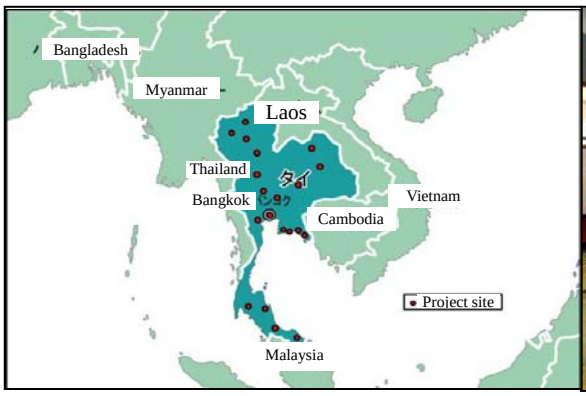
Thailand

Strengthening Vocational and Technical Manpower Production Program

Field Survey: June - August 2003

1. Project Profile and Japan's ODA Loan



The twenty technical colleges and the Staff Development Institute (SDI) that benefited from the project.

Practical training at Nakhon Si Thammarat Seaboard Industrial College

1.1 Background

Thailand's economy expanded rapidly, starting the latter half of the 1980s stimulated by direct investment from overseas. As the industrial level rose, the demand from industry for technicians increased. There was a particularly striking increase in the demand for mid-level technicians to work in industry. However, most of the job training facilities were not able to provide adequate education for mid-level technicians to meet the needs of the changing industrial sector due to their outdated curricula, lack or antiquation of educational facilities, and difficulty in securing and training good-quality instructors.

Thailand's Seventh Five-Year Plan for Economic and Social Development aimed for quantitative expansion and qualitative improvement by placing emphasis on the development of human resources, particularly in the fields of science and technology, and by increasing the number of mid-level technicians from 141.5 persons per 10,000 of population (1992) to 221.5 persons per 10,000 of population (1996).

.Given these circumstances, the Thai Ministry of Education's Department of Vocational Education (DOVE) attempted to improve the quality of job training by establishing new technical colleges under its purview, enhancing educational equipment, and providing funds and technical expertise to support retraining for instructors, thereby boosting the educational system's ability to supply mid-level technicians.

1.2 Objectives

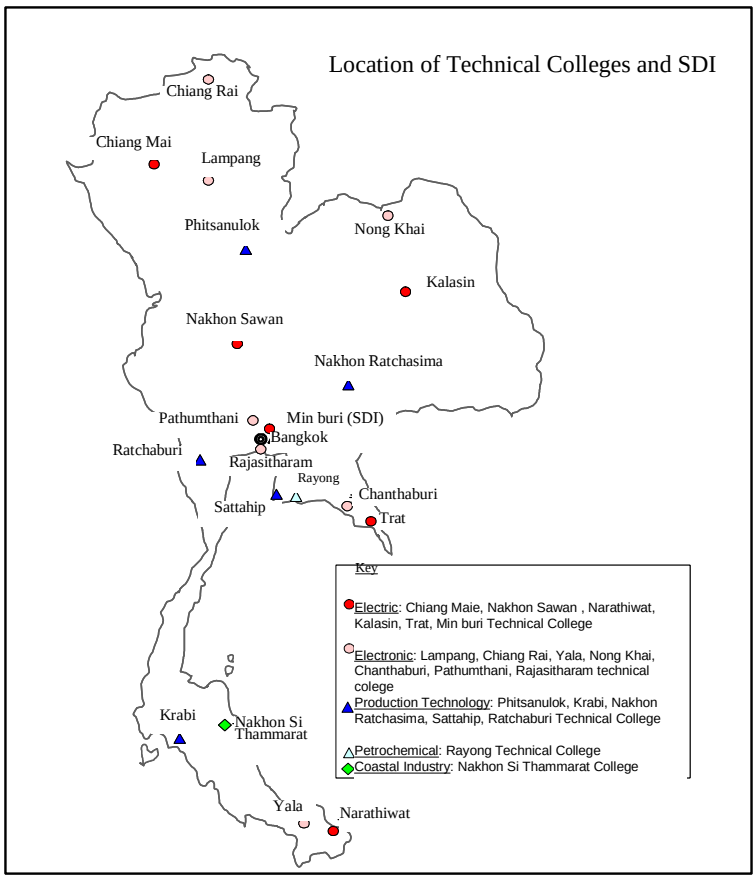
The objective is to expand the supply of mid-level technicians who possess adaptability and capabilities fitting the technological level of the increasingly advanced industrial sector by expanding the job training capabilities of technical colleges under the purview of the Department of Vocational Education.

