

Republic of Indonesia

FY2020 Ex-Post Evaluation Report of

Japanese ODA Loan

“Development of Bandung Institute of Technology (III)”

External Evaluator: Kenichi Inazawa, Octavia Japan, Co., Ltd.

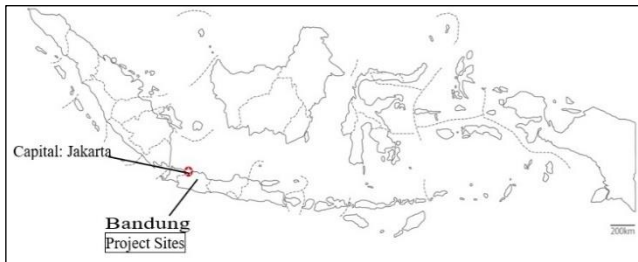
## 0. Summary

This project developed research facilities, etc., to improve the quality and quantity of education and research at the Institute of Technology in Bandung (hereinafter referred to as “ITB”), located in the province of West Java, thereby contributing to the development of human resources, the promotion of industry and the enhancement of competitiveness in Indonesia’s science technology fields. The *Medium-Term National Development Plan* (RPJM: 2004–2009) and the *National Medium-Term Development Plan* (RPJMN: 2020–2024) of the government of Indonesia aim to strengthen higher education institutions that contribute to improved competitiveness by developing science technology fields. ITB is expected to enhance its human resource development and education and research functions in science technology and engineering fields. The *Country Assistance Program for Indonesia* advocated to “support efforts to reduce poverty by providing support that contributes to the development of human resources who lead the industry in higher education.” Because this project is also consistent with the assistance policy of Japan, the relevance is high. As for efficiency, while the project cost was within the initially planned budget, due to a decrease in the number of fellowship program participants and fluctuations in the exchange rate, the project period was longer than the initial plan because it took time to complete the authorization procedure inside the Indonesian government, to select the consultant, to review the detailed designs and to select the suppliers concerning equipment procurement, and due to unexpected changes in the government policy regarding the procurement of construction work, delays occurred in the actual overall construction work. Therefore, the efficiency of the project is fair. With regard to the quantitative effects of this project, the actual results generally exceeded the initially set targets. The significant role of this project was confirmed through the interviews regarding improvements in ITB’s educational quality through enhanced and expanded educational and research facilities, human resource development, the promotion of industry and the enhancement of competitiveness in Indonesia’s science technology fields. Based on the above, this project’s effectiveness and impact is judged to be high. It is thought that there is no major concern with the institutional, technical or financial aspects of ITB’s maintenance department, which is the body responsible for operation and maintenance, and nor is there a concern with the

status of the operation and maintenance. Therefore, the sustainability of this project is judged to be high.

In light of the above, this project is evaluated to be highly satisfactory.

## 1. Project Description



Project Location



Center for Arts, Design and Languages (CADL) Under the Project

### 1.1 Background

Before this project began, in the light of economic liberalization and globalization, the need for enhancing industrial competitiveness was advocated in Indonesia. It was increasingly recognized that, to enhance competitiveness, human resource development and improvements to technical capabilities were needed and that higher education institutions played important roles in this. Enrollment rates in higher education institutions in Indonesia were not very high. There was a shortage of facilities and equipment. The number of research publications produced by the faculties was limited. It was thus necessary to expand educational and research activities.

Established in 1920, ITB is the oldest engineering-oriented university in Indonesia, a hub for technology-related education. ITB became an autonomous body in 2000. Since then, ITB has been expected to increase its own revenues and operate efficiently through quality improvement and quantitative expansion of education research and industry-academia-community collaborations. While ITB was expected to increase the number of students/researchers and to expand its educational and research facilities, its budget was limited. Therefore, it was considered an urgent task to assist the development of ITB's research facilities, which would contribute to the development of human resources in science technology fields, industrial development and competitiveness enhancement.

## 1.2 Project Outline

The objective of this project is to improve the quality and quantity of education and research of ITB, located in the province of West Java, by developing facilities for research and promoting industry-academia-community collaborations, thereby contributing to human resource development, promoting industry and enhancing competitiveness in Indonesia's science technology fields.

Loan Approved Amount / Disbursed Amount	5,659 million yen / 4,812 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 31, 2009 / March 31, 2009
Terms and Conditions	<p>Interest Rate 1.40% (construction, equipment procurement) 0.55% (fellowship program) 0.01% (consulting service)</p> <p>Repayment Period (Grace Period) 30 years 10 years</p> <p>Conditions for Procurement General Untied</p>
Borrower / Executing Agency(ies)	Ministry of Education, Culture, Research and Technology <sup>1</sup> of the Republic of Indonesia, Institute of Technology in Bandung (hereinafter referred to as "ITB")
Project Completion	October 2018
Target Area	Bandung, West Java Province
Main Contractor(s) (Over 1 billion yen)	PT. Wijaya Karya (Indonesia) / PT Multi Structure (Indonesia) (JV)
Main Consultant(s) (Over 100 million yen)	PT. Yodya Karya (Indonesia) / PT.Prosys Bangun Persada (Indonesia) / Yachiyo Engineering Co., Ltd. (Japan) (JV)
Related Studies (Feasibility Studies, etc.)	I/P by ITB (2007), SAPROF by JICA (2008)
Related Projects	<p>[ODA Loan]</p> <ul style="list-style-type: none"> <li>- Development Project of the Institute of Technology in Bandung (I) (1992)</li> <li>- Development Project of the Institute of Technology in Bandung (II) (1994)</li> </ul> <p>[Other International Organizations, Aid Agencies]</p> <ul style="list-style-type: none"> <li>- Managing Higher Education for Relevance and Efficiency Project (World Bank, 2005)</li> <li>- Technical and Professional Skills Development Sector Project (ADB, 2000)</li> </ul>

<sup>1</sup> It used to be the Directorate General of Higher Education (DGHE) at the time of the appraisal as well as at the time of this evaluation study. However, the name has been changed since the reorganization of ministries and agencies dated April 28, 2021.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Kenichi Inazawa, Octavia Japan, Co., Ltd.

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: October 2020–November 2021

Duration of the Field Study: Conducted remotely with local consultant

### 2.3 Constraints during the Evaluation Study

Due to spread of COVID-19, the external evaluator did not travel internationally. With the local consultant, the external evaluator conducted the site visits, information and data collection and interviews with the individuals concerned remotely. The external evaluator analyzed the collected information to conduct the evaluation and make a judgement.

## 3. Results of the Evaluation (Overall Rating: A<sup>2</sup>)

### 3.1 Relevance (Rating: ③<sup>3</sup>)

#### 3.1.1 Consistency with the Development Plan of Indonesia

Before this project began, the government of Indonesia formulated the *National Medium-Term Development Plan* (RPJM<sup>4</sup>: 2004–2009), which stated the need for strengthening higher education institutions that would develop human resources to meet the needs of companies and contribute to enhancing the country's competitiveness in science technology fields. The government also formulated the *Higher Education Long-Term Strategy* (HELTS<sup>5</sup>: 2003–2010) and the *National Education Strategic Plan* (RENSTRA<sup>6</sup>: 2005–2009), based on which the government planned to strengthen educational facilities and equipment, train teachers, utilize IT, expand scholarship support and improve curriculums based on pillars such as improved access to and quality of education, more efficient university management and enhanced autonomy.

