Indonesia
Ministry of Education, Culture,
Research and Technology
(MoECRT)

Data Collection Survey on Higher Education and Vocational Education Sectors in Indonesia

Final Report

January 2022

Japan International Cooperation Agency (JICA)

Registered Non-Profit Organization Asia SEED
Oriental Consultants Global Co., Ltd.

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Abbreviations

Abbreviation	English/Indonesian
ABET	Accreditation Board for Engineering and Technology
AFM	Atomic Force Microscope
ADB	Asian Development Bank
AI	Artificial Intelligence
APO	Asian Productivity Organization
ASEAN	Association of South-East Asian Nations
BAN-PT	Badan Akreditasi Nasional Pendidikan Tinggi
BAPPENAS	National Development Planning Agency/Badan Perencanaan Pembangunan Nasional
BATAN	National Nuclear Energy Agency of Indonesia
BPPT	Agency for Assessment and Application of Technology/Badan Pengkajian dan Penerapan Teknologi
BRIN	National Research and Innovation Agency/Badan Riset Dan Inovasi Nasional
COE	Center of Excellence
COVID-19	Corona Virus Disease 2019
DIKTI	Directorate General of Higher Education
EKG	Electrocardiogram
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
GII	Global Innovation Index
GIZ	German Corporation for International Cooperation/Deutsche Gesellschaft für Internationale Zusammenarbeit
HR	Human Resources
ICT	Information and Communication Technology
IT	Information and Technology
IDB	Islamic Development Bank
IQF	Indonesian Qualifications Framework
IMA	Indonesian Medical Association
JABEE	Japan Accreditation Board for Engineering Education
JICA	Japan International Cooperation Agency

JJC	Jakarta Japan Club
KI	Kekayaan Intelektual
LIPI	Lembaga Ilmu Pengetahuan Indonesia
LMS	Learning Management System
LPDP	Lembaga Pengelola Dana Pendidikan
MoECRT	Ministry of education, culture, Research and Technology
MoH	Ministry of Health/Kementerian Kesehatan
MoNE	Ministry of National Education
MOOC	Massive Open Online Course
NMR	Nuclear Magnetic Resonance
OBE	Outcome-Based Education
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation And Development
OSCE	Objective Structured Clinical Examination
PDPT	Pangkalan Data Perguruan Tinggi
PPBT	Technology-Based Beginner Company/ Program Perusahaan Pemula Berbasis Teknologi
PPP	Public Private Partnership
RISPRO	Funding for Innovative Productive Research
RPJMN	Medium-Term National Development Plan/Rancangan Pembangunan Jangka Menengah Nasional
RPJPN	Long-Term National Development Plan/Rencana Pembangunan Jangka Panjang Nasional
SEAMOLEC	Southeast Asian Ministers of Education Organization Regional Open Learning Centre
STI	Science, Technology, and Innovation
STP	Strategic Science Park
TEMDEC	Telemedicine Development Center of Asia
TFP	Total Factor Productivity
TVE	Technical and Vocational Education
TVET	Technical and Vocational Education and Training
UHC	Universal Health Coverage
UIS	UNESCO Institute for Statistics
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAID	United States Agency for International Development

WB	World Bank
WHO	World Health Organization

Executive Summary

Objectives of the survey

- This survey identifies and analyzes the current situation, issues, and assistance needs of higher education, especially university education and vocational education, in Indonesia, discusses the future direction of JICA cooperation in the higher education sector, and offers suggestions for specific projects. In addition, the survey team advances proposals for improving university and vocational education in Indonesia to the Ministry of Education, Culture, Research and Technology (MoECRT) and National Research and Innovation Agency (BRIN).

Survey period and implementation method

- This survey was originally planned to be conducted for a survey period of about 9 months from March to November 2020. However, due to the COVID-19 pandemic, it was difficult to carry out the field survey as originally planned, and in order to respond to the medical projects related to the COVID-19 pandemic proposed by BRIN, it was extended until February 2022. Since the field survey could hardly be conducted, there were major restrictions on the implementation of the survey.

Policy and current situation of the government on higher education and vocational education

- In the Medium-Term National Long-Term Development Plan (RPJMN) 2020–2024, Indonesia stated the goals of improving the productivity and competitiveness of industrial human resources, such as strengthening cooperation with industry, vocational education / training reform, teacher capacity strengthening, and the development of the qualification system.
- There are six categories of higher education institutions in Indonesia: University, Institute, School of Higher Learning, Polytechnic, Academy, and Community Academy, with about 3,200 institutions and 7.3 million students enrolled as of 2019.
- 2,383 institutions were accredited by Indonesian government as of 2019. Among them, 4.0% are evaluated as A, and the percentage of B and C evaluations is overwhelmingly high.
- The 2002 constitutional amendment stipulates that at least 20% of national and local government finances should be allocated to the education budget, and this standard of 20% has been maintained as of today. Education as a percentage of GDP was 3.1% in 2019. However, compared to ASEAN countries, the share of government spending as a percentage of GDP is fourth lowest.
- Regarding indicators of the Global Competitiveness Index, the indicators related to vocational education are somewhat equivalent to those of Thailand and Malaysia, but the indicators of research innovation ability are positioned lower.

Trends in higher education support by major donors, including Japan

- While World Bank (WB) and Asian Development Bank (ADB) donors provide support to entire sectors or groups of universities, Japan has continued to strengthen its key higher education institutions since the 1980s through intensive support (e.g., research facilities and faculty development). Since the 1990s, these higher education institutions have taken on the roles of teacher training institutions and host institutions for local higher education institutions of science and engineering in Indonesia and of trainees from Africa and Asia. As a result, the scope of support is gradually changing from the development of major domestic universities to the development of regional engineering universities through the formation of domestic networks, and to the further strengthening of major hub universities through the formation of ASEAN networks.
- In Thailand, there has been an urgent need for higher education support to develop human resources with more advanced expertise and skills to take charge of technological development due to recent economic and social developments. ADB and Japan have provided support such as equipment, training materials, scholarships, research incentives, and training facilities to improve vocational skills development.
- Malaysia has urgently needed to improve its science and technology human resource development due to the country’s industrialization since the 1980s, and the government has focused on the expansion and upgrading of domestic universities and support for study abroad. In line with this trend, donor cooperation has focused on the expansion of scientific and technological universities and support for foreign students. However, support for the education sector is now quite limited.
- In Vietnam, WB has mainly provided support for strengthening the functions and capacity of universities, while the ADB has supported the development of equipment necessary for industrial education and vocational training. In addition, since around 2010, Japan, Germany, France, and other countries have supported the establishment of new faculties in new fields, capacity building of existing faculties, and establishment of universities in Vietnam.

Current status and issues of science and technology education and research at universities

- The strategic priority research areas shown in the National Research Master Plan 2017–2045 are medical / drug discovery, digital technology and cyber security, advanced material development, renewable energy, nuclear technology, defense / security, and space.
- RPJMN 2020–2024 seeks to promote an interdisciplinary approach to science and technology development and innovation creation in the above priority areas, mapping of Indonesia’s potential natural resources, the development of production technology in agriculture and fisheries, disaster prevention technology and post-disaster recovery, the development of other technology,

improvement of the quality of science and technology human resources, improvement of the quality of research materials and equipment of research institutions, strengthening of the research capacity of research centers (Centers of Excellence), strengthening of biological resource management, strengthened cooperation between industry, academia, and government (Triple Helix), improvements of patent and intellectual property rights governance, strengthening of strategic science parks (STP), the development of industry-academia collaboration innovation ecosystems at universities and STP, and the fostering of technology-based startups at universities and STP (PPBT). It calls for the promotion of R & D funding from outside the government and the provision of financial incentives for science and technology development, coordinated by the National Research and Innovation Agency (BRIN).

- In the current state of science and technology in Indonesia, there is a gap between the needs of industry and the national science and technology development policy, so cooperation between industry and universities and research institutes has not progressed, impacting R & D efficiency and productivity. In addition, the ratio of doctoral degree faculty members to the total number of faculty members belonging to higher education institutions is only 14.1%. The number of faculty members is small compared to the number of higher education institutions, and high-quality human resources such as researchers, engineers, and faculty members who are responsible for science and technology development have not yet been sufficiently trained
- Indonesia's score on the Global Innovation Index (GII) in 2020, which is a representative science and technology index, was 85th out of 131 countries and 14th among 17 countries in Southeast Asia, East Asia, and Oceania.
- The number of Indonesian universities ranked in the World University Rankings 2020 in the General Engineering Division is small compared to Thailand and Malaysia. Among the indices, those with the lowest scores are generally the Research and Citations indicators. On the other hand, the indices of Industry Income, International Outlook, and Teaching are not so different.
- There are reports that due to insufficient and aging educational and research equipment/materials universities and research institutes, students are unable to receive high-quality education and unable to meet the human resource needs of industry. One factor is that the inflow of research funds from the private sector is very small, indicating a need to promote industry-government-academia collaboration.
- The current status of the 11 target universities for Engineering is summarized as follows.
  - The 11 universities investigated in this survey have faculties of engineering or faculties that offer engineering education. Airlangga University provides engineering education in the faculty of science and IPB University and Padjadjaran University offer engineering education in the faculty of agriculture or geology.
  - Major research fields in the universities are chemical engineering, mechanical engineering,

and electrical engineering. According to the data on research output in the past 3 years in the SINTA database, there is a tendency for active research fields to move to information engineering, computer engineering, and software engineering.

- Bandung Institute of Technology, Gadjah Mada University, and Sepuluh Nopember Institute of Technology are establishing departments of biomedical engineering, which combine engineering and medical education. This movement is one of the global trends in science and technical development.
- Some universities—the University of Indonesia, Sepuluh Nopember Institute of Technology, Diponegoro University, and Hasanuddin University—are setting up faculties or departments related to naval architecture and ocean (offshore) technology. This is a feature of technical development in Indonesia as an island country.
- Some universities, such as the Indonesia University of Education, have not prepared adequate graduate programs, according to the data on research output in the SINTA database.
- The 11 target universities in this survey are trying to promote industrial-academic collaboration in order to create innovation by developing Science and Technology Parks (STPs) and startup companies in universities. These activities indicate that the universities are inviting industries to their STPs in collaboration with regional society. Therefore, it is necessary to conduct a further survey to investigate the current achievement of industrial-academic collaboration as well as collaboration between the university and regional society.
- Some universities, such as the University of Indonesia, Bandung Institute of Technology, IPB University, and Gadjah Mada University, have conducted international collaboration research with oversea universities, including ones from Japan. Most of the international joint research they have conducted is supported financially by the agency that provides the research budget in the counterpart's country.
- As for the ratio of professors, lecturers, and researchers with doctorate degrees to the total staff, which is one of indicators for assessing the research capability of a university, it is about 33.6% at the University of North Sumatra and about 69.3% at the Bandung Institute of Technology. This result indicates a lack of quality human resources in the universities. This is, however, the overall figure for the university. It is necessary to conduct further surveys focusing on the science and engineering fields to grasp the current status of human resource development in science and technology.
- The number of students per lecturer is another indicator relating to the educational capability of universities. This figure is between 15.5 and 31.4 for the 11 target universities; it is 31.4, 26.2, and 24.2 for Diponegoro University, the University of

Indonesia, and Indonesia University of Education, respectively. This result shows a lack of academic staff at the university.

- According to the SINTA database, as of November 2021, the 11 universities targeted in this survey are all top research universities in Indonesia. In the past 3 years, Airlangga University (2nd), Padjadjaran University (5th), and Hasanuddin University (6th) have moved up in the national university rankings.

Current status of public health and the role of universities in Indonesia

- Indonesian public medical care has adopted a referral system wherein patients are first examined at a primary medical facility such as Puskesmas designated for each district / community, except in emergencies. If it is difficult to obtain treat there, patients are sent to a Type D / Type C medical institution（government classification), where more specialized examination and treatment will be performed. Type B and Type A medical institutions provide more comprehensive and specialized examinations and treatments. Most of the university hospital / teaching hospitals fall under Type C or Type B, and are in charge of managing and leading the public health of the region together with the government.
- The indicators of Universal Health Coverage (UHC) show there to be regional disparities of public health in Indonesia.
- In Indonesia, the specialized education of doctors in remote areas is recognized as an issue, and in order to prevent the absence of local doctors for several days due to travel to the city for training, there is a strong for remote medical education. As the needs and momentum of distance medical education are increasing, we are expanding the e-learning of medical education centered on the Indonesian Medical Education and Research Institute (IMERI) and the Asian Distance Medical Development Center (TEMDEC).

Survey for the formulation of a JICA assistance plan for the universities surveyed

(Engineering)

- As a basis for formulating the JICA Assistance Plan, a document survey was conducted and a questionnaire survey was conducted of the engineering departments of the University of 11 universities: University of Indonesia, Bandung Institute of Technology, Gadjah Mada University, IPB University, Airlangga University, Sepuluh Nopember Institute of Technology, Paddjaran University, Diponegoro University, Hasanuddin University, Indonesia University of Education, and the University of North Sumatra.
- The questionnaire inquired into each university's needs and background of the following activities, including the current situation and issues. It is important for JICA to support these from the viewpoint of the target indices for engineering-related productivity / competitiveness

enhancement shown in RPJMN 2020–2024.

＜Research capacity development / industry-academia collaboration support related＞

- (a) Joint research and researcher exchanges with Japanese institutions to improve research capabilities
- (b) Human resources development support for researchers and students (bachelor's and non-degree programs)
- (c) Procurement of research equipment
- (d) Building construction and rehabilitation for research
- (e) Promotion of industry-academia collaboration and support for intellectual property management

＜Education development support related＞

- (f) Construction of educational facilities
- (g) Procurement of educational equipment
- (h) Human resource development support for teachers and students (degree and non-degree programs)
- (i) Introduction of Japanese engineering education such as Monodukuri procuration education and KOSEN technical college education
- (j) Curriculum improvement through international linkage programs (twinning programs, double degree programs, etc.)
- (k) Training program for IT bridge engineers with Japan
- (l) Internship and apprenticeship programs in Japan

- Based on the above survey results, the following is a list of JICA's assistance directions for engineering university education.
  - The conventional JICA assistance related to universities in Indonesia, especially loan aid, had many component configurations including facility construction, equipment procurement, and some human resource development fellowships, but the results of the questionnaire survey suggest that the needs of the Indonesian side are shifting to support in the soft fields such as improvement of research ability and improvement of educational curricula.
  - All the universities surveyed are strongly demanding improvement of research ability such as research cooperation, joint research, and researcher exchange with Japanese universities and research institutes. Also, Japanese universities are generally in a positive situation to cooperate with Indonesia if a win-win situation is produced, not only one-sided support; for instance, the research field can yield mutual benefit in terms of, for instance, research materials and geographical characteristics, opportunities for excellent Indonesian researchers to work together, or receiving good Indonesian international

students.

- Regarding degree and non-degree programs for researchers and students including studying abroad in Japan, since the proportion of PhD holder researchers and faculty is low, the needs of the Indonesian side on this are high. However, the current Indonesian government restricts overseas degree study abroad and long-term non-degree programs by loans. However, these programs create a win-win relationship with Japanese universities, and they constitute an important component of the promotion of joint research with universities. On the other hand, according to BRIN, special cases are allowed for specific purposes such as joint research implementation. In this regard, Indonesian government consideration of this matter is expected to be strong.
- Regarding equipment procurement, the universities surveyed show strong needs for the purposes of improving research abilities and educational abilities. Links to solid research and education plans will be important. In addition, this questionnaire survey revealed a strong need for equipment for remote learning to cope with COVID-19.
- Regarding the construction of facilities, some universities have expressed the need to build educational facilities to meet the rapid demand for higher education. Most of the universities have expressed a need for smart buildings with learning rooms, virtual laboratories, etc., that support hybrid learning.
- Regarding educational development, means for which Japanese support is suitable include the introduction of Japanese engineering education such as Monozukuri manufacturing education and KOSEN technical college education, curriculum improvement through international cooperation programs such as twinning program and double degree program, and internship and apprenticeship programs in Japan. The needs of universities are high in this survey as well. These might be combined with the procurement of experimental equipment and a learning room that supports hybrid learning.

（Medicine）

- Regarding the higher education surveys in the medical field, a document survey was conducted to collect information from websites and dissertations and a questionnaire survey was conducted of medical schools at nine universities: the University of Sumatera Utara, Sriwijaya University, Padjadjaran University, Diponegoro University, Sebelas Maret University, Brawijaya University, Airlangga University, Udayana University, and the University of Mataram
- In the document survey, information was collected on the status of government funding for medical research, the status of overseas activities of students / faculty and staff, the status of employment support / career support, the status of industry-academia collaboration / university-

launched startups, and R&D-related intellectual property, status of property rights acquisition, support from other donors, and health indicators for each university location.

- In the questionnaire survey, prospective cooperation through sector loans under JICA's ODA loan program, we asked about the current situation, issues, and support needs of each university regarding the following eight support components.
  (a) Facility construction support (research buildings, university hospital, infectious disease center, etc.)
  (b) Equipment procurement support (research equipment, educational equipment, ICT equipment, telemedicine equipment, etc.)
  (c) Human resource development support (scholarships for short-term study abroad in Japan, study abroad, researcher exchange, etc.)
  (d) Development of joint research programs with Japanese research institutes to raise the level of research abilities
  (e) Development of international medical education programs (twinning programs, double degree programs, etc.)
  (f) Development of e-learning courses for medical education (curriculum, teaching materials, e-learning software, etc.) and hybrid courses for face-to-face education and e-learning
  (g) Support for industry-academia collaboration, intellectual property management, and hospital management
  (h) Others
- Responses to the questionnaire from universities are as follows;
  - For cooperation of the faculties of medicine to the nearby primary healthcare units, all of them answered that they are providing supports and doing cooperative activities to primary healthcare facilities such as student's/academic staff's/medical practitioner's engagement in diagnosis and treatment, provision of human resource development programs to healthcare workers, construction of networking among primary healthcare facilities, etc.
  - For cooperative activities with governmental organizations, all the faculties of medicine answered that they are providing supports and doing cooperative activities to both local and central government. They support in policy making at local governments by becoming their professional experts, response to COVID-19 (PCR test, treatment, etc.), and transfer knowledge and provide human resource development training to the governmental officials in the field of medicine and health.
  - All the faculties of medicine have been providing students with online education since the pandemic of COVID-19. They found it easier to provide lectures online, however, it is difficult or impossible to conduct practical trainings and experiments online, which indicates hybrid education of online and face-to-face is desired in the future.

- Current status of telemedicine is identified in the vicinity of the target universities. Telemedicine has been widely used since the pandemic of COVID-19 such as health consultation by using video call, monitoring of patients infected with COVID-19 by using smartphone's applications, online diagnosis and delivery service of prescriptions via Gojek or Halodoc. On the other hand, improvement of devices and internet environment is needed for better services. In addition, there are some comments in the answers to the questionnaire mentioning that ordinary citizens pay less attention to telemedicine according to some responses.
- Support needs from each faculty of medicine tend to be construction of research centers and procurement of equipment in the fields in which each university has advantages or is planning to focus on in the future; development of programs to encourage research capacity and human resource enhancement in those fields; development of a curriculum for online medical education and update of equipment as a means of education and research; development of academic-industrial collaboration; and update of the telemedicine system and equipment. Those components (support needs) are requested as a consistent package by each target university.

Current status and issues of vocational education

- For the purpose of understanding the current situation and issues of polytechnics and making recommendations on the direction of JICA's support, the survey was conducted, targeting polytechnics, Japanese companies and Japanese vocational education institutions. As for the survey to polytechnics, the questionnaire was sent to 43 polytechnics, and interviewed selected polytechnics, while questionnaires and interview survey were conducted to Japanese companies and interview survey to 2 vocational education institutions in Japan (1 kosen and 1 professional university).
- The issues confirmed from the survey on polytechnics are that there are disparities among polytechnics. The high-level polytechnics have high research ability and active cooperation with industry, while the lower-level polytechnics have insufficient facilities and equipment, and the job-placement support system for students is inadequate.
- Interviews with Japanese vocational education institutions revealed the followings. In recent years, the system of professional universities that emphasize practical education has been established. In terms of kosen's situation, although it has produced the human resources required by industry with a long history, kosen has kept to trying to improve its program and in fact they are introducing a cross-appointment system to secure higher quality teachers and developing human resources for a newer era. They have also introduced a model core curriculum. Both professional universities and kosen have incorporated a curriculum related to career education

from an early stage, helping students to be able to draw a career plan after being a member of the society.

- In the survey of Japanese companies, it is turned out that Japanese companies have a need for cooperation with polytechnics, and dissemination of the strengths and characteristics of polytechnics as well as high competences of students among Japanese companies so that the students of polytechnics can be candidates when developing a new business and seeking human resources with high knowledge and skills. The Japanese companies also demand of strengthening the job-placement support function at polytechnics, being a contact point when Japanese companies need human resources The function is expected, beyond its original service of job-placement support, to be a bridge with industry to facilitate the cooperation with industry.

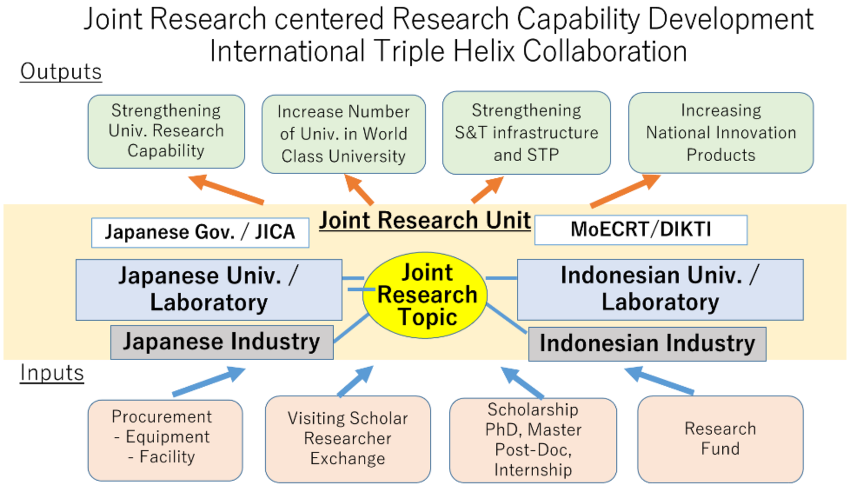
JICA assistance project proposals (hypotheses) for higher education

（Engineering）

- As a result of the above survey, the following project plan (hypothesis) can be considered as a JICA assistance project for engineering higher education in Indonesia.

（1）Joint Research (Research Cooperation)-Centered Research Capacity Development Project through Industry-Academia-Government (International Triple Helix Collaboration

The approach of this project is to launch a joint research project with themes that meet the needs of industry with the participation of the laboratories of Indonesian universities and Japanese universities, research institutes, and companies. Based on this set-up, the project can promote collaboration activities and realize innovation at the university. This approach can be aimed at strengthening the research capacity of a single university, but it does not necessarily target a single university: It is also possible to select laboratories from university groups with research topics that make it easy to build win-win relationships with Japanese universities, research institutes, and companies and to provide pinpointed support for research themes that transcend the boundaries of universities.



（In the case of an approach that transcends the boundaries of the university）

- The executing agency will be MoECRT, and the project site will be selected laboratories of the participating universities.
- Project components will be: 1) Construction of science and technology infrastructure and research facilities, 2) Procurement of experimental equipment, 3) Activities necessary to promote joint research / industry-academia collaboration and commercialization, 4) Researcher's degree / non-degree study abroad, 5) Invitation of visiting scholars from a Japanese university, 6) International collaborative education programs in line with research themes, 7) Consulting services, etc.
- As for the JIVA assistance scheme, either a project loan or sector loan can be used.

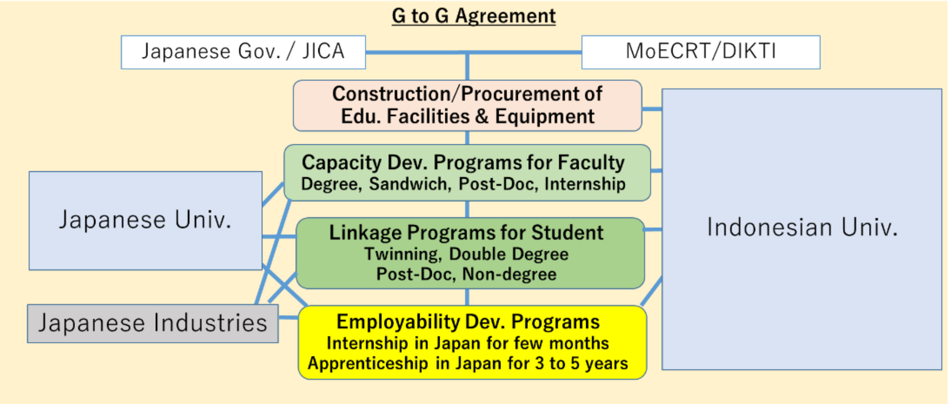
（In the case of an approach to a single university）

- The executing agency will be the single university selected, and the project site will be the same university.
- Project components are similar to the above: equipment procurement for laboratories, various activities necessary for promoting joint research and industry-academia collaboration, and consulting services. In the case of a single university, other components included in the following project plans (2) and (3) will be combined according to the strategic plan of the university.

(2) Engineering Education Development to Nurture Practical Engineers that Meet the Needs of Industry and Rapid Increases of Higher Education Demand

The project plan aims at enhancing and improving the training content and eliminating regional disparities in the supply of higher education to meet the rapid quantitative increase in demand for higher education and the provision of educational content that meets the needs of industry. The project will include the expansion and improvement of educational infrastructure, improvement of quality and quantity of teachers, and suiting the education to the needs of industry and society through educational collaboration with Japanese universities and industries through Capacity Development Programs for Faculties such as degree, sandwich, post-doc, internship programs in Japan for faculties, Linkage Programs for Student including twinning, double Degree, post-doc, non-degree programs and Employability Development Programs for Students including internship program in Japanese companies in Japan for few months and apprenticeship program in Japan for 3 to 5 years.