1.3 Output

A. Educational equipment (at 20 technical colleges[1] (electric, electronic, production technology, petrochemical, and coastal industry fields) and at the Staff Development Institute (SDI)

B. Construction of buildings at 7 schools[2] (1 school newly established, 6 schools expanded)

C. Instructor training (training of 180 persons domestically and 16 persons overseas)



1.4 Borrower / Executing Agency

Thai Government / Department of Vocational Education (DOVE)[3]

1.5 Outline of Loan Agreement

Loan Amount / Loan Disbursed Amount	7,806 million yen / 7,226 million yen
Exchange of Notes / Loan Agreement	September 1994 / September 1994
Terms and Conditions - Interest Rate	3.0%

[1] Chiang Mai, Nakhon Sawan, Narathiwat, Kalasin, Trat, Minburi, Lampang, Chiang Rai, Yala, Nong Khai, Chanthaburi, Pathum Thani, Rajasitharam, Phitsanulok, Krabi, Nakhon Ratchasima, Sattahip, Ratchaburi, Rayong, Nakhon Sit Thammarat.

[2] Newly established: Nakhon Si Thamamarat, Expanded: Lampang, Nakhon Ratchasima, Rayong, Chanthaburi, and Staff Development Institute.

[3] As stated below in the section on sustainability, the name of DOVE was changed in July 2003 to the Vocational Education Commission (VEC). However, at the time of this writing in August 2003, the reorganization is still ongoing. In this report, the said organization shall be referred to as DOVE.

- Repayment Period (Grace Period) - Procurement	25 years (7 Years) General Untied
Final Disbursement Date	January 2002

2. Results and Evaluation

2.1 Relevance

Thailand's Seventh Five-Year Plan for Economic and Social Development, which was in effect at the time of the project, aimed for quantitative expansion and qualitative improvement by placing emphasis on the development of human resources, particularly in the fields of science and technology, and by increasing the number of mid-level technicians from 141.5 persons per 10,000 of population (1992) to 221.5 persons per 10,000 of population (1996). So, the relevance of this project, which endeavored to expand the quantity and improve the quality of mid-level technicians, was high. Today as well, the project is consistent with the "human resources development in the education and technical fields" in the Ninth Five-Year Plan for Economic and Social Development (2002-2006), and the project's relevance is maintained.

2.2 Efficiency

2.2.1 Output

The installation of educational equipment and the school building construction were implemented according to plan. With regard to instructor training, the plan was to train 180 persons domestically and 16 persons overseas, but actually the number increased to 589 persons[4] domestically and 17 persons overseas. According to DOVE, this was to provide complete training for instructors in every field with the budget of the executing agency.

2.2.2 Project Period

The project was scheduled from September 1994 to December 1998, a period of 52 months, but it extended to 89 months, from September 1994 to January 2002, a delay of approximately 3 years. The main reason for the delay was the time required to receive approval from the instructors regarding selection of the equipment. The delay was also due to the fact that, since equipment was procured from various companies in multiple countries, coordination of the shipment and installation of equipment was complex, and the shipment and installation of equipment fell behind schedule.

2.2.3 Project Cost

The planned project cost was originally 10,128 million yen (equivalent to 2,482 million bahts), but the actual project cost was 8,377 million yen (equivalent to 2,530 million bahts), a decline of approximately 17% from the appraisal on a yen basis. The main reason for the lower project cost was the fact that the devaluation of local currency exceeded the rate of inflation.

2.3 Effectiveness

2.3.1 Usage of Equipment

[4] The targeted number of persons in the original scheme under consulting service of the projects was 359 persons out of 589. The rest were dealt with by domestic currency

According to a study by JBIC[5], the operation time of all equipment was 19 hours per week on average, and overall, the operation time was satisfactory.

Also, in the interviews implemented at the schools involved in this project (responses received from 17 out of 20 schools) and at SDI concerning usage of the equipment, responses showed that over 70% of the equipment is employed at high level of usage at all technical colleges and SDI that responded.

However, there are some items of equipment that are not frequently used, and the following reasons were given.