At the time of the ex-post evaluation, the government of Indonesia has formulated the *National Medium-Term Development Plan* (RPJMN<sup>7</sup>: 2020–2024), which lists the improved

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<sup>2</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>3</sup> ③: High, ②: Fair, ①: Low

<sup>4</sup> Rencana Pembangunan Jangka Menengah.

<sup>5</sup> Higher Education Long Term Strategy.

<sup>6</sup> Rencana Strategis.

<sup>7</sup> Rencana Pembangunan Jangka Menengah Nasional.

competitiveness of human resources and higher quality of education as one of the development agendas. The government also aims to enhance the quality of higher education. By promoting industry-government-academia collaborations, the government is advocating the importance of the strategic promotion of research and development, job creation, collaborations between industry and universities or higher education institutions, and the training of researchers. In Indonesia, the presidential election was held in April 2019 and Ir. H. Joko Widodo was re-elected. As a result, human resource development in science technology fields has been identified as one of the priorities of this administration.

Based on the above, improving the quality of higher education and developing human resources in science technology fields are considered important in Indonesia before this project began as well as at the time of the ex-post evaluation. Therefore, this project is consistent with the national and sector plans from a policy point of view.

### 3.1.2 Consistency with the Development Needs of Indonesia

Established in 1920, ITB is the oldest engineering-oriented university in Indonesia, a hub for technological education. ITB became an autonomous body (before this project began) in 2000 and since then it has been expected to increase its own revenues and operate efficiently through quality improvement and quantitative expansion of education and research and industry-academia-community collaborations. While ITB was expected to increase the number of students/researchers and to expand its educational and research facilities, its budget was limited. Therefore, it could not sufficiently strengthen its educational and research functions.

At the time of the ex-post evaluation, according to the abovementioned *National Medium-Term Development Plan* (RPJMN: 2020–2024) and ITB, research programs being conducted at higher education institutions are not necessarily meeting the expectations of the labor market. In addition, according to the Global Innovation Index 2018<sup>8</sup>, Indonesia is ranked 85th of 126 countries and 14th of 15 Southeast Asia and Oceanian countries, which is not necessarily high. The majority of higher education graduates are in social and human science fields. The number of people who study and complete higher education in science technology and engineering fields is still limited. In order to improve the quality of education and research in the science technology/engineering fields, the expansion of high-level research and development facilities and fellowship/internship

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<sup>8</sup> The ranking is based on innovation capabilities and outcomes of each country. The indicators include investments in research and development, number of international patent applications, quality of science technology related publications. It is led and announced by the World Intellectual Property Organization (WIPO).

programs are needed. For this reason, ITB is expected to strengthen human resource development in science technology and engineering fields such as increasing the number of doctoral degree holders.

Based on the above, expectations are high for ITB to enhance human resource development and educational and research functions in the science technology and engineering fields before this project began as well as at the time of the ex-post evaluation. Therefore, it can be said that this project is highly consistent with the development needs.

### 3.1.3 Consistency with Japan's ODA Policy

Japan's *Country Assistance Program for Indonesia* (November 2004) proposed to "support efforts to reduce poverty by providing support to higher education that contributes to the development of human resources who will lead the industry" as part of its assistance in the "creation of a democratic and fair society." In addition, it was recognized that "developing human resources for the industry is an issue from the viewpoint of achieving economic growth." Considering that this project was designed to contribute to human resource development for the industry in Indonesia, it was consistent with Japan's assistance policy.

This project has been highly relevant to Indonesia's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.



Photo 1: Developed Center for Advanced Sciences (CAS) Under the Project



Photo 2: Developed Center for Research and Community Services (CRCS) Under the Project

### 3.2 Efficiency (Rating:②)

#### 3.2.1 Project Outputs

The output plan and the actual results at the time of the ex-post evaluation are shown in Table

1. (Underlined sections denote major differences from the plan.)

Table 1: The Output Plan and Actual Results of this Project at Time of Ex-Post Evaluation

Plan (At the time of project appraisal: 2009)	Actual (At the time of ex-post evaluation: 2020–2021)
<p>1) Facility Construction and Basic Infrastructure Construction</p> <p>(a) New Construction of Research Centers Center for Advanced Sciences (herein after referred to as “CAS”): 8,300 m<sup>2</sup>, Center for Research and Community Services (herein after referred to as “CRCS”): 7,000 m<sup>2</sup>, Center for Infrastructure and Built Environment Engineering (herein after referred to as “CIBE”): 11,000 m<sup>2</sup>, Center for Arts, Design and Languages (herein after referred to as “CADL”): 8,000 m<sup>2</sup> (Gross floor area: <u>34,300 m<sup>2</sup></u>)</p> <p>(b) Renovation of Research Centers CIBE: 2,460 m<sup>2</sup>, Center for Information Technologies and Industrial Engineering (herein after referred to as “CITIE”): 5,900 m<sup>2</sup>, CADL: 5,200 m<sup>2</sup> (Gross floor area: <u>13,560 m<sup>2</sup></u>)</p> <p>(c) Construction of basic infrastructure related to each research center (new construction)</p>	<p>1) Facility Construction and Basic Infrastructure Construction</p> <p>(a) New Construction of Research Centers CAS: 11,735.14 m<sup>2</sup>, CRCS: 8,682.44 m<sup>2</sup>, CIBE: 9,274.60 m<sup>2</sup>, CADL: 10,283.42 m<sup>2</sup> (Gross floor area: <u>39,976 m<sup>2</sup></u>)</p> <p>(b) Renovation of Research Centers CIBE: 2,526 m<sup>2</sup>, CITIE: 8,697 m<sup>2</sup>, CADL: 7,524 m<sup>2</sup> (Gross floor area: <u>23,278 m<sup>2</sup></u>)</p> <p>(c) Construction of basic infrastructure related to each research center (new construction): As planned (water supply and drainage, electrification)</p>
<p>2) Equipment Procurement Materials and equipment used for educational and research activities</p>	<p>2) Equipment Procurement Mostly as planned (experimental equipment, analyzers, video equipment, electron microscopes, PCs and PC-related equipment, software, books, furniture, etc. were procured and installed at each center)</p>
<p>3) Fellowship (Plan: 100 people) For the purpose of improving the research capabilities of faculty members, participants will take part in master’s, doctoral, postdoctoral<sup>9</sup> programs, short-term training, seminars, etc. at universities in Indonesia and overseas. All overseas programs will be at Japanese universities. The following is the expected number of participants: &lt;Overseas&gt; Master’s (4), doctoral (14), <u>postdoctoral (8), short-term training (9), seminar participation (50)</u> &lt;Domestic&gt; Doctoral (5), seminar participation</p>	<p>3) Fellowship (Actual: 49 people) Participants took part in master’s, doctoral, postdoctoral programs, short-term training and seminars. All overseas studies were at Japanese universities. The actual numbers of participants are as follows: &lt;Overseas&gt; Master’s (1), doctoral (16), <u>postdoctoral (6), short-term training (5), seminar participation (16)</u> &lt;Domestic&gt; Doctoral (5), seminar</p>

<sup>9</sup> It refers to researchers who join several laboratories after obtaining doctoral degrees and continue their research while acquiring various techniques.