Educational Capacity Development
through International Triple Helix Collaboration

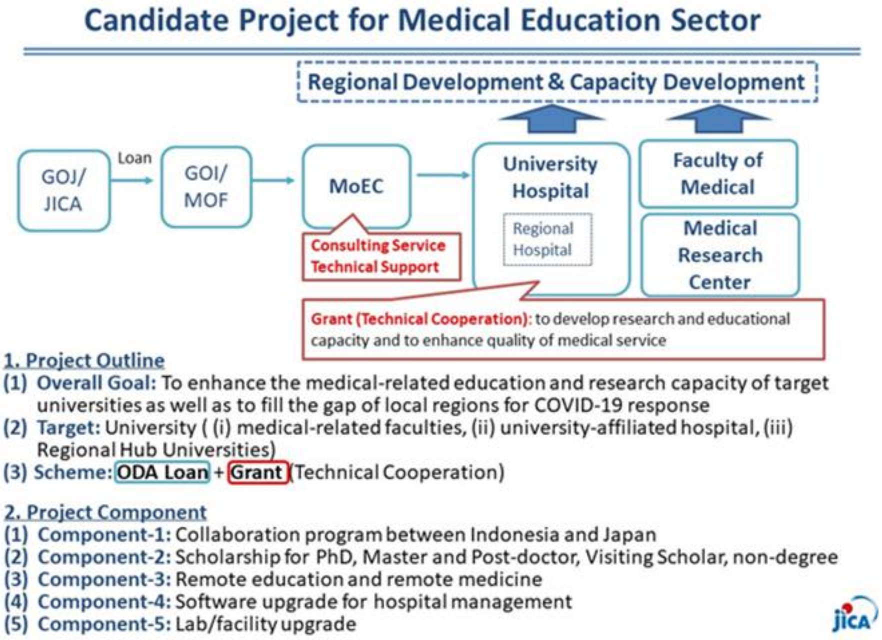


(3) Development of Engineering Education Environment for Hybrid Learning to Provide High-Quality Education Corresponding to the New Normal after the Corona Pandemic

This project aims to develop an engineering education environment for hybrid learning to provide high-quality education corresponding to the new normal after the corona pandemic by promoting collaboration with Japanese universities and technical colleges and the sharing of experiences on the issue.

（Medicine）

- According to the above data collection and the following JICA's candidate projects for medical education sector, the Survey Team proposes the support project components (hypotheses) as below.



Candidate Project for Medical Education Sector

Regional Development & Capacity Development

GOJ/ JICA → Loan → GOI/ MOF → MoEC → University Hospital (Regional Hospital); Faculty of Medical; Medical Research Center

Consulting Service
Technical Support

Grant (Technical Cooperation): to develop research and educational capacity and to enhance quality of medical service

1. Project Outline
(1) **Overall Goal:** To enhance the medical-related education and research capacity of target universities as well as to fill the gap of local regions for COVID-19 response
(2) **Target:** University ((i) medical-related faculties, (ii) university-affiliated hospital, (iii) Regional Hub Universities)
(3) **Scheme:** ODA Loan + Grant (Technical Cooperation)

2. Project Component
(1) **Component-1:** Collaboration program between Indonesia and Japan
(2) **Component-2:** Scholarship for PhD, Master and Post-doctor, Visiting Scholar, non-degree
(3) **Component-3:** Remote education and remote medicine
(4) **Component-4:** Software upgrade for hospital management
(5) **Component-5:** Lab/facility upgrade

(1) Development of research collaboration with Japanese research institutions for research capacity and human resource enhancement

Research consortium is organized between Indonesian and Japanese universities focusing on some specific topics, and researcher exchange and knowledge sharing are implemented. This will foster the basis of research collaboration.

(2) Human resource development through non-degree study-abroad program

Due to the regulations of Indonesia, degree study-abroad programs using Japanese Yen loans are currently not available. Therefore, human resource development is conducted by dispatching students and researchers through short-term training programs or as visiting scholar.

(3) Development of international medical programs through updating online education

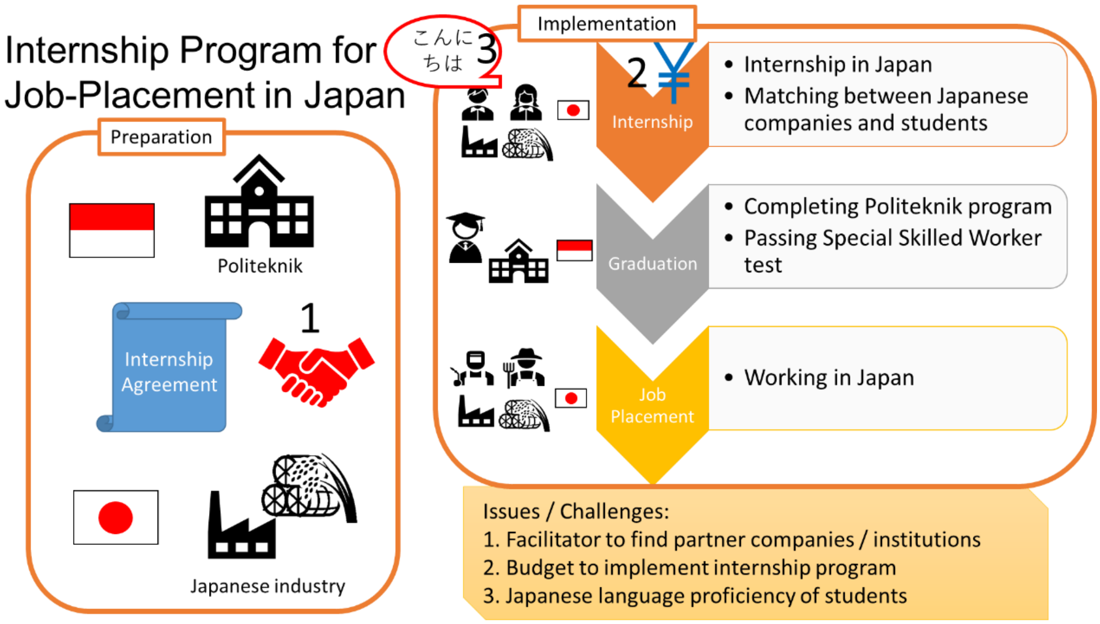
Participants of international medical programs (twinning programs, double-degree programs, etc.) are required to move to foreign countries, and enroll in the university and participate in the classes physically so far, which is regarded as both positive and negative aspect. Students may be able to choose participation in international medical programs online if curriculum and devices for online medical education is developed.

(4) Development of academic-industrial collaboration

Nurturing research support specialists in universities such as research IR or URA will enable universities and industries to communicate each other more smoothly, which is expected to encourage technology development. Many Japanese universities have knowledge and experiences in research IR and URA and some of them support capacity development for those staff. Therefore, there is a validity for JICA to support this component.

Direction of support and cooperation for vocational education

- The following two can be proposals for the direction of support and cooperation for strengthening polytechnics education. (1) A program that provides teaching staff and students with opportunities to practice and study abroad in Japan in order to strengthen teachers' abilities to further improve their abilities and to provide students with a variety of programs, (2) A program to strengthen polytechnics' job-placement support functions. These programs do not target a specific polytechnic, but it should be targeting all polytechnics through the Forum to spread the effect to all polytechnics.



- On the other hand, there are some issues to be overcome when implementing these programs. The issues are; the necessity of Japanese language proficiency, the issue of capacity on the Japanese side, and the fact that the Japanese-style employment support system may not be applicable in Indonesia where the system is different. It might be useful that stakeholders to visit and inspect Japanese vocational education institutions and have direct discussions with them.

Chapter1 Overview of the survey

1.1 Background of the survey

The Government of Indonesia has placed the highest priority on human resource development in several important policy documents, including the "Vision of 2045," which was formulated for the period until 2045, the year of the 100th anniversary of independence, the Long-Term National Development Plan (hereinafter referred to as RPJPN 2005–2025), and the Mid-Term National Development Plan (hereinafter referred to as RPJMN 2020–2024). However, the Human Capital Index (2020) released by the World Economic Forum ranked Indonesia 96th out of 174 countries, which is lower than many neighboring countries, such as Vietnam (38th), Malaysia (62rd), and Thailand (63th).[1] In terms of productivity, Indonesia's growth rate of total factor productivity (TFP) published by the Asian Productivity Organization (APO), shows that the score of Indonesia from 2010 to 2017 changed by −3.3%, while other neighbor countries showed positive changes in scores, e.g., Vietnam (1.8%), Thailand (0.6%), Malaysia (0.5%), and Singapore (0.3%). The lack of innovation and poor quality of the labor can be deemed to have hindered economic growth.[2]

On the other hand, although there are many universities that should play important roles in human resource development and science and technology development, which are the basis of technological innovation, there are only two Indonesian universities within the top 500 place in various world university rankings: University of Indonesia in 296th place and Bandung Institute of Technology in 331st place in the QS World University Rankings 2020. In the THE World University Rankings 2020, no university from Indonesia was ranked. In addition, the Polytechnic is regarded in Indonesia as a higher education institution that can provide vocational education for potential human resources for the industry, and it is thus expected to contribute to improve labor quality, an urgent issue in Indonesia. However, it cannot be said that it has been able to produce enough human resources with the practical skills required by the industry.

Various reasons for this have been adduced from both inside and outside Indonesia, such as the lack of educational facilities and equipment that can respond to the rapid increase in demand for higher education, the shortage of teaching staff with sufficient qualifications, the shortage of teaching staff capable of providing practical education, poor access to higher education except for Java Island, curricula that do not match the needs of industry, lack of cooperation with industry, problems with the effectiveness of quality assurance systems, and delays in the internationalization of higher education institutions.

Under such circumstances, the Government of Indonesia expects JICA's cooperation to solve the issues of higher education institutions, and hence this survey was conducted.

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[1] https://www.weforum.org/reports/the-global-competitiveness-report-2020/in-full/infographics-14b60f7c60

[2] APO Productivity Datebook 2019, Asian Productivity Organization

In addition, the COVID-19 epidemic seems to have had a considerable effect on higher education and vocational education in Indonesia. This survey will be one of the first conducted under these circumstances, and it is thus significant in providing us a better sense of how Japan should best support Indonesia’s higher education and vocational education under post-COVID-19 circumstances.

1.2 Objectives of the survey

This survey identifies and analyzes the current situation, issues, and needs of higher education, especially university education and vocational education, in Indonesia, discusses the future direction of JICA’s cooperation in the higher education sector, and suggests specific projects. In addition, the survey team offers proposals for improving universities and vocational education in Indonesia to the Ministry of Education, Culture, Research and Technology (MoECRT) and National Research and Innovation Agency (BRIN).

1.3 Survey area and target organizations

The target area of this survey is Indonesia and Japan. At the beginning of this survey, the counterparties of this survey were the Directorate General of Higher Education and Directorate General of Vocational Education of the Ministry of Education and Culture (MOEC), and the Ministry of Research and Technology (Kemenristek/Ristek-BRIN), while after the survey started, MOEC was reorganized and renamed the Ministry of Education, Culture, Research and Technology (MoECRT) and BRIN was reclassified as an agency separate from the ministry under the reorganization of ministries and agencies by presidential decree in April 2021.

Regarding the scope of jurisdiction of each organization, the Directorate-General of Higher Education formerly has jurisdiction over polytechnics, but just before the start of the survey, a new Directorate-General of Vocational Education was established with jurisdiction over it. At the beginning of the survey, research and innovation activities at universities were under the jurisdiction of BRIN and were managed together with the research institutes under its jurisdiction, but this is no longer so. Therefore, the survey of university research and innovation activities started with BRIN as a counterparty, and from there, the project was formulated in relation to the new coronavirus infection, and measures strengthening the ability to respond to infectious diseases were supported by JICA. It has been proposed as a project whose feasibility evaluated in this survey. The detailed changes of jurisdiction due to the reorganization are still continuing as of October 2021, which constitutes one of the limiting factors in the implementation of the survey.

In the higher education surveys for the field of engineering, the following 11 universities with PTN-BH qualifications were selected as target universities: the University of Indonesia, Bandung Institute of Technology, IPB University, Gadjah Mada University, Sepuluh Nopember Institute of Technology, Padjadjaran University, Indonesia University of Education, Airlangga University, the University of

North Sumatra, Diponegoro University, and Hasanuddin University. These universities have been designated as “Universities Aiming for World-Class Level” in the strategic plan (2015–2019) formulated by the former Ministry of Higher Education.

Regarding the higher education surveys in the medical field, there are changes in the above 11 universities at the request of JICA, and finally 9 universities were selected: the University of Sumatera Utara, Sriwijaya University, Paddjaran University, Diponegoro University, Sebelas Maret University, Brawijaya University, Airlangga University, Udayana University, and the University of Mataram.

In addition, at the request of BRIN, Andalas University, Akeman Institute for Molecular Biology and Indonesia Atomic Energy Agency (under the jurisdiction of the Ministry of Research and Technology; hereinafter “BATAN”) were also included in the survey to formulate a project to strengthen the ability to respond to new coronavirus infections and infectious diseases.

The vocational education survey targeted all public polytechnics under MoECRT. In addition, Japanese companies operating in Indonesia were surveyed to investigate the needs gap between vocational education and industry, and Japanese universities and KOSEN technical colleges (hereinafter “KOSEN”) will also be surveyed for comparative surveys.

1.4 Survey Period and Implementation Method

Survey Period

Original schedule: March 2020～November 2020

After the 1st contract change: March 2020～March 2021

After the 2nd contract change: March 2020～August 2021

After the 3rd contract change: March 2020～February 2022

This survey was originally planned to be conducted for a survey period of about 9 months from March 2020 (the field survey started in April of the same year) to November of the same year. However, due to the new coronavirus infection, it became difficult to carry out the on-site survey as originally planned, and in order to respond to the medical projects related to the new coronavirus infection proposed by BRIN, it was extended until February 2022. Since the field survey could hardly be conducted, there were major restrictions on the implementation of the survey.

Table 1 Schedule of Survey

＜Schedule of University Education Survey＞

Survey title	Period	Tasks
1st domestic survey (Part 1)	Mar 2020 to Oct 2020	（Preparatory work） ・ Organizing and analyzing related materials, information and data ・ Pre-kick-off meeting held (July 2020) ・ Consultation with the executing agency and information acquisition through web conferences, etc.

		・ Preparation of inception report ・ Conducting possible surveys based on the information available
1st domestic survey (Part 2)	Oct 2020～ Mar 2021	（Additional work for BRIN project） ・ Preparation / planning / survey format preparation (incl. research profile) ・ Promotion of discussion, explanation, and information submission with BRIN ・ Analysis / verification / summary of existing information ・ Analysis / verification / summary of provided information ・ Holding series of Workshop ・ Feasibility Study 1st draft preparation / submission ・ Support for preparation of materials to be submitted to the National Development Planning Agency (BAPPENAS) for BRIN ・ Follow-up survey
1st domestic survey (Part 3)	Mar 2021～ Oct 2021	（University Survey） ・ Submission of the Interim Report to MoECRT and BRIN ・ Preparation of questionnaire format for universities and discussion with MoECRT ・ Questionnaire survey using the format ・ Answer collection and follow-up ・ Analysis of answer contents, examination of direction and possibility of JICA support project ・ Preparation of interim report （Additional work for BRIN project） ・ Follow-up survey ・ Holding a workshop ・ Review of proposed change project plan
2nd domestic survey	Oct 2021～ Jan 2022	(Report preparation work) ・ Preparation of Draft Final Report / submission ・ Discussion on Draft final report with MoECRT ・ Preparation of Final Report and submission

＜Schedule of Vocational Education Survey＞

Survey title	Period	Tasks
1st domestic survey (Part 1)	Mar 2020 to Oct 2020	・ Pre-kick-off meeting ・ Organizing and analyzing related materials, information, and data ・ Preparation of questionnaire ・ Consultation with the executing agency and information acquisition through web conferences, etc. ・ Survey of other donors ・ Distribution and collection of questionnaires to polytechnics ・ Interview to polytechnics ・ Distribution and collection of questionnaires to Japanese companies ・ Interview to Japanese companies ・ Visits to Japanese vocational education institutions, etc.
2nd domestic survey	Oct 2021～ Jan 2022	(Report preparation work) ・ Preparation of Draft Final Report / submission ・ Workshop with MoECRT and polytechnics ・ Preparation of Final Report / submission

1.5 Survey Team

The composition of the Survey Team is as follows.

Table 2 Members of Survey Team

Name	Affiliation	Assigned Duties
Masahiro Hamano	Asia SEED	Chief / Higher and Vocational Education Policy
Hideaki Shimizu	Asia SEED	Deputy Chief / Higher and Vocational Education Policy
Keiko Masamoto	Asia SEED	Education and Finance
Kazunori Seki	Oriental Consultants Global （reinforcement）	University Facilities and Equipment I (Facilities)
Naoto Morimoto	Oriental Consultants Global	University Facilities and Equipment II (Equipment)
Takamasa Takemoto	Asia SEED	Science and Technology I (Engineering Field)
Hirotaka Onishi	Asia SEED （reinforcement）	Science and Technology II (Medical Science Field 1)
Rie Sawashita	Oriental Consultants Global	Labour Market / Japanese Company's Needs
Yoshiya Kitamura	Asia SEED （reinforcement）	Labour Market / Japanese Company's Needs
Hiroyuki Kanzaki	Asia SEED （reinforcement）	Management, Teaching Materials, and Equipment of Polytechnics / Student's Employment Support
Takuya Uchiyama	Asia SEED	Science and Technology III (Medical Science Field 2)

Chapter2 Government policy and the current situation of higher education and vocational education

2.1 Government policy on higher education and vocational education

Important reference documents regarding Indonesia's higher education policy are the National Long-Term Development Plan (RPJPN 2005–2025) and the National Medium-Term Development Plan (RPJMN), which divide it into four phases. There is also a strategic plan (*Renstra*) prepared by each ministry based on RPJMN.

As stated in the final phase of fourth (2020–2025) of RPJPN 2005–2025, the goal is for "Independent, advanced, fair, and independent by establishing a stronger economic base supported by quality and competitive human resources, and aim to realize a prosperous Indonesian society." Human resources are positioned as the key to the development of the country.

Seven agendas are listed in RPJMN 2020–2024. One of them is the development of high-quality and competitive human resources, that is, human resources who are healthy, knowledgeable, highly receptive and innovative, and capable and distinctive. Improving the quality of education is advocated as one of the measures necessary for that purpose. It is recognized that the weaknesses of industrial human resources in Indonesia are low productivity and low competitiveness, and that it is necessary to reform vocational education and training in order to improve productivity and competitiveness. The following are listed as specific activities for that purpose.

- Strengthening cooperation with industry (strengthening rules and incentives related to vocational education in industry, cooperation with local industry, sharing of necessary human resources information)
- Vocational education / training reform (study program / curriculum development according to industry needs and priority fields, vocational ethics / soft skills / foreign language proficiency acquisition, practical dual system introduction, vocational education and training facilities / equipment activation, strengthening of practical training utilizing Production Unit, Teaching Factory, and Teaching Industry components)
- Strengthening teacher capacity
- Establishing a qualification system based on the needs of industry
- Improvement of vocational education and training management (approval of the establishment of new vocational education institutions and study programs considering the needs of industry, accreditation, flexible financial management, budgetary measures for professional improvement, establishment of Vocational Committee, vocational Improved access to training)

In addition, the first of the 41 projects listed as priority projects during the planning period is Industry in the Five Priority Areas (Food & Beverage, Textile & Apparel, Automotive, Electronics, Chemical & Pharmacy). "Economic development by 4.0" is listed. Among the major projects is "vocational training and education for Industry 4.0."

The document that incorporates provisions of RPJMN into more specific content is the *Renstra* created by each ministry, but the *Renstra* 2020–2024 of MoECRT lists specific target indicators based on RPJMN. It also incorporates the *Kampus Merdeka* (free and independent campus) policy announced by MoECRT shortly after taking office. The minister has set up a *Merdeka Belajar* (open learning) policy to address primary and secondary threats and a *Kampus Merdeka* for higher education as education reform policies, with the intention of promoting collaboration between industry and academia for the latter. *Kampus Merdeka* consists of the following four pillars.[3]

Table 3　The Four Pillars of *Kampus Merdeka*

① Setting up a new Study Program	A or B certified universities[4] can start a new Study Program (if they have an MOU with a corporate partner, a non-profit organization, a multinational institution, or a university within the 100th QS ranking).
② Relaxation of higher education institution certification system	Automatic recertification of higher education institutions and study programs
(1) Corporatization of National University (Optional)	Conditions for PTN BLU (equivalent to public service enterprise universities, national hospitals, etc.) & Satker (university-approved national universities) to be incorporated into national universities have been relaxed.
(2) Right to study 3 semesters outside of Study Program	Higher education institutions must give students the right to take courses outside the learning program and to recognize them as credits. 2 semesters (40 credits on average) are allowed for off-campus learning, and 1 semester (20 credits on average) for study programs at other companies can be added.

Source: JETRO Indonesia Education (EdTech) Industrial Survey (December 2020)

2.2 Higher education system in Indonesia

2.2.1 Education system in Indonesia

2.2.1.1 School education system

The basic and secondary education in Indonesia is based on the 6-3-3 system, and the age at which students enter higher education institutions is 18, the same as in Japan. As shown in Figure 1, higher education in Indonesia is largely divided into academic and vocational education. Academic education involves the awarding of a bachelor's degree or higher, while vocational education provides knowledge useful for work. Professional education is a specialized program that builds on the knowledge and skills acquired in academic and vocational education with a bachelor's degree or equivalent, and includes programs equivalent to master's and doctoral degrees. The following are the educational programs of each higher education institution and their standard length of study.

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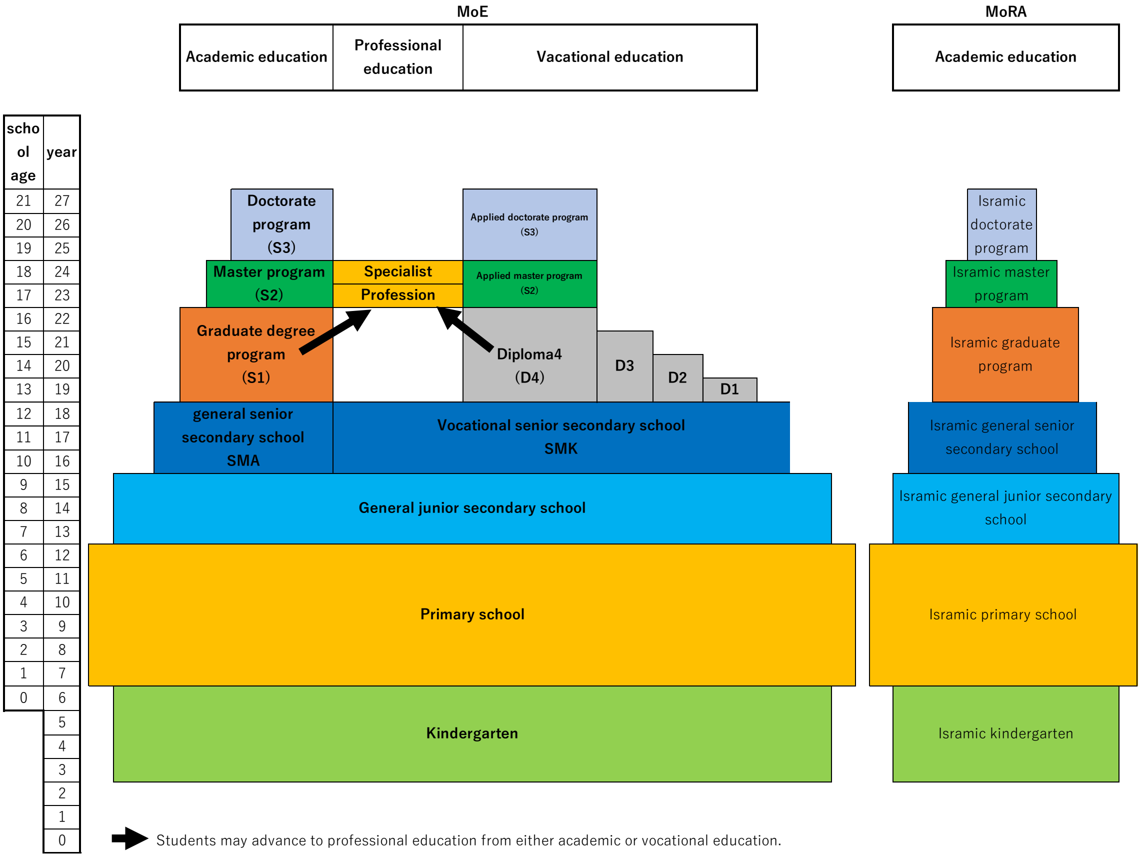
[3] Cited from a paper by Takahashi, Secretary, JETRO 2020 Survey

[4] For more information on accreditation, refer to 2.2.3. Higher education quality assurance system



Source: Indonesia Education Statistics in Brief 2019

Figure 1 The school education system in Indonesia

2.2.1.2 Types of higher education institutions

The legal basis for higher education institutions can be found in the Act on the National Education System (Act No. 20 of 2003) and the Act on Higher Education (Act No. 12 of 2012). According to the Act on Higher Education, six types of higher education institutions are permitted to be established: University (*Universitas*), Institute (*Institut*), School of Higher Learning (*Sekolah Tinggi)*, Polytechnic (*Politeknik*), Academy (*Akademi*), and Community Academy (*Akademi Komunitas*).

Table 4 List of higher education institutions in Indonesia

Higher Education Institutions	Contents
University（*Universitas*）	An institution of higher education that provides academic and / or vocational education in a variety of fields, including the humanities, sciences, and technology. It can also provide professional education if conditions are met.
Institute（*Institut*）	An institution of higher education that provides academic and / or vocational education in specific fields, including the humanities, sciences, and technology. It can also provide professional education if conditions.

School of higher learning（*Sekolah Tinggi*）	An institution of higher education that provides academic and / or vocational education in a certain field, including the humanities, sciences, and technology. It can also provide professional education if conditions.
Polytechnic（*Politeknik*）	An institution of higher education that provides vocational education in several fields, including the humanities, sciences and technology. It can also provide professional education if conditions are met.
Academy（*Akademi*）	An institution of higher education that provides vocational education in a certain or several field/s including the humanities, sciences, and technology.
Community academy（*Akademi Komunitas*）	An institution of higher education that provides vocational education in a certain or several field/s. It can provide Diploma 1 and / or Diploma 2 programs.

Source: Act on Higher Education

Institutions responsible for academic education (*Pendidikan Akademik*) include universities, institutes, schools of higher learning, and institutions responsible for vocational education (*Pendidikan Vokasi*) only include polytechnics, academy, and community academy. Four institutions namely universities, institutes, schools of higher learning and polytechnics can provide professional education if conditions are met. The table below shows 11 degrees that higher education institutions can provide.