1) The course that uses the given equipment was cancelled because of changes in demand for human resources in the industrial sector.
2) Personnel who had the necessary technical expertise for using several electronic-related pieces of equipment and CIM (computer-integrated manufacturing) were lacking.
3) The technological level of the computer CPUs and the software became outdated.
4) Operation and management were inadequate due to both lack of technical knowledge and the difficulty of procuring parts locally, and so usage became difficult.

2.3.2 Contribution to Improvement of the Quality of Technical Education

The kind of contributions and the extent of contributions made by this project's equipment to the education of "mid-level technicians who have capabilities fitting the technological level in the industrial sector and who are adaptable" are evaluated from the standpoints of (1) completeness of the course content at each technical college, and (2) improvement in the quality of students.

(1) Enhancing the Course Content at Each Technical College

Looking at the responses of students and instructors to the questions concerning the equipment in this project, the introduction of the equipment is highly appreciated as having made the equipment more complimentary to the curriculum, and students and instructors recognized that the consistency between the equipment and the course content was improved (Tables 1 and 2).

Table 1: Student Evaluations of Equipment Introduced

Item	Electric	Electronic	Production Technology	Petrochemistry	Shipbuilding	Overall
Complementariness of Equipment and Curriculum	4.2	4.2	3.5	3.5	4.0	4.2
Existence of Functional Difficulties with Equipment	4.1	3.8	4.0	3.3	4.0	4.0
Consistency of Equipment with Course Content	4.1	3.9	3.8	3.9	4.0	3.9
Ratio of Equipment to Students	3.9	4.0	3.4	3.5	3.9	3.8
Technical Advancement of Equipment	4.4	4.2	3.8	4.2	4.2	3.8

Note: Questionnaires were sent to students at 20 technical colleges, and responses were received from 1,912 students. Key: "1" = very much disagree; "2" = disagree; "3" = neutral; "4" = agree; "5" = very much agree.

[5] This study was targeted at 6 groups of people comprising instructors, students, college administrators, parents, graduates, and employers through questionnaires and telephone interviews. As a consequent, answers from 240 instructors, 1,912 students and each administrator from the 20 colleges, and from 401 graduates, 454 parents and 70 employers were obtained.

Table 2: Instructor Evaluation of Equipment Introduced

Item	Electric	Electronic	Production Technology	Petrochemistry	Shipbuilding	Overall
Complementariness of Equipment and Curriculum	4.4	4.2	3.8	4.2	4.2	4.2
Coordination of Equipment with Market Demand	4.1	3.9	3.8	3.9	4.0	4.0
Usage of Equipment	4.2	4.2	3.5	3.5	4.0	3.9
Ratio of Equipment to Students	3.9	4.0	3.4	3.5	3.9	3.8
Technical Advancement of Equipment	4.1	3.8	4.0	3.3	4.0	3.8

Note: Questionnaires were sent to instructors at 20 technical colleges, and responses were received from 240 instructors.
Key: “1” = very much disagree; “2” = disagree; “3” = neutral; “4” = agree; “5” = very much agree.

To summarize the results of the latest study implemented at each of the schools that benefited from this project, it is pointed out that the following changes occurred accompanying the introduction of equipment by this project.

1. Improvements in Instruction Methods and Convenience

It is reported that, due to the implementation of this project, instructors can now teach their classes effectively and efficiently, and at the same time, it is easier for both students and instructors to prepare for classes. The technical colleges value the fact that they can adopt more effective teaching methods since adequate equipment has been secured for the students. They also value the fact that it is easier to teach students skills related to usage of the new equipment. (see examples below).

- Example of Change in Instruction Method

Nong Khai Technical College (electronics field)

Prior to receiving equipment through this project, the school had equipment that was inappropriate for teaching and partial sets of equipment. Since the instructors had to borrow and lend equipment among practical training classes and specialized courses, an extremely long time was required to finish teaching practical training. However, the convenience of practical training classrooms improved because new equipment was provided by this project, and all of the classrooms and equipment for practical training were installed in one building.

Rayong Technical College (petrochemistry field)

Prior to this project, there were only two usable classrooms for practical training for 240 students, and since there were not enough tools and equipment, the students were forced to share equipment, materials, and tools in all practical training classes. It was necessary to hold classes on weekends as well so that all students could use practical training classrooms. However, new practical training classrooms and equipment were provided through this project, increasing the opportunities to learn by using the equipment directly and increasing the opportunities to use different types of equipment. Also, instructors state that since there are now more practical training classrooms, they are able to prepare for classes in the practical training classrooms prior to their scheduled classes.