<u>(10)</u>	<u>participation (0)</u>
4) Consulting Services (1) Total project management (2) Detailed design, bidding support, construction supervision (3) Support to the overseas studies (4) Development of a mid-to-long term plan related to CAS (a roadmap), research program development such as curriculum, support to the formulation of human resource development programs	4) Consulting Services  (1)–(4) were implemented as planned.

Source: JICA document (at the time of the appraisal), Project Completion Report, ITB's answers to the questionnaire (at the time of the ex-post evaluation)

Major differences between the plan and the actual outputs shown in Table 1 are explained below:

1) Differences between the plan and actual outputs related to the construction of facilities and basic infrastructures are as follows:

(a) The gross floor area of research centers (new construction) increased from the plan except for CIBE. The floor area of CAS, CRCS and CADL increased as a result of the reviews conducted during the detailed design. According to ITB, verifying the more realistic needs of the users, expected usage and structural safety led to the judgment that it would be necessary to alter the composition of each room and to add underground parking. With regard to CIBE, the reduction in the number of floors led to a decrease in floor area. It was initially planned to be 10 stories (plus 1 underground floor), which was altered to 6 stories (plus 2 underground floors) at the stage of detailed design. This is because the location of the facility fell into a historic site preservation area on the ITB campus, and landscape protection was taken into consideration.

(b) The gross floor area of research centers (renovation) increased from the initial plan for CIBE, CITIE and CADL. This was because the conditions of the existing facilities turned out to be older than expected when they were reviewed at the time of the detailed design, and additional construction work was required.

## 2) Fellowship

The actual number of participants was almost half of those planned. The differences between the planned and actual numbers and the reasons are explained below:

<Overseas>

The number of master's participants did not reach the plan (1 actual vs. 4 planned) because this project commenced late, as will be explained under "3.2.2.2 Project Period." Some of the fourth-



year university students who had planned to proceed to ITB's master's course had to forgo the opportunity so their period of study and research in their master's program would not be delayed by the late start of this project. The number of postdoctoral participants (mainly lecturers and researchers) did not reach the plan (6 actual vs. 8 planned) because ITB did not have a well-established sabbatical (long-term leave for a certain period) system. While most of the postdoctoral fellowship programs were planned for 6 to 12 months, fewer candidates took long-term leave (more than 2 months) than expected. It was necessary to improve the system for obtaining leave. The number of short-term training participants did not reach the plan (5 actual vs. 9 planned), nor the number of seminar participants (16 actual vs. 50 planned) due to the process associated with obtaining official passports. According to ITB, short-term training and seminar participation of the fellowship program required official passports in principle as the purpose was not obtaining degrees. On the other hand, some candidates did not have enough days after the issuance of acceptance letters<sup>10</sup> by seminar organizers until the departure and could not attend the program because the timing was not right. ITB explains that they faced different policies from different organizations, and it was difficult to coordinate, which was unexpected.

#### <Domestic>

The number of domestic seminar participants did not reach the plan (none actual vs. 10 planned). Initially, domestic seminars were planned in Indonesia which were not for the purpose of obtaining degrees. According to ITB, it turned out that domestic seminars were not as attractive as overseas seminars, and there were no applicants.

Based on the above, concerning the overseas seminars and Indonesian domestic seminars where there were relatively large differences between the plan and the actual results, it would have been preferable if ITB and JICA had identified possible obstacles before the start of this project, had estimated demands to some extent and had made an in-depth forecast, thereby having a thorough preparation system in place.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

At the time of appraisal, the total project cost was planned to be 7,801 million yen (of which the ODA loan was 5,659 million yen). In reality, the total project cost was 6,182 million yen (of which the ODA loan was 4,812 million yen), which is within the planned amount (approximately

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<sup>10</sup> Letters were issued to prove acceptance by the organizers. This was one of the required documents to apply for public passports.

79% of the planned amount). The main reasons for this were: there were fewer fellowship program participants than planned<sup>11</sup>; most participants were sent to national or public universities where tuition was relatively reasonable; price escalations had been anticipated at the time of the planning<sup>12</sup> but there was no significant increase in purchase prices during the project period; and the influence of the exchange rate fluctuations (yen appreciation/rupee depreciation).

### 3.2.2.2 Project Period

Table 2 shows the initial plan and the actual project period. At the time of the appraisal, the project was planned to be implemented for 6 years and 7 months (79 months) from March 2009 to September 2015<sup>13</sup>. It was actually delayed and lasted for 9 years and 8 months (116 months) from March 2009 to October 2018, which is approximately 147% of the plan. The main reasons for the delay are as follows: (1) due to delay in the authorization process for the project implementation within the Indonesian government, the effective date of the Project Loan Agreement was changed to July 2009 (3 months delay); (2) the selection of the consultant was delayed by prolonged procedures among the government organizations; (3) more changes were made than expected during the detailed design, and it took time to coordinate and communicate with the consultant; (4) the government's procurement policy changed, and it took time to check how this would affect the bidding and selection of contractors for the new construction of research centers, which delayed the overall construction; (5) the process for selecting suppliers for the equipment procurement was delayed, meaning that it took longer for the suppliers to provide the equipment. As a result of these delays, the consulting service was extended until October 2018.

Table 2: Initial Plan and Actual Project Period

	Initial Plan	Actual
(Overall Project)	March 2009–September 2015 (79 months)	March 2009–October 2018 (116 months)
1) Consulting Service	March 2009–May 2014 (63 months)	April 2011–October 2018 (91 months)
2) Academic Advisor	March 2009–January 2010 (11 months)	January 2012–December 2012 (12 months)
3) Construction	June 2010–May 2013 (36 months)	January 2012–February 2016 (50 months)

<sup>11</sup> The scope of the fellowship program was smaller than initially planned. In monetary terms, the reduction is about 196 million yen, which is not large when compared to the total project cost (planned and actual amount). Therefore, it is judged to have little effect.

<sup>12</sup> More specifically, costs related to tariffs, exchange rate fluctuations, transportation, etc., were estimated and included in the costs of construction and equipment purchases at the time of the project planning.

<sup>13</sup> At the time of the appraisal, the completion of this project was set to be “when the consulting service ends.”

4) Procurement and Installment	September 2011–August 2013 (24 months)	September 2011–May 2018 (93 months)
5) Consulting Service (Study Abroad Support)	March 2009–September 2015 (79 months)	December 2010–December 2015 (61 months)
6) Fellowship	January 2010–September 2015 (69 months)	April 2011–March 2018 (84 months)

Source: Document provided by JICA (initial plan), Project Completion Report and answers to the questionnaire (actual)

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

The IRR was not calculated at the time of the appraisal because the project was not designed to increase profitability. Therefore, it was not recalculated at the time of ex-post evaluation.

