Indonesia

Development Project of the Institute of Technology in Bandung (II)

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Field survey: September 2004

1. Project Profile and Japan's ODA Loan

Project site location map

Building of the Faculty of Industrial Technology Faculty, the Faculty of Mathematics and Natural Sciences and so on (Lab.Tek VIII)

1.1 Background

Located in Bandung, West Java, the Institute of Technology in Bandung (ITB) and its predecessor, established in 1920, is one of the oldest universities in Indonesia and has the highest academic standard of science and engineering education in the country. In 1994, when the project appraisal was conducted, ITB comprised five faculties, the faculty of mathematics and natural sciences, the faculty of industrial technology, the faculty of civil engineering and planning, the faculty of mining engineering and the faculty of arts and design, had a student body of 11,000 comprising non-degree (diploma), undergraduate, master's degree and doctoral students, and a teaching staff of 1,000.

In the context of economic development, the industrial sector was seen to represent the engine for growth and the government had set a priority on increasing the number of graduates in the natural sciences and on securing engineers for industrial development. As the center for technical education in Indonesia, ITB has produced numerous leading figures in both the public and private sectors, has provided refresher education for university teaching staff nationwide, has advised on national technology policy, and has played a key role in industrial development; however, it was faced with quantitative and qualitative shortages of facilities, equipment and lecturers vis-à-vis student numbers, and was necessitated to improve the internal efficiency of education[1] and to enhance both its undergraduate and postgraduate programs.

[1] This refers to the relationship between the inputs into (incoming students) and outputs from (graduating students) an education system. It indicates the degree of efficiency with which students entering educational establishments graduate within the prescribed curricula framework.

To address these issues, ITB developed a university development master plan in 1988 and began promoting the redevelopment of the campus. On the basis of this master plan, the Japan Bank for International Cooperation (JBIC) implemented the Development Project of the Institute of Technology in Bandung (Phase 1) (approved in 1992), providing support for the development of some of ITB's educational and research facilities. This project is its successor.

1.2 Objectives

This project's objective was to improve the internal efficiency of education, make quantitative and qualitative improvements in postgraduate education and strengthen research activities, through the construction of education and research buildings, the procurement of research equipment, the fellowship program for faculty staffs, and technical assistance for curriculum development at Institute of Technology in Bandung (ITB) in West Java, thereby contribute to development of the human resources that will become core figures in industrial and academic fields, and developing and industrial development in Indonesia through the development and dissemination of technologies.

1.3 Borrower/Executing Agency

The Republic of Indonesia/Directorate General of Higher Education (DGHE), Ministry of Education and Culture

1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	7,353 million yen/7,180 million yen
Exchange of Notes/Loan Agreement	November 1994/November 1994
Terms and Conditions -Interest Period -Repayment Date (Grace Period) -Procurement	 2.6% 30 years (10 years) General untied (consultant component: partially untied)
Final Disbursement Date	December 2002
Principal Contractors (Goods and Services)	PT.SATYAMITRA SURYA PERKASA
Principal Contractors (Consulting Services)	PT.YODYA KARYA, Pacific Consultants International/PT.BITA ENARCON ENGINEERING
Project Identification and Preparation Study (such as Feasibility Study (F/S))	1988: Government of Indonesia (Master Plan) 1992: Loan Agreement for Phase 1

2. Evaluation Results

2.1 Relevance

In view of the fact that the objectives of this project were consistent with Indonesian developmental policies and programs both at appraisal and at ex-post evaluation, thereby confirming the need for its implementation, the plans are considered highly relevant.

2.1.1 Relevance of project plans at the time of appraisal

REPELITA VI (1994-1998), Indonesia's sixth five-year national development plan, advocated growth in the industrial sector through technological development. Moreover, the second long-term development framework for higher education (KPPT-JP 1986-1995) was focused on improving postgraduate education and the provision of refresher education for university lecturers at postgraduate schools with the aim of enhancing the quality of education, including that undertaken in the fields of industrial and academic research.

This project was a high priority undertaking involving improvements in educational and research facilities, the provision of support for lecturers in acquiring postgraduate qualifications and assistance in curriculum development focusing on postgraduate courses at ITB, a center for technical education and development and one of the top academic establishments in Indonesia. Specifically, placing greater emphasis on improving the quality of postgraduate education as compared to the Phase 1 project was also consistent with the policies outlined above.

2.1.2 Relevance of project plans at the time of ex-post evaluation

PROPENAS (2000-2004), Indonesia's national development plan, called for efforts to increase the competitiveness of the industrial sector by promoting science and technology. In higher education program, the third long-term development framework for higher education (KPPT-JP 1996-2005) ,in addition to the improvement in quality of education including industrial and academic research that was worked on in the second development framework, aims to ensure equal opportunity in education and increase contributions of education to society, and take a policy for granting legal autonomy to universities in order to deliver more efficient and effective higher education.