2. Establishing New Curricula and Courses

.New curricula have been established due to the procurement of advanced equipment by this project. It is pointed out that, due to the new curricula, students have more chances to become acquainted with new technology and acquire knowledge. It is also reported that the new equipment has contributed to expansion of the educational curricula’s content and course breadth, and moreover,

to the creation of courses at the college level (i.e. bachelor degree level) (see examples below).

- Example of Creation of a New Course

Rayong Technical College (petrochemistry field)

As a result of receiving the equipment procured through this project, the college was able to utilize this advanced equipment and create a "Rubber Polymer Technology Course" to promote the development of the rubber industry, which is a local industry.

Ratchaburi Technical College, Lampang Technical College (production technology field)

The miniature model CIM which is used in order to demonstrate all production processes in manufacturing was useful in improving the curriculum. (However, at the time of this study, Ratchaburi Technical College had only used the CIM once because the procedure was complex for receiving approval from DOVE for a new curriculum that uses the equipment. In the future, the college is planning to establish a bachelor level course, and this course will further promote usage of the equipment, according to the college.)

Example of Creation of a College-level Course

Nakhon Si Thammarat Seaboard Industrial College

Because equipment was procured through this project, an ocean technology course at the Bachelors' level was created starting in FY2003. This course was established with the cooperation of Nakhon Si Thammarat Seaboard Industrial College and the Royal Thai Naval Training Center.

3. Acquisition of Practical Technology

The assessment was frequently expressed that the project enabled students to strengthen their practical abilities by providing equipment for use at the schools that is similar to that actually used by industries. In the questionnaires sent to each school and in the interviews with instructors, students, and DOVE, generally the evaluations were frequently heard that "we are satisfied with the equipments' quality, etc." and "what we learn with the procured equipment can be immediately put into practice and is useful.

- Example of Practical Application

Ratchaburi Technical College (production technology field)

The procured equipment is more advanced than one in other schools particularly in the field of casting, car parts, and wrapping, and hence students can practically learn all production processes with the model equipment for instruction.

(2) Improving the Quality of the Students

When 70 employers were asked to compare graduates of schools that benefited from this project with graduates of other schools, it was evident that the former were more highly evaluated under all criteria, including knowledge, equipment usage skills, and work attitude (Table 3). To summarize the comments of the employers in detail, graduates of schools that benefited from this project are well-perceived, as they (1) are well-acquainted with the basic methods of equipment operation, and learn quickly, (2) convey knowledge to their co-workers, and (3) understand well the details of their duties.