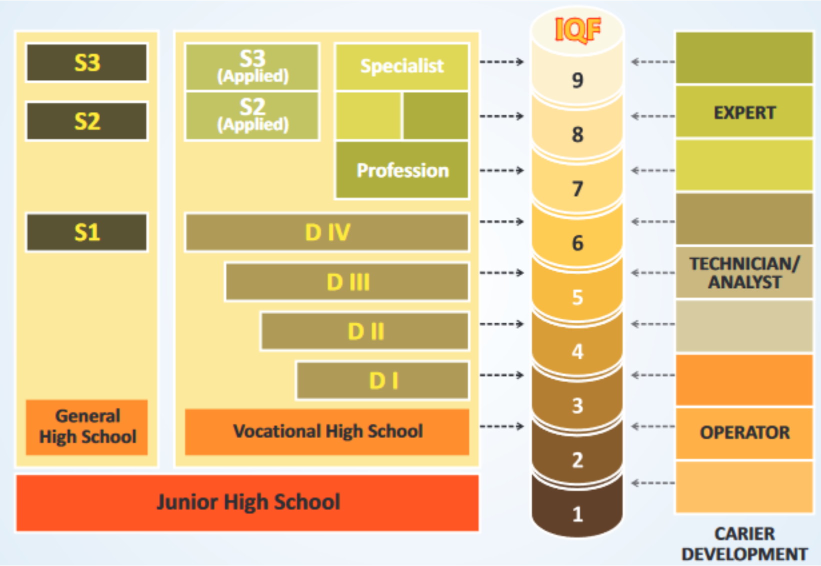
Table 5 List of degrees

Degree Major Classification	Degree Minor Classification	Corresponding Programs
Academic education degree (*gelar akademi*)	Bachelor（*sarjana*） Master（*magister*） Doctoral（*doktor*）	Batchelor（*sarjana*） Master（*magister*） Doctoral（*doktor*）
Vocational education degree (*gelar vokasi*)	First expert（*ahli pratama*） Young expert（*ahli muda*） Associate expert（*ahli madya*） Applied bachelor（*sarjana terapan*） Applied master（*magister terapan*） Applied doctoral（*doktor terapan*）	Diploma I Diploma II Diploma III Diploma IV Applied master(*magister terapan*） Applied doctoral（*doktor terapan*）
Professional education degree（*gelar profesi*）	Profession（*profesi*） Specialist（*spesialis*）	Profession（*profesi*） Specialist（*specialis*）

Source: Act on Higher Education

2.2.1.3 National qualifications and education

The Presidential Decree No 8 2012 established the Indonesian Qualifications Framework (IQF) to facilitate the use of skills gained the national qualifications and its correspondence with education especially vocational education, and work experience in the labor market. The skill obtained from education is corresponding to the level of IQF as below.



Source: Indonesian Qualification Framework, Ministry of Education and Culture, Republic of Indonesia

Figure 2 A mutual equivalence toward IQF qualifications levels between education pathways both formal and non-formal and operational / career pathways

2.2.2 Number of higher education institutions and enrollment status

As of 2019, colleges made up the largest number of higher education institutions, but in terms of the number of enrolled students, general universities are the largest branch of higher education. Among the institutions that focus on vocational education, the number of academy institutions is the largest, but the number of students is the largest in polytechnics. There are 213 schools in Indonesia as a whole, and about 240,000 people are enrolled in polytechnics, but the numbers of institutions and students are still only 3% to 7% of the total number of higher education institutions. The Higher Education Law stipulates that at least one national higher education institution (university, vocational university, polytechnic) should be established in each state, which has been indicated as a government guideline (Article 80) from private to national. The number of national higher education institutions is increasing due to the transfer to and establishment of new institutions. In Indonesia, in addition to the educational institutions under the jurisdiction of the MoECRT, there are also educational institutions based on Islam under the jurisdiction of the Ministry of Religion, including higher education institutions. In addition, among institutions responsible for vocational education, there are also institutions set up by the competent ministries and agencies according to their specialized fields.

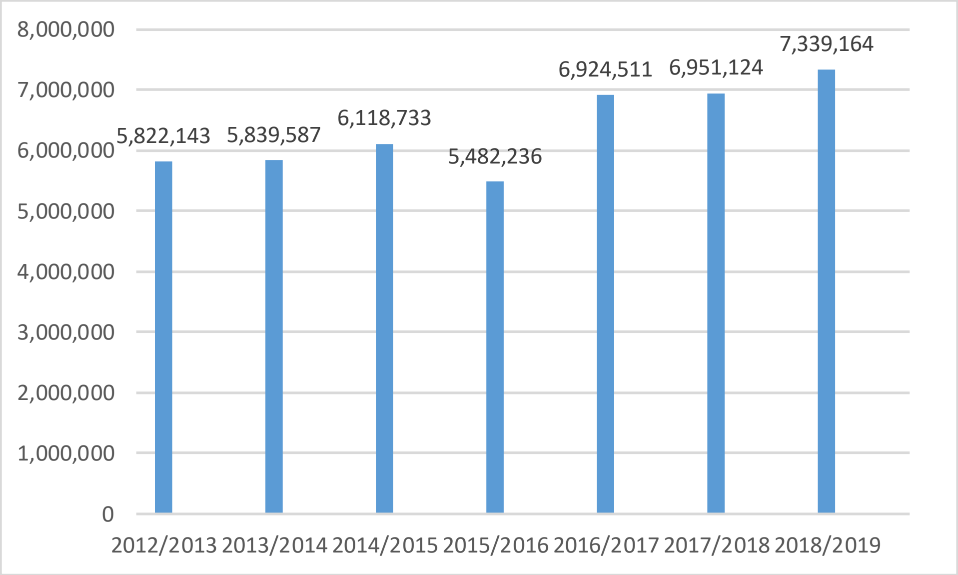
In addition to educational institutions under the jurisdiction of MoECRT, Indonesia also has Islamic educational institutions under the jurisdiction of the Ministry of Religious Affairs, including higher education institutions. There are also institutions for vocational education established by the relevant ministries according to their fields of expertise.

Table 6 The number of institutions, students and teaching staff at tertiary education level

	Grand Total			Public (MoECRT)			Private (MoECRT)			Total (MoECRT)		
	Inst.	**Student**	**Teacher**	**Inst.**	**Student**	**Teacher**	**Inst.**	**Student**	**Teacher**	**Inst.**	**Student**	**Teacher**
University	633	5,864,453	181,782	63	2,683,427	65,948	552	2,872,994	105,890	615	5,556,421	171,838
Institute	238	589,154	24,666	12	96,311	5,511	102	205,070	8,432	114	301,381	13,943
Sch. of HL	2,501	1,335,865	66,427	-	-	-	1,424	1,103,182	49,078	1,424	1,103,182	49,078
Polytechnic	304	377,893	22,185	43	148,138	8,518	170	89,615	6,110	213	237,753	14,628
Academy	909	145,076	13,400	-	-	-	851	138,844	12,211	851	138,844	12,211
C.Academy	36	1,679	147	4	527	46	30	1,056	83	34	1,583	129
Total	**4,621**	**8,314,120**	**308,607**	**122**	**2,928,403**	**80,023**	**3,129**	**4,410,761**	**181,804**	**3,251**	**7,339,164**	**261,827**

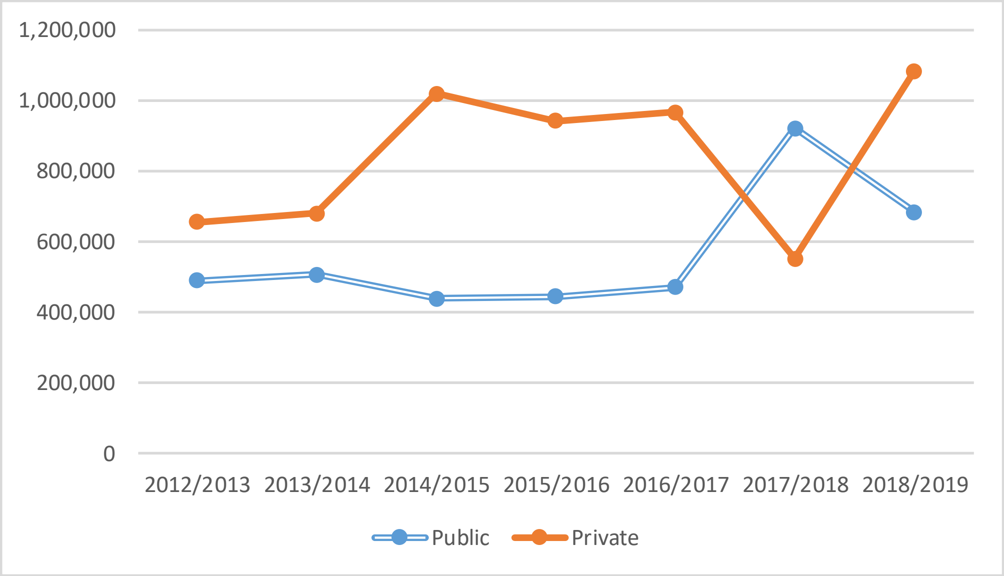
Source: Higher Education Statistics 2019

The number of students enrolled in higher education institutions as a whole has been increasing, with the exception of 2015, and the number of new students has remained higher in private institutions than in public institutions, except in 2017. Also, the largest number of students graduated from private universities in 2019.



Source: Higher Education Statistics Year Book 2019

Figure 3 Trends in enrollment



Source: Higher Education Statistics Year Book 2019

Figure 4 Trends in new students

Table 7 Number of graduates by higher education institution

Higher Education Institutions	Public (Person)	Private（Person）	Graduates（Person）
University	439,712	591,574	1,031,286
Institute	30,318	42,671	72,989
School of Higher Learning*	-	276,973	276,973
Polytechnic	54,392	27,699	82,091
Academy*	-	57,461	57,461
Community Academy	296	738	1,034
Total	524,718	997,116	1,521,834

*Private only

Source: Higher Education Statistics Year Book 2019

2.2.3 Higher education quality assurance system

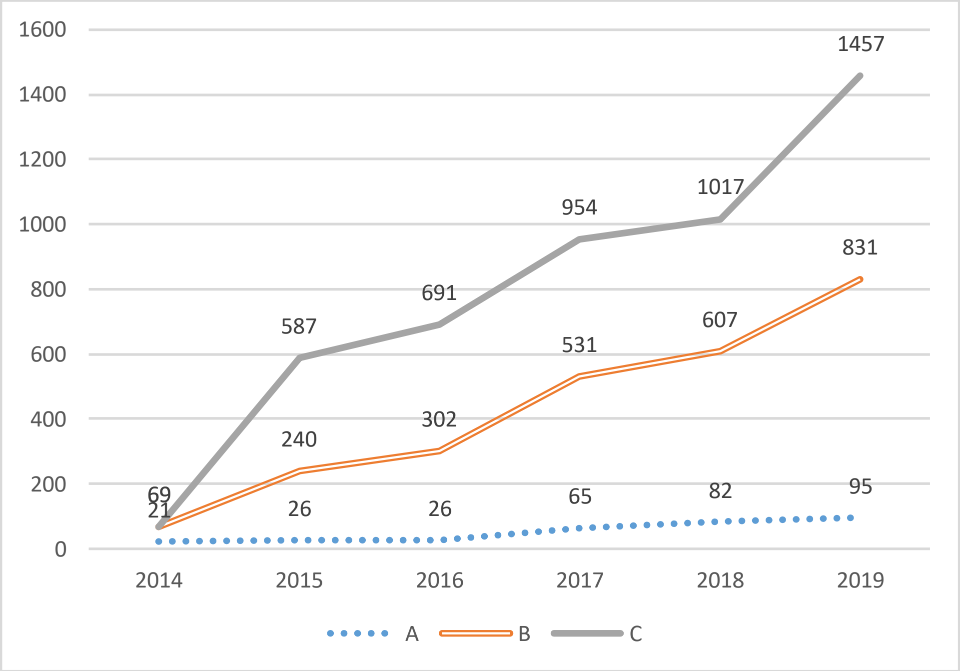
Under the provisions of the National Education System Act (2003), newly established educational institutions are required to obtain approval (accreditation) from the central or local government. Both the accreditation of institutions and educational programs are valid for five years. The current criteria set by the accreditation agency, BAN-PT, fall under the following seven evaluation perspectives.

BAN-PT's seven accreditation standards

① Vision, mission, goals and objectives, and strategies to achieve
② Governance, leadership, management system, and internal quality assurance
③ Students and graduates
④ Human resources
⑤ Curriculum, instruction, and academic atmosphere
⑥ Finances, facilities and infrastructure, and information system
⑦ Research, community service, and partnership

The results are presented as either one of three classifications (A, B, or C), which correspond to accreditation, or non-accreditation. The data and information used in the accreditation process are registered in a database (Pangkalan Data Perguruan Tinggi: PDPT) managed by the Directorate General of Higher Education, MoECRT.

According to a report by MoECRT in 2019, the number of accredited higher education institutions is growing, but 48 percent are still not accredited. As shown in the table below, the number of accredited higher education institutions with an A has been increasing since 2014, but has only reached 4.0% in 2019, and the percentages of B and C accreditation are still overwhelmingly high.



Source: RISTEKDIKTI Yearly Report 2015–2018, *Statistik Pendidikan Tinggi* Indonesia 2019

Figure 5 Trends in the number of accredited higher education institutions

Table 8 Accredited higher education institutions in 2019

Evaluation	No. of institutions	Percentage
A	95	4.0%
B	831	34.9%
C	1457	61.1%
Total	2,383	100%

Source: *Statistik Pendidikan Tinggi* Indonesia 2019

2.2.4 Responsible government agencies

In 2019, the election of the president led to a new structure of ministries in Indonesia. The MoEC has been made responsible for higher education and vocational education, which covers the formulation and planning of higher education policies, supervision and coordination of higher education institutions, and quality management. In addition, the MoRT is responsible for research conducted by universities and research centers.

In April 2021, the MoEC was reorganized to form the MoRT. The BRIN is managed as the National Research and Innovation Agency under the President (Presidential Decrees No. 33/2021 and No. 78/2021).

2.2.5 Budget for higher education

Education is one of the key investment areas in Indonesia, and government expenditure on the education sector has been increasing. In the fourth constitutional amendment in 2002, Article 31, Clause 4 of the Constitution stipulated that “at least 20% of the national and local government finances shall be allocated to the education budget,” and the table below shows that the budget has been maintained at 20% to the present. In 2020, the education budget will be 505 trillion Indonesian Rupiah, which is about 20% of government expenditure.

Table 9 Government expenditure on education

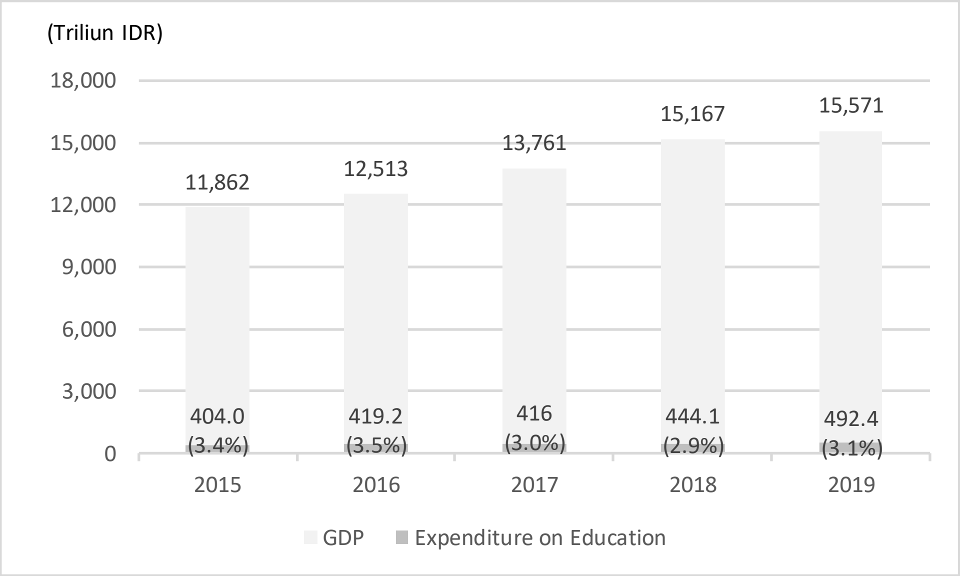
Unit: Trillion Indonesian Rupiah

	2015	2016	2017	2018	2019	2020
National budget	2039.5	2095.7	2080.4	2220.7	2,461.1	2,540.4
Budget for education sector	404.0	419.2	416	444.1	492.4	505.8
Percentage	19.8	20.0	20.0	20.0	20.0	19.9

Source: Statistical Year Book 2019, 2021

The share of education in GDP (gross domestic product) is also increasing, standing at 3.1% in

2019.



Source: Prepared by the study team based on data from the UNESCO Institute for Statistics

Figure 6　Ratio of government expenditure on education to GDP

Compared to other ASEAN countries, Indonesia has the fourth-lowest government expenditure on the education sector as a percentage of GDP (3.16%). Myanmar, Singapore, and Thailand have lower ratios than Indonesia.

Table 10　Comparison of government expenditure on education in other Asian countries

	Percentage of national expenditure on education	
	Share of GDP (%)	Share of total national expenditures (%)
Indonesia	3.58	20.50
Cambodia	4.50	8.84
Malaysia	4.53	19.74
Myanmar	1.97	10.35
Philippine	2.70	13.20
Singapore	2.85	28.84
Thailand	4.12	19.13
Vietnam	4.17	14.47

Source: World Bank, UNESCO Institute for Statistics

2.3 Current situation and challenges of higher education in Indonesia from the perspective of international higher education

An analysis based on international data comparisons with Southeast Asian countries that are considered to be meaningful for comparison, as well as targets and indicators (benchmarks) to be achieved, was conducted. Malaysia and Thailand were selected as the specific countries, as they are aiming to become advanced countries like Indonesia and are ahead of Indonesia on various indicators such as the Global Competitiveness Index in Table 11, and Vietnam was added after consultation with JICA.

Table 11 Rankings on each index in the Global Competitiveness Index of the World Economic Forum

	Indonesia	Singapore	Malaysia	Thailand	Vietnam	Japan
Quality of vocational training	37	6	12	74	102	18
Ease of finding skilled employees	45	9	11	86	96	54
Scientific publications	56	23	44	39	59	6
Patent applications	101	15	41	66	91	1
R&D expenditures	116	14	24	48	70	6
Research institutions prominence	45	21	38	43	58	7

Source: Prepared by the study team based on the Global Competitiveness Report 2019, World Economic Forum

Table 12 Policies, goals, indicators, and strategies for higher education in Vietnam

Policy	Goal（Only those related to higher education and vocational education）	Indicator（Only those related to higher education and vocational education）	Policy
Socio-Economic Development Strategy 2011-2020	Education, training, science and technology that contribute to the modernization and industrialization of the nation	(1) The rate of educated workers should exceed 70%, and workers with vocational training should account for 55% of total social labor (2) The number of university students should reach 450 per 10,000 population	Socio-Economic Development Strategy 2011-2020
Socio-Economic Development Plan 2016-2020	Improving the quality of education and training, and developing science, technology and intellectual economy	(1) The trained workforce should be 55% of the total workforce (2) The annual increase in the number of students entering universities and colleges should be 7% (3) The annual increase in the number of students entering	Socio-Economic Development Plan 2016-2020

		colleges and secondary schools for vocational training should be 8% (4) The ratio of university and college students per 10,000 population to be 300	
Human Resources Development 2011-2020	To be the fundamental and most advantageous factor for Vietnam's sustainable development, international integration and social stability, and to raise the international competitiveness of Vietnam's human resources to the level of developed countries	(1) 70% of workers with professional and higher education, (2) 55% of workers with vocational training, (3) at least 10 vocational training schools based on international standards, and (4) at least 4 first-class universities based on international standards	Human Resources Development 2011-2020
Human Resources Development Master Plan 2011-2020	①To rapidly increase the proportion of trained personnel in the market ②To develop a comprehensive human resource to improve the quality and effectiveness in all fields ③To develop high quality teachers to achieve these goals	(1) Percentage of trained labor force in each labor market sector: 70% for all economic sectors, 50% for agriculture, forestry, fisheries and fisheries, 92% for industrial sectors, 65% for industrial and construction sectors, 88% for service sectors (2) Demand for human resources by market sector: agriculture, forestry, fisheries and fisheries sector 12,980,000; industry and construction sector 16,120,000; service sector 14,952,000. (3) ・Number of teachers and instructors and percentage of high degree holders: Professional Secondary Schools level 48,000 (38.5%), Colleges level 44,200 (8%), Universities level 75,800 (30%) ・Number of professional teachers and instructors: 28,000 at the university level	Human Resources Development Master Plan 2011-2020
Education Strategic Development Plan 2011-2020	To fundamentally and comprehensively reform Vietnam's education system	(1) By 2020, vocational education institutions should accept 30% of secondary school graduates. (2) The percentage of workers	Education Strategic Development Plan 2011-2020

	toward standardization, modernization, socialization, and international integration	with vocational and higher education should reach about 70%, and the percentage of students receiving any form of training should reach about 350-400 per 10,000 population	
Higher Education Reform Agenda 2006-2020	To expand the quantity and improve the quality of higher education institutions responsible for human resource development (strengthening teaching and research capabilities and management capacity)	(1) Increase the number of students entering higher education institutions to 450/10,000 by 2020. (2) Increase the number of university faculty members so that the faculty/student ratio should be 1:20 (1:30 as of 2005). 60% of university faculty members should have master's degrees and 35% should have doctoral degrees by 2020 (15% as of 2005). (3) Establish two types of higher education institutions: research-oriented (approximately 20% of the student population) and vocational training institutions by 2020. (4) Increase the number of students entering private higher education institutions to 40% by 2020. (5) Increase the quantitative and qualitative activities of scientific and technological research in higher education institutions, so that the income from research and development activities of universities will account for 25% of the total income by 2020 (1% as of 2005).	Higher Education Reform Agenda 2006-2020

Source: Prepared by the study team based on each policy

Table 13　Policies, goals, indicators, and strategies for higher education in Thailand

Policy	Goal（Only those related to higher education and vocational education）	Indicator（Only those related to higher education and vocational education）	strategies（Only those related to higher education and vocational education）
20-Year National Strategy	(1) National security (2) Strengthening national competitiveness (3) Human resource development (4) Social equality (5) Green growth (6) Correcting imbalances and public sector	(1) Ratio of total R&D expenditure to GDP: approx. 0.5% (2016) → 1.0% (2017-21) → 1.5% (2022-26) → 2.0% (2027-31) → more than 2.0% (2032-36) → 4.0% (after 2036)	Science and technology, research and innovation

	development	(2) Number of researchers 36 per 10,000 working population: 12.9 (2016) → 80 (2036)	
12th National Economic and Social Development Plan（2017-2021）	Reduce income inequality and poverty, strengthen the economy and enhance national competitiveness, etc.	Based on the above 20-Year National Strategy	(1) Strengthen and develop human resources (2) Promotion of science and technology, research, and innovation
Second 15-Year Long Range Plan on Higher Education（2008-2022）	Promote teaching and learning, research, and strengthen all aspects of the higher education system and its infrastructure	Number of students Health: Science: Social Science = 40:10:50	Develop human resources with the skills and capacity needed to enhance national competitiveness
National Science Technology and Innovation Policy Plan（2012-2021）	Development of science, technology, and innovation, and initiatives toward science, technology, and innovation for development and systematic introduction of innovation	(1) Increase R&D expenditures in GDP by 2%. (2) Increase the number of researchers from 9 to 25 per 10,000 populations. (3) Increase the ratio of private expenditure on R&D (private: government = 70:30 by 2021)	(1) Improve science education, enhance vocational skills, and strengthen industry-university-research cooperation (2) Regional science parks, tax incentives for research and development, etc.
9th National Research Policy and Strategy（2017-2021）	Building a knowledge-based and innovative nation	Based on the above National Science Technology and Innovation Policy Plan（2012-2021）	(1) Promote the use of R&D and innovation for economic growth and social development (2) Increase R&D investment by the government and private sector (3) Reform of the national research system to improve research integration and efficiency (4) Develop infrastructure and R&D human resources

Source: Prepared by the study team based on each policy

Table 14　Policies, goals, indicators, and strategies for higher education in Malaysia

Policy	Goal（Only those related to higher education and vocational education）	Indicator（Only those related to higher education and vocational education）	Strategies（Only those related to higher education and vocational education）
Shared Prosperity	By 2030, all Malaysians should be able to live	(1) Human capital: 35% of the workforce should be	Increase in the number of highly skilled human

Vision 2030	above a certain standard of living.	highly skilled human resources (2) 40% of the Human Resource Development Fund should be used for training related to Industry 4.0.	resources and improvement in average wages and labor productivity
12th Malaysia Plan（2021-2025）	Economic empowerment, environmental sustainability, and social reengineering	unknown	unknown
Malaysia Education Blueprint（2015-2025）	Developing human resources capable of creating the innovative science and technology and innovations required in the new era.	(1) Increase the percentage of students entering higher education from the current 48% to 70% by 2025. 2) Increase the employment rate of graduates from the current 75% to 80%. (3) Increase the number of schools in the top 200 of the Quarelli-Simons (QS) rankings from the current 1 to 7. (4) Increase the number of international students from the current 108,000 to 250,000. (5) Improve the enrollment and graduation rates of students from socially and economically disadvantaged backgrounds. (6) Share common values and common experiences among the diverse ethnic groups in Malaysia, based on their diversity. (7) Maintain the current level of government expenditure on higher education per student.	(1) Increasing the learning experience of students 2) Positioning of higher education institutions (3) Creating a framework for the accreditation of previously acquired learning (4) Financial support for lifelong learning (5) Cooperation among various skill and vocational training institutions (6) Collaboration with other ministries and agencies (including rationalization of qualification frameworks) (7) Promoting donations and funding (8) Strengthening quality assurance in private institutions (9) Increasing the number of international students accepted at the graduate level (10) Promote publicity and marketing of higher education in Malaysia in overseas markets. (11) Promote quality assurance framework by MQA (Malaysian Qualifications Agency) to establish greater consistency in performance standards and regulations for public and private institutions.