The objectives of this project are consistent with these policies and programs. The importance of ITB in developing human resources and undertaking research in Indonesia's industrial sector remained high at evaluation, thereby confirming the necessity for this project. Added to which, the technical assistance that was provided in connection with ITB's bid to acquire legal entity status as an additional component, is

deemed relevant in that four national universities[2], including ITB, were accredited as separate legal entities ahead of other universities in the country (see “2.5 Sustainability”).

2.2 Efficiency

Actual outputs, project period and project costs were more than adequate in relation to the original plans, and the efficiency of project implementation is thus judged to have been exceptionally high.

2.2.1 Outputs

The outputs planned at the time of appraisal are detailed below. Details for the respective faculties are shown in Table 1.

(1) Building construction work: Construction of education and research buildings of Lab.Tek VII, VIII, IXA, IXB, IXC, and XI, mainly for use by the four faculties of civil engineering and planning, mining engineering, industrial technology, and mathematics and natural sciences, and by the common preparatory program[3], and Science, Technology and Art Center (STAC) as a communal facility for the entire university (Total: 65,865 m^2)[4]; infrastructure development (water supply and sewerage systems, etc.)
(2) Equipment procurement: Procurement of educational and research equipment for the newly-constructed facilities and for some existing facilities.
(3) Fellowship program: Support for 40 lecturers belongs to the above faculties and the faculty of arts and design to study abroad for the acquisition of postgraduate qualifications. The figure breaks down as follows: at Japanese universities, 24 lecturers enrolled in master’s/doctoral degree programs, 9 lecturers enrolled on doctoral programs; at universities in foreign countries other than Japan, 7 lecturers enrolled in master’s/doctoral degree programs.
(4) Consulting services: engineering services (ES): 1,046 man months (MM); project management services (PMS): 300 MM; academic fellowship services: 26 MM.
(5) Technical assistance: Dispatch of experts in operation of higher-education (improving the university operational system), in management of higher-education (improving and developing the university management system, focusing on information systems), and in curriculum development for the subjects. A total 96 experts MM were scheduled to be dispatched.

[2] The other three are University of Indonesia (UI), Gadjah Madah University (UGM) and Bogor Agricultural University (IPB).
[3] Courses studied by all first and second-year undergraduate students.
[4] The plans also included construction work on Lab.Tek X, a Phase 1 project output that was not undertaken.

Japan’s ODA loan covered all the foreign currency costs incurred in the implementation of the aforementioned outputs and some of the local currency costs.

Actual outputs were as follows.

(1) Building construction work: Initially planned outputs were implemented almost as planned. The total floor area of buildings included in the initial plans was 72,444 m^2, or 110% of the target. The Basic Science Center (faculty of mathematics and natural sciences, and so on) and Computer Center and Academic Resources (CCAR) (a communal facility) were constructed as additional facilities.
(2) Equipment procurement: Almost as planned.
(3) Fellowship program: A total 46 lecturers from five faculties studied abroad. The number breaks down as follows: at Japanese universities 2 lecturers enrolled in master’s degree programs, 16 lecturers advanced from master’s degree programs to doctorate programs, and 21 lecturers enrolled in doctorate degree programs; at universities in foreign countries other than Japan 4 lecturers enrolled in master’s and doctoral programs, and 3 lecturers enrolled in doctorate degree programs.
(4) Consulting services: Commensurate with the additional outputs, ES and PMS were respectively extended to 1,837 MM (176% of the initial plans) and 365 MM (122%). The duration of academic fellowship services was as planned.
(5) Technical assistance: The originally planned components were implemented as planned. The expert for higher-education operations provided additional assistance in the legal entity accreditation process and the number of curriculums covered was also increased. Dispatched experts provided a total 102 MM of service.