Table 3: Evaluation of Technical College Graduates by Employers

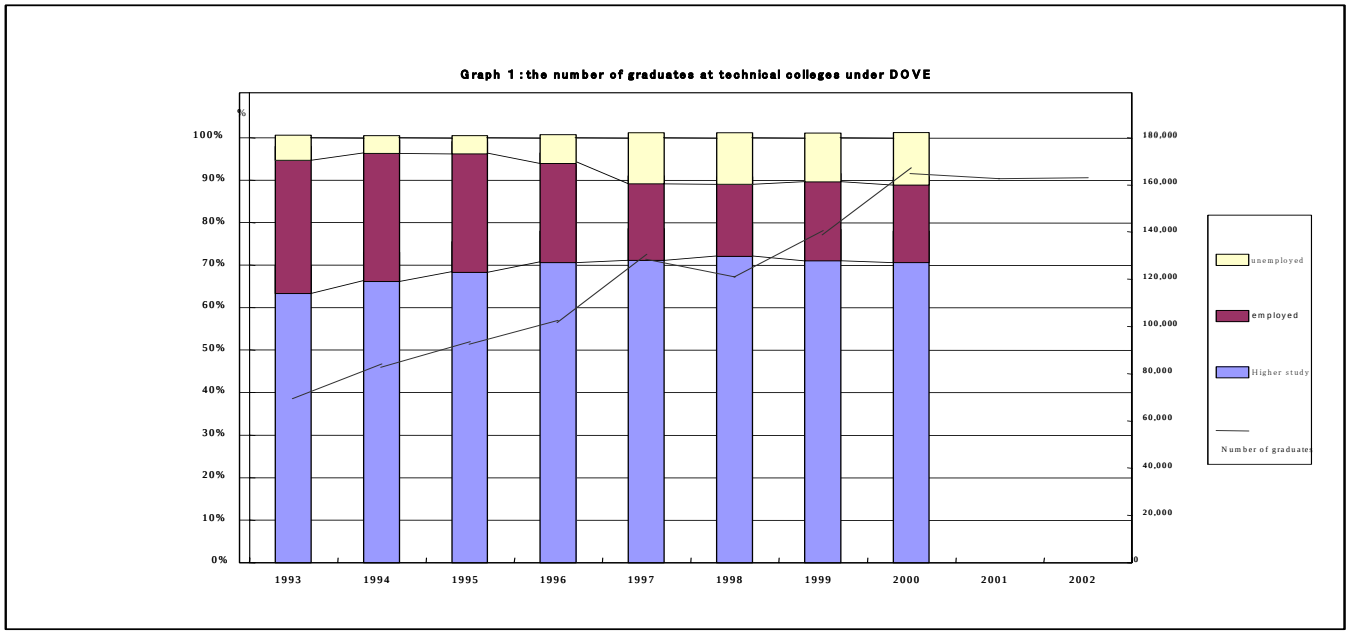
Evaluated Item	Project Colleges	Non-project Colleges
Knowledge	3.6	3.0
Equipment-using skills	3.6	3.1
Work Attitude	3.9	3.5
Average	3.7	3.2

Note: Result of interviews with 70 employers who employed 193 graduates from the schools that benefited from this project between 1998 and 2000. The employers rated their satisfaction with each evaluation item, from "1" = very dissatisfied to "5" = very satisfied.

2.3.3 Trends in Graduate Numbers and Supply of Human Resources to Industry

The number of graduates from all technical colleges under the jurisdiction of DOVE was on the uptrend from prior to this project in 1993 until 2002 (Figure 1). The number of graduates in fields that were supplied by this project from schools that benefited from this project was in the range of 2,700 persons in 1997, and starting in 1998 (excluded 2002 due to unclear data), fluctuated at 3,000 to 3,600 persons annually (Table 4). Following the implementation of this project, there were schools, such as Chiang Mai Technical College and Nakhon Si Thammarat Coastal Industries Technical College, where the number of students increased due to the establishment of new courses, etc., but there were also schools where the number of students decreased, such as Rayong, Ratchaburi, and Nakhon Sawan.

Also, students at all of the schools that benefited from the project are eager to learn, and the dropout rate is low[6]. Many students pursue further education after graduation. Looking at Figure 1, among the paths chosen by graduates, approximately 70% choose to pursue further studies. Of the remaining 30%, 65% find employment, and 35% are unemployed. While college-educated human resources tend to be sought in many fields including petrochemical industry, many students opt for even more advanced education in pursuit of higher salaries. The unemployment figure increases from 1997 onward, but this is believed to be due to the effect of the Asian Economic Crisis.



[6] Dropout rate in Chiang Mai and Nakhon Si Thammarat is about 1%.

Table 4

	1997	1998	1999	2000	2001	2002
Applicants	n.a.	8,239	6,955	7,070	7,364	6,019
Admissions	n.a.	4,934	3,820	4,194	4,544	4,201
Competition	n.a.	60%	55%	59%	62%	70%
Number of students	2,777	3,252	3,662	3,344	3,024	n.a.
Number of total students	10,791	n.a.	10,676	10,430	10,087	10,183

Source : DOVE

2.4 Impact

2.4.1 Increase of Educational Opportunities in Outlying Areas and Promotion of Industrial Investment and Employment

Technical colleges in rural areas are familiar entities to the local people in each area, and they offer local people an opportunity to receive a higher quality of education. For example, Krabi and Nong Khai technical colleges are offering computer skills study programs for local residents and process management study programs for factory personnel. Also, it is reported that since some of the equipment at the technical colleges is more hi-tech than the equipment at the companies, the companies pay a user fee to utilize the equipment at the technical colleges.

Meanwhile, in the latest study, 10 schools out of the 14 that sent valid responses state that investment and employment were promoted and increased in the industrial sector of the provinces where they are located. Four schools stated that investment by foreign-owned companies was promoted.