Source: Prepared by the study team based on each policy

Looking at the current state of higher education in Indonesia from a comparison with Thailand, Malaysia, and Vietnam, among the constituent indicators of the Global Competitiveness Index, indicators related to vocational education such as Quality of Vocational Training and Ease of Finding Skilled Employees are not at all inferior. However, indicators of research innovation such as Scientific Publications, Patent Applications, R & D Expenditures, and Research Institution Prominence are lower than in Thailand and Malaysia. Also, the values of many indicators are below those of Vietnam. As seen in the policy aimed at becoming an international higher education hub in Malaysia[5], Malaysia and Thailand have recently been internationalizing higher education institutions through international joint research, international collaborative education, international credit accreditation, and increases in international students. It is also noteworthy that the internationalization of higher education has focused on such things as attracting foreign universities, etc., and industry-academia collaboration with industry-academia joint research, corporate participation in educational programs, problem-solving internships, etc.

2.4 Trends in higher education support by major donors, including Japan

This section summarizes efforts for higher and vocational education in Indonesia and other Asian countries over the past 30 years based on information from donor websites, including those of Japan.

【Indonesia】

While World Bank (WB) and Asian Development Bank (ADB) donors provide support to entire sectors or groups of universities, Japan has continued to strengthen specific key higher education institutions such as the Bandung Institute of Technology, Bogor Agricultural University, and Surabaya Electronics Polytechnic since the 1980s through intensive support (e.g., research facilities and faculty development). Since the 1990s, these higher education institutions have taken on the roles of teacher training institutions and host institutions for local science and engineering higher education institutions in Indonesia and trainees from Africa and Asia. As a result, the scope of support is gradually changing from the development of major domestic universities to the development of regional engineering universities through the formation of domestic networks, and to the further strengthening of major hub universities through the formation of ASEAN networks.

【Thailand】

There has been an urgent need for higher education support in Thailand to develop human resources with more advanced expertise and skills to take charge of technological development due to recent economic and social development.[6] Although ADB and Japan have provided support such as

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[5] http://souken.shingakunet.com/college_m/2019_RCM215_44.pdf

[6] http://souken.shingakunet.com/college_m/2018_RCM211_64.pdf

equipment, training materials, scholarships, research incentives, and training facilities to improve vocational skills development, each donor's support to this field in Thailand is currently limited.

【Malaysia】

Malaysia urgently needs to improve its human resource development in the field of science and technology due to the country's industrialization since the 1980s, and the government has been focusing on the expansion and upgrading of domestic universities and support for study abroad.[7] In line with this trend, donor cooperation has focused on the expansion of scientific and technological universities and support for foreign students. However, support for the education sector is now quite limited.

【Vietnam】

Until now, the WB has mainly provided support for strengthening the functions and capacity of universities in Vietnam, while the ADB has supported the development of equipment necessary for industrial education and vocational training. In addition, since around 2010, Japan, Germany, France, and other countries have been supporting the establishment of new faculties in new fields, capacity building of existing faculties, and the establishment of universities in Vietnam.

The following are details of specific projects for higher and vocational education in Indonesia, Vietnam, Thailand, and Malaysia by Japan and other donors.

2.4.1 Overview of other donors' cooperation in higher and vocational education in Indonesia

As of 2021, the main donors implementing projects in these areas in Indonesia are the ADB, WB, and the Islamic Development Bank (IDB), each of which provides support to the higher education and vocational education sectors.

Table 15 Other donors' cooperation in higher and vocational education in Indonesia

Donor	Sector	Project	Contents	Period	Amount（USD）
ADB	Higher education	Regional: Technology-Enabled Innovation in Education in Southeast Asia	【Technical cooperation】 Improve knowledge of EdTech products and increase their use	2020-Present	2,000,000
		Regional: Support for Human and	【Technical cooperation】 Develop education sector, social	2019-Present	8,500,000

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[7] JICA "History of Japan's ODA in Malaysia"（2017）

		Social Development in Southeast Asia	protection initiatives, technical and vocational education and training, health insurance and subsidized health programs, health system		
		Supporting the Advanced Knowledge and Skills for Sustainable Growth Project	【Technical cooperation】 (1) initial phase of the loan project implementation supported, and (2) entrepreneurship and technology pilot assessments in higher education prepared. University of Malikussalleh, University of Jambi, University of Riau in Sumatra and Indonesia University of Education in Bandung	2018-Present	1,650,000
		Advanced Knowledge and Skills for Sustainable Growth Project	【Loan】 Support advanced skills and knowledge for sustainable economic growth in Indonesia by upgrading three public universities in Sumatra and one public university in Bandung, West Java, as the first phase of higher-education reform. It will integrate new technologies in teaching programs, strengthen technical and vocational teacher education, and help the government develop a medium-term higher-education investment plan.	2018-Present	2,000,000
		Preparing the Advanced Knowledge and Skills for Sustainable Growth Project	【Technical cooperation】 Support the upgrading of four public universities, three in Sumatra and one in Bandung, as the first step of a long-term higher education reform strategy.	2017-2018	800,000
		Analytical and Capacity Development Partnership	【Technical cooperation】 To modernize the education system and improve the quality of education services by implementing operational research on education legislative and regulatory reforms and the development of government agencies at the central and local levels, primary and secondary schools, vocational training schools, and universities, with the aim of strengthening the education system, improving the performance capacity of organizations, and enhancing regional and international competitiveness.	2010-2015	50,000,000
		Engineering Education Development Project	【Loan】 (1) improve the quality of engineering and technician education, (2) promote access and	1996-2002	102,000,000

			participation of the economically disadvantaged, and (3) strengthen institutional capacity for engineering and technician education. Establish 10 new engineering programs in 5 universities, strengthen engineering departments in 7 universities, upgrade polytechnics, and offer 3-year Diploma programs		
		Engineering Education Development	【Technical cooperation】 No data	1994- No data	800,000,000
		Higher Education Project	【Loan】 To improve the quality and efficiency of higher education in the local public and private universities/institutions. (1) developing local universities to strengthen the 9 public universities in each province of the region (e.g., curriculum development and improvement, staff development, improvement of equipment, teaching and research facilities, student and technician development, etc.); (2) networking universities to reduce the isolation of higher education institutions and increase their complementarity (3) strengthen management at the central and local levels.	1993-2001	140,000,000
		Study on Private Post-Secondary Education	【Technical cooperation】 No data	1992- No data	425,000,000
		Outer Islands Universities	【Technical cooperation】 No data	1992- No data	465,000,000
	Vocational education	Polytechnics Education Development Project	【Grant/Loan】 Focus on five priority sectors: manufacturing, agribusiness, infrastructure, energy and mining, and tourism to improve access to polytechnic education, respond to labor market needs, and innovate.	2012-	91,700,000
		Polytechnic Development Project	【Technical cooperation】 No data	2009- No data	1,595,900
		Vocational Education Strengthening Project	【Loan / Technical cooperation】 The project aims to enhance the international competitiveness of Indonesian workers and improve their entrepreneurial skills by providing equipment, teacher training, curriculum development,	2008-2013	115,000,000

			on-the-job training, support for strengthening cooperation between industry and vocational training schools, and holding job fairs at 90 model vocational training schools and 230 partner schools.		
		Vocational And Technical Education Project	【Loan】 It consists of three components: (1) improving teaching and learning, (2) supporting industrial growth through human resource development, and (3) improving management practices.	1994-2001	85,000,000
		Third Vocational Education	【Technical cooperation】 No data	1992-No data	450,000,000
		Second Surabaya Institute of Technology	【Technical cooperation】 No data	1992-No data	78,000,000
		Technical Education Development Project	【Loan】 No data	1991-No data	100,000,000
WB	Higher education	Research and Innovation in Science and Technology Project	(1) Improving STI human resource capacity; and (2) strengthening technology transfer, institutional functioning, and data management of public research agencies (LPNKs).	2013-Present	95,000,000
		Managing Higher Education for Relevance and Efficiency	(1) support for reform of the higher education system, (2) financial support for higher education institutions to improve their research and education capabilities and organizational management and administration, and (3) improving the governance, finance, outreach, and distance learning content and its delivery at public universities.	2005-2012	80,000,000
		Global Development Learning Network Project (LIL)	(1) strengthen the capacity of policy makers in Indonesia by providing access to new information, seminars, and linkages with counterparts in the region and around the world. and (2) to provide the latest communication technology for quality distance learning and information exchange between institutions in Indonesia and regional and global network distance learning networks.	2002-2007	2,660,000
		Quality of Undergraduate Education	To improve the quality and relevance of undergraduate programs of study in national priority areas in order to increase the	1997-2003	71,200,000

			income of graduates; establish Discipline Service Centers in 8 public universities		
		Higher Education Support Project - Development of Undergraduate Education	(1) improving the quality of undergraduate education, (2) increasing the efficiency of the educational process, and (3) improving the relevance of the study programs offered. By achieving these goals, the project aims to increase the income of graduates of the six target universities. It consists of the following components: 1) University development program; 2) Capacity building of higher education institutions; 3) Implementation of a national accreditation system for higher education; 4) Competitive national fellowship program; and 5) Project management.	1996-No data	65,000,000
		Professional Human Resources Development Project (02)	No data	1994-No data	69,000,000
		University Research for Graduate Education Project	No data	1994-2001	58,900,000
		Higher Education Development Project (02)	No data	1991-1996	150,000,000
	Vocational education	Health Professional Education Quality Project	(1) streamlining and assuring competency-focused accreditation of public and private health professional training institutions; (2) developing national competency standards and examination procedures for the certification and licensure of health professionals; and (3) building institutional capacity to adopt results-based grants to encourage the use of accreditation and certification standards to improve the quality of medical schools. This will strengthen the quality assurance policy governing the education of health professionals in Indonesia.	2009-2014	77,820,000
		Health Workforce & Services (PHP 3)	(1) Improve financing and delivery of basic health services in Jambi, East Kalimantan, West Kalimantan, and West Sumatra provinces to improve access to care, quality of care, and health outcomes at the	2003-2008	105,600,000

			district level. (2) Strengthen health workforce policy, management and development in a decentralized situation to improve allocative efficiency and equity in the distribution and use of health resources in the districts. (3) Strengthen the three main stakeholders in the health sector, MOH, MONE and IMA.		
		Polytechnics Project (02)	Expanding the engineering and commerce polytechnic subsystem by expanding seven polytechnics and developing courses and curricula for 11 new polytechnics, and improving the management of the polytechnic subsystem	1983-1990	107,000,000
IDB	Higher education	Development and Quality Improvement of the Semarang State University Project	【Loan】 No data	2011-2017	36,000,000
		Reconstruction and Upgrading of the State University of Padang Project	【Loan】 Reconstruction and upgrading of State University of Padang	2011-2017	29,000,000
		Development and Quality Improvement of Institute for Islamic Studies Sunan Ampel Surabaya	【Loan】 No data	2011-2016	35,000,000
		The Development of Four Higher Education Institutions Project	Improve the quality, relevance, and competitiveness of higher education by upgrading and equipping existing and new facilities, developing curricula and staff, strengthening research capacity, and promoting the commercialization of innovations in existing higher education institutions. Construct 30 new buildings in 4 universities, provide training to 673 staff, and improve curricula through activities such as needs assessment and evaluation, review and evaluation of existing curricula, identify and design new curricula for 46 programs of study, validation and adoption of curricula and programs, national and international accreditation of degree programs and ISO certification of university processes	2014-2020	174,000,000
	Vocational	Support to Quality	No data	2013-	32,000,000

	education	Improvement of Vocational Training Centers Project		2020	
GIZ	Vocational education	Technical and Vocational Education and Training (TVET) System Reform	Collaborate with the private sector to enhance the involvement of the private sector in TVET development, and advise and create appropriate conditions	2018-2021	No data
		Regional Leadership and Capacity Development in Technical and Vocational Education and Training (TVET) in Indonesia, Laos and Vietnam	Strengthen the institutional capacity of technical education and vocational training institutions through a variety of training and networking opportunities. The training includes long-term training in Korea and Germany.	2012-2013	No data
		Sustainable economic development through technical and vocational education and training	(1) improving the management and educational capacity of TVET institutions; (2) innovation for private sector cooperation; (3) implementing and monitoring TVET regulations; and (4) quality assurance and certification in specific areas. The program’s activities are mainly conducted in the provinces of West Java, Central Java, Yogyakarta, South Sulawesi, and East Kalimantan	2010-2017	No data
USAID	Higher education	Higher Education Leadership and Management	【Technical cooperation】 (1) support strategic planning and policy analysis at DIKTI; (2) design technical assistance approaches to achieve system-wide reform in higher education; (3) provide technical assistance to higher education institutions; (4) strengthen leadership and management of graduate programs in higher education; and (5) implement special initiatives.	2011-2016	19,700,000
		University Partnership Program	Support the development of cooperative relationships between higher education institutions in the U.S. and Indonesia, including exchange and training programs, provision of scholarships, and support for joint research.	2009-No data	20,100,000
		Sustainable Higher Education Research Alliances (SHERA)	Support collaboration between universities in Indonesia and higher education institutions in the US in the areas of science, technology, and innovation	2009-No data	2,000,000

Source: Prepared by the study team based on the website of each organization

2.4.2 Overview of other donors' cooperation in higher and vocational education in Asian countries

【Thailand】

Other donors have provided limited support to the education sector in Thailand. As the economy of Thailand has grown, other donors have repositioned the country from a direct aid recipient to a hub for development cooperation in the surrounding countries.

Table 16 Other donors' cooperation in higher and vocational education in Thailand

Donor	Sector	Project	Contents	Period	Amount（USD）
ADB	Higher education	Regional: Support for Human and Social Development in Southeast Asia	【Technical cooperation】 Education sector development, social protection initiatives, technical and vocational education and training, health insurance and subsidized health programs, health system development	2019-No data	8,500,000
		Skills Development Project	【Loan】 No data	1996-2003	80,000,000
		Strengthening of Evaluation and Monitoring Capacity in Postgraduate Education and Research	【Technical cooperation】 No data	1996-No data	100,000,000
		Coordination and Private Sector Participation in Skills Development	【Technical cooperation】 No data	1996-No data	467,000,000
		Higher Education Development	【Technical cooperation】 Strengthen research and education capacity at the graduate level and programs in science and technology, and develop necessary policy frameworks.	1994-2006	400,000,000
		Skills Development	【Technical cooperation】 No data	1994-2003	484,000,000
WB	Higher education	Universities Science and Engineering Education Project	The purpose of this project is to improve the quality of undergraduate science and engineering programs. Specifically, the project aims to (1) strengthen the teaching capacity of faculty members, (2) upgrade the content of existing science and engineering programs and expand the scope of programs relevant to	1997-2003	143,400,000

			Thailand's technological progress, (3) modernize laboratories and strengthen their management, and (4) improve the use of resources in science and engineering departments and establish a system for large-scale equipment procurement.		
	Vocational education	Technical Education Project	No data	1996-2002	31,600,000
GIZ	Vocational education	Introduction of Dual Vocational Training	Instead of conventional vocational training at vocational training schools, combine private companies and vocational training schools to build a vocational training system that includes both on-the-job training and lectures.	1998-2000	No data
		Vocational Guidance System Project	The goal is to establish an efficient employment guidance system and to ensure necessary information for employment guidance as well as necessary equipment and human resources available.	1999-2002	No data

Source: Prepared by the study team based on the website of each organization

【Malaysia】

As shown in the table below, support for higher education and vocational education in Malaysia by other donors has been quite limited.

Table 17 Other donors' cooperation in higher and vocational education in Malaysia

Donor	Sector	Project	Contents	Period	Amount（USD）
ADB	Vocational education	Technical Education Project	Improve the quality of technical education and enhance staff development, faculty training, and expansion and upgrading of facilities and equipment	1997-2005	40,000,000
		Technical and Vocational Education	(1) To improve the quality of TVE by providing students with engineering and business education that meets the new workforce needs of industry in Malaysia. (2) To improve access to TVE by expanding the capacity of the TVE system. Specially to increase access to TVE by expanding the capacity of the TVE system for low-income and female students; (3) To increase internal efficiency and cost-effectiveness through staff	1995-2003	72,000,000

			development and improved management systems.		
WB	Higher education	Education Sector Support Project	【Loan】 No data	1993-No data	244,000,000
		University Development Project	【Loan】 No data	1987-1992	48,200,000
	Vocational education	Polytechnic Development Project	【Loan】 Establish 3 polytechnics and implement a long-term investment program in the training of technicians and skilled workers. Train teachers, instructors, and administrators, and provide technical assistance at the national level to improve the project implementation and management capacity of the development and supply sector and the technical and vocational education sector.	1993-1999	107,000,000

Source: Prepared by the study team based on the website of each organization

【Vietnam】

In Vietnam, the ADB and WB are the major donors involved in the education sector and have been implementing projects since 1998.

Table 18 Other donors' cooperation in higher and vocational education in Vietnam

Donor	Sector	Project	Contents	Period	Amount
ADB	Higher education	Regional: Technology-Enabled Innovation in Education in Southeast Asia	【Technical cooperation】 Improve knowledge of EdTech products and increase their use	2020-Present	2,000,000 USD
		Regional: Support for Human and Social Development in Southeast Asia	【Technical cooperation】 Develop education sector, social protection initiatives, technical and vocational education and training, health insurance and subsidized health programs, health system	2019-現在	8,500,000 USD
		Regional: Support for a Regional Platform on Innovations in Education and Human Resources Development for Competitiveness	【Technical cooperation】 Supporting the specific activities of SEAMEO College, which provides capacity building modules for education ministers, policy makers, education practitioners, and youth leaders, primarily on ASEAN-wide education and human resource development issues	2013-2017	1,650,000 USD

		towards an Integrated ASEAN Community			
		University of Science and Technology of Hanoi Development (New Model University) Project	【Loan】 Improve performance of the higher education system in Viet Nam	2011-Present	193,000,000 USD
		Higher Education Sector Development Project	【Technical cooperation】 To prepare a project (feasibility study) on "Higher Education Development" to establish four new world-class research universities in Vietnam. The project also develops the necessary policy framework and strategies for this purpose.	2008-2010	1,200,000 USD
		Rmit International University in Vietnam	【Loan】 No data	2001-No data	7,500,000 USD
	Vocational education	Skills and Knowledge for Inclusive Economic Growth Project	Realign Viet Nam's TVET system with current and future labor market needs	2018-Present	95,200,000 USD
		Regional: Implementing the Greater Mekong Subregion Human Resource Development Strategic Framework and Action Plan (Phase 2)	【Technical cooperation】 Strengthen cooperation in TVET and higher education, and strengthen national implementation and monitoring of strategies and action plans	2013-2017	6,150,000 USD
		Skills Enhancement Project	【Loan】 Produce a more competitive and highly skilled workforce in priority industries by developing higher level training programs at a new college level, while also establishing and strengthening system governance and quality assurance frameworks for vocational training. Studies will also strengthen the policy foundation for future development	2010-2018	58,000,000 USD
		Skills Enhancement Project	【Technical cooperation】 Design a project for enhancing vocational skills training to better respond to the demand for skilled workers in key industries in the industrial and service sectors.	2010-2017	809,700 USD

		Vocational and Technical Education Project	【Loan】 Reform the vocational and technical education system so that it can better support the government's market-oriented industrialization policy	1998-2008	32,600,000 USD
WB	Higher education	Vietnam University Development of VNU-Hanoi, VNU-HCM, and UD	To improve the quality of teaching and research at three targeted national universities.	2020-Present	294,870,000 USD
		Support for Autonomous Higher Education Project (SAHEP)	To improve research, teaching, and institutional capacity at selected autonomous universities and strengthen the national higher education management system.	2017-Present	155,000,000 USD
		Fostering Innovation through Research, Science and Technology (FIRST)	To support science, technology and innovation (STI) in Vietnam by designing and piloting of STI policies, enhancing the effectiveness of project-aided research and development institutions, and encouraging the development of innovative technology enterprises.	2013-2019	100,000,000 USD
		Higher Education Development Policy Program - Third Operation	(1) Improving the responsiveness of higher education and research and increase the quantitative capacity of the system; (2) Enhancing fiscal transparency, sustainability and effectiveness of the higher education sector; and (3) Improving the quality of Higher Education institutions.	2013-2014	50,000,000 USD
		Higher Education Development Policy Program - Second Operation	To support the Government of Vietnam to Strengthen governance, rationalize financing, improve the quality if teaching and research, improve accountability for performance, and enhance transparency in financial management within the higher education sector.	2010-No data	50,000,000 USD
		Vietnam New Model University Project	To develop an autonomous research-based university to demonstrate a new policy framework on governance, financing, and quality in Vietnam's higher education system.	2010-Present	180,400,000 USD
		Higher Education Development Policy Program - First Operation	Strengthen governance, rationalize financing, improve the quality of teaching and research, improve accountability for performance, and enhance transparency in financial management within the higher education sector	2009-No data	50,000,000 USD
		Higher Education Project	The project aims to (1) improve the coherence, flexibility, and responsiveness of higher education to the changing	1998-No data	83,300,000 USD

			demands of society and the market economy; (2) improve the efficiency and resource utilization of higher education; and (3) improve the quality of higher education curricula, teaching, learning, and research. Focus on capacity building, institutional development, and computerization for central institutions responsible for higher education		
	Vocational education	Health Professionals Education and Training for Health System Reforms	To improve the quality of health professionals' education, strengthen management competencies in the health sector, and improve the competencies of Primary Health Care teams at the grass-roots level.	2014-Present	106,000,000 USD
Government of France	Higher education	Development and operational assistance to the University of Science and Technology of Hanoi	Support for a new model university in Vietnam to facilitate research, innovation, and skills development. Support the establishment of the Hanoi University of Science and Technology in partnership with the French government and the Vietnam Academy of Science and Technology.	2010-2020	100,000,000 EUR
	Vocational education	Training of High Quality Engineers: Vietnamese French Training Program of Excellent Engineers (PFIEV)	A joint training program aimed at developing high-level engineers and managers to work in key economic sectors in Vietnam.	1999-Present	11,300,000 USD
Government of Germany	Higher education	Development and operational assistance to Vietnamese–German University	No data	2008-2018	No data
USAID	Vocational education	Higher Engineering Education Alliance Program (HEEAP)	To transform and modernize Vietnam's top engineering and technical vocational universities by training lecturers from 8 partner institutions, enabling them to return to Vietnam to teach qualified students who are ready to work with the applied and technical communication skills required by multinational companies.	2010-Present	5,000,000 USD

Source: Prepared by the study team based on the website of each organization

2.4.3 Overview of Japan's cooperation in higher and vocational education in Indonesia

Japan has provided significant cooperation in support of higher and vocational education in

Indonesia over the years. The three priority areas of Japan's cooperation with Indonesia are "support for improving international competitiveness," "support for realizing a safe and fair society through balanced development," and "support for improving the capacity to respond to the challenges of the Asian region and the international community" (Ministry of Foreign Affairs of Japan, "Outline of the Country Assistance Policy and the Rolling Plan"). As of 2021, Japan has been providing the support listed in the table below within the framework of the assistant policy for Indonesia.

Table 19　Japan's cooperation in higher and vocational education in Indonesia

Scheme	Project	Contents	Period
Loan	Development of World Class University with Socio Entrepreneurial Spirit at Universitas Gadjah Mada	Contribute to the improvement of the level of industrial human resources and the promotion of industry by improving the quality of education and promoting research and product development through the development of facilities necessary for education, research, and industry-academia collaboration activities at Gadjah Mada University.	2017-2022
Loan	Professional Human Resource Development（4）	Support the implementation of degree programs and short-term training in Japan and Indonesia for human resources involved in policy planning in the central and local governments of Indonesia.	2014-2020
Loan	Development of Bandung Institute of Technology（3）	Improve the quality and expand the quantity of education and research at the university by developing research facilities and facilities for promoting industry-academia-community collaboration.	2009-2015
Loan	Development of World Class University at University of Indonesia	Strengthen cooperation with local universities and expand medical education and research activities by developing medical-related faculties and university hospitals of the University of Indonesia.	2008-2016
Loan	Hasanuddin University Engineering Faculty Development	Strengthen engineering higher education and research activities by upgrading and expanding the engineering department of Hasanuddin University in South Sulawesi	2007-2016
Loan	Professional Human Resource Development Project（3）	Support the implementation of degree programs and short-term training in Japan and Indonesia for human resources involved in policy planning in the central and local governments of Indonesia.	2006-2013
Loan	Development of Faculty of Medicine and Health Sciences of University	Support the development of both hardware (e.g., construction of school buildings) and software (e.g., fellowship programs) for health and medical schools of national Islamic universities that emphasize local and regional contributions, such as actively accepting students from rural areas.	2005-2013
Loan	Gadjah Mada	Support for the construction of new	1998-2009

	University Development Project.	buildings and equipment, as well as the study and short-term training of university faculty members in Japan, in order to improve and expand the 7 faculties of medicine and agriculture at Gadjah Mada University.	
Loan	Pattimura University Development Project	－	1996-2004
Loan	Mulawarman University Development Project	Support the development of facilities and the procurement of educational and research equipment for the Faculty of Agriculture, Faculty of Forestry, and Faculty of Science.	1995-2001
Loan	Professional Human Resource Development Project（2）	Support the implementation of overseas study and training, mainly in Japan, as well as study and short-term training in Indonesia.	1995-2004
Loan	Development of Bandung Institute of Technology（2）	Support construction of education and research buildings, procurement of equipment for teaching and research, and implementation of study-abroad programs for faculty members.	1994-2002
Loan	The Bogor Agricultural University Development Project（2）	Support the development of facilities and equipment for the Faculty of Agriculture and the Faculty of Veterinary Medicine, and the implementation of study-abroad programs for faculty members.	1994-2002
Loan	Syiah kuala University Development Project	Support the construction of buildings for the Faculty of Agriculture and the Faculty of Engineering, etc., the provision of equipment for education and research, and the implementation of study-abroad programs for faculty members.	1993-2003
Loan	Professional Human Resource Development	Support the development of the skills of human resources with more advanced knowledge and skills in the fields of public policy, business administration, environment and development, economic and financial policy, industrial development, science and technology, etc., and improve the capacity to formulate and implement human resources development policies through strengthening the organization and infrastructure for human resources development policies.	1990-1998
Technical cooperation	ASEAN University Network / Southeast Asia Engineering Education Development Network（AUN/SEED-Net） Project (4) (3) (2) (1)	Support the establishment of new international joint education programs with Japanese universities and ASEAN-Japan industries so that ASEAN member universities can develop more global and advanced education and research activities, and hold regional conferences to strengthen academic networks in each field	(4)2018-2022 (3)2013-2018 (2)2008-2013 (1)2003-2008
Technical	Project for the	Support the Indonesian Accreditation	2014-2019

cooperation	Establishment of Indonesia Accreditation Board for Engineering Education	Board for Engineering Education (IABEE) in setting standards for accreditation and human resource development.	
Technical cooperation	Project for Research and Education Development on Information and Communication Technology in Institut Teknologi Sepuluh Nopember	Support the further strengthening of laboratory-based education, the further enhancement of research capacity, and the strengthening of human networks with universities in the Eastern Indonesia region	2006-2010
Technical cooperation	Project for Establishment of the Center for Japanese Studies, University of Indonesia 3	Support the human resource development of researchers who should become the core leaders of the Center for Japanese Studies at the University of Indonesia	2005-2008
Technical cooperation	Project for Strengthening of Polytechnic Education in Electric-related Technology	Improve administrative, research, and teaching skills by providing training for in-service teachers of electronic engineering, electrical engineering, communications engineering, and information technology at electrical polytechnics.	1999-2006
Technical cooperation	CEVEST Vocational Training Development Project	Support capacity building through training for instructors of 153 vocational training centers under the jurisdiction of the Ministry of Labor to obtain Diploma 3 (a three-year junior college degree) and skills improvement training for employees of private companies in the mechanical, electrical, and electronic fields.	1992-1997
Technical cooperation	Higher Education Development Support Project in Indonesia	Support the improvement of the quality of engineering instructors and the management of 11 universities on the islands of Sumatra and Kalimantan by establishing management systems, improving the expertise of faculty members, promoting research activities, and producing textbooks in local languages.	1990-2002
Grant	Project for Development of Tropical Disease Center at Airlangga University	Support the development of the activities of the Yellow Fever Center and the human resource development of health care staff related to the elimination of yellow fever	1996
Grant	Science and Technology Training Project	Promote the industrial development of Indonesia by enhancing the country's scientific and technological capabilities through the dispatch of young researchers by government-affiliated research institutions to universities in developed countries.	1988-1997

Source: Prepared by the study team from JICA website

2.4.4 Overview of Japan’s cooperation in higher and vocational education in Asian countries

【Thailand】

The three priority areas of Japan’s cooperation with Thailand are “addressing sustainable economic development and maturing societies,” “addressing common issues within the ASEAN region,” and “providing third-country assistance to countries outside the ASEAN region” (Ministry of Foreign Affairs of Japan, “Outline of the Country Assistance Policy and the Rolling Plan”).In this priority area of cooperation, support for the development of industrial human resources, the strengthening of Japan-Thailand economic ties, and the enhancement of research capacity through Japan-Thailand cooperation are also considered to contribute to the economic and social benefits of such measures for both Japan and Thailand. At present, support for higher education is limited to the ASEAN University Network / Southeast Asia Engineering Education Development Network Project, and there has been no support for vocational education since 2002.