Table 1: List of ITB Faculties and Departments and Infrastructure covered by the Project (Planned and Actual)

Faculty (current titles)	Department (current titles)	Components covered by Japan's ODA Loan		
		Building/equipment[1] Phase 1: ○ Phase 2: ●	Fellowship program Phase 2	Curriculum development Phase 2 TA (additional outputs are underlined)
Mathematics and Natural Sciences	Astronomy	● (BSC)	●	Astronomy
	Biology	● (XI)		Bioscience, Biotechnology (bioengineering)
	Chemistry	● (BSC))		
	Mathematics	● (VIII)		
	Microbiology	● (VIII)		
	Pharmacy	● (VII)		
	Physics	● (BSC)		
Industrial Technology	Aeronautics Engineering		●	Aeronautics, aviation engineering
	Chemical Engineering	○ (X [2])		Polymer science
	Electrical Engineering	● (VIII)		
	Applied Physics	○ (VI)		Instrumentation, controls
	Industrial Engineering			
	Informatics	○ (V)		
	Material Engineering	○ (VI)		
	Mechanical Engineering			
Earth Sciences and Mineral Technology (Faculty of mining engineering at appraisal)	Geology	● (BSC)	●	
	Geophysics and Meteorology	● (XI)		Geophysics, volcanology, geothermal engineering
	Earth and Mineral Technology	● (XI)		Engineering geophysics, seismology
	Mining Engineering	● (XI)		
	Petroleum Engineering	● (XI)		
Civil Engineering and Planning	Architecture	● (IXB)	●	
	Civil Engineering			
	Environmental Engineering	● (IXC)		
	Geodetic Engineering	● (IXC)		
	Regional and City Planning	● (IXA)		
Art and Design	Fine Arts		●	
	Design			Industrial design
	Socio-Technology			
Common Preparatory		● (VII)	—	
Language Center		● (VIII)	—	
Computer Center and Academic Resources (CCAR)		● (CCAR)	—	
Science, Technology and Art Center (STAC)		● (STAC)	—	

Source: ITB

Note 1): The letters in brackets are the abbreviations for the respective buildings. The numbers given are the building numbers. BSC refers to the Basic Science Center; CCAR to the Computer Center and Academic Resources; and STAC to the Science, Technology and Art Center.

Note 2): Lab.Tek.X was to be constructed under the Phase 1 project, but was built under Phase 2. Its equipment was procured under Phase 2.

2.2.2 Project Period

The project period planned at the time of appraisal was 82 months, or from November 1994 through September 2001. Actual project period for original outputs was as planned. Because of the output additions described above, the total project period was 97 months and the completion date was December 2002.

The construction work and equipment procurement for original outputs were completed one year ahead of schedule due to the early completion of the consultant selection process and well designed time schedule management. The ITB campus is located in Bandung and the buildings were constructed in close proximity to one another with the work being undertaken whilst teaching and lecture activities continued; however, because ITB, the consultants, the contractors and the relevant faculties worked closely together, and the construction, relocation and demolition of multiple buildings were implemented in parallel on the basis of well-laid and flexible work plans, it is thought to come to complete the work ahead of schedule.

Figure 1: Several of the project outputs

Lab. Tek. XI
(Earth Sciences and Mineral Technology, etc.)

Basic Science Center
(Science)

Architecture lab for the Faculty of Civil Engineering and Planning in Lab. Tek. IXB

2.2.3 Project Costs

Actual total project costs were 7,767 million yen against a planned cost of 8,650 million. The reduction is considered attributable to the depreciation of the local currency (Rupiah), which exceeded inflation, and to competitive bidding, which enabled cost-effective ordering.

2.3 Effectiveness

This project's objectives can be three points as follows: (1) to improve the internal efficiency of education, (2) to make quantitative and qualitative improvements in postgraduate education, (3) to strengthen research activities at ITB. Based on information

collected during the field survey, the improvements that have been made in all three points surpass the original targets and project objectives are thus considered to have been achieved. Further, ITB was ranked at 21 in a list of outstanding science and engineering universities in Asia published in the magazine *Asia Week* in 2000[5], which gives some indication of the superior quality of education and research work being undertaken at ITB.

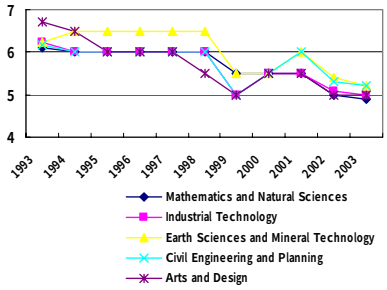
In view of the fact that, depending on the faculty, only some of the departments were covered by the project (see Table 1), and that some departments are being targeted by several university development projects that are either being internally funded or are being funded by the Indonesian government, by other aid agencies, by educational organizations, or by the private sector[6], it is difficult to isolate those effects that are solely attributable to this project. Accordingly, the issues dealt with hereunder should be considered as the outcome of all projects, including both phases of this project that have been implemented on the basis of the university development master plan.