2.4.2 Other Impact

SDI and the schools that benefited from this project are attracting the attention from neighboring countries. There is a report that students from countries such as Laos and Vietnam have become interested in attending Nong Khai Technical College. SDI is not only contributing to the training of instructors at the technical colleges, but it is also offering opportunities to Thai government officials and neighboring countries (Myanmar, Laos, Cambodia, and Vietnam).

2.5 Sustainability

2.5.1 Executing Agency

(1) Technical Capacity

Equipment manuals are provided. However, it was pointed out that no repair manuals in the Thai language are provided, and moreover, the manuals that are provided contain only basic information.

Also, when equipment usage rate is high, on one hand there are cases where the staff's operation and management capabilities have improved due to frequent usage, on the other hand a tendency for equipment to break due to overuse has been pointed out as a problem. For this reason, DOVE is promoting mutual support (in operation and management technology and in information sharing) among technical colleges in the same region.

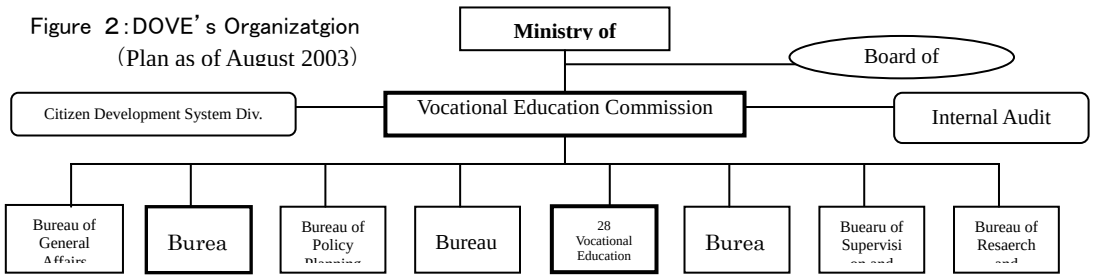
(2) Operation and Management System

Currently, the overall reorganization of the Thai Government and reforms in the educational sector are being implemented. In July 2003, the Ministry of Education merged with the Ministry of University Affairs, and DOVE was renamed the Vocational Education Commission (VEC)

(see Figure 2 for the plan as of August 2003). There are 31 members on the commission, including 15 from private companies so that the opinions of private industry can be incorporated. As part of the reorganization, the SDI is scheduled to be renamed the Bureau of Personnel Competency Development in July 2003, and its functions are to be strengthened under the Vocational Education Commission. For example, the bureau is scheduled to implement a certification test every five years for instructors at all technical colleges and to give instructors who fail the test opportunities for retraining. The number of VEC instructors is to increase from the current 37 accompanying the expansion of its operations.

Also, DOVE (VEC), which had been responsible for the operation and management of all laboratory buildings, has had its authority reduced, and currently each technical college is responsible for the operation and management. In each laboratory building, at least one staff member is assigned as operation and management personnel. In the case of SDI (BPCD), the head of the institute and training section managers carry out operation and management of equipment.

Figure 2：DOVE's Organizatgion
（Plan as of August 2003）



Source：DOVE data

(3) Financial Status

At nearly all the technical colleges and at SDI (BPCD), there are cases where some broken equipment cannot be fixed due to lack of operation and management funds. In the latest study, 8 out of 12 schools indicated that their operation and management budget is insufficient.

As shown in Table 5, the Ministry of Education's budget shows little fluctuation, but DOVE's (VEC's) budget has declined compared to the 1999 level. In the latest study as well, the effects of budget shortfalls on operation and management were pointed out. Meanwhile, the budget allocation system changed following the revision of the education law in 1999, such that the budget allocation is now calculated based on the cost per student. This allows the technical colleges more discretion when deciding budget usage than they enjoyed when the budget was allocated according to item.

Table 5: Budget of DOVE

year	Min of Education (million bahts)	DOVE		
		(million bahts)	increase (%)	% out of budget of Min of Education
1999	151,752.10	11,787.20	-	7.77
2000	159,141.50	10,421.20	-11.59	6.55
2001	160,864.20	9,309.40	-10.67	5.79
2002	162,428.00	9,674.50	3.92	5.96
2003	158,729.80	9,944.90	2.79	6.27

Source：DOVE data

2.5.2. Operation and Management

In the case of equipment with a high rate of usage, a tendency for equipment to break due to overuse has been pointed out as a problem. However, no specific problems are visible.