Table 20 Japan’s cooperation in higher and vocational education in Thailand

Scheme	Project	Contents	Period
Loan	Industrial Human Resources Development Project	Establish two new colleges of technology (technical colleges) in Bangkok to provide the same level of technical education as Japanese technical colleges and opportunities to study abroad at Japanese technical colleges, thereby fostering the practical and innovative engineers needed by industry in Thailand.	2020-2032
Loan	Thailand-Japan Technology Transfer Project	Support for the improvement of the academic standards of faculty members and the expansion of teaching and research facilities to raise the level of science and technology education and research and development activities for the Faculty of Science and Engineering of Chulalongkorn University	1995-2006
Loan	Strengthening Vocational And Technical Manpower Production	Contribute to the improvement of the quality of vocational education and the fostering of human resources that meet the needs of industry by providing educational equipment at 20 technical colleges and teacher training centers, new and additional buildings and support for teacher training at 7 schools.	1994-2002
Technical cooperation	ASEAN University Network / Southeast Asia Engineering Education	Support the establishment of new international joint education programs with Japanese universities and	(4)2018-2022 (3)2013-

	Development Network （AUN/SEED-Net） Project (4) (3) (2) (1)	ASEAN-Japan industries so that ASEAN member universities can develop more global and advanced education and research activities, and hold regional conferences to strengthen academic networks in each field	2018 (2)2008-2013 (1)2003-2008
Technical cooperation	Research Center for Communications and Information Technology	Contribute to the development of advanced human resources in the industry of information technology by transferring technology to a total of 14 laboratories in the fields of communication systems, information technology, signal processing, semiconductor circuits, and control for the Research Center for Information and Communication Technology established by the Japanese government in the university.	1997-2002
Technical cooperation	Chiang Mai University Plant Biotechnology Research Project in Thailand	Support for human resource development for researchers in the field of plant biotechnology at Chiang Mai University through the establishment of technology for the production of superior seedlings for agricultural crops, the preparation of manuals, and the holding of seminars	1993-1998

Source: Prepared by the study team from JICA website

【Malaysia】

As mentioned above, long-term comprehensive plans have been drawn up since the mid-1990s from the perspective of carrying out the nation’s economic development in an increasingly well-planned manner, and education planning has been positioned within these plans. The focus of education policy has been on higher education, especially the training of technical and scientific engineers.

The three priority areas of Japan’s cooperation with Malaysia are “support for balanced development toward becoming a developed country,” “addressing common issues in the East Asian region,” and “Japan-Malaysia Development Partnership beyond the East Asian region” (Ministry of Foreign Affairs of Japan, “Outline of the Country Assistance Policy and the Rolling Plan”).

Table 21　Japan’s cooperation in higher and vocational education in Malaysia

Scheme	Project	Contents	Period
Loan	Malaysia-Japan International Institute of Technology	Support the procurement of materials and equipment necessary for education at MJIIT and the development of curricula, with the aim of fostering human resources with the ability to develop and research practical, cutting-edge technologies that will contribute to the development of Malaysia’s	2011-2018

		economy and society.	
Loan	Higher Education Loan Fund Project（3）	Support 465 Malaysian students to study in Japanese science and engineering departments, 68 in master's programs and 23 in doctoral programs through the 3+2 twinning program between Malaysian and Japanese universities	2006-2015
Loan	University Malaysia Sarawak Development Project	Support the construction, procurement of necessary equipment and materials, and training and study abroad for faculty, students, and university staff of the 5 priority faculties at the University of Sarawak.	1999-2009
Loan	Higher Education Loan Fund Project（2）	Support 270 Malaysian students to study in Japanese science and engineering departments and 79 students to study in master's programs through the 2+3 twinning program between Malaysian and Japanese universities	1999-2009
Loan	Look East Policy	Provide study-abroad programs for students.	1999-2009
Loan	Higher Education Loan Fund Project（HELP）	Support 310 Malaysian students who have completed their preliminary education in Malaysia to study in science and technology departments in Japan.	1992-2002
Technical cooperation	Technical Cooperation Project for Development Project of Malaysia-Japan International Institute of Technology	Support the formulation of curricula and courses, the assignment of faculty members, and the strengthening of partnerships between universities and industries in Japan and other ASEAN countries as an ancillary project to the yen loan "Malaysia-Japan International Institute of Technology."	2013-2018
Technical cooperation	Development Project of Malaysia-Japan International Institute of Technology	Develop human resources with practical, cutting-edge, high technology development and research skills and work ethics required in industry in Malaysia by establishing an undergraduate and graduate school with Japanese-style engineering education.	2011-2018
Technical cooperation	Improvement of Vocational Training System to Keep Meeting with the Needs of Industries	Support the Ministry of Human Resources to improve its ability to collaborate with industry, to survey and analyze human resources working in industry, and to improve curricula and training methods in training institutions.	2008-2011
Technical cooperation	The Establishment of a Japan-Malaysian Technical Institute in	Support JMTI in developing vocational training plans that reflect the needs of industry, and in training instructors in	1998-2004

	Malaysia	production, electronics, information, and mechatronics engineering technologies.	

Source: Prepared by the study team from JICA website

【Vietnam】

Japan has made significant contributions to the country's development by providing Official Development Assistance in accordance with the framework of the assistant policy for Vietnam formulated in July 2009. The three priority areas of Japan's cooperation with Viet Nam are "Enhancing growth and competitiveness," "Addressing vulnerabilities," and "Strengthening governance" (Ministry of Foreign Affairs of Japan, "Outline of the Country Assistance Policy and the Rolling Plan").

Table 22 Japan's cooperation in higher and vocational education in Vietnam

Scheme	Project	Contents	Scheme
Loan	Can Tho University Improvement Project	Support the strengthening of Can Tho University's research and teaching capacity in the areas of agriculture, fisheries, and the environment	Loan
Loan	Project for Human Resource Development of Technicians at Hanoi University of Industry	Establish a TVET program at Hanoi University of Industry that can provide industrial human resources that meet the needs of industry.	Loan
Loan	Higher Education Development Support Project on ICT	Implement model education programs at universities that play a leading role in education and research activities in the IT field, and support the improvement and expansion of facilities, employment of Japanese language teachers, and technology transfer.	Loan
Technical cooperation	Project for Enhancement of Education, Research and University Management Capacity at Vietnam-Japan University	Establish a foundation for consistent, high-quality education, research, and administration from undergraduate to graduate levels by strengthening the education, research, and administrative capabilities of the university.	Technical cooperation
Technical cooperation	ASEAN University Network / Southeast Asia Engineering Education Development Network （AUN/SEED-Net） Project (4) (3) (2) (1)	Support the establishment of new international joint education programs with Japanese universities and ASEAN-Japan industries so that ASEAN member universities can develop more global and advanced education and research activities, and hold regional conferences to strengthen academic networks in each field.	Technical cooperation
Technical cooperation	Project for the Establishment of the Master Programs of	Support the creation of a Japan-Vietnam University, including the establishment of an institutional	Technical cooperation

	Vietnam-Japan University	management system and a master’s degree program	
Technical cooperation	Project for Human Resources Development for Heavy-Chemical Industry at Industrial University of Ho Chi Minh City	Support the formation of a model for the training of practical engineers at IUH	Technical cooperation
Technical cooperation	Capacity Building of Ho Chi Minh City University of Technology to Strengthen University-Community Linkage （Phase2）	Support for Ho Chi Minh City University of Technology, a central research and education institution in the southern region of the country, to introduce research-centered education for the systematic and sustainable implementation of regional cooperation activities, and to improve the education and research capacity of related institutions and strengthen networks necessary for the promotion of regional cooperation activities	Technical cooperation
Technical cooperation	Strengthening the capacity of ITSS education at Hanoi University of Technology (Phase2)	Contribute to the promotion of Vietnam’s IT industry by providing Japanese language and practical, advanced IT education at Hanoi University of Technology, which is one of the universities playing a leading role in education and research activities in the IT field in Vietnam, and producing human resources that meet the needs of industry.	Technical cooperation
Technical cooperation	Improvement of Environmental Education in Agricultural Science in Can Tho University	Support will be provided to Can Tho University for research activities and the establishment of an educational system (curriculum revision, textbook development, teacher training, etc.) in the three areas of (1) environmental assessment in soil and water, (2) impact of agricultural development on ecological diversity, and (3) establishment of environment-friendly agriculture, with the aim of strengthening education and research capacity in the field of environmental science.	Technical cooperation
Technical cooperation	Education and Research Capability Building Project of Hanoi Agricultural University	Provide technical guidance to instructors, advice on improving syllabus, and facilities at the Faculty of Agriculture, the Faculty of Land and Water Resources Management, and the Faculty of Economics and Rural Development in order to improve the quality of education and research at Hanoi Agricultural University.	Technical cooperation

Source: Prepared by the study team from JICA website

Chapter3 Issues of education and research capabilities, roles in the health sector, and support needs

3.1 Current status and issues of education and research in universities

3.1.1 Overview of science and technology in Indonesia

The national policy for development of science and technology in Indonesia is specified in the National Long-Term Development Plan (RPJPN) and in the National Medium-Term Development Plan (RPJMN), which is updated every five years. Furthermore, the National Research Master Plan (RIRN), which is created by BRIN, indicates more specific plans for developing the capabilities of science and technology in Indonesia. This section provides an overview of Indonesia’s science and technology policy based on RPJPN 2005–2025, RPJMN 2020–2024, and RIRN 2015–2045.

The RPJPN 2005–2025 states that in order to realize Indonesia as a competitive country, it is important to develop high quality and competitive human resources and to develop new technology based on research outputs in science and technology. Qualitative researchers and innovative technologies are necessary to grow sustainable development in Indonesia, and the directions for development of science and technology in Indonesia are indicated as follows.

1. To improve research capability by developing human resources for R&D in science and technology;
2. To develop innovative technologies by enhancing the capability for industrialization from the research outputs;
3. To build national and international networks for science and technology
4. To strengthen the linkage between social needs and national development policy of science and technology;
5. To develop natural resources into value-added products, and manufacture innovative products based on research output in order to increase economic competitiveness

In RIRN 2017–2045, the following goals have been set up and various activities are being undertaken in accordance with RPJPN 2005–2025

1. To develop international competitive human resources for R&D quantitatively and qualitatively;
2. To strengthen the productivity of the research output through research collaboration, while clarifying the role of universities/research institutes and researcher.
3. To contribute to national economic growth by increasing research outcome

The RPJMN 2020–2024, which is the most recent version of the RPJMN, identifies specific subjects in the science and technical fields that the Indonesian government would like to promote, and sets the goals for developing the quality of R&D and the innovation capabilities in each research field.

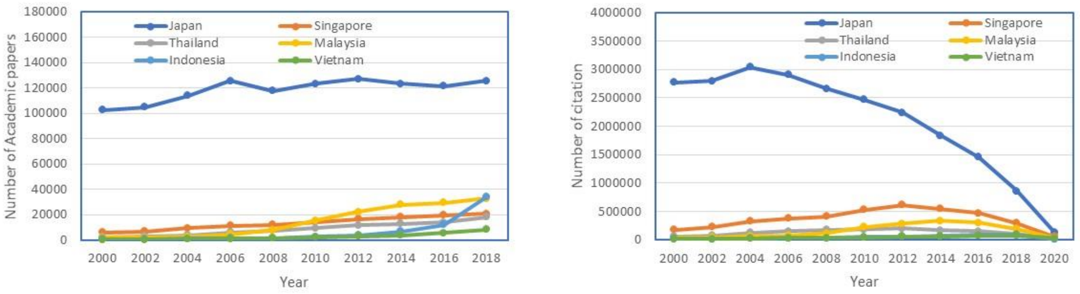
1. To promote interdisciplinary collaboration on technical development and innovation in the strategic priority areas identified in the National Research Master Plan for Sustainable Development 2017–2045 (Medical and drug discovery, Digital technology and cyber security, Advanced materials development, Renewable energy, Nuclear technology, Defense and security, and Space technology). In addition, mapping potential natural resources, production technologies in agriculture and fisheries, and technologies for disaster prevention and post-disaster recovery are to be developed.
2. To improve human resources for R&D in science and technology qualitatively and quantitatively. In addition, facilities and equipment in research institute/universities shall be improved. The research capacity of Centers of Excellence (COEs) as well as the management capacity of natural resources in Indonesia must be enhanced.
3. To strategically promote industrial-governmental-academic collaboration (triple helix collaboration) and the establishment of Science and Technology Parks (STPs) and startup companies based on technology. In addition, an eco-system for industrial-academic collaboration at University and STPs shall be developed. Furthermore, governance of intellectual property right will be enhanced.
4. To promote the inflow of funding for R&D from not only government but also industrial sectors and financial incentives for development in science and technology through BRIN initiatives.

As shown above, the strategic plan for development of science and technology in Indonesia is not only to accumulate academic knowledge related to science and technology, but also to develop industrialization based on technology developed by industrial-academic collaboration. However, the current status of science and technology development in Indonesia is far from having developed as planned. In terms of the collaboration between university/research institutes and industry, there is a gap between the needs of industry and the government’s policy on science and technology development, which prevents industrial-academic collaboration. Therefore, this serious situation has had a deleterious influence on the efficiency and productivity of R&D performance. In addition, a sufficient body of high-quality human resources for R&D, such as professors, researchers, and engineers in research institutes/university and industrial sectors have not yet been prepared, and the shortage and aging of research facilities and equipment in universities/research institutes might be one of the factors that have delayed the development of science and technology. As for the financial provision for R&D in science and technology, most of the R&D budget has been provided by government, and only a little by the industrial sector.

3.1.2 Global positioning of Indonesia’s science and technology development

3.1.2.1 Status of submissions to academic journals

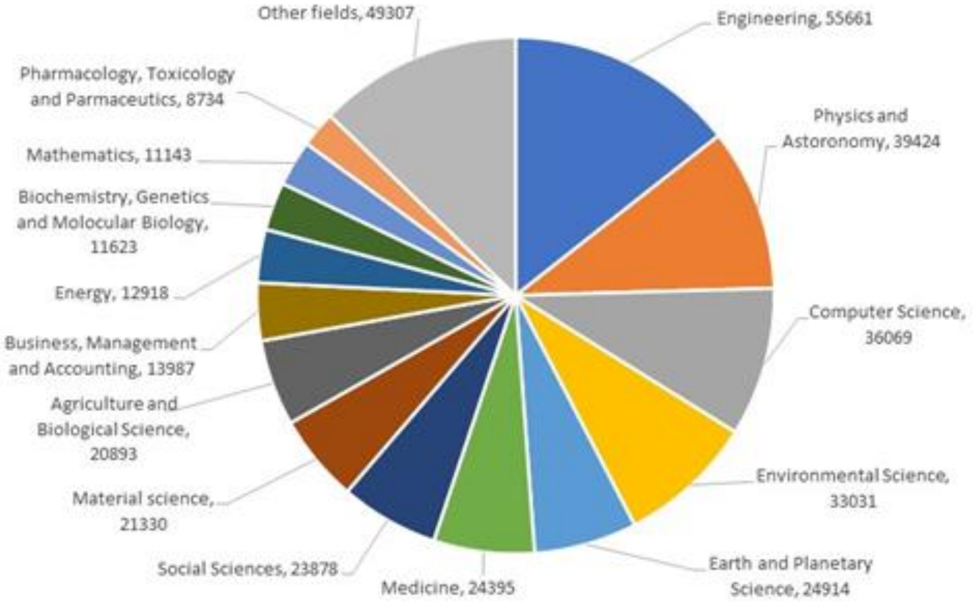
In general, research output is presented through academic journals and textbooks, academic conferences, and intellectual property rights, and it should be evaluated internationally. Therefore, the number of indexed journals registered in reliable academic databases and the number of intellectual property right awards are the major indicators of research capability.



Source: Scimago database

Figure 7 Number of academic papers and number of citations (yearly)

Figure 7 shows the number of academic indexed papers registered in academic databases from FY2000 to FY2020. During FY2000 to FY2014, the number of index papers in Indonesia was ranked 4th among the ASEAN countries after Malaysia, Singapore, and Thailand, while has been increasing since FY2016. In 2020, it surpassed Malaysia to be ranked 1st among ASEAN countries. However, it is still low compared to Japan. In addition, citation count, another indicator of the novelty and quality of research, has also increased year by year. However, citation numbers for Indonesia remain low compared with Japan.



Source: Compiled by the research team based on information from the Scimago database

Figure 8 Number of indexed papers by research field (1996–2020)

Figure 8 shows the accumulated number of academic papers by research fields in terms from FY2016 to FY2020. Most of research are conducted in engineering, physics and astronomy, computer science, environmental science. In addition, research on medicine, materials science, and energy, which are strategic priority areas identified in the National Research Master Plan for Sustainable Development 2017–2045, is being actively conducted.

3.1.2.2 Status of acquisition of intellectual property rights

As of FY2015, there were 312 Indonesian patents registered with the U.S. Patent Office, which is far below Singapore, Malaysia, and Thailand. In addition, the growth rate of Indonesian patents has been stagnant since 2005, while the other four ASEAN countries have shown tendencies to increase. In FY2014, the number of patents registered by Indonesian research institutes or industries in the Indonesian Patent Office was 702 out of 8,023 applied patents. Therefore, Indonesia ranks the lowest in the number of national patents registered in ASEAN countries. According to the WIPO report in FY2015, Indonesia ranks 43rd in global patents and 4th among ASEAN countries.

3.1.2.3 Human resources for science and technology development (HR)

The situation of human resources development for R&D has a significant impact on a country's science and technology development and innovation. The tables below show a comparison of the number of human resources in charge of science and technology development in Indonesia with

ASEAN countries (Malaysia, Thailand, Singapore, and Vietnam) and Japan.

It can be seen in Tables 23–28 that the human resources for development in science and technology in Indonesia are still not well developed in comparison with other ASEAN countries. Furthermore, Tables 27 and 28 shows the number of researchers who have obtained doctorates or master's degrees; Indonesia is also not well developed here in comparison with other ASEAN countries and Japan. Thus, the human resources for R&D in science and technology in Indonesia are insufficient, both qualitatively and quantitatively.

Table 23 Number of human resources for R&D in science and technology

	2016	2017	2018
Indonesia	157,964	178,484	194,633
Malaysia	145,740	-.	123,362
Singapore	-.	49,964	49,297
Thailand	-.	185,668	217,258
Vietnam	-.	185,668	217,258
Japan	1,180,402	1,199,237	1,209,426

Source: UNESCO UIS

Table 24 Number of human resources for R&D in science and technology per 1 million population

	2016	2017	2018
Indonesia	603.9	674.4	727.1
Malaysia	4,749.6	-.	3,912.8
Singapore	8,837.5	8,636.4	-
Thailand	2,692.0	3,139.1	-.
Vietnam	-.	1825.4	-.
Japan	9,240.0	9,405.6	9,507.9

Source: UNESCO UIS

Table 25 Number of researchers for R&D in science and technology per 1 million population

	2016	2017	2018
Indonesia	540.25	627.6	622.7
Japan	7,183.0	7,299.6	7,355.7
Malaysia	3,537.8	-.	2,856.6
Singapore	7,637.0	7,492.8	-.
Thailand	1,990.5	2,169.9	-.

Vietnam	-.	1,438.4	-.

Source: UNESCO UIS

Table 26　Number of researchers in each sector

	2016			2017			2018		
	Industry	Government	Academic	Industry	Government	Academic	Industry	Government	Academic
Indonesia	7,851	21,295	128,575	8,603	19,424	150,292	9,449	28,078	156,053
Malaysia	26,926	17,945	100,817	-	-	-	19,553	8,590	95,130
Singapore	24,006	5,008	20,950	23,728	4,942	20,627	-	-	-
Thailand	69,476	30,173	83,703	92,652	32,531	90,204	-	-	-
Vietnam	-	-	-	26,192	56,987	88,401	-	-	-
Japan	692,609	72,077	398,821	706,816	73,020	402,870	713,299	73,265	406,787

Source: UNESCO UIS

Table 27　Number of researchers for R&D in Science and Technology Development

(by degree: Doctoral degree)

	2016	2017	2018
Indonesia	25,926	28,202	28,383
Japan	174,906	177,716	179,671
Malaysia	39,678	-.	42,228
Singapore	10,603.	10,540.	-.
Thailand	31,591	29,386	-.
Vietnam	-.	15,774	-.

Source: UNESCO UIS

Table 28　Number of researchers for R&D in Science and Technology Development

(by degree: Master degree)

	2016	2017	2018
Indonesia	98,162	117,977	118,253
Japan	-.	-.	-.
Malaysia	39,961	-.	32,572
Singapore	-.	-.	-.
Thailand	52,422	49,588	-.
Vietnam	-.	58,890	-.

Source: UNESCO UIS

3.1.2.4 National expenses for science and technology development

Since all countries in the world have established policies under which science and technology development occupies an important role in driving national economic growth, national expenses for R&D are an important factor in support for national science and technology performance. Countries across the world, especially the developed countries, have shown a high level of commitment to investment for R&D in science and technology. This commitment can be seen from the ratio of total R&D expenditure (GERD: Gross Expenditure on R&D) to GDP. Regarding the ratio of GERD to GDP, the figure are high for Israel (4.2%), Korea (4.1%), Japan (3.5%), Finland (3.3%), Sweden (3.3%), Denmark (3.1%), and Switzerland (3.0%), while that for Indonesia remains low. The average GERD per GDP of developed countries in the ASEAN continent is 1.6%, with South Korea and Japan ranking the highest, followed by Singapore (2.0%), China (2.0%), Malaysia (1.1%), and Thailand (0.39%).

3.1.3 National policy and current status of higher education in engineering

3.1.3.1 Strengthening the quality of higher education

In the RPJMN 2020–2024, goals for the enhancement of quality in higher education are indicated as follows:

(a) To enhance industrialization by strengthening national and international collaboration among universities/research institutes.

(b) To develop strategic R&D in science and technology by establishing industrial-academic collaboration. The Indonesian government provides financial incentives for universities/research institutes in order to promote industrial-academic collaboration.

(c) To improve the quality of education by enhancing mutual cooperation between universities and industry.

(d) To improve the quality of human resources by developing educational programs, technical certification systems, and entrepreneurial education that meet the needs of industrial development in the region.

(e) To set up endowment funds at universities to attract funding from industries and government.

(f) To develop industrial-academic collaboration in each university, categorized by research universities, educational universities, and vocational universities.

(g) To strengthen the governance of PTN-BH.

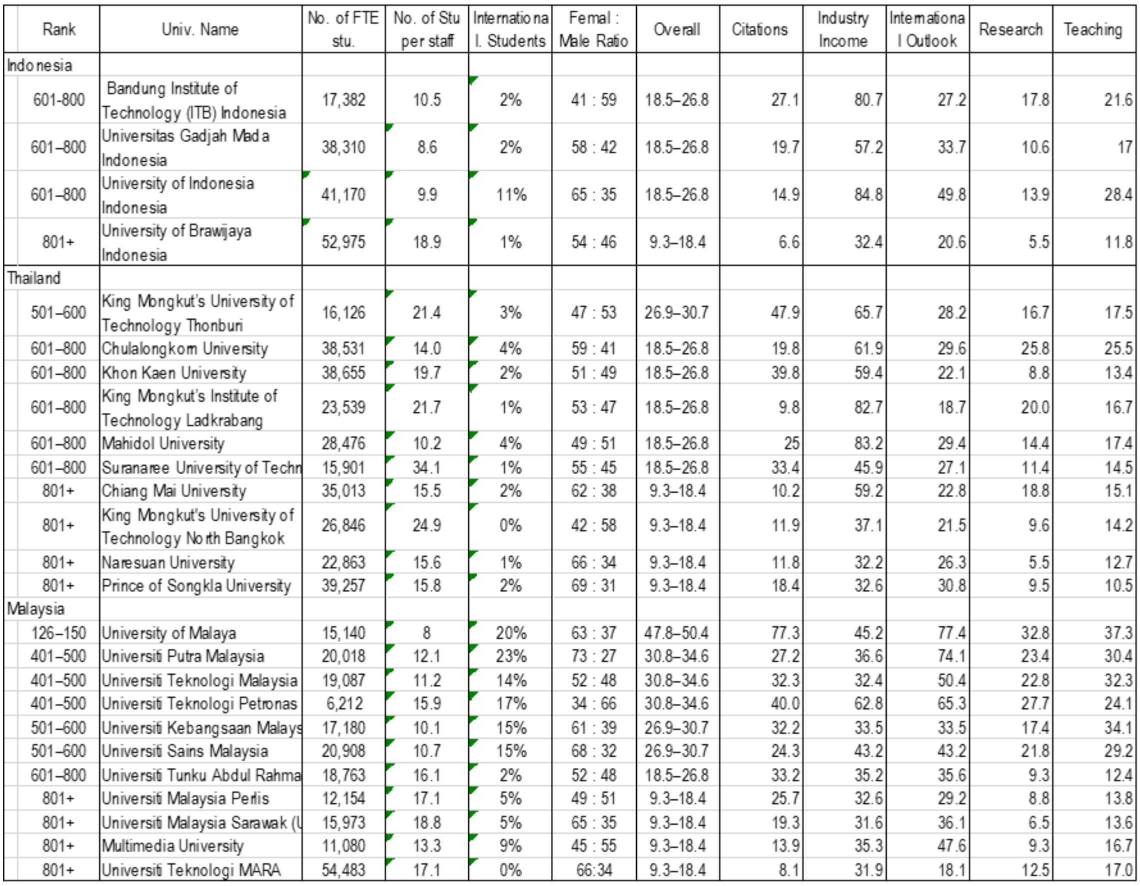
(h) To enhance the education and research capability of Indonesia by improving quality of education in private universities.