#### [Summary of Efficiency]

While the scope of the fellowship program was reduced from the plan, the overall project outputs were implemented without significant deviations from the plan set at the time of the appraisal. The project cost was within the initially planned budget because there were fewer fellowship program participants than planned and exchange rates fluctuated. The project period was longer than the initial plan because the consultant selection was delayed, it took longer than expected to review the detailed designs, and it took time to select suppliers for equipment procurement, and due to unexpected changes in the government policy regarding the procurement of construction work, delays occurred in the actual overall construction work. Although the project cost was within the plan, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

## 3.3 Effectiveness and Impacts<sup>14</sup> (Rating: ③)

### 3.3.1 Effectiveness

#### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 3 shows the quantitative effect indicators (baseline, target, actual) of this project.

Table 3: Operation and Effect Indicator of this Project (Baseline, Target, Actual)

	Baseline	Target	Actual
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<sup>14</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.

Indicator	2008	2017 2 Years After Completion	2018 Completi on Year	2019 1 Year After Completion	2020 2 Years After Completion
1) Enrolled students (a. Master's / b. Doctorate)	a. 300 b. 42	a. 425 b. 78	a. 616 b. 38	a. 504 b. 55	a. 743 b. 80
2) Percentage of the enrolled students who successfully obtained the expected degree (a. Master's / b. Doctorate)	72.7%	85%	a. 92.4% b. 80.5%	a. 87.7% b. 54.2%	a. 66.7% b. 39.5%
3) Percentage of qualified faculty members (Master's or Doctorate degree holders)	95%	100%	99.7%	100%	100%
4) Student-to-faculty ratio	1:16	1:15	1:14	1:13.6	1:14.4
5) Number of joint research	38	84	251	276	252
of which joint research with overseas universities	11	34	8	83	69
6) Number of joint research funding bodies (institution, organization, company, etc.)	11	23	19	23	27

Source: JICA's documents (baseline and target), answers to the questionnaire (actual)

In this project, based on the research facilities, industry-academia-community collaboration promotion facility and the implementation of fellowship programs, the following 6 quantitative indicators and targets were set at the time of the appraisal: 1) enrolled students, 2) percentage of the enrolled students who successfully obtained the expected degree, 3) percentage of qualified faculty members, 4) student-to-faculty ratio, 5) number of joint research projects, and 6) number of joint research funding bodies. The target year was 2 years from the project completion. This evaluation study obtained actual data for 3 years including 2020, which is 2 years after the completion of the project. Each indicator is explained below:

1) Enrolled Students: The actual number exceeded the target. The number of students enrolled in master's and doctoral programs at ITB is steadily increasing. The development of educational and research facilities and the expansion of research programs by this project is thought to be one of the factors.

2) Percentage of the Enrolled Students Who Successfully Obtained the Expected Degree: ITB's

master's program takes 3 years and the doctoral program five years. If the enrolled students' studying and research had progressed smoothly, the master's degree holders in the table would have been enrolled from 2015 to 2017, and the doctoral degree holders from 2013 to 2015. The percentages of students who obtained a doctorate degree in 2019 and 2020 were lower than the target. According to ITB, (1) there were many cases of research extensions by doctoral students in 2019 for personal reasons and their own intentions<sup>15</sup>; (2) As COVID-19 became prevalent in 2020, some students decided to extend their research. This, combined with the abovementioned reason "(1)," led to the even lower percentage in 2020 (54.2% → 39.5%). After the first half of 2020 especially, when the impact of COVID-19 became noticeable, it became difficult for students to commute to school, and restrictions were imposed on experiments and assignment reports in the laboratories on the ITB campus<sup>16</sup>. In addition, the percentage of master's degree holders decreased (87.7% in 2019 → 66.7% in 2020), which was also due to the influence of COVID-19.

3) Percentage of Qualified Faculty Members: The actual percentage exceeded the target. At the time of the ex-post evaluation (March 2021), ITB has 1,509 qualified faculty members. All of them have master's degrees<sup>17</sup> and 1,045 (approximately 69% of the total) are doctorate degree holders. According to ITB, their recruitment policy is to seek faculty members who can start research in the doctoral course within 2 years of joining the institution. ITB has expectations for educational quality and high research results and therefore they believe that the educational and research facilities developed in this project can be utilized effectively.

4) Student-to-Faculty Ratio: As stated in 1) above, the number of enrolled students of master's and doctoral programs is increasing, and the actual ratio has achieved the target. According to ITB, realizing that fine-tuned small-group education leads to improvement in the quality of education and research, they have been trying to improve their system by paying attention to the number of students per faculty member in recent years. ITB also stated that utilizing the education and research facilities developed by this project is one of the keys to responding to the increasing number of enrolled students, while improving and strengthening the education and research functions at the same time.

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<sup>15</sup> Although the same target was set for the master's and doctoral degree acquisition ratios at the time of the appraisal, the actual results were divided. It was presumably difficult to predict the doctoral degree acquisition rate and to set the target value, but it may have been desirable to set the target for each category separately.

<sup>16</sup> According to ITB, Indonesian national universities are focusing on infectious disease control and risk mitigation, and certain restrictions are imposed on campus visits by students and faculty members. They are also promoting new initiatives such as utilizing online tools.

<sup>17</sup> According to DGHE, faculty members of Indonesian universities are required to have master's degrees at a minimum.

5) Number of Joint Research Projects: The actual number exceeded the target. According to ITB, this is owing to the achievements in education and research, the good research environment, and the research level and scale<sup>18</sup>. Pointing out that there are various forms of joint research such as different investment methods and partners, ITB commented, “Joint research is one of our strengths. We believe it will be further developed, given the educational and research facilities, the research materials and equipment and the participation in the fellowship program of this project. Recently, we have been particularly focusing on joint research. There are a wide range of cases from cross-faculty research to joint research with other universities and ministries in Indonesia and overseas.” CAS, which has an acoustic research building, is one specific example of the utilization of the facilities developed in this project for joint research. CAS is equipped with a high-quality anechoic chamber<sup>19</sup>, which is efficient at measuring transmission loss and sound absorption, and is currently receiving research activity support from the Ministry of Education, Culture, Research and Technology<sup>20</sup> at the time of ex-post evaluation. Joint research with overseas universities is also actively conducted. As a concrete example of the utilization of the developed research facilities for joint research, the Research Center of Nanoscience and Nanotechnology (RCNN), a research division of CAS, has a joint research network with more than 35 partners in 12 countries including Japan<sup>21</sup>. Considering the comment given in the interview described in “3.3.1.2 Qualitative Effects,” it can be inferred that more results have been produced than initially expected.

6) Number of Joint Research Funding Bodies: The actual number exceeds the target. The main investors are government agencies such as the Ministry of Education, Culture, Research and Technology, foreign government research institutes such as UK Research and Innovation, overseas partner universities and industry collaborators (e.g., Toyota Motor Corporation). According to ITB, the increasing investment in joint research is attributed to the features of the university (the achievements in education and research, good research environment, the research

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<sup>18</sup> The result from 2020 was less than the previous year, which is thought to be the influence of COVID-19 to some extent.