2.3.1 Improvements in the internal efficiency of education[7]

(1) Shortening of years to graduation

The cohort of undergraduate students that graduated in 1993 required 6.3 years to graduate, while master's degree students took an average 3.3 years to complete the program; it aimed to bring these figures down to the prescribed academic terms, i.e. 4 years for undergraduate courses, 2 years for master's degree courses. Despite fluctuations, the time to graduation has decreased in all faculties since the project was initiated[8], and in 2003, the undergraduate average was 5.1 years, while the master's degree average was 2.6 years.

Figure 2: No. of years to graduation (faculty average)



Source: ITB

[5] ITB was the only Indonesian university to make it into the Top 40.

[6] The assistances made by the foreign aid agencies during the time of implementing this project, the World Bank implemented some project of mainly equipment provision (all assistances targeted a number of universities including ITB). Besides these, departments visited during the field survey explained that the Indonesian government and ITB itself were undertaking facilities development and equipment procurement projects, and providing subsidies for research, that exchange students were being accepted by individual universities in Europe, the US and Japan, that funding was being extended to joint research projects, to small-scale facilities development and equipment supply projects and to joint research projects being undertaken by ITB in cooperation with national and foreign companies.

[7] The rate of repetition is frequently used as a representative indicator of educational internal efficiency, but since it was not possible to obtain sufficient data during the field survey, the number of years to graduation was used instead.

[8] The Faculty of Arts and Design was not targeted for building construction and equipment procurement under this project, but the faculty is considered to have received certain benefits since its students utilize the common preparatory program facilities (covered).

Given that there have been higher-than-expected increases in numbers of admissions, enrolled students and graduates in all faculties[9], it may be concluded that more students are graduating and in shorter periods of time.

(2) Increased floorage per student

The floor area of educational and research facilities vis-à-vis student numbers was studied, as this being one of the promotional factors for improvements in internal efficiency. Post-project, the per student area of classrooms has expanded in all faculties. Further, in those faculties that include a large number of departments targeted for building construction work under this project, there has been an increase in the area of lab space available per student. The rates of increase are not high reflecting the higher-than expected increases in student numbers, and the floorage of classrooms (which averages 0.6m^2/student in the buildings covered by the project) does not meet the relevant Indonesian national standard (INS, at appraisal this was 1.5-2m^2/student).

Table 2: Per student floorage

(Unit: m^2/person)

Faculty	Pre-project (1994)		Post-project (2003)	
	Class-rooms	Labs	Class-rooms	Labs
INS	**2 – 1.5**	N.A	N.A	N.A
Sciences	0.3	3.8	0.5	4.4
Industrial Technology	0.3	4.0	0.6	3.0
Earth Sciences	0.3	0.9	0.4	2.1
Civil Engineering	0.7	2.0	1.1	3.6
Arts and Design	1.8	6.2	2.2	1.2

Source: ITB

2.3.2 Qualitative and Quantitative Improvements in Postgraduate Education

(1) Increased numbers of postgraduate students

The university development master plan (revised in 1992) called for the number of postgraduate students enrolled on master's degree and doctoral programs to be increased from 910 in 1993 to 2,000 in 2003. Against this, the total number of postgraduates in 2003 was 3,375, or 1.7 times higher than the target figure[10].

(2) Fewer graduate students per lecturer

It was planned that the number of postgraduate students per lecturer be reduced from 18 in 1994 to 8.4 in 2002; this target was attained in 2000. The Indonesian government

[9] In 2003, there were 10,305 undergraduate and 3,375 postgraduate students enrolled at ITB, with 1,862 undergraduates and 1,080 postgraduates graduating that year. Between 1993 and 2003 the dropout rate fluctuated at around 2-5% of current students, and was showing signs of rising. In passing, the dropout rate is also on the rise at national universities in Japan and findings from a 1998 survey showed it to be around 1.7% (it had dropped to around 1.2% in 1990).

[10] For reference, the number of postgraduate students at a representative, large science and engineering university in Japan is approximately 4,800, which indicates that ITB is delivering postgraduate education on a similar scale. This university has approximately 10,000 active undergraduate students, which is also on a similar scale to ITB.

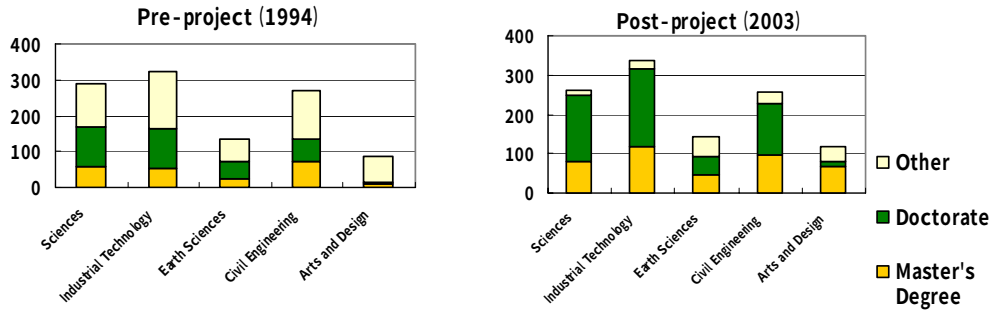
has adopted a policy not to increase in teacher numbers meaning that there was no substantial increase in the number of lecturers at ITB during the project period; however, as detailed hereunder, by increasing the number of lecturers holding master's degrees and/or doctorates it has been possible to increase the number of lecturers capable of advising postgraduate students.