Based on the policy mentioned above, the Indonesian government has been working on the improvement of higher education, and the University of Indonesia is ranked in the top 300, while

Bandung Institute of Technology and Gadjah Mada University are ranked in the top 500 in the world university ranking as of FY2019. In addition, IPB University, Airlangga University, and Padjadjaran University have undertaken to be ranked in the top 500 in the world university ranking by FY 2024.

The number of Indonesian universities ranked in the General Engineering category of the THE World University Rankings 2020 is much smaller than in Thailand and Malaysia. In terms of indicators, Indonesia is generally inferior in the indicators of Research and Citations, while there is not much difference in the indicators of Industry Income, International Outlook, and Teaching.

Table 29 Universities ranked in the THE World University Rankings 2020 in General Engineering (Comparison of three countries)



Rank	Univ. Name	No. of FTE stu.	No. of Stu per staff	International. Students	Femal : Male Ratio	Overall	Citations	Industry Income	International Outlook	Research	Teaching
Indonesia											
601-800	Bandung Institute of Technology (ITB) Indonesia	17,382	10.5	2%	41 : 59	18.5–26.8	27.1	80.7	27.2	17.8	21.6
601–800	Universitas Gadjah Mada Indonesia	38,310	8.6	2%	58 : 42	18.5–26.8	19.7	57.2	33.7	10.6	17
601–800	University of Indonesia Indonesia	41,170	9.9	11%	65 : 35	18.5–26.8	14.9	84.8	49.8	13.9	28.4
801+	University of Brawijaya Indonesia	52,975	18.9	1%	54 : 46	9.3–18.4	6.6	32.4	20.6	5.5	11.8
Thailand											
501–600	King Mongkut's University of Technology Thonburi	16,126	21.4	3%	47 : 53	26.9–30.7	47.9	65.7	28.2	16.7	17.5
601–800	Chulalongkorn University	38,531	14.0	4%	59 : 41	18.5–26.8	19.8	61.9	29.6	25.8	25.5
601–800	Khon Kaen University	38,655	19.7	2%	51 : 49	18.5–26.8	39.8	59.4	22.1	8.8	13.4
601–800	King Mongkut's Institute of Technology Ladkrabang	23,539	21.7	1%	53 : 47	18.5–26.8	9.8	82.7	18.7	20.0	16.7
601–800	Mahidol University	28,476	10.2	4%	49 : 51	18.5–26.8	25	83.2	29.4	14.4	17.4
601–800	Suranaree University of Techn	15,901	34.1	1%	55 : 45	18.5–26.8	33.4	45.9	27.1	11.4	14.5
801+	Chiang Mai University	35,013	15.5	2%	62 : 38	9.3–18.4	10.2	59.2	22.8	18.8	15.1
801+	King Mongkut's University of Technology North Bangkok	26,846	24.9	0%	42 : 58	9.3–18.4	11.9	37.1	21.5	9.6	14.2
801+	Naresuan University	22,863	15.6	1%	66 : 34	9.3–18.4	11.8	32.2	26.3	5.5	12.7
801+	Prince of Songkla University	39,257	15.8	2%	69 : 31	9.3–18.4	18.4	32.6	30.8	9.5	10.5
Malaysia											
126–150	University of Malaya	15,140	8	20%	63 : 37	47.8–50.4	77.3	45.2	77.4	32.8	37.3
401–500	Universiti Putra Malaysia	20,018	12.1	23%	73 : 27	30.8–34.6	27.2	36.6	74.1	23.4	30.4
401–500	Universiti Teknologi Malaysia	19,087	11.2	14%	52 : 48	30.8–34.6	32.3	32.4	50.4	22.8	32.3
401–500	Universiti Teknologi Petronas	6,212	15.9	17%	34 : 66	30.8–34.6	40.0	62.8	65.3	27.7	24.1
501–600	Universiti Kebangsaan Malays	17,180	10.1	15%	61 : 39	26.9–30.7	32.2	33.5	33.5	17.4	34.1
501–600	Universiti Sains Malaysia	20,908	10.7	15%	68 : 32	26.9–30.7	24.3	43.2	43.2	21.8	29.2
601–800	Universiti Tunku Abdul Rahma	18,763	16.1	2%	52 : 48	18.5–26.8	33.2	35.2	35.6	9.3	12.4
801+	Universiti Malaysia Perlis	12,154	17.1	5%	49 : 51	9.3–18.4	25.7	32.6	29.2	8.8	13.8
801+	Universiti Malaysia Sarawak (	15,973	18.8	5%	65 : 35	9.3–18.4	19.3	31.6	36.1	6.5	13.6
801+	Multimedia University	11,080	13.3	9%	45 : 55	9.3–18.4	13.9	35.3	47.6	9.3	16.7
801+	Universiti Teknologi MARA	54,483	17.1	0%	66:34	9.3–18.4	8.1	31.9	18.1	12.5	17.0

Source: https://www.timeshighereducation.com/world-university-rankings/2020/subject-ranking/engineering

Since there are many universities in Indonesia, the educational and research capabilities in universities have not been prepared sufficiently except for the universities ranking in the world university rankings. There are several reasons why these universities have not developed well, particularly their lack of quality academic staff and the lack of equipment and facilities Therefore, it may be that educational programs to impart the specific knowledge and skills that industry requires cannot be developed. Human resources developed in the universities are expected to acquire highly specialized, creative, and adaptable skills. However, in Indonesia, the ratio of workers who have acquired highly specialized knowledge and skills to the total workforce is about 40.6% as of FY2019, which is lower than in other ASEAN countries. In addition, the unemployment rate for graduates from higher and secondary educational institutions is about 8.01%. These figures indicate that there is a mismatch between the human resources that the labor market requires and the students who have graduated from higher and secondary education institutions.

3.1.3.2 Teachers and researchers in higher education institutions

As of FY2018, the number of institutions accredited as higher education institutions in Indonesia is about 4,650. The total number of academic staff in higher education institutions is 290,687, while the number of academic staff with doctoral degrees is about 41,066. The percentage of PhD holders to the total number of lecturers in higher education institutions is only 14.1%. This indicates that the academic staff in higher education institutes has not been sufficiently prepared qualitatively or quantitatively.

3.1.3.3 Educational programs

Universities in Indonesia can be classified into three categories: "Research universities," which conduct interdisciplinary innovative research; "Educational universities," for the purpose of providing education and community services; and "Vocational universities," which focus on vocational education. The Indonesian government has implemented a policy to improve the educational programs of each classification of university by promoting collaboration between industry or local communities and higher education institutions. In particular, it recommends the development of educational programs that incorporate the needs of industrial sectors and the local community in higher education institutions. This indicates that the current educational program has established different policies between universities, industries, and local communities; therefore, the human resources nurtured at universities are not able to contribute to industries and local communities well. In addition, since educational facilities in some of universities are insufficiently developed, universities cannot offer educational programs to impart practical knowledge and skills in such fields as experimental education on engineering. As a result, students studying in university cannot meet the conditions of skills and knowledge required by the industrial sectors.

3.1.3.4 Research programs

One of the indices for science and technology is the Global Innovation Index (GII), which is based on the number of scientific and engineering papers, the number of intellectual property rights, and GERD to GDP at the global level. Indonesia's GII score in 2020 is 85th out of 131 countries, and 14th out of 17 countries in Southeast Asia, East Asia, and Oceania. Indonesia’s GII in 2020 obviously indicates the country’s current status of a lack of qualitative human resources for R&D, a lack of equipment and facilities for research and innovation, and a lack of research funds compared with other countries. To escape this situation, the Indonesian government is planning to establish Centers of Excellence (COEs) and Strategic Science and Technology Parks (STPs) and to increase the efficiency and productivity of research by promoting industrial-governmental-academic collaboration (Triple Helix collaboration). In addition, the Indonesian government has a plan to increase the inflow of research funds from industrial sectors by promoting industry-government-academia collaboration.

3.1.3.5 Engineering education and research related target indicators

The following is an extract of the target indicators related to engineering education and research shown in RPJMN 2020–2024.

Table 30 Productivity and competitiveness targets from RPJMN 2020–2024

RPJMN Indicator No.	Indicator	Baseline	Target 2024
7	Number of University that have entered the World Class university a. Top 100 b. Top 300 c. Top 500	a. － b. UI c. ITB, UGM	a. UI b. ITB, UGM c. IPB, UNAIR, UNPAD
8	Number of scientific publications and citations in international journals a. Number of International Publications (Articles) b. Number of citations in international journals	a. 14,606 (2018) b. 38,586 (2018)	a. 20,937 b. 59,770
9	Number of Prototypes from Higher Education	94 (2017)	243
10	Number of KI registered from the Higher Education R&D results	762 (2017)	1,849
11	Number of innovative products from technology-based Starter Company (PPBT) tenants built	143 (2018)	700
12	Number of innovation products utilized by industry / business entity	52 (2018 年)	210
13	Patent application that fulfills administrative requirements for KI (domestic) formality	1,362 (2018 年)	3,000
14	Patent Granted (Domestic)	790 (2018 年)	1,000
15	Percentage of Science and Technology HR (lecturers, researchers, engineers) Qualified S3	14.08 (Dikti, LIPI, BPPT)	20 *
16	Science and Technology Excellence Centers established	81 (2018 年)	138 *
17	Number of R&D institutions that are accredited (active)	48 (2018 年)	75 *
18	Number of strategic science and technology infrastructure developed	6	10

19	The number of strategic STPs developed to fully operate: a. College Based b. Non-Higher Education Based	45 a. 17 b. 28	8 ** a. 5 b. 3
20	Innovation products and research products produced by National Priority Research	N/A	40 *
21	Application of technology to support sustainable development: a. The application of technology for the sustainable use of natural resources b. Application of technology for post-disaster prevention and mitigation	a. 12 b. 35	a. 24 b. 35
22	Percentage of the R&D budget to GDP	0.25	0.42

*Cumulative number
**Location: UI, UGM, ITB, IPB, ITS, CSTP LIPI, Puspiptek Serpong Kemristekdikti, NSTP Pasar Friday BATAN
Source: Translation from RPJMN2020–2024 by Joint Venture

These indicators and targets are the goals that each university or research institute should aim for according to the current situation of individual universities, and are important in considering the direction of JICA's support for higher education in Indonesia and specific support measures by serving as convenient indices / targets. It is interesting to note that the number of fully operational strategic STPs for No. 19 is "48 for the baseline and 8 for the 2024 target," which is smaller than the current number. The eight locations selected for strategic STPs are the University of Indonesia (UI), Gadjah Mada University (UGM), Bandung Institute of Technology (ITB), IPB University (IPB), Sepuluh Nopember Institute of Technology (ITS), CSTP LIPI, Puspiptek Serpong Kemristekdikti, and NSTP Pasar Friday BATAN.

3.2 Current status of public health and the role of universities in Indonesia

3.2.1 Governmental policy for public health

According to the State of Health Inequality Indonesia,[8] urgent challenges for public health in Indonesia were identified as the expansion of provision of medical treatment, inhibition of health-risky behaviors, and amelioration of harmful environments for maternal and child health as of 2017. Additionally, in terms of other indicators, there are large gaps in the improvement among provinces/districts. In general, urban places show positive indicators of improvement and rural places show lower indicators.

In order to respond to these circumstances, the Government of Indonesia specified the policy directions in RPJMN 2015–2019[9] as in Table 31, which were succeeded by those in RPJMN 2020–2024[10] as shown in Table 32.

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[8] State of Health Inequality Indonesia, 2017, WHO/Ministry of Health Indonesia
[9] RPJMN 2015-2019, Ministry of National Development Planning Indonesia
[10] RPJMN 2020-2024, Ministry of National Development Planning Indonesia

Table 31 Challenges and policy directions for public health in Indonesia (RPJMN 2015–2019)

Challenge	Policy Direction
Health among mothers, children and elderly citizens	Improvement of quality of and access to health services for mothers, children and elderly citizens
Reproductive health, family planning	Expansion of coverage of and access to family planning services
Status of nutrition intake	Improvement of access to regional nutrition services
Disease management, environmental sanitation	Improvement of disease management and environmental sanitation
Provision of medicine and medical equipment, food and pharmaceutical safety	Improvement of management for food and pharmaceutical safety
Health promotion activities, citizen's participation	Improvement of health promotion activities and citizen's participation
National health insurance	Development of national health insurance
Primary healthcare and access to medical reference services	Improvement of access to primary healthcare
	Improvement of access to medical reference services
Recruitment of medical personnel	Improvement of quality and quantity of medical personnel
Management, R&D, information	Improvement of management, R&D and information
Cost-effectiveness of expenses to health	Improvement of cost-effectiveness of expenses to health
	Improvement of provision, coverage, and fair distribution of medicine and medical equipment

Reference: State of Health Inequality Indonesia, WHO/Ministry of Health, Indonesia

Table 32 Challenges and policy directions for public health in Indonesia (RPJMN 2020–2024)

Challenge	Policy Direction
Maternal and child health, reproductive health	Improvement of maternal and child health and neonatal medical services at healthcare facilities
	Expansion of basic vaccination such as pneumonia
	Improvement of nutrition intake among pregnant women and infants
	Improvement of knowledge, understanding and access to reproductive health
Nutrition intake in society	Strengthening of commitment, campaign, monitoring and evaluation to improve status of nutrition intake
	Improvement of nutrition provision to fetus, parental care at home, child-raising through safe water and environmental sanitation, and status of nutrition intake
	Encouragement of decrease in growth prevention through interventions
	Strengthening of communication and encouragement to society for behavioral change to balanced nutrition intake through food

	Implementation of quick response for improvement of nutrition intake in case of emergency
Disease management	Strengthening real-time surveillance of diseases and prevention through early detection and control of risky factors
	Capacity enhancement for disease prevention, early detection and early response, and strengthening of quarantine alert system and health security under emergency
	Strengthening of accumulation of cases and treatment for diseases and injuries
Health in society	Development of working environment, schools, shops and districts leading Healthy Living Movement
	Encouragement of reduction in pollution, heathy environment, utilization of public transportation, and physical activities in public spaces
	Enforcement of laws and regulations to encourage Healthy Living Movement and to develop health among private sectors, local governments and central government
	Encouragement of innovative behavioral change, sports, culture and community empowerment through improvement of health
Health system	Strengthening of access to referral system
	Capacity enhancement among health workers
	Strengthening of international competitiveness of medicine and medical equipment
	Strengthening of research, finance and governance on health
	Strengthening of national health insurance system

Reference: Renstra Kementerian Kesehatan Tahun 2020–2024, and Rencana aksi program 2020–2024, Ministry of Health, Indonesia

The government of Indonesia aims to improve the health status of its citizens and their nutritional intake and expand the coverage of medical services and fair medical services through the above policy directions. Also, the mortality ratio of non-communicable diseases (NCDs) reached 71% of all causes of death in Indonesia as of 2012[11] and has since continued to increase. As of 2016, it reached 73% of all causes of death,[12] for which reason NCDs are regarded as one of the challenges of public health in Indonesia. The government of Indonesia declared its overall medical policies in RPJPN (2005–2025).[13] It states that the government aims to strengthen its policy to focus on prevention and health promotion rather than treatment and rehabilitation and to control NCDs through improved lifestyle practices and health education. Other donors such as WHO or OECD also state that more investment

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[11] WHO Country Cooperation Strategy, 2014-2019, WHO

[12] Non-communicable Diseases Country Profiles, 2018, WHO

[13] RPJPN 2005-2025, Ministry of National Development Planning Indonesia

on prevention and health promotion will be effective in improving public health in Indonesia,[14,15] and the current Indonesian policy directions correspond to the statements of those donors.

The global COVID-19 pandemic has spread in Indonesia since March 2020, and the total number of cases reached about 1.5 million, with 41 thousand deaths from the infection as of March 2021.[16] The government implemented urban lockdowns, closure of workplaces and educational institutions, domestic travel bans, and strict border management. In addition, the government started a vaccination program. Most of the people vaccinated were medical-related personnel, and the total number vaccinated was more than 8 million as of January 2021. According to the Research and Innovation Consortium for COVID-19, Indonesia aims to produce domestic vaccines, and some research institutes, especially the Eijkman Institute for Molecular Biology, are working on its development.[17] National Research and Innovation Agency (BRIN), as a hub of research institutes, is encouraging research collaboration among institutions for increased synergetic effects and cost-effectiveness. It also aims to implement research collaboration not only within Indonesia but also with foreign research institutes for the development of vaccines. Additionally, self-production of vaccines is intended to be accomplished by encouraging equipment investment and tax reduction for the industry sector in Indonesia as well. RPJMN 2020–2024 had to be modified largely due to the COVID-19 pandemic, for which the government presented short- and medium-term policy directions in Rencana Kerja Pemerintah (RKP) 2021. Control of the pandemic is the most urgent agenda in the short term, and the implementation of policies under RPJMN 2020–2024 that have been postponed due to the pandemic is the main agenda under the "Acceleration of economic recovery and social reformation."

Table 33 Indonesia's short- and medium-term policy directions (RKP 2021)

Short Term Policy Directions	Medium Term Policy Directions
Control of the number of infected people by implementing social and behavioral restrictions	Recovery of industrial sectors
Decrease in the number of infected patients with serious symptoms by accelerating vaccination program	Strengthening of food safety
	Reformation of national health system
	Reformation of social security system
	Reformation of disaster recovery system
	Strengthening of human resource enhancement

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[14] The Republic of Indonesia Health System Review, 2017, WHO

[15] Indonesia Policy Brief, 2016, OECD

[16] Reuters COVID-19 Tracker, Reuters

[17] PROGRESS IN THE DEVELOPMENT OF VACCINESIN INDONESIA TO FIGHT COVID19, Indonesian Hospital Association (PERSI)

	through education and training

Reference: A Year of COVID-19: A Long Road to Recovery and Acceleration of Indonesia's Development, The Indonesian Journal of Development Planning, Muhyiddin and Hanan Nugroho

As shown in Table 33, all six medium-term policy directions are related to the field of health and medicine and overlapped with the public health policies in RPJMN 2015–2019 and RPJMN 2020–2024.

The recovery of industrial sectors is related to strengthening the international competitiveness of medicine and medical equipment. The strengthening of food safety is related to improvements in the environment for nutrient intake. Reformation of the national health system is related to improvements in access to and the quality of medical services. Reformation of the social security system is related to strengthening governance and finance for medical services. Reformation of the disaster recovery system is related to strengthening the quarantine alert system and health security under the COVID-19 pandemic. Finally, strengthening human resource enhancement through education and training is related to the enhancement of health worker capacity. This shows that the policy directions in RKP 2021 emphasize the field of health and medicine in both the short and medium terms.

3.2.2 Regional disparities of medicine

Among the indicators of Universal Health Coverage (UHC), regional disparities in public health in Indonesia are as follows. UHC consists of four categories: "Reproductive, Maternal, Newborn and Child Health," "Infectious Diseases," "Non-communicable Diseases," and "Service Capacity and Access," and there are several indicators in each category so that the degree of regional accomplishment of each category can be assessed. According to Universal Health Coverage: Tracking Indonesia's Progress,[18] there are 14 indicators in total evaluating the degree of regional accomplishment of UHC in Indonesia (higher scores show higher degrees of accomplishment). As shown in Figure 9, the average indicator score of overall UHC accomplishment is 60 in Indonesia, and urban areas such as Jakarta, Bali, and Yogyakarta show higher scores. On the other hand, rural areas such as West Sulawesi, East Nusa Tenggara, and North Maluku show lower scores. The category of "Service Capacity and Access" shows larger regional disparities (highest: 86, lowest: 51, average: 67) than the others. In particular, "Hospital beds per capita" and "Health worker density" show the largest disparities in the category of "Service Capacity and Access." In Indonesia, community-based small medical/healthcare facilities are called Posyandu and Poskesdes, middle-sized community-based facilities are Puskesman, and central medical facilities are university hospitals or general hospitals. According to Universal Health Coverage: Tracking Indonesia's Progress, 430 middle-sized communities, especially in the east of Indonesia, do not have Puskesmas, and an absence of required

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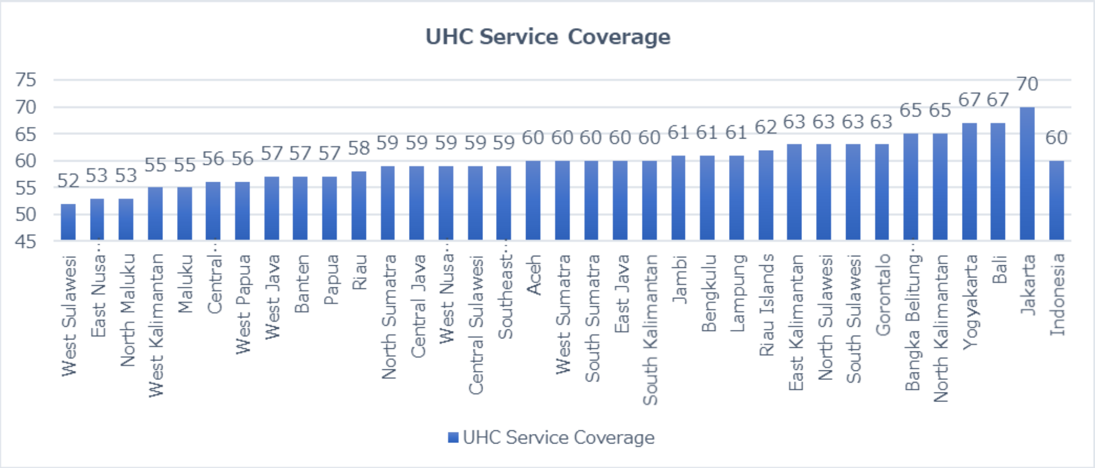
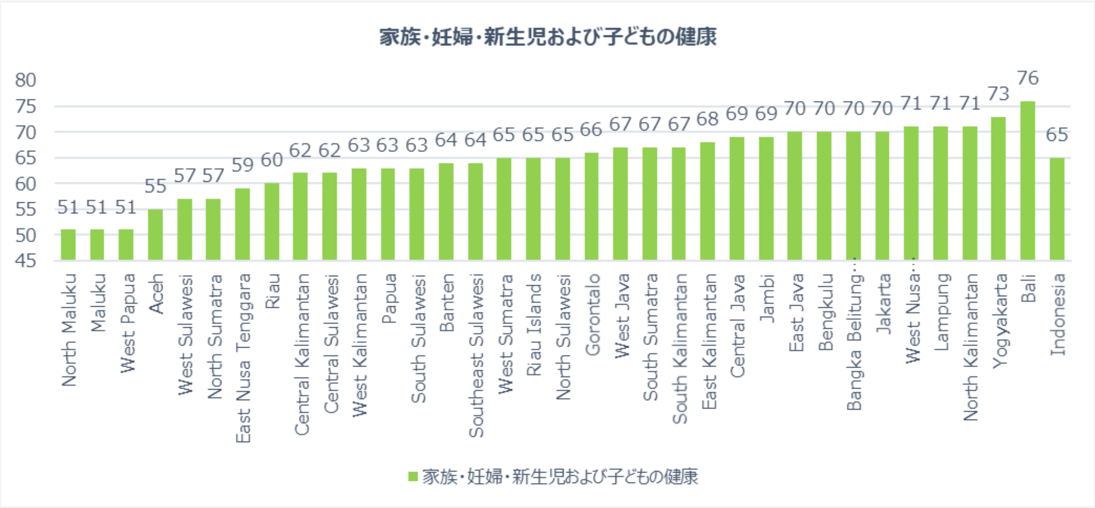
[18] Universal Health Coverage: Tracking Indonesia's Progress, 2020, Perkumpulan PRAKARSA

medical personnel is pointed out for 380 Puskesmas. On the other hand, the category of "Non-Communicable Diseases" shows small disparities among regions, indicating that it is a public health problem throughout Indonesia.