<sup>19</sup> A shielded space constructed so that it is not affected by electromagnetic waves from the outside, does not leak electromagnetic waves to the outside, and does not reflect electromagnetic waves inside.

<sup>20</sup> After the reorganization of ministries and agencies dated April 28, 2021, the previous Ministry of Research and Technology and Ministry of Education and Culture merged and became the Ministry of Education, Culture, Research and Technology.

<sup>21</sup> (Reference information) The Joint research contact points at ITB are “Office of Partnership”, “Institute for Research and Community Services (LPPM)”, and “Institute for Innovation and Entrepreneurship Development (LPIK).” Joint Research is started by signing Memorandum of Understanding (MoU) and Memorandum of Agreement (MoA) documents that outline the collaboration detail, deliverables, etc. The MoU and/or MoA documents will be signed by Rector or Vice Rector for research. The financial management is carried out by LPIK and/or LPPM, and the procurement for joint research is carried out by Logistics Department.

level and scale) mentioned at the beginning of 5) above. It is presumed that the educational and research facilities developed in this project and the research equipment introduced by this project are helping to attract investment. Specific examples of collaboration and joint research with Japanese companies will be explained in “3.3.2 Impact.”

### 3.3.1.2 Qualitative Effects (Other Effects)

(ITB’s Educational Quality Improvement through the Improvement and Expansion of Educational and Research Facilities)

In this evaluation study, participants of the fellowship program, implemented to improve the research capabilities of ITB faculty members, were interviewed with regard to how ITB’s educational and research quality is improving and their research scopes are expanding, etc. The following are some of the comments obtained during the interview<sup>22</sup>.

- “I conducted research on concrete materials, especially the microstructure of internal concrete, at a Japanese university. I conducted research using cutting-edge technology (synchrotron X-ray CT, microfocus X-ray CT, etc.). Currently, I am continuing experiments on concrete materials and my research on structural reinforcement at ITB. The fellowship program helped me gain knowledge and experience of the latest technology.” (long-term program, doctorate at national university)

- “I completed my doctoral course in design science at the Faculty of Engineering. I conducted research on the structural strength of wood, using a case of teakwood in West Java, Indonesia. I feel that the preparations until joining the course in Japan were properly planned. We also received support from Japanese NGO staff. I am happy with the fellowship program, as it allowed me to gain knowledge and experience in the field of engineering in Japan. Currently, I am continuing my research at ITB, working on papers and treatises based on the knowledge and experience I gained from my research in Japan.” (long-term program, doctorate at national university)

- “I conducted research on organic electronic materials including porphyrin and polyaniline blends. Although it was a short period of 2 months, the training was meaningful and I am satisfied. I am continuing to collaborate with the Japanese university for my research at ITB, working toward publishing papers.” (short-term program, national university postdoc)

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<sup>22</sup> The interview survey items were: a) research content and sufficiency at Japanese educational institutions, b) the relationship between post-training research achievements at ITB and the training results, c) research presentations/papers at ITB and other locations than ITB, d) issues of the fellowship program you noticed during the training that need to be improved, e) to what extent the fellowship program is contributing to ITB, etc. The survey subjects were long-term overseas (Japan) training participants, postdoctoral fellows, short-term overseas (Japan) training participants, and seminar participants (23 in total), of whom 11 answered the questions.

- "I am grateful that my experience of the JICA Fellowship Program has paved the way for research at ITB, and I gained a position as a civil engineer. I participated in the domestic training for 6 months on a theme related to green building and architectural risks. After participating in the program, I had the opportunity to attend an international conference and had a wide range of discussions on the same research theme with participants from other countries. The program motivated me to do research on more areas, which has become a topic for my future research."  
(domestic training in Indonesia)

In addition, combining the comments above with ITB's comment above in "5) Number of Joint Research Projects" under "3.3.1.1 Quantitative Effect" (expansion and development of joint research by introducing educational and research facilities and research materials and equipment), it can be said that this project is contributing to the improvement/expansion of ITB's educational and research facilities and quality improvement.

Judging from the above, it is considered that this project is contributing to the improvement of the quality of ITB education and the expansion of their research scopes.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

(Contribution to Human Resource Development, Industrial Promotion and Competitiveness Enhancement in Indonesia's Science Technology Fields)

Through the interviews with ITB and the Ministry of Education, Culture, Research and Technology and questionnaire, we looked into the ways in which this project contributes to Indonesia's science technology fields and whether they are related. The following are the comments obtained.

<Contribution to Human Resource Development in Science Technology Fields>

"The Indonesian government has an interest in science technology fields, as they are an important pillar for the national development. ITB is expanding its educational and research facilities and programs in order to respond to the increasing number of students." "Represented by several laboratories including the Nanoscience Center at the CAS, ITB is gaining recognition as a promising partner among international networks, especially in the field of nanotechnology. The number of research papers at the center increased from 41 in 2017 to 84 in 2020, and research activities are brisk. The facilities and research equipment developed by this project are being fully utilized." "At CRCS it is possible to produce high-quality online course contents that can be easily accessed by other universities in Indonesia, with the utilization of video recording and editing



equipment. In addition, nationwide conferences and workshops can be held using the conference rooms of the CAS, CIBE, CITIE and CADL. In other words, networks of researchers and venues for presentations are expanding, which is linked to the development of human resources.” Based on the comments above, it is considered that this project is supporting the human resource development in Indonesia’s science technology fields.

#### <Contribution to Industrial Promotion>

“ITB has a department that is dedicated to nurturing innovations and entrepreneurs (Lembaga Pengembangan Inovasi & Kewirausahaan: LPIK)<sup>23</sup>. According to LPIK’s data, the total number of joint research that are applicable to the industry increased from 86 in the 3 years from 2015 to 2017 to 95 in the 3 years from 2018 to 2020.” “In recent years, intellectual property rights and patents have been increasing in number. In 2014, 60 applications were submitted, of which 7 were granted as intellectual property rights and 11 were granted as patents. In 2019, 237 applications were submitted, of which 57 were granted as intellectual property rights and 43 were granted as patents<sup>24</sup>.” “The number of innovation related startups<sup>25</sup> increased from 60 in 2016 to 112 in 2019.” “From the above achievements, it can be said that ITB’s education and research activities are brisk. They are supporting not only ITB but also Indonesia’s industrial promotion.” Based on the comments made, this project is considered to be contributing to the promotion of industry in Indonesia.

#### <Contribution to Enhanced Competitiveness>

“ITB is ranked 313th in the 2021 QS World University Rankings<sup>26</sup> and 66th in Asia, whereas in 2018 it was 359th in the world and 73rd in Asia. Therefore, the ranking has improved. ITB is enthusiastic about improving research productivity in order to compete with other competitive universities. Expansion of research facilities and human resource development is the key to that.” “The publications of papers on Web of Science<sup>27</sup>, which measures the competitiveness of academic research fields, increased from 124 in 2011 to 442 in 2018. This gives many research institutes around the world access to ITB’s research results. It is leading to the enhancement of

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<sup>23</sup> ITB also promotes industry-academia joint research and collaboration.