(3) Higher ratio of lecturers with master's degrees and/or doctorates

ITB was aiming to increase the ratio of lecturers with master's degrees and/or doctorates from 50 percent in 1994 to 70 percent in 2003. The proactive implementation of refresher education programs at ITB, including the program provided as part of this project, meant that by 2003 this rate had reached 90 percent, far exceeding the target. The ratio of lecturers with doctorates was 53 percent, surpassing majority. There have been no major changes in the total number of lecturers employed by ITB: 1,105 in 1994 against 1,119 in 2003.

As to the extent of project contribution, between 1994 and 2003 the number of lecturers with either master's degrees or doctorates increased to 450, 10 percent of which studied overseas and obtained their qualifications via this project. Furthermore, as of 2003, 655 lecturers had obtained their master's degrees or doctorates overseas, 7 percent of which participated in the fellowship program provided via this project.

Figure 3: Numbers of lecturers by final academic qualification (Unit: people)



Source: ITB

(4) Number of graduate study programs

In 1994, ITB offered 27 master's degree and/or doctoral study programs; this number had increased to 31 in 2003. Of the four additional study programs (aerospace engineering, astronomy, information science, and oceanography/aeronomy), two[11] are provided in newly-constructed facilities and three[12] were subject to technical assistance,

[11] Astronomy and oceanography/aeronomy. Of the 27 study programs that were already on offer at appraisal, 15 were covered by the construction component of this project.
[12] Aerospace engineering, astronomy and oceanography/aeronomy. Of the 27 study programs on offer at appraisal, four were covered by the technical assistance component of this project.

suggesting that the new buildings, the advanced laboratory equipment procured for ITB and the technical assistance provided through this project encouraged ITB to offer new research areas.

2.3.3 Strengthening of Research Activities

The number of research activities being undertaken by ITB (including both "researches" involving either basic or applied research and "public service projects"[13], results from which are applied and/or disseminated in society by ITB) increased from 340 in 1993 to 434 in 2003[14]. This includes joint projects and funded research involving close to 60 private companies, suggesting that research activities at ITB are being built up thereby enabling the university to make a direct contribution to society through applied research and the provision of services. Faculties visited during the field survey commented on the fact that the expansions to research equipment have made it possible to conduct a wider variety of research.

2.3.4 Internal Rates of Return

The internal rate of return was not calculated at appraisal. For the purposes of this evaluation, an attempt was made to calculate the economic internal rate of return (EIRR) employing the costs and benefits of the Phase 1 and Phase 2 projects. Including costs as (1) the project costs and operation and maintenance costs incurred during both phases, and (2) future earnings from students who did not enter the workforce after graduating from high school and/or university but went on to university and/or graduate school, and benefits as (1) wage growth resulting from larger numbers of graduates, (2) wage increases stemming from longer periods spent in employment (i.e. the reduction in number of years to graduation), and (3) savings on educational expenses stemming from longer periods spent in employment, yielded an EIRR of 11.1 percent[15].

2.3.5 Use of/Satisfaction with Facilities (Beneficiary Survey)

As part of the field survey, a beneficially survey was conducted regarding the use of and satisfaction with ITB facilities; it covered 25 lecturers at ITB, 109 current students, 9

[13] Public service projects indicate consulting and promotional/training activities that are delivered directly to the general public or to the business community; for example, ITB is involved in the design of buildings and various types of equipment and is providing IT training.

[14] This number indicates the research activities that are being implemented via the IPB administrative bureau and does not include those being carried out independently by the faculties/departments.

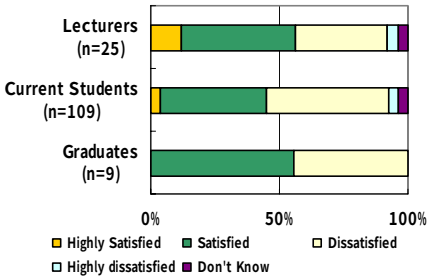
[15] Regarding benefits, only those directly attributable to the project (wage increases and savings in educational expenses among the students who benefited directly from the project) for which information could be obtained during the field survey were factored into the calculation. Some research quantifies indirect benefits (external effects), i.e. the ripple effects generated in society by university-educated individuals (direct beneficiaries), and factors these into IRR calculations, but due to difficulties in identifying and quantifying these indicators they were not employed for this calculation.

students that have graduated since the start of this project and 10 lecturers at other universities[16].