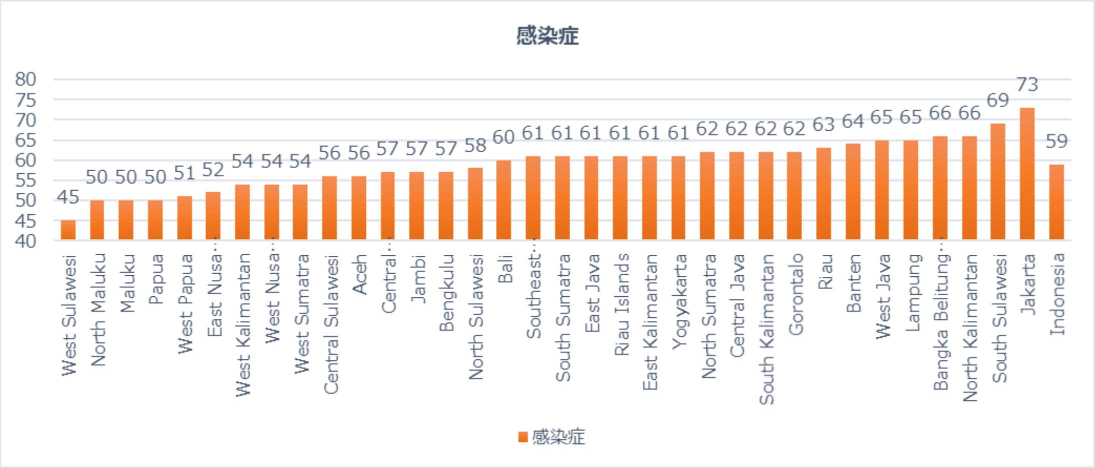
*The average of 4 categories of "Reproductive, Maternal, Newborn and Child Health," "Infectious Diseases," "Non-communicable Diseases," and "Service Capacity and Access"

Figure 9 Indicator Score of UHC Service Coverage in Indonesia



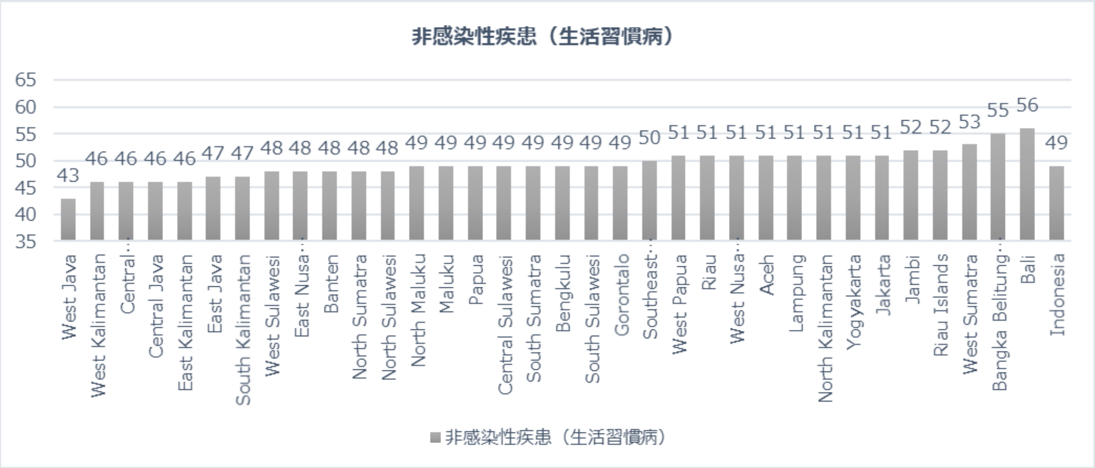
*The average of 4 indicators of "Demand for family planning satisfied by modern methods (% of married women with demand for family planning)," "Births attended by a skilled health worker," "Immunisation (DPT, HepB3 & Measles)," and "ORS therapy for childhood diarrhoea"

Figure 10 Indicator Score of Reproductive, Maternal, Newborn and Child Health in Indonesia



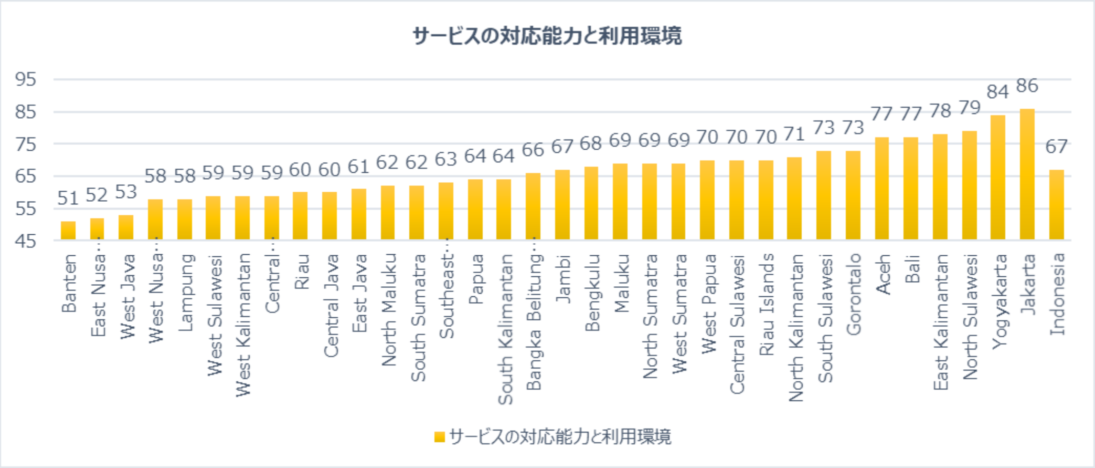
*The average of 3 indicators of "Tuberculosis effective treatment coverage," "People living with HIV receiving ART (%)," and "People using at least basic sanitation services (% of population)"

Figure 11　Indicator Score of Infectious Diseases in Indonesia



*The average of 4 indicators of "Prevalence of normal blood pressure," "People with diabetes receiving treatment," "Cervical cancer screen (% of women 30-49yrs)," and "Adults aged ≥ 15 years not smoking tobacco in the last 30 days (%)"

Figure 12　Indicator Score of Non-communicable Diseases (NCDs) in Indonesia



*The average of 3 indicators of "Hospital beds per capita," "Health worker density," and "Access to essential medicines"

Figure 13 Indicators of Service Capacity and Access in Indonesia

3.2.3 Role of higher educational institutions in the field of public health

Healthcare units are categorized as follows in Indonesia. Phuskesmas/Posyandu/Poskesdes (mainly in charge of maternal and child health) cover small communities and villages. Healthcare/medical facilities categorized in Type D cover multiple small communities and villages. Type C is a mid-sized medical facility covering wider areas. Type B covers districts and provinces. Type A is a central medical facility covering multiple provinces. University hospitals are usually categorized as Type B or Type C.

Table 34 Classification of healthcare units

Classification	Minimum Number of Hospital Beds	Areas to Be Covered	Medical System
Type D	50	Villages, communities	Primary healthcare More than 2 specialists are needed among gynecology, pediatrics, surgical and inner medicine departments
Type C	100	Villages, town,	Primary healthcare More than 4 specialists are needed among gynecology, pediatrics, surgical, inner medicine and dentistry departments
Type B	200	Cities, provinces	More than 8 specialists in the designated 13 departments
Type A	400	Provinces, wider areas	Specialists in the field of more than 17 departments

Reference: Minstry of Indonesia, Indonesia

Indonesia’s public medical services applies a referral system, and patients are supposed to see a doctor at the primary healthcare facility designated by each district and community except in case of emergency. Usually Puskesmas is the primary healthcare facility. When doctors find it difficult to provide diagnosis or treatment at a Puskesmas, patients are supposed to be sent to Type D and Type C hospitals where they can receive treatment from specialists. Type B and Type A facilities provide more specialist diagnosis and treatment. The target university hospitals in this research are categorized as Type C or Type B and play a leading role in managing public health with local governments in the districts. According to the discussion between Airlangga University and JICA in August 2020, the Institute of Tropical Disease, Airlangga University, was in charge of testing for COVID-19 in the district and accepted around 6,600 infected people (and suspected infected people) for treatment. This illustrates that universities play an important and specialist role in public health in their districts.

3.2.4 Current status of online medical education and policy directions and current status of telemedicine

There are limitations to face-to-face lectures and activities under the COVID-19 pandemic; however, there are also difficulties in conducting medical educational practices online in terms of both hardware and curriculum. According to Airlangga University, the Faculty of Medicine had a difficulty in conducting online education as of August 2020. Practical training is necessary for nurturing medical personnel, although conducting practical trainings online is not effective. On the other hand, there is a higher risk of infection in face-to-face instruction because social distancing cannot be maintained. Furthermore, Diponegoro University is conducting face-to-face practical training except OSCE, although lectures are provided to undergraduates online. Currently, online lectures are provided through an online meeting system; however, its educational effectiveness is not so good due to insufficient Internet devices, Internet speed, and systems.

The Indonesian Medical Education and Research Institute (IMERI) was established in 2017 and Center of e-Learning was opened as one of its department. Cooperation with the Faculty of Medicine, University of Indonesia, Southeast Asian Ministers of Education Organization Regional Open Learning Centre (SEAMOLEC), etc., enabled the Center of e-Learning of IMERI to increase the effectiveness of the e-learning system by using online medical educational platforms such as Massive Open Online Courses (MOOCs) and Learning Management Systems (LMSs).[19] In addition, the Telemedicine Development Center of Asia (TEMDEC) has been cooperating in the development of online medical education, preparation and setting up of online systems, and distribution of video

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[19] https://imeri.fk.ui.ac.id/, IMERI

lectures, seminars, and technical demonstration with member institutes.[20] The University of Indonesia, Padjadjaran University, Airlangga University, Brawijaya University, and others have been participating in its activities. According to the research of TEMDEC and IMERI,[21] the number of Indonesian universities participating in online programs related to online medical education hosted by TEMDEC increased dramatically around 2015–2016, when cheap and stable Internet connections became prevalent in Indonesia. Also, medical specialist education for medical practitioners working in remote areas was identified as one of the problems in Indonesia. There was a high demand of online medical education among those doctors so as to avoid having to go to urban places to participate in specialist education. This might be another reason for the increase of online medical education. Although the period of generalized use of online medical education within Indonesian universities was not identified, it is speculated that each university started preparing online educational systems around 2015–2016 and have been using these systems since the COVID-19 pandemic in 2020.

The government of Indonesia stated in the policy directions of Minister of Health Regulation No. 90 of 2015 that use of telemedicine is to be accelerated for the purpose of provision of medical services especially to areas with insufficient quality and quantity of medical personnel and facilities. In the Minister of Health’s Regulation No. 20 of 2019, telemedicine services in Indonesia were defined as medical diagnosis, treatment, and prevention by using online communication tools between health service facilities. That is, as of 2019, the regulation did not specify direct communication between patients and medical practitioners using online communication tools. Therefore, patients were required to stop by the nearest medical facilities which have a license to conduct telemedicine to contact the other facility. In April 2020, due to the increase of number of infected people with COVID-19, the Ministry of Health issued Circular Letter Number HK.02.01/MENKES/303/2020 and approved direct telemedicine between patients and medical practitioners using online communication tools in order to prevent infections at hospitals, which produces several private companies to support telemedicine. However, in reality, these situations are observed only in certain cities with sufficient infrastructure, and have not yet become prevalent in remote areas with inadequate devices and Internet connections. Even in urban areas, it has been conducted only at some medical facilities. Therefore, it is still far from general.[22] According to the Center for Digital Society, Universitas Gadjah Mada, if public health insurances such as Badan Penyelenggara Jaminan Sosial (BPJS) covers telemedicine, the range of services and territories of telemedicine will expand in the future.[23]

3.3 Survey for formulating a JICA assistance plan for the engineering faculties of the

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[20] https://www.temdec.med.kyushu-u.ac.jp/index.php, TEMDEC

[21] REMOTE MEDICAL EDUCATION IN INDONESIA: ANALYSIS OF 10 YEARS OF ACTIVITIES, Shimizu S, et al.

[22] SDG Talks Vol. 12: Telemedicine: The Rise of Telehealth Services During COVID-19, 2020, UNDP Indonesia

[23] Telemedicine in Indonesia: A Path towards Universalizing Healthcare?, Center for Digital Society, Universitas Gadjah Mada

surveyed universities

3.3.1 Survey methods

For the formulation of JICA assistance proposals for engineering faculties, a document survey was conducted, and at the same time a questionnaire survey was conducted of the engineering faculties of the surveyed universities as follows.

Step 1: Collect existing information from websites and papers

Step 2: Create a questionnaire

Step 3: Installation of cooperation request letters for each university from the Directorate General of Higher Education, Ministry of Education, Culture, Research and Technology / Introduction of contact information for each university

Step 4: Contact each university and request that it answer the questionnaire

Step 5: Additional questions / follow-up to the answers to each university

The engineering survey questionnaire was sent to the engineering faculties of the following 11 universities, which have been granted PTN-BH qualifications under Law 12 of 2012.

1) University of Indonesia (UI)
   - Faculty of Engineering, Faculty of Computer Science
2) Bandung Institute of Technology (ITB)
   - Faculty of Arts and Design, Faculty of Civil and Environmental Engineering, Faculty of Earth Sciences and Technology, Faculty of Industrial Technology, Faculty of Mechanical and Aerospace Engineering. Faculty of Mining and Petroleum Engineering, School of Architecture, Planning, and Policy Development, School of Electrical Engineering and Informatics
3) Gadjah Mada University (UGM)
   - Faculty of Engineering
4) IPB University (IPB)
   - Faculty of Agricultural Technology
5) Airlangga University (UNAIR)
   - Faculty of Advanced Technology and Multidiscipline
6) Sepuluh Nopember Institute of Technology (ITS)
   - Faculty of Science and Data Analytics, Faculty of Industrial Technology and System Engineering, Faculty of Intelligent Electrical and Informatics Technology, Faculty of Civil, Planning, and Geo Engineering, Faculty of Marine Technology, Faculty of Vocational Studies, Faculty of Creative Design and Digital Business
7) Padjadjaran University (UMPAD)
   - Faculty of Agricultural Industrial Technology, Faculty of Geological Engineering
8) Diponegoro University (UNDIP)

- Faculty of Techniques

9) Hasanuddin University (UNHAS)

- Faculty of Engineering

10) Indonesia University of Education (UPI)

- Faculty of Technology and Vocational Education

11) University of North Sumatra (USU)

- Faculty of Computer Sciences and Information Technology, Faculty of Engineering

3.3.2 Basic information of the 11 target universities

An outline of the 11 target universities in the engineering survey is as follows:

Table 35 Basic information of the 11 target universities

<table>
<tr><td>Name</td><td colspan="4">University of Indonesia</td></tr>
<tr><td>QS World University Ranking in 2021</td><td colspan="4">305</td></tr>
<tr><td>Faculty*</td><td colspan="4">Administrative Sciences, Computer Science, Dentistry, Economics & Business, Engineering, Humanities, Law, Mathematics and Natural Sciences, Medicine, Nursing, Pharmacy, Psychology, Public Health, Social and Political Sciences, School of Environmental Science Program, School of Strategic and Global Studies</td></tr>
<tr><td>Number of programs (by educational level) **</td><td colspan="4">Diploma course (13), Bachelor course (64), Master course (69), Doctoral course (39), Profesi course (7), Specialist course (51)</td></tr>
<tr><td>Number of programs (by educational field) **</td><td colspan="4">Religion (3), Economics (15), Humanities (31), Health Science (85), Mathematics & Natural Science (19), Education (-), Agriculture (1), Art (1), Social Science (51), Engineering (37)</td></tr>
<tr><td rowspan="5">Number of academic staff **</td><td colspan="2">Professor</td><td colspan="2">284</td></tr>
<tr><td colspan="2">Associate professor</td><td colspan="2">419</td></tr>
<tr><td colspan="2">Lecturer</td><td colspan="2">865</td></tr>
<tr><td colspan="2">Assistant lecturer</td><td colspan="2">517</td></tr>
<tr><td colspan="2">Academic staff without specific title</td><td colspan="2">412</td></tr>
<tr><td>Completion rate of degree in academic staff</td><td>Doctoral degree</td><td>53.9%</td><td>Master degree</td><td>33.7%</td></tr>
<tr><td rowspan="3">Number of students by educational program**</td><td colspan="2">Diploma course</td><td colspan="2">2,530</td></tr>
<tr><td colspan="2">Bachelor course</td><td colspan="2">23,992</td></tr>
<tr><td colspan="2">Master course</td><td colspan="2">8,232</td></tr>
</table>

	Doctoral course	1,182
	Profesi course	1,328
	Specialist course	2,518
Number of students per teacher **	15.9	
SINTA Score*** (As of Nov. 2021)	All year Score	164,904 (1st on National S&T ranking)
	3 years score (since 2019)	24,639 (1st on National S&T ranking)
	All years Score v2	1,678,920
	3 years Score v2 (since 2019)	517,102
Remarks	Member university of AUN/SEED-Net	

<table>
<tr><th>Name</th><th colspan="4">Bandung Institute of Technology</th></tr>
<tr><td>QS World University Ranking in 2021</td><td colspan="4">313</td></tr>
<tr><td>Faculty*</td><td colspan="4">Arts and Design, Civil and Environmental Engineering, Earth Sciences and Technology, Industrial Technology, Mathematics and Natural Sciences, Mechanical and Aerospace, Engineering, Mining and Petroleum Engineering, School of Architecture, Planning, and Policy Development, School of Business and Management, School of Electrical Engineering and Informatics, School of Life Sciences and Technology, School of Pharmacy</td></tr>
<tr><td>Number of programs (by educational level)**</td><td colspan="4">Diploma course (4), Bachelor course (50), Master course (53), Doctoral course (27), Profesi course (2), Specialist course (0)</td></tr>
<tr><td>Number of programs (by educational field)**</td><td colspan="4">Religion (0), Economics (4), Humanities (0), Health Science (1), Mathematics & Natural Science (24), Education (4), Agriculture (9), Art (9), Social Science (8), Engineering (77)</td></tr>
<tr><td rowspan="5">Number of academic staff**</td><td colspan="2">Professor</td><td colspan="2">178</td></tr>
<tr><td colspan="2">Associate professor</td><td colspan="2">285</td></tr>
<tr><td colspan="2">Lecturer</td><td colspan="2">505</td></tr>
<tr><td colspan="2">Assistant lecturer</td><td colspan="2">150</td></tr>
<tr><td colspan="2">Academic staff without specific title</td><td colspan="2">394</td></tr>
<tr><td>Completion rate of degree in academic staff</td><td>Doctoral degree</td><td>69.3%</td><td>Master degree</td><td>30.2%</td></tr>
<tr><td rowspan="3">Number of students**</td><td colspan="2">Diploma course</td><td colspan="2">0</td></tr>
<tr><td colspan="2">Bachelor course</td><td colspan="2">18,817</td></tr>
<tr><td colspan="2">Master course</td><td colspan="2">4,628</td></tr>
</table>

	Doctoral course	855
	Profesi course	268
	Specialist course	0
Number of students per teacher**	16.2	
SINTA Score*** (As of Nov. 2021)	All year Score	116,061 (2nd on National S&T ranking)
	3 years score (since 2019)	14,089 (4th on National S&T ranking)
	All years Score v2	1,385,330
	3 years Score v2 (since 2019)	301,920
Remarks	Member university of AUN/SEED-Net	

Name	Gadjah Mada University			
QS World University Ranking in 2021	254			
Faculty*	Agriculture Technology, Agriculture, Animal Science, Biology, Cultural Science, Dentistry, Economics and Business, Engineering, Forestry, Geography, Law, Mathematics and Natural Science, Medicine, Public Health, and Nursing, Pharmacy, Philosophy, Psychology, Social Science and Political Science, Veterinary Medicine, Graduate School			
Number of programs (by educational level)**	Diploma course (44), Bachelor course (70), Master course (92), Doctoral course (50), Profesi course (10), Specialist course (31)			
Number of programs (by educational field)**	Religion (5), Economics (22), Humanities (27), Health Science (57), Mathematics & Natural Science (26), Education (2), Agriculture (46), Art (2), Social Science (51), Engineering (59)			
Number of academic staff**	Professor		312	
	Associate professor		592	
	Lecturer		825	
	Assistant lecturer		513	
	Academic staff without specific title		603	
Completion rate of degree in academic staff**	Doctoral degree	50.7%	Master degree	41.9%
Number of students**	Diploma course		7,138	
	Bachelor course		32,911	
	Master course		10,815	
	Doctoral course		1,733	

	Profesi course	2,339
	Specialist course	1,174
Number of students per teacher**	19.7	
SINTA Score*** (As of Nov. 2021)	All year Score	135,632 (3rd on National S&T ranking)
	3 years score (since 2019)	17,513 (3rd on National S&T ranking)
	All years Score v2	1,265,500
	3 years Score v2 (since 2019)	380,690
Remarks	Member university of AUN/SEED-Net	

<table>
<tr><th>Name</th><th colspan="4">IPB University(Institut Pertanian Bogor)</th></tr>
<tr><td>QS World University Ranking in 2021</td><td colspan="4">531-540</td></tr>
<tr><td>Faculty*</td><td colspan="4">Agriculture, Veterinary Medicine, Fisheries and Marine Science, Animal Science, Forestry and Environment, Agricultural Technology, Mathematics and Natural Science, Economics and Management, Human Ecology, School of Business, College of Vocational Studies, School of Graduate</td></tr>
<tr><td>Number of programs (by educational level)**</td><td colspan="4">Diploma course (22), Bachelor course (39), Master course (71), Doctoral course (46), Profesi course (3), Specialist course (0)</td></tr>
<tr><td>Number of programs (by educational field)**</td><td colspan="4">Religion (1), Economics (13), Humanities (0), Health Science (5), Mathematics & Natural Science (24), Education (0), Agriculture (110), Art (0), Social Science (15), Engineering (13)</td></tr>
<tr><td rowspan="5">Number of academic staff**</td><td colspan="2">Professor</td><td colspan="2">216</td></tr>
<tr><td colspan="2">Associate professor</td><td colspan="2">362</td></tr>
<tr><td colspan="2">Lecturer</td><td colspan="2">351</td></tr>
<tr><td colspan="2">Assistant lecturer</td><td colspan="2">243</td></tr>
<tr><td colspan="2">Academic staff without specific title</td><td colspan="2">178</td></tr>
<tr><td>Completion rate of degree in academic staff**</td><td>Doctoral degree</td><td>67.5%</td><td>Master degree</td><td>32.3%</td></tr>
<tr><td rowspan="6">Number of students**</td><td colspan="2">Diploma course</td><td colspan="2">7,446</td></tr>
<tr><td colspan="2">Bachelor course</td><td colspan="2">15,959</td></tr>
<tr><td colspan="2">Master course</td><td colspan="2">3,505</td></tr>
<tr><td colspan="2">Doctoral course</td><td colspan="2">1,298</td></tr>
<tr><td colspan="2">Profesi course</td><td colspan="2">263</td></tr>
<tr><td colspan="2">Specialist course</td><td colspan="2">0</td></tr>
</table>

Number of students per teacher**	21.1	
SINTA Score*** (As of Nov. 2021)	All year Score	115,406 (4th on National S&T ranking)
	3 years score (since 2019)	11,236 (8th on National S&T ranking)
	All years Score v2	872,055
	3 years Score v2 (since 2019)	244,892
Remarks		

Name	Airlangga University			
QS World University Ranking in 2021	521-530			
Faculty*	Medicine, Dental Medicine, Law, Economics and Business, Pharmacy, Veterinary Medicine, Social and Political Science, Science and Technology, Public Health, Psychology, Humanities, Nursing, Fisheries and Marine Sciences, Vocational Studies, Postgraduate School, Advanced Technology and Multidiscipline			
Number of programs (by educational level) **	Diploma course (21), Bachelor course (44), Master course (46), Doctoral course (15), Profesi course (7), Specialist course (41)			
Number of programs (by educational level) **	Religion (2), Economics (19), Humanities (9), Health Science (82), Mathematics & Natural Science (17), Education (0), Agriculture (12), Art (0), Social Science (27), Engineering (6)			
Number of academic staff**	Professor		223	
	Associate professor		366	
	Lecturer		576	
	Assistant lecturer		496	
	Academic staff without specific title		306	
Completion rate of degree in academic staff	Doctoral degree	42.1%	Master degree	40.1%
Number of students**	Diploma course		4,128	
	Bachelor course		23,781	
	Master course		3,616	
	Doctoral course		1,119	
	Profesi course		1,651	
	Specialist course		1,495	
Number of students per teacher	18.2			

**		
SINTA Score *** (As of Nov. 2021)	All year Score	59,400 (6th on National S&T ranking)
	3 years score (since 2019)	19,226 (2nd on National S&T ranking)
	All years Score v2	725,243
	3 years Score v2 (since 2019)	386,493
Remarks		

Name	Sepuluh Nopember Institute of Technology			
QS World University Ranking in 2021	751-800			
Faculty*	Science and Data Analytics, Marine Technology, Industrial Technology and Systems, Engineering, Intelligent Electrical and Informatics, Technology, Civil, Planning, and Geo Engineering, Creative Design and Digital Business			
Number of programs (by educational level)**	Diploma course (14), Bachelor course (32), Master course (20), Doctoral course (16), Profesi course (1), Specialist course (0)			
Number of programs (by educational field)**	Religion (0), Economics (4), Humanities (0), Health Science (1), Mathematics & Natural Science (16), Education (0), Agriculture (0), Art (4), Social Science (1), Engineering (57)			
Number of academic staff**	Professor		102	
	Associate professor		231	
	Lecturer		375	
	Assistant lecturer		224	
	Academic staff without specific title		134	
Completion rate of degree in academic staff	Doctoral degree	47.0%	Master degree	52.6%
Number of students **	Diploma course		2,747	
	Bachelor course		16,660	
	Master course		2,653	
	Doctoral course		576	
	Profesi course		26	
	Specialist course		0	
Number of students per teacher**	21.3			
SINTA Score*** (As of Nov. 2021)	All year Score		50,848 (7th on National S&T ranking)	
	3 years score (since 2019)		9,414 (12th on National S&T ranking)	

	All years Score v2	617,584
	3 years Score v2 (since 2019)	210,733
Remarks	Member university of AUN/SEED-Net	

Name	Padjadjaran University			
QS World University Ranking in 2021	801-1000			
Faculty*	Law, Economics and Business of Medicine, Mathematics and Natural Sciences, Agriculture, Dentistry, Culture Sciences, Social and Political Science, Psychology, Animal Husbandry, Communication Science, Nursing, Fishery and Marine Science, Agricultural Industrial Technology, Pharmacy, Geological Engineering, Postgraduate School			
Number of programs (by educational level)**	Diploma course (28), Bachelor course (60), Master course (52), Doctoral course (22), Profesi course (6), Specialist course (35)			
Number of programs (by educational field)**	Religion (3), Economics (17), Humanities (23), Health science (53), Mathematics & Natural Science (21), Education (0), Agriculture (25), Art(2), Social Science(46), Engineering(13)			
Number of academic staff**	Professor	158		
	Associate professor	440		
	Lecturer	827		
	Assistant lecturer	409		
	Academic staff without specific title	312		
Completion rate of degree in academic staff	Doctoral degree	47.2%	Master degree	43.1%
Number of students **	Diploma course	2,218		
	Bachelor course	24,623		
	Master course	2,543		
	Doctoral course	1,798		
	Profesi course	1,036		
	Specialist course	1,126		
Number of students per teacher**	15.5			
SINTA Score*** (As of Nov. 2021)	All year Score	64,752 (10th on National S&T ranking)		
	3 years score (since 2019)	14,174 (5th on National S&T ranking)		
	All years Score v2	578,959		

	3 years Score v2 (since 2019)	263,012
Remarks		

Name	Diponegoro University			
QS World University Ranking in 2021	1001+			
Faculty*	Engineering, Social Science and Political Science, Medicine, Economics and Business, Law, Fisheries & Marine Sciences, Psychology, Animal and Agricultural Sciences, Humanities, Public Health, Sciences and Mathematic, Postgraduate School			
Number of programs (by educational level)**	Diploma course (37), Bachelor course (52), Master course (38), Doctoral course (15), Profesi course (5), Specialist course (19)			
Number of programs (by educational field)**	Religion (2), Economics (15), Humanities (15), Health Science (36), Mathematics & Natural Science (10), Education (0), Agriculture (18), Art (0), Social Science (25), Engineering (45)			
Number of academic staff**	Professor		149	
	Associate professor		487	
	Lecturer		580	
	Assistant lecturer		395	
	Academic staff without specific title		175	
Completion rate of degree in academic staff	Doctoral degree	40.7%	Master degree	53.8%
Number of students**	Diploma course		8,639	
	Bachelor course		40,298	
	Master course		4,531	
	Doctoral course		1,165	
	Profesi course		780	
	Specialist course		712	
Number of students per teacher**	31.4			
SINTA Score*** (As of Nov. 2021)	All year Score		77,565 (11th on National S&T ranking)	
	3 years score (since 2019)		10,774 (9th on National S&T ranking)	
	All years Score v2		552,135	
	3 years Score v2 (since 2019)		240,329	
Remarks				

<table>
<tr><td>Name</td><td colspan="4">Hasanuddin University</td></tr>
<tr><td>QS World University Ranking in 2021</td><td colspan="4">-</td></tr>
<tr><td>Faculty*</td><td colspan="4">Medicine, Engineering, Agriculture, Mathematics and Natural Science, Animal Husbandry, Dentistry, Public Health, Marine and Fisheries Sciences, Forestry, Pharmacy, Nursing, Economy and Business, Law, Social and Political Sciences, Cultural Sciences, Graduate School</td></tr>
<tr><td>Number of programs (by educational level)**</td><td colspan="4">Diploma course (3), Bachelor course (67), Master course (65), Doctoral course (26), Profesi course (8), Specialist course (31)</td></tr>
<tr><td>Number of programs (by educational field)**</td><td colspan="4">Religion (1), Economics (13), Humanities (19), Health Science (51), Mathematics & Natural Science (18), Education (1), Agriculture (36), Art (0), Social Science (26), Engineering (35)</td></tr>
<tr><td rowspan="5">Number of academic staff**</td><td colspan="2">Professor</td><td colspan="2">318</td></tr>
<tr><td colspan="2">Associate professor</td><td colspan="2">520</td></tr>
<tr><td colspan="2">Lecturer</td><td colspan="2">502</td></tr>
<tr><td colspan="2">Assistant lecturer</td><td colspan="2">326</td></tr>
<tr><td colspan="2">Academic staff without specific title</td><td colspan="2">318</td></tr>
<tr><td>Completion rate of degree in academic staff**</td><td>Doctoral degree</td><td>56.3%</td><td>Master degree</td><td>35.1%</td></tr>
<tr><td rowspan="6">Number of students**</td><td colspan="2">Diploma course</td><td colspan="2">76</td></tr>
<tr><td colspan="2">Bachelor course</td><td colspan="2">26,135</td></tr>
<tr><td colspan="2">Master course</td><td colspan="2">4,300</td></tr>
<tr><td colspan="2">Doctoral course</td><td colspan="2">1,358</td></tr>
<tr><td colspan="2">Profesi course</td><td colspan="2">1,814</td></tr>
<tr><td colspan="2">Specialist course</td><td colspan="2">1,104</td></tr>
<tr><td>Number of students per teacher**</td><td colspan="4">17.5</td></tr>
<tr><td rowspan="4">SINTA Score***
(As of Nov. 2021)</td><td colspan="2">All year Score</td><td colspan="2">57,027 (8th on National S&T ranking)</td></tr>
<tr><td colspan="2">3 years score (since 2019)</td><td colspan="2">12,204 (6th on National S&T ranking)</td></tr>
<tr><td colspan="2">All years Score v2</td><td colspan="2">591,587</td></tr>
<tr><td colspan="2">3 years Score v2 (since 2019)</td><td colspan="2">259,448</td></tr>
<tr><td>Remarks</td><td colspan="4"></td></tr>
</table>

Name	Indonesia University of Education

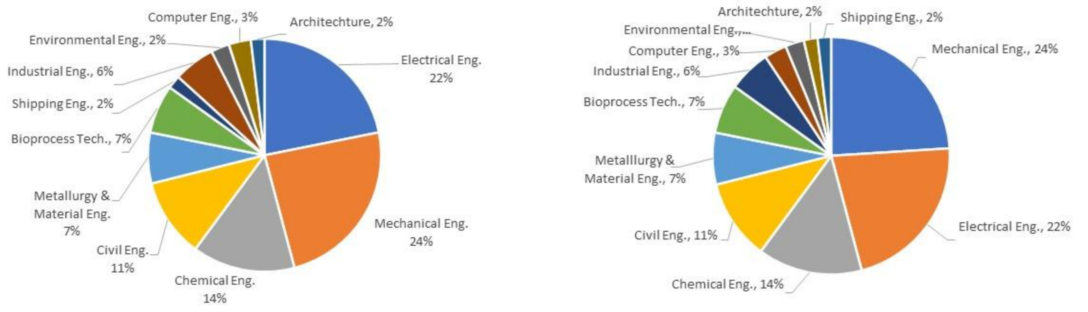
QS World University Ranking in 2021	-	
Faculty*	Educational Science, Language and Literature Education, Economics and Business Education, Social Science Education, Technology and Vocational Education, Sport and Health Education, Mathematics and Science Education, Art and Design Education, School of Postgraduates	
Number of programs (by educational level)**	Diploma course (7), Bachelor course (97), Master course (37), Doctoral course (21), Profesi course (4), Specialist course (0)	
Number of programs (by educational field)**	Religion (3), Economics (7), Humanities (6), Health Science (4), Mathematics & Natural Science (5), Education (106), Agriculture (2), Art (4), Social Science (12), Engineering (17)	
Number of academic staff**	Professor	116
	Associate professor	442
	Lecturer	468
	Assistant lecturer	145
	Academic staff without specific title	124
Completion rate of degree in academic staff	Doctoral degree	46.7%
	Master degree	53.0%
Number of students**	Diploma course	881
	Bachelor course	28,691
	Master course	3,016
	Doctoral course	1,340
	Profesi course	0
	Specialist course	0
Number of students per teacher**	26.2	
SINTA Score*** (As of Nov. 2021)	All year Score	96,144 (18th on National S&T ranking)
	3 years score (since 2019)	14,256 (16th on National S&T ranking)
	All years Score v2	260,628
	3 years Score v2 (since 2019)	144,151
Remarks		

Name	University of North Sumatra
QS World University Ranking in 2021	-

Faculty*	Economics and Business, Pharmacy, Law, Cultural Science, Computer Science and Information Technology, Social Science and Political Science, Medicine, Dentistry, Forestry, Nursing, Public Health, Mathematics and Natural Science, Agriculture, Psychology, Engineering, School of Graduate studies			
Number of programs (by educational level)**	Diploma course (16), Bachelor course (49), Master course (43), Doctoral course (23), Profesi course (7), Specialist course (32)			
Number of programs (by educational field)**	Religion (1), Economics (16), Humanities (18), Health Science (40), Mathematics & Natural Science (20), Education (1), Agriculture (13), Art (2), Social Science (22), Engineering (27)			
Number of academic staff**	Professor	178		
	Associate professor	484		
	Lecturer	530		
	Assistant lecturer	251		
	Academic staff without specific title	249		
Completion rate of degree in academic staff	Doctoral degree	34.2%	Master degree	53.4%
Number of students**	Diploma course	3,274		
	Bachelor course	31,436		
	Master course	4,166		
	Doctoral course	912		
	Profesi course	718		
	Specialist course	393		
Number of students per teacher**	24.2			
SINTA Score*** (As of Nov. 2021)	All year Score	37,598 (13th on National S&T ranking)		
	3 years score (since 2019)	10,742 (11th on National S&T ranking)		
	All years Score v2	406,304		
	3 years Score v2 (since 2019)	213,137		
Remarks				

(Source: *Web site, **STATISTIK PENDIDIKAN TINGI 2020, ***Science and Technology Index (SINTA))

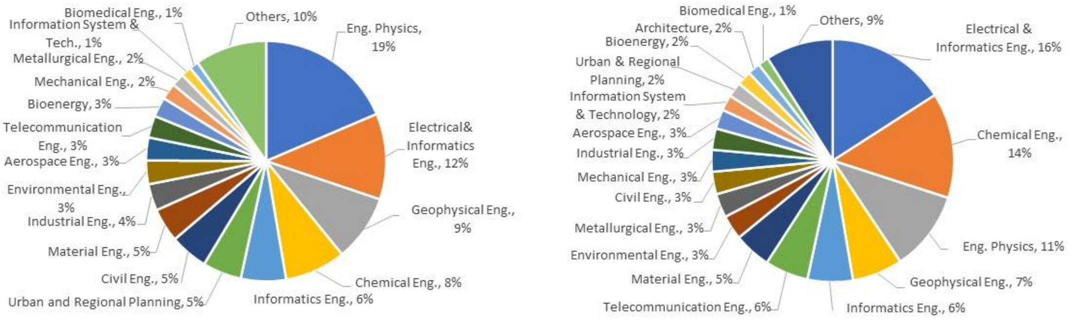
Figure14 shows the number of academic output of faculties related to engineering in the 11 target universities. The analyzed data were drawn from the Science and Technology Index (SINTA) database developed by the Ministry of Education, Culture, Science and Technology. The SINTA Score is standardized by the calculation formula defined by BRIN based on information from Scopus.[24,25]



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

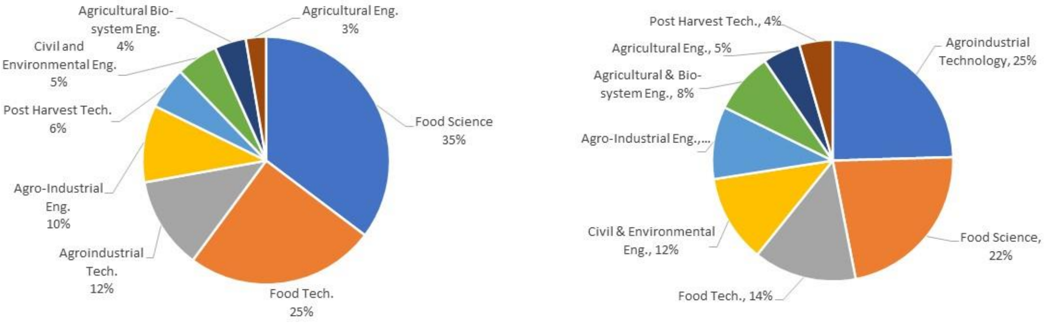
Academic output from faculties related to engineering in University of Indonesia



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in Bandung Institute of Technology



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in IPB University

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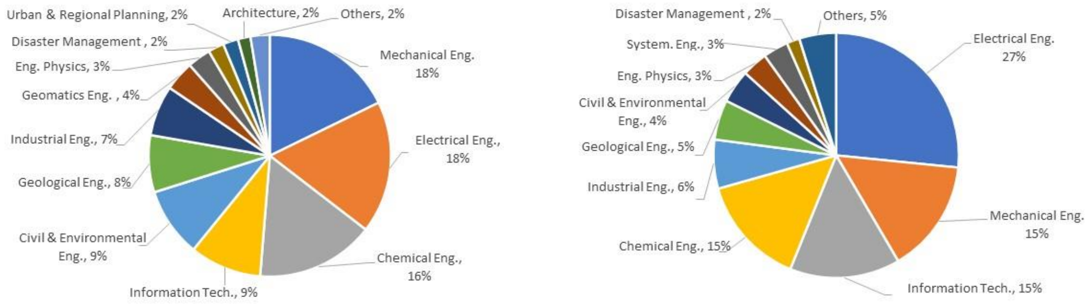
[24] Definition of calculation formula of SINTA Score; https://sinta.kemdikbud.go.id/home/faq#ans3

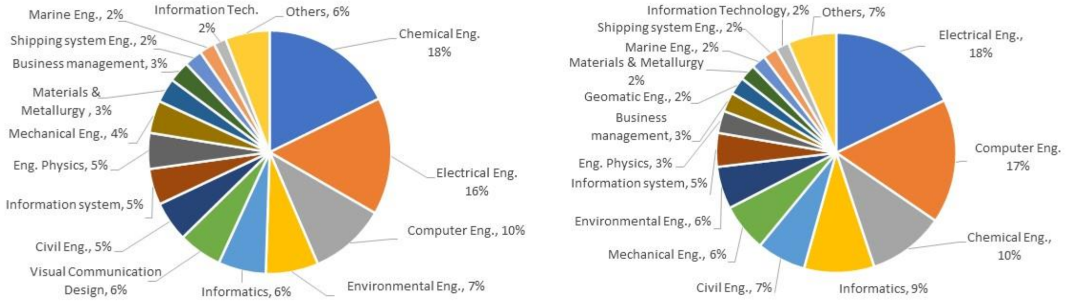
[25] As of Nov. 2021, some universities had not registered their academic output in the SINTA database.



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

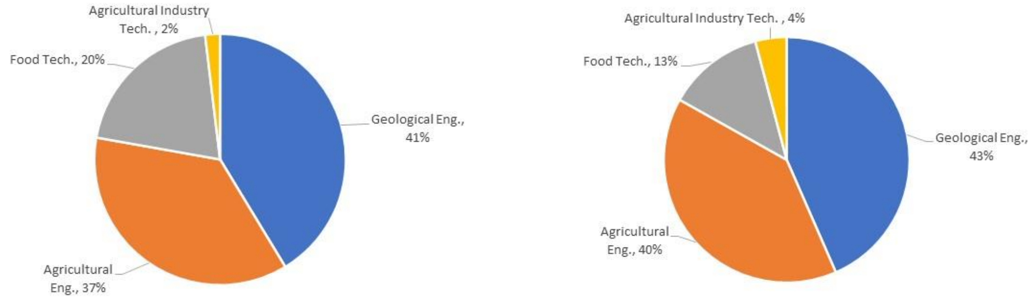
Academic output from faculties related to engineering in Gadjah Mada University



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

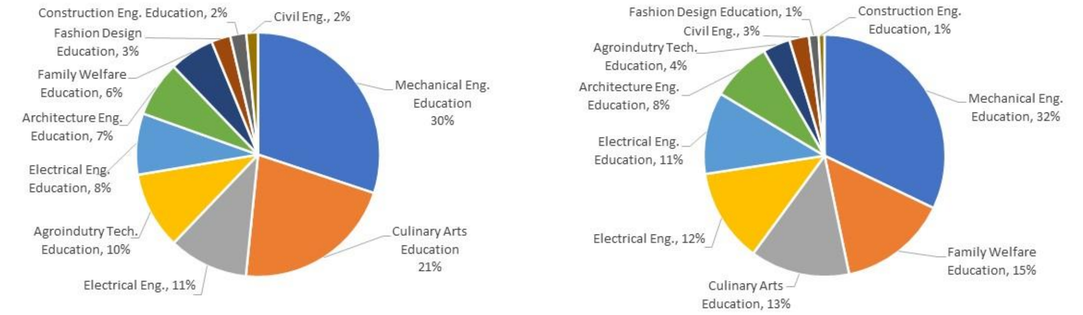
Academic output from faculties related to engineering in University of North Sumatra



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in Padjajaran University



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in Indonesia University of Education

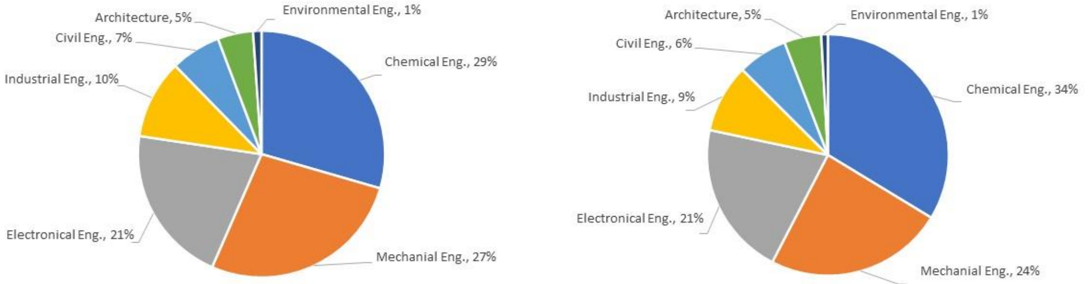
No data in SINTA database

No data in SINTA database

(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

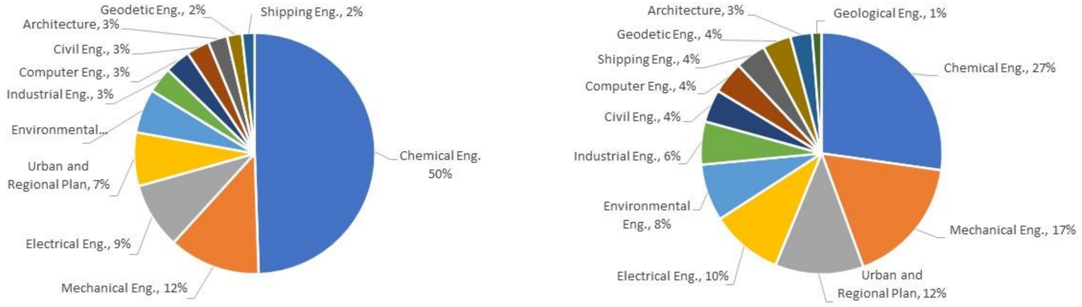
Academic output from faculties related to engineering in Airlangga University



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

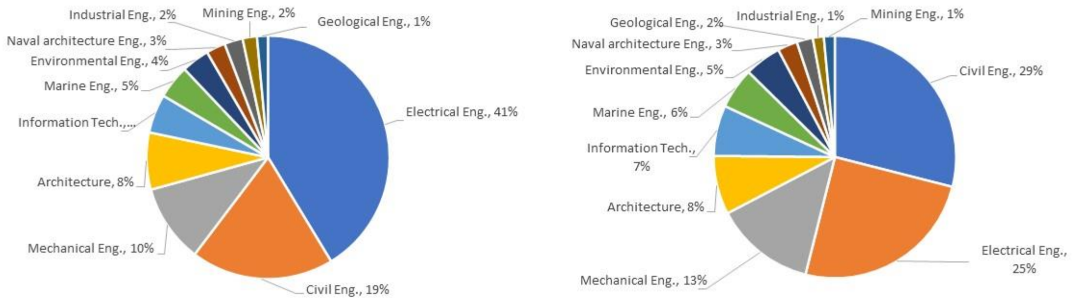
Academic output from faculties related to engineering in Sepuluh Nopember Institute of Technology



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in Diponegoro University



(A) Academic outputs from establishment of Univesity until Nov. 2021 (accumulation)

(B) Academic output in recent 5 years from FY 2016 to Nov. 2021 (accumulation)

Academic output from faculties related to engineering in Hasanuddin University

(Source: Science and Technology Index (SINTA)

Figure 14 Composition and research results of the universities surveyed by Scopus

In this survey, in order to determine the current status of the educational and research capabilities of the 11 target universities, the fundamental information of the university—the structure of the university, number of education programs (by educational level and by subject), number of academic staff, number of students, and number of indexed papers as academic output based on the Scopus database—was collected. The current status of the target universities is summarized as follows.

- The 11 universities investigated in this survey have faculties of engineering or faculties that offer engineering education. Airlangga University provides engineering education in the faculty of science and IPB University and Padjadjaran University offer engineering education in the faculty of agriculture or geology.
- Major research fields in the universities are chemical engineering, mechanical engineering, and electrical engineering. According to the data on research output in the past 3 years in the SINTA database, there is a tendency for active research fields to move to information engineering, computer engineering, and software engineering.
- Bandung Institute of Technology, Gadjah Mada University, and Sepuluh Nopember Institute of Technology are establishing departments of biomedical engineering, which combine engineering and medical education. This movement is one of the global trends in science and technical development.
- Some universities—the University of Indonesia, Sepuluh Nopember Institute of Technology, Diponegoro University, and Hasanuddin University—are setting up faculties

or departments related to naval architecture and ocean (offshore) technology. This is a feature of technical development in Indonesia as an island country.

- Some universities, such as the Indonesia University of Education, have not prepared adequate graduate programs, according to the data on research output in the SINTA database.
- The 11 target universities in this survey are trying to promote industrial-academic collaboration in order to create innovation by developing Science and Technology Parks (STPs) and startup companies in universities. These activities indicate that the universities are inviting industries to their STPs in collaboration with regional society. Therefore, it is necessary to conduct a further survey to investigate the current achievement of industrial-academic collaboration as well as collaboration between the university and regional society.
- Some universities, such as the University of Indonesia, Bandung Institute of Technology, IPB University, and Gadjah Mada University, have conducted international collaboration research with oversea universities, including ones from Japan. Most of the international joint research they have conducted is supported financially by the agency that provides the research budget in the counterpart's country.
- As for the ratio of professors, lecturers, and researchers with doctorate degrees to the total staff, which is one of indicators for assessing the research capability of a university, it is about 34.2% at the University of North Sumatra and about 69.3% at the Bandung Institute of Technology. This result indicates a lack of quality human resources in the universities. This is, however, the overall figure for the university. It is necessary to conduct further surveys focusing on the science and engineering fields to grasp the current status of human resource development in science and technology.
- The number of students per lecturer is another indicator relating to the educational capability of universities. This figure is between 15.5 and 31.4 for the 11 target universities; it is 31.4, 26.2, and 24.2 for Diponegoro University, Indonesia University of Education, and University of North Sumatra respectively. This result shows a lack of academic staff at the university.
- According to the SINTA database, as of November 2021, the 11 universities targeted in this survey are all top research universities in Indonesia. In the past 3 years, Airlangga University (2nd), Padjadjaran University (5th), and Hasanuddin University (6th) have moved up in the national university rankings.

3.3.3 Hypotheses for JICA support components

Hypotheses for JICA support activities or components were set from the viewpoint of the target index for engineering-related productivity / competitiveness enhancement shown in RPJMN 2020–2024, the current situation and issues of the universities surveyed, etc.

Hypotheses for JICA support components

＜Research capacity development / industry-academia collaboration support related＞

(a) Joint research and researcher exchanges with Japanese institutions to improve research capabilities

One of the effective means for JICA to support the targets of RPJMN2020–2024, such as improvement of research capacity and application of its results to industry, is research collaboration between Indonesian universities and Japanese universities and research institutes. This involves building a unit of cooperation, preferably joint research, and promoting the exchange of researchers based on it. This method is used in many soft-loan projects and technical cooperations of JICA.

(b) Human resource development assistance for researchers and students (Degree and non-degree programs)

Human resource development assistance for researchers and students is also an effective means for JICA to support the improvement of research capabilities. This includes studying abroad in Japan and studying in Indonesia, including doctoral and master's degree programs and non-degree programs such as postdocs, short-term training, and internships.

(c) Procurement of research equipment

Needless to say, support for the procurement of research equipment is an effective means for JICA to support the improvement of research capabilities. In order to do this more effectively, it is necessary to identify the relationship with human resources, environment, and research funds for those who conduct research using the equipment.

(d) Building construction and rehabilitation for research

Construction and rehabilitation of buildings for research is also an important method. Construction with special specifications is required for research purposes.

(e) Promotion of industry-academia collaboration and support for intellectual property management

In order to promote the application of research results to industry and promote research cooperation with industry, it is necessary to enhance the ability to promote industry-academia collaboration and manage intellectual property. In many cases, it is effective for JICA to support such activities

＜Educational development support related＞

(f) Construction of educational facilities

One of the means of JICA assistance that contributes to the development of educational ability is the construction of educational facilities. Behind this survey, there was an awareness of the problem of lack of educational facilities and equipment to meet the rapid increase in demand for higher education in Indonesia.

(g) Procurement of educational equipment

Procurement of educational equipment is an important means of ICA support that contributes to the development of educational capacity. In the case of engineering universities, it is expected that there will be a need for educational experimental equipment and training environment, especially equipment for remote learning compatible with COVID-19 at present.

(h) Human resources development support for teachers and students (Bachelor's and non-degree programs)

JICA assistance to improve educational ability naturally includes human resource development for teachers and students, which includes studying abroad in Japan and studying in Indonesia, and these programs should include doctoral and master's degrees, as well as academic programs and non-degree programs such as postdocs, short-term training, and internships.

(i) Introduction of Japanese-style engineering education such as KOSEN technical college education and active learning methods

One approach of JICA assistance in improving engineering education is the introduction of Japanese-style engineering education. University education in Japan has the characteristics of Japanese-style active learning centered on experimental training and graduation research, and has distinctive programs such as so-called procreation (Monodukuri) education and KOSEN technical college education. JICA has this type of assistance experience.

(j) Curriculum improvement through international collaboration programs (twinning program, double degree program, etc.)

As a means of curriculum improvement and international student exchange, an international collaboration program between Japanese and Indonesian universities is also an option for improving education. These include undergraduate-level twinning programs, mainly graduate-level double degree programs and joint degree programs, and student exchanges based on a common curriculum, which all have the effect of improving education.

(k) Training program for IT bridge engineers with Japan

Although it is a type of international collaboration program between universities in Japan and Indonesia, a training program for IT bridge engineers aimed at improving the curriculum in the IT field in developing countries and the shortage of IT human resources in Japan has also been supported by JICA.

(l) Internship Apprenticeship Program in Japan

One of the problems of engineering education in developing countries is that even after acquire knowledge at a university, there are few sites such as factories and laboratories that actually use such training and experience to create something concrete. Sometimes it is not possible to gain the soft skills needed to grow as a practical engineer. There are many such training opportunities in

Japanese companies, and there is also a need for foreign engineering personnel. Short-term internships in Japan and 3–5-years apprenticeship programs are a way to upgrade Indonesian engineering talent and improve their employability.

3.3.4 Questionnaire survey

In order to explore the issues and assistance needs of the engineering faculties of the target universities, a questionnaire survey was conducted asking about the current situation and assistance needs of each university engineering faculty with respect to the hