Assistance comes from many donors, including the World Bank, ADB and AusAID, so coordination between donors is important.	• The target regions and content of assistance must be carefully considered to avoid expanding regional disparities. • There have been repeated periods of political instability and social unrest since the second half of the 1990s, so the authorities must take care to adopt consistent development policies.
△	Implementation of "new paradigms": (1)Autonomy, (2) Accountability, (3) Accreditation, (4) Evaluation.	Considering social needs, assistance is required to expand higher education in engineering subjects. At that stage, the content of the project should look forward to the operation stage and allow joint operation with private sector funds, rather than planning to rely on public funds for all maintenance, operation and management.	
△	Cooperation with the private sector: Overcome financial restrictions by inviting company staff to lecture and carrying out joint practice sessions using the facilities and equipment of private companies.	• Industry is still mainly labor intensive, so assistance should be provided for the expansion of occupational training (occupational high schools) as upper secondary education. • In the same way as for higher education, measures must be devised to use private sector funds to supplement funding at the operational stage.	
—	None worth noting	(There is no apparent need for foreign donor assistance for pre-school, primary and secondary education).	• The influence of the Bumiputra Policy on educational policy must be considered. The content of assistance should be devised to respect the wishes of the government without supporting any one ethnic group. • For Malaysia, which is at the point of moving beyond developing country status, public assistance programs for the education sector should serve a pump-priming effect for attracting private-sector funds.
△	• Development of evaluation systems to secure levels of education and research. • The Bumiputra policy and the "brain drain": Ethnic Chinese citizens tend to study abroad to learn English and the latest science and technology, and then stay abroad. The Bumiputra Policy has a significant impact. • Cooperation with the private sector: Even though a substantial share of the government budget is allocated to higher education, the absolute amount of the public budget is inadequate. Measures for cooperation with private companies, including foreign ones, must be considered as a way of securing funding.	Assistance is needed to expand higher education institutions in natural science fields. At that stage, the content of the project should look forward to the operation stage and allow joint operation with private sector funds, rather than planning to rely on public funds for all maintenance, operation and management.	
△	• Securing sources of funding that do not rely on public funds: Including cooperation with private companies.	Even when support from foreign donors is directed to a specific technical field, now that there is mass access to institutions of higher education, it is more sustainable to assist universities and graduate schools engaged in research and development in natural sciences, rather than assisting occupational training institutions, because the university-level work underpins the scientific fields.	