<sup>24</sup> (Reference information) The institution that manages intellectual property at ITB is the Institute for Innovation and Entrepreneurship Development (LPIK). The Intellectual Property Management Procedure is listed in the Rector's Decree Number 070/PER/II.A/HK/2017 concerning the Intellectual Property Policy of the ITB. According to ITB, obstacles to managing intellectual property rights include dealing with financial management and procurement processes according to government rules. ITB faces constraints of time and procedures.

<sup>25</sup> In this document, “startup” means the establishment of a new company with innovations.

<sup>26</sup> Quacquarelli Symonds, a UK based institution that evaluates universities, publishes annual rankings of universities around the world.

<sup>27</sup> Web of Science is the world’s largest online academic database provided by Clarivate Analytics, an international information company. Academic journals are carefully selected and recorded, and it is used by many research institutes around the world.

the development and competitiveness of not only ITB but also Indonesia's science technology fields." Based on the comments, it is considered that this project is making a great contribution to enhancing Indonesia's competitiveness in academic and research fields.

As for ITB's collaborations with Japanese companies, a total of 78 joint research projects have been realized in the 3 years from 2018 to 2020; collaborative projects are being conducted at each ITB faculty and research center<sup>28</sup>. Based on the above collaborations and joint research with Japanese companies, it can be inferred that this project is supporting the promotion of industry and the strengthening of competitiveness in Indonesia.

This project is therefore considered to be contributing not only to ITB, but also to the human resource development, promotion of industry, and the enhancement of competitiveness in science technology fields<sup>29</sup>.

### 3.3.2.2 Other Positive and Negative Impacts

#### 1) Impacts on the Natural Environment

This project does not fall under the vulnerable sectors/characteristics or vulnerable areas listed in the "JBIC Guidelines for Confirmation of Environmental and Social Considerations<sup>30</sup>" and the undesired impact on the environment was thought not to be significant. Therefore, it was labeled as Category B. Preparation of an environmental impact assessment (EIA) was not required under Indonesian domestic law.

In this project, consideration was given to preventing noise from the generator by using noise prevention materials during the construction of the research center facilities. According to ITB, the contractor kept the atmospheric substances and odors at the construction site below the environmental standard, and the wastewater inspection did not show a serious degree of pollution.

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<sup>28</sup> "Establishment of a Space-Based Atmospheric Water Vapor Monitoring System for Hydro-Meteorological Disaster Management," "Development of Trivalent Rare Earth Ion Doped Glasses for Solid State Lighting Application," "Smart Porous Nanostructured Silica for Controlled Drug Delivery," etc. (all the above are Asahi Glass Foundation), "Development of Remaining Life Estimate Method of Gears for the Purpose of Remanufacturing" (Komatsu Limited), "Optimization and Modelling of Pharmaceuticals Adsorption onto Clay Materials as a Green and Low-Cost Water Treatment" (Kurita Water and Environment Foundation), "Modification of Natural and Synthetic Fibers for Sorbent Materials in Oil Spill Disaster Response" (Osaka Gas Foundation), etc. According to ITB, there are many cases of collaboration and conferences besides those mentioned above.

<sup>29</sup> In addition, the Faculty of Civil Engineering and Environmental Engineering at CIBE developed in this project is collaborating with the ASEAN University Network / Southeast Asia Engineering Education Development Network (AUN/SEED-Net) and building networks both during the project and after the project's completion. For example, the "Civil Engineering Research Network Conference (ConCERN)" and "7th ASEAN Civil Engineering Conference (ACEC)" in 2014, and the "12th SEED-Net Environmental Engineering Regional Conference 2019 (RC EnvE 2019)" have been held by the Faculty of Civil Engineering and Environmental Engineering. It can be said that the developed facilities are being fully utilized, supporting ITB's research activities and the establishment of international collaborations.

<sup>30</sup> Established in April 2002.

It was confirmed by the questionnaire and interviews that there were no major negative environmental impacts on noise/vibration, air pollution, odors, etc., even after completion. Regarding the treatment of waste and wastewater from the laboratory, after being stored temporarily in the facility, a sticker identifying the waste is affixed to an external container and taken out, and the treatment is carried out under a systematic process. At ITB, the “Facility Infrastructure Department” under the Safety, Health, Business Conservation and Environmental Division (K3L) is responsible for environmental management and process supervision. The department handles waste disposal, safety guidance and facility inspections according to the Standard Operating Procedures (SOPs). The department is also responsible for the environmental monitoring of the facilities of this project and the installed research equipment, from planning to monitoring. Occasionally, specialists are hired to check the sites and prepare reports. According to the reports, there have been no negative impacts on the environment and no special measures have been taken so far. In addition, it was confirmed by the questionnaire and interviews with ITB that there were no complaints about noise, vibration, odor, etc., from the local residents.

## 2) Resettlement and Land Acquisition

No land acquisition occurred in this project. Since the land was owned by ITB before the start of this project, no new land acquisition or physical relocation of residence was involved. However, there was an economic relocation of a shop (one case), which was operating on the street around the north exit of the ITB campus, to a nearby location (one inhabitant affected by the relocation). The local government of Bandung City provided the relocation site and a building for the affected shop, and the procedure was carried out smoothly based on Indonesian domestic law and JBIC Guidelines for Confirmation of Environmental and Social Considerations. It was confirmed that no dispute had arisen at the time of the ex-post evaluation. There was no relocation of residents.

### [Summary of Effectiveness and Impact]

Regarding the quantitative effects of this project, the actual values have generally exceeded the initially set targets. Interviews with ITB confirm that the scopes of education and research have been enhanced by developing education and research facilities and introducing research materials and equipment through this project, which is expected to develop further. In addition, interviews with the participants of this project’s fellowship program confirm that the knowledge and experience of the participants have increased and the scopes of research have expanded. Furthermore, it can be inferred from the interviews regarding human resource development, the

promotion of industry, and the enhancement of competitiveness in the science technology fields that ITB's research achievements have increased, on-campus and off-campus collaborations have progressed, and this project is contributing to the strengthening of science technology fields in Indonesia. Based on the above, this project has mostly achieved its objectives. Therefore, the effectiveness and impact of the project is high.



Photo 3: Facilities in the Acoustic Research Building (Anechoic room)



Photo 4: Experiment by ITB Students

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

The executing agency of this project is ITB. The Ministry of Education, Culture, Research and Technology supervises ITB. The total number of ITB's staff is 2,924 (as of the end of December 2020). ITB is designated as a state university under Law No. 12 of the Republic of Indonesia and Rule No. 44 (both promulgated in 2012). The Ministry of Education, Culture, Research and Technology, or the central government, grants an operating budget including the operation and maintenance budget for facilities and research equipment to ITB as a research grant. ITB is then entrusted with the financial management of the budget for the purpose of promoting educational and research activities.

At ITB, 6 vice presidents and 1 senior director are assigned under the president, and under such an operating system, the Asset Management Department, Information System/Technology Department, E-learning Department and each center/faculty are responsible for the operation and maintenance of facilities and research equipment including the ones provided by this project. Of these, the Asset Management Department is responsible for the maintenance of centers, while each center is responsible for the operation and maintenance of the research equipment introduced there. Table 4 shows the departments in charge of the operation and maintenance of each

facility/research equipment and the number of staff.