3. Feedback

3.1 Lessons Learned

None.

3.2 Recommendations

None.

Comparison Original and Actual Scope

Item	Planned	Actual
(1) Output		
1. Educational equipment	-At 20 schools and SDI	As planned
2. Construction of school buildings	-7 schools (1 new school, 6 schools expanded)	As planned
3. Instructor training	180 persons (domestic), 16 persons (overseas)	589 persons (domestic), 17 persons (overseas)
(2) Project Period		
1. Engineering works	September 1995 - July 1997	September 1995 – April 1999
2. Curriculum review/equipment selection	June 1995 – March 1996	October 1995 – March 1997
3. Preparation of equipment list and written specifications	June 1995 – July 1996	October 1995 – September 1997
4. Bidding and evaluations	May 1996 – April 1997	June 1996 – March 1999
5. Equipment shipment and installation	February – August 1997	April 1997 – July 2000
6. Preparation and implementation of maintenance plan	-	June 1997 – July 1998
7. Hiring of specialists for instructor training	June – September 1997	February 1997 – May 1998
8. Domestic training	May 1997 – April 1998	March 1998 – November 1999
9. Overseas training	November 1996 – October 1997	September 1996 – April 1997
(3) Project Cost		
Foreign currency	7,806 million yen	7,226 million yen
Local currency	2,322 million yen (569 million bahts)	1,151 million yen (348 million bahts)
Total	10,128 million yen	8,377 million yen
ODA loan portion	7,806 million yen	7,226 million yen
Exchange rate	1 baht = 4.08 yen (as of May 1994)	1 baht = 3.31 yen (average from 1995 to 2000)

Third Party Evaluator's Opinion on
Strengthening Vocational and Technical
Manpower Production

Dr. Narongchai Akrasanee
Chairman, MFC Assets Management Plc.

Relevance

The project's objectives are consistent with Thailand's needs and priorities.
Thailand's industrialization process is on - going, transforming the economy from an agro – based to more and more industry based. This process of industrialization requires well trained technicians. And the policy of decentralization has resulted in several industrial centers away from Bangkok. Providing equipments to vocational and technical colleges in these centers have made these colleges stronger in terms of their capability in training.

Efficiency

Based on the survey information, the implementation of the project by the executing agency has been found to be satisfactory. The time delay in the project implementation could be partly explained by the project period, which overlapped with the period of a severe economic crisis in Thailand during 1997-1998. This crisis affected not only the economy, but also the government and the entire administration including the program to improve the education system.

Effectiveness

The survey has found that the project achieved a certain degree of effectiveness. But based on the survey information, it is this evaluator's opinion that the effectiveness was still limited. It seems the utilization rate of the equipments for training was very low, partly because of the availability of the trainers, and partly because of the bureaucracy.
To improve effectiveness of such a project in the future the procurement of equipments should be made conditional upon the availability of trainers to be provided by the Thai government.

Impacts

Nevertheless, since 2001 it seems that industries in Thailand have been able to recover very well from the economic crisis. There is relatively little complaint about the shortage of technicians needed. Also the strong growth of manufactured exports, produced from all regions in Thailand, demonstrate high quality of skilled technicians.
This high growth of manufactured exports, averaging about 15 % annually during 2001-2004 taking place in the midst of high competition from products from several low cost countries, could be cited as evidence confirming the strong competitiveness of the Thai workforce.

Sustainability

Recently the vocational and technical colleges have been reorganized into one system called " Rajmongkol Institute of Technology ", with a much more efficient administrative structure. Thus the vocational and technical colleges involved in the project should be able to sustain their training capability, particularly with the equipments provided by the project.
Of course this sustainability could not be taken for granted. The most important issue is about the maintenance of the equipments. As often the case, the bureaucracy in Thailand has not been found to be efficient particularly in the area of equipment maintenance. Every year the Thai government spends a large amount of the budget, acquiring state-of-the-art machinery and equipments. Most of the cases, unfortunately, because of poor maintenance routine, these machinery and equipments could not deliver what they were supposed to deliver.
If possible JBIC should include in the loan program a provision for maintenance expenses for about 10 years. In this case the equipments will be in the condition ready to be used to strengthen vocational and technical manpower production in Thailand.