Firstly, asked to name three pieces of educational and/or research equipment that they use on a regular basis, the majority (124 people) of the 134 lecturers and current students at ITB cited computers. Otherwise, almost all respondents pointed to different experimental equipment (microscopes, OHP, spectrophotometers, drawing boards, centrifuges, gas chromatographs, etc.), with 509 devices being named. On use frequency, 30 percent stated that they use the equipment daily, 73 percent that they use it at least once a week.

As to satisfaction with ITB facilities, 56 percent of ITB lecturers, 45 percent of current students and 56 percent of graduates stated that they were satisfied. Reasons given for dissatisfaction with facilities included the failure of some equipment, limited use opportunities, and insufficient quantities of equipment (for details on the current status of equipment/resources, see "2.5 Sustainability").

Figure 4: Satisfaction with ITB Facilities



Source: Beneficiary Survey

2.4 Impact

The higher objective of this project was to contribute to development in the industrial sector through human resource development and the development and dissemination of technologies. As detailed above, ITB has been offering the highest standard of education and research in Indonesia for many years and many of its graduates are leading figures in national development[17]; moreover, the knowledge of its human resources and the outcomes of its research have been and continue to be applied in political and business circles. The qualitative improvements in education and research that were effectuated by this project are considered to have encouraged ITB to make further contributions to national industrial development.

2.4.1 Developing the human resources that will play leading roles in industrial and academic fields

In 1993, the ratio of working adults to master's degree students was 27 percent, but

[16] The breakdown of the respondents is as follows. Lecturers: 7 from Mathematics and Natural Sciences, 9 from Industrial Technology, 3 from Civil Engineering and Planning and 6 from Earth Sciences and Mineral Technology. Current students: 19 from Science, 28 from Industrial Technology, 39 from Civil Engineering, and 23 from Earth Sciences and Mineral Technology. Graduates: 3 from Industrial Technology, 5 from Civil Engineering and 2 from Earth Sciences and Mineral Technology. Other university lecturers: 5 from University of Indonesia Faculty of Engineering, and 5 from the Faculty of Sciences.

[17] Two former presidents and the current minister of education are ITB graduates.

ITB reports that this had risen to 70 percent by 2003. The population of master's degree students includes a considerable number of national university lecturers, thus ITB is contributing to qualitative improvements in education and research at other universities through its refresher education programs for lecturers.

ITB has not collected information on the career choices/movements of its graduates systematically so that it was not able to carry out a follow-up survey. Based on information provided by individual departments, beneficially survey for nine ITB graduates (who graduated between 1997 and 2004 with bachelor's degrees) employed with technical consulting companies was conducted. All respondents stated that they selected their current positions "because the work corresponded to their university major", which suggests that ITB learning is contributing to activities in the technology sector.

2.4.2 Utilization of Research Results in Society

As already mentioned, ITB is involved in numerous research projects, training programs and product development activities in collaboration with national and foreign universities, with research organizations and with private businesses, some of which have been commercialized. Although it was not possible to obtain systematic data on research results that have been put into practical application, the departments visited during the field survey provided the following examples of how the outcomes of research conducted using facilities and equipment developed through this project have been put into use in society. Indonesia Petroleum commissioned ITB to develop engine oil and design the container for it (Chemical Engineering Department, Faculty of Industrial Technology, and Design Department, Arts and Design Faculty); ITB has been involved in the development and marketing of telecommunications equipment and computer software (Department of Electrical Engineering, Faculty of Industrial Technology), and has developed radiopharmaceuticals in collaboration with government organizations and hospitals[18] (Department of Pharmacy, Faculty of Mathematics and Natural Sciences; commercial launch scheduled for 2005), among others.

Figure 5: Engine oil (and container) developed by ITB and sold by Indonesia Petroleum

2.4.3 Other Impacts

(1) Impact of the Fellowship Program

[18] Dr. Hasan Sadikin Hospital, a hospital located in Bandung that was developed using a Japanese ODA loan, is participating in this project.

There are signs that the fellowship program for lecturers has resulted in joint research projects and student/lecturer exchanges with Japanese universities. For example, in a joint program being undertaken by the Department of Geophysics and Meteorology, the Faculty of Earth Sciences and Mineral Technology and Kyoto University, ITB has been received computers and laboratory equipment and has invited foreign researchers to attend summer seminars.

(2) Impact of the Science, Technology and Art Center (Sasana Budaya Ganesa Building)

The Science, Technology and Art Center contains a concert hall, meeting/training facilities and an exhibition space and is used by both ITB members and the general public. Exhibitions on the various departments are visited by numerous local residents and school students on weekends and holidays, and the center is serving to raise interest in science and technology among general public.

Figure 6: The Science, Technology and Art Center

(3) Environmental Impacts

ITB reports that wastewater and solid waste produced in its laboratories are being appropriately disposed of. By way of example, during the field survey it was confirmed that effluent from chemistry department laboratories (faculty of mathematics and natural sciences) is being treated in the neutralizing tank that was installed under this project[19].

The squatters occupied the northern campus (the site of the science, technology and art center, and other facilities) prior to the start of project implementation had moved smoothly by the time of appraisal. There have been no subsequent reports of any specific problems concerning the center facilities and their usage.

2.5 Sustainability

Despite some minor concerns in connection with the operation and maintenance systems at individual departments, broadly speaking, the sustainability of project effects is considered to be high.

2.5.1 Executing Agency

2.5.1.1 Technical Capacity

The operation and maintenance of facilities and equipment that were developed for the use of the ITB community is the responsibility of the administrative bureau, that of

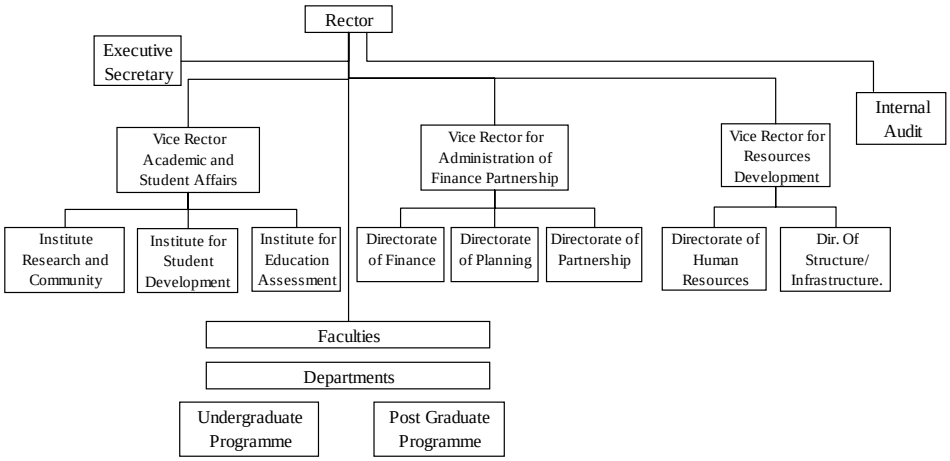
[19] Lab technicians check the acidity and pH of effluent on a daily basis, and any heavy metals removed are outsourced to an external contractor for disposal.

individual faculty facilities and equipment by the respective faculties. Given that the spec of the facilities and equipment corresponds to existing items and that there are many lecturers who have mastered the techniques required to operate advanced laboratory equipment through their overseas studies, there are no particular problems on the technical aspect.

2.5.1.2 Operation and Maintenance System

ITB was accredited as a separate legal entity in 2000 and its budgetary and institutional autonomy has increased as a result. Internal university systems are in transition in consequence of ITB's incorporation, and it was not possible to check up on the operation and maintenance system for facilities after the transition is complete. It will be necessary to monitor where responsibility for the operation and maintenance of facilities and equipment belonging to individual departments falls once the transition process is complete (it currently falls under departmental jurisdiction).

Figure 7: ITB Organizational Chart



Source: ITB

2.5.1.3 Financial Status

ITB's budget comprises subsidies received from the Indonesian government, tuition fees, revenues from research projects and funds raised by the university in the form of donations, etc. Overall, its budget is on the increase, and in 2004 totaled around Rp. 300 billion. Currently, ITB is working to increase university revenues (reviewing tuition fees, increasing its revenues from donations and subsidies, etc.), and the ratio of government subsidies to gross has been gradually declining: from 36.6 percent in 2002, to 30.3 percent in 2003 and 29.5 percent in 2004.

According to ITB, its facilities operation and maintenance budget for 2004 was approximately Rp. 20 billion. This budget is allocated on a priority basis to the operation

and maintenance, repair of communal facilities, and allocation of funds to individual departments[20] are thus not sufficient. The respective departments are making up the budgetary shortfalls through their own efforts[21].

2.5.2 Operation and Maintenance Status

Interdepartmental variability was observed in the operation and maintenance status of facilities and equipment that was developed via this project. Departments in which the operation and maintenance status is good are distinguished by the fact that they are (1) selecting equipment that is easy to operate and maintain (spare parts are readily available, maintenance funds can be generated, etc.) (Department of Chemical Engineering, Faculty of Industrial Technology, etc.), or (2) have devised and are implementing a clear-cut and integrated operation and maintenance plan for the department (Department of Architecture, Faculty of Civil Engineering and Planning, etc.). By contrast, cracks and rainwater damage were observed on the walls of some departments, and some broken down equipment which is difficult to repair because the spare parts are not available in country. There were comments that contracts for maintenance of large equipment and renewal charge for software licenses cannot be renewed because of the high costs involved.

3. Feedback

3.1 Lessons Learned

As seen in the transition of system followed by becoming a fully acting legal entity at IPB, it is believed that the systems employed in operating national universities will diversify as they gain legal autonomy. Accordingly, to ensure the sustainability, it will be necessary to monitor the structural reforms being undertaken by individual establishments and to figure out what operation and maintenance systems are being employed for facilities and equipment.

[20] Budgetary allocations from ITB to the individual departments are generally based on student numbers and teaching hours, and the budget for operation and maintenance of facilities and equipment is not listed. The departments can apply on an as-needs basis for funds to cover the cost of repairs to certain facilities/equipment and for purchases of consumables, such as reagents, but are required procuring the remainder, including routine maintenance expenses, by themselves. According to the administrative bureau, ITB is planning to allocate operation and maintenance budgets based on the scale and type of facilities/equipment belonging to individual departments in the future.

[21] It was explained that when ITB receives money from researches and public service projects, the group of lecturers that carried out the project is reimbursed for direct expenses, while overhead costs are shared among the administrative bureau, the relevant faculties and the relevant departments. Also, when individual departments are contracted by private-sector businesses to undertake funded research, the revenues are spent on operation and maintenance.

3.2 Recommendations

[To the executing agency] In order to ensure the sustainability of project effects, it is desired that ITB's administrative bureau monitor the operation and maintenance status in each faculty. During the monitoring, ITB needs to thoroughly assess the status of faculties with problems in facilities and equipment, and pass on successful operation and maintenance methods to other faculties (e.g. the comprehensive operation and maintenance plan being developed and implemented by the architecture department).

Comparison of Original and Actual Output

Item	Planned	Actual
(1) Outputs		
1. Building construction	Construction of education and research buildings Lab. Tek VII, VIII, IXA, IXB, IXC, and XI; Science, Technology and Art Center, etc. (total: 65,865m^2), water supply and sewerage systems, etc.	Initial outputs: almost as planned (total: 72,444m^2) Additional outputs: Basic Science Center, Computer Center and Academic Resources, etc.
2. Equipment procurement	Procurement of educational and research equipment for the new buildings	Almost as planned
3. Fellowship program	Total: 40 lecturers	Total: 46 lecturers
4. Consulting services		
1) ES	1,046MM	1,837MM
2) PMS	300MM	365MM
3) Academic fellowship services	26MM	As planned
5. Technical assistance	Dispatch of experts in HE operations, HE management and in curriculum development for subjects; total: 96MM.	Initial outputs: as planned Additional outputs: Assistance for the legal entity accreditation process, increased number of curriculums developed, etc. provided by the expert HE operations; total: 102MM
(2) Project period		
1. Loan agreement	Oct. 1994	As planned
2. Consulting services		
1) Consultant selection	Oct. 1994 – Mar. 1996	Oct. 1994 – Jul. 1995
2) Provision of services		May 1995 – Dec. 2002
3. Building construction	Oct. 1994 – Dec. 1999	Jul. 1995 – Nov. 1998 (Additions: Aug. 1999 – Jul. 2002)
4. Equipment procurement	Oct. 1994 – Dec. 1999	Jul. 1994 – Apr. 1998
5. Fellowship program	Oct. 1994 – Mar. 2001	Initial outputs: as planned (Additions: Apr. 2001 – Sept. 2002)
6. Technical assistance	Oct. 1994 – Mar. 1997	May 1996 – Aug. 2001

(3) Project costs		
Foreign currency	4,014 million yen	3,033 million yen
Local currency	4,636 million yen	4,734 million yen
	(92,720 million Rp)	(130,850 million Rp)
Total	8,650 million yen	7,767 million yen
ODA loan portion	7,353 million yen	7,173 million yen
Exchange rate	1 Rp = 0.05 yen	1 Rp = 0.04 yen
	(as of April 1994)	(average for 1994-2002)