Table 4: Departments in Charge of Operation and Maintenance of ITB's Facilities and Research Equipment and Number of Staff

Department	No. of Staff
E-Learning Department	7
Asset Management Department	28 *Note
Information System/Engineering Department	5
Each Research Center	14
Each Faculty	33
Safety, Health, Business Conservation and Environmental Division	16
<b>Total</b>	<b>103</b>

Source: Answers to the questionnaire

Note: Many other engineers and cleaners work at the Asset Management Department. They are engaged in facility management and cleaning work on a daily basis.

The ITB staff is responsible for the daily operation and monitoring of the research center facilities and research equipment, including the ones developed/introduced by this project and of other research support works. On the other hand, external contractors conduct the regular maintenance of corrosion prevention coatings and paints on the exterior and handrails of the center facility, elevators, emergency generators, transformers, air conditioning, water treatment plants, electrical equipment, piping, etc. Through the questionnaire and interviews with ITB, it was confirmed that the number of staff in Table 4 was sufficient. It was also confirmed that there are no major problems with the maintenance system or with the number of staff of the external contractors. ITB manages the organization by paying attention to the number of supporting staff in accordance with the number of students and the research systems. As the research activities and students have been increasing since 2021, ITB points out the need to increase the number of staff engaged in operation and maintenance<sup>31</sup>.

Based on the above, it is judged that there is no particular problem in the institutional aspect of the operation and maintenance system of this project.

### 3.4.2 Technical Aspect of Operation and Maintenance

Each ITB department has many staff who are familiar with and experienced in operation and maintenance work. It was confirmed through the questionnaire, site visits and interviews that there were no technical shortages in operation and maintenance. It was also confirmed that there

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<sup>31</sup> As of the time of the ex-post evaluation (March 2021), ITB is discussing a budget for that purpose and is also considering hiring an external consultant to secure appropriate staff.

were no problems in the technical aspect of the work carried out by the external contractors.

ITB regularly holds training for operation and maintenance staff. For example, training on themes such as “spectroscopic deflection analysis method,” “electron microscope workshop,” “calculation material design,” and “how to use a coordinate measuring machine” was given recently. Although ITB does not provide training for newly hired staff, they are trying to upgrade their capabilities and knowledge through on-the-job training after joining the institute.

Each research center also has manuals and guidelines for the operation and maintenance of research equipment. As for the advanced research equipment used in CAS, there is a specialized manual for each equipment, which is being utilized by the maintenance staff as needed.

Based on the above, it is judged that there are no major technical problems related to the operation and maintenance of this project.

### 3.4.3 Financial Aspect of Operation and Maintenance

About one-third of the total ITB annual budget is the operating budget and research grants from the Indonesian government (Ministry of Education, Culture, Research and Technology). The other one-third is generated from tuition, and the remaining one-third is the revenue from research and collaboration projects with Indonesia and overseas partners. In principle, the government’s budget is determined based on the research results. Therefore, ITB is required to submit an annual activity report to the Ministry of Education, Culture, Research and Technology<sup>32</sup>.

Table 5 shows the operation and maintenance costs of ITB, including the research facilities and research equipment developed in this project. They are generally increasing. ITB commented: “we are allocating necessary budget in a just proportion,” “the amount is expected to increase because research activities are expected to increase after 2021.” The operating cost in 2020 was slightly less than that of the previous year due to the influence of COVID-19.

Table 5: Operation and Maintenance Cost (Actual Spending for Recent 4 Years)

	(Unit: million IDR)			
Cost	2017	2018	2019	2020
Operation Cost	32,406	33,268	33,738	29,361
Maintenance Cost	35,598	38,379	43,394	46,818

Source: Answers to the questionnaire

Table 6 shows the income statement (P/L) for the last 3 years for reference. The gross income

<sup>32</sup> On the other hand, the Ministry of Education, Culture, Research and Technology regularly monitors the financial and operational status of ITB with the support of the Ministry of Education’s Audit Department.

consists of education-related income such as revenue from running the university, from collaborative projects with other organizations and from donations. Income exceeded the total spending in any year and is in the black after tax. It can be confirmed that the accumulation of net assets has continued recently. It can be said that ITB's finance is well managed as an incorporated administrative institution.

(Reference) Table 6: ITB's Profit and Loss Statement (P/L)

(Unit: million IDR)

	2017	2018	2019
Gross income (A)	1,760,313	1,757,481	1,945,265
Gross expenditure (B)	-1,622,892	-1,607,906	-1,707,448
Profit before tax (C)	137,421	149,575	237,817
<b>Profit after tax (D)</b>	<b>133,268</b>	<b>145,423</b>	<b>233,699</b>
(*Below is for reference)			
Net assets at the beginning of the fiscal year (E)	1,783,209	1,926,314	2,064,285
Other profit or less (F)	9,837	-7,452	6,313
Net assets at the end of the fiscal year (D+E+F) *Note	1,926,314	2,064,285	2,304,297

Source: ITB

Note: This is consistent with net assets in Table 7.

Table 7 shows the balance sheet (B/S) of ITB for reference. While there is no increase in liabilities, one can see that the financial improvement is due to the accumulation of net assets and the increase in cash flow. It can be inferred that ITB's finances are in a healthy state and that there are no major problems with the expenditure of the operation or the maintenance costs.

(Reference) Table 7: Balance Sheet of ITB (B/S)

(Unit: million IDR)

	2017	2018	2019

Asset			
(Current assets)			
Cash on hand and in banks	1,008,990	1,211,071	1,438,654
Short-term investment	155,649	163,091	182,441
Other current assets	143,699	122,058	131,391
Total current assets	1,308,338	1,496,220	1,752,486
(Non-current assets)			
Fix assets	1,014,385	966,575	938,965
Other assets	31,651	24,853	30,893
Total non-current assets	1,046,036	991,428	969,858
<b>Total Assets</b>	<b>2,354,374</b>	<b>2,487,648</b>	<b>2,722,344</b>
Liabilities			
Accounts payable	41,827	42,991	43,406
Accrued expenses	71,268	88,853	73,187
Other liabilities	314,965	291,519	301,454
Total Liabilities	428,060	423,363	418,047
Net Assets	1,926,314	2,064,285	2,304,297
<b>Total Liabilities + Net Assets</b>	<b>2,354,374</b>	<b>2,487,648</b>	<b>2,722,344</b>

Source: ITB

Based on the above, it is judged that there are no major financial problems in the operation and maintenance of this project.

#### 3.4.4 Status of Operation and Maintenance

At the time of the ex-post evaluation, there is no particular concern about the maintenance status of the research facilities and research equipment developed/introduced by this project, and no problems have occurred. ITB staff perform the daily operation and monitoring of the research facilities including research equipment and other research support work, while external specialists manage the corrosion prevention coating/painting of exteriors and handrails of each center facility, elevators, emergency generators, transformers, air conditioning, water treatment plants, electrical equipment, piping, etc.

Spare parts requested by ITB maintenance staff and by the external contractors are procured and stored separately. Specialized and particular parts are handled by specialized companies. Depending on the part's type, it may take time to procure and deliver. However, no major concerns have arisen so far. In either case, necessary budget is allocated every year, and parts are procured in accordance with the regulations of ITB.



No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.



Photo 5: Introduced High Performance Liquid Chromatography (HPLC) Under the Project



Photo 6: Introduced Single-arm Robot Set Under the Project

#### 4. Conclusion, Lessons Learned and Recommendations

##### 4.1 Conclusion

This project developed research facilities, etc., to improve the quality and quantity of education and research at the ITB, located in the province of West Java, thereby contributing to the development of human resources, the promotion of industry and the enhancement of competitiveness in Indonesia's science technology fields. The *Medium-Term National Development Plan* (RPJM: 2004–2009) and the *National Medium-Term Development Plan* (RPJMN: 2020–2024) of the government of Indonesia aim to strengthen higher education institutions that contribute to improved competitiveness by developing science technology fields. ITB is expected to enhance its human resource development and education and research functions in science technology and engineering fields. The *Country Assistance Program for Indonesia* advocated to “support efforts to reduce poverty by providing support that contributes to the development of human resources who lead the industry in higher education.” Because this project is also consistent with the assistance policy of Japan, the relevance is high. As for efficiency, while

the project cost was within the initially planned budget, due to a decrease in the number of fellowship program participants and fluctuations in the exchange rate, the project period was longer than the initial plan because it took time to complete the authorization procedure inside the Indonesian government, to select the consultant, to review the detailed designs and to select the suppliers concerning equipment procurement, and due to unexpected changes in the government policy regarding the procurement of construction work, delays occurred in the actual overall construction work. Therefore, the efficiency of the project is fair. With regard to the quantitative effects of this project, the actual results generally exceeded the initially set targets. The significant role of this project was confirmed through the interviews regarding improvements in ITB's educational quality through enhanced and expanded educational and research facilities, human resource development, the promotion of industry and the enhancement of competitiveness in Indonesia's science technology fields. Based on the above, this project's effectiveness and impact is judged to be high. It is thought that there is no major concern with the institutional, technical or financial aspects of ITB's maintenance department, which is the body responsible for operation and maintenance, and nor is there a concern with the status of the operation and maintenance. Therefore, the sustainability of this project is judged to be high.

In light of the above, this project is evaluated to be highly satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to JICA

- As an initiative to pursue quality improvement in education and research, ITB has been regularly conducting the feedback survey (Tracer Study), obtaining the answers after graduation as to whether the practical work of the students after graduation and the content of research work at the ITB match or are useful, which will utilize for their future education and research programs. It is worth considering that JICA will incorporate such efforts in other similar projects and strive to improve its educational programs.

## 4.3 Lessons Learned

### Need to Improve Accuracy of the Project Scope Planning before the Project Commencement

- Regarding the overseas seminar participation of this project's fellowship program, the number of participants was less than initially expected and planned. This was because ITB did not have a solid staff leave system in place, making participation difficult. It was also because the procedure for obtaining public passports was unsuccessful, forcing the candidates to forgo the opportunity

due to the delay. As for lower number of participants in the domestic seminar training (seminar training which did not aim at obtaining a degree), this was because the training was not as attractive as the overseas programs. Although these may have been unexpected events, it would have been preferable for the aid provider and recipient country to pre-interview the needs and intentions of the faculty members, researchers and others who were interested in education and training programs in Indonesia and overseas such as this project's fellowship program, to make a forecast of the number of participants and the contents of the program with high needs at the time of project formation, while confirming whether the program design matches the recipient country's system and whether there is a current system being an obstacle to participation. For similar projects in the future, the aid provider and the recipient country should take necessary measures at the time of project formation to have a more accurate perspective to avoid mismatches between the applicants and the offered training programs and strive to improve the accuracy of the project plan.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p>1) Facility Construction and Basic Infrastructure Construction</p> <p>(a) New Construction of Research Centers CAS: 8,300 m<sup>2</sup>, CRCS: 7,000 m<sup>2</sup>, CIBE: 11,000 m<sup>2</sup>, CADL: 8,000 m<sup>2</sup> (Gross floor area: 34,300 m<sup>2</sup>)</p> <p>(b) Renovation of Research Centers CIBE: 2,460 m<sup>2</sup>, CITIE: 5,900 m<sup>2</sup>, CADL: 5,200 m<sup>2</sup> (Gross floor area: 13,560 m<sup>2</sup>)</p> <p>(c) Construction of basic infrastructure related to each research center (new construction)</p> <p>2) Equipment Procurement Materials and equipment used for educational and research activities</p> <p>3) Fellowship (Plan: 100 people) &lt;Overseas&gt; Master's (4), doctoral (14), postdoctoral (8), short-term training (9), seminar participation (50) &lt;Domestic&gt; Doctoral (5), seminar participation (10)</p> <p>4) Consulting Services (1) Total project management (2) Detailed design, bidding support, construction supervision (3) Support to the overseas studies (4) Development of a mid-to-long term plan related to CAS (a roadmap), research program development such as curriculum, support to the formulation of human resource development programs</p>	<p>1) Facility Construction and Basic Infrastructure Construction</p> <p>(a) New Construction of Research Centers CAS: 11,735.14 m<sup>2</sup>, CRCS: 8,682.44 m<sup>2</sup>, CIBE: 9,274.60 m<sup>2</sup>, CADL: 10,283.42 m<sup>2</sup> (Gross floor area: <u>39,976 m<sup>2</sup></u>)</p> <p>(b) Renovation of Research Centers CIBE: 2,526 m<sup>2</sup>, CITIE: 8,697 m<sup>2</sup>, CADL: 7,524 m<sup>2</sup> (Gross floor area: <u>23,278 m<sup>2</sup></u>)</p> <p>(c) Construction of basic infrastructure related to each research center (new construction): As planned (water supply, electrification)</p> <p>2) Equipment Procurement Mostly as planned (experimental equipment, analyzers, video equipment, electron microscopes, PCs and PC-related equipment, software, books, furniture, etc. were procured and installed at each center)</p> <p>3) Fellowship (<u>Actual: 49 people</u>) &lt;Overseas&gt; <u>Master's (1), doctoral (16), postdoctoral (6), short-term training (5), seminar participation (16)</u> &lt;Domestic&gt; <u>Doctoral (5), seminar participation (0)</u></p> <p>4) Consulting Services (1)–(4) were implemented as planned.</p>

2. Project Period	March 2009–September 2015 (79 months)	March 2009–October 2018 (116 months)
3. Project Cost		
Amount Paid in Foreign Currency	5,354 million yen	4,812 million yen
Amount Paid in Local Currency	2,447 million yen	1,370 million yen
Total	7,801 million yen	6,182 million yen
ODA Loan Portion	(5,659 million yen)	(4,812 million yen)
Exchange Rate	1 USD = 107 yen, 1 rupiah = 0.0115 yen (As of August 2008)	1 USD = 100.34 yen, 1 rupiah = 0.0087 yen (Average taken from IMF's IFS data)
4. Final Disbursement	December 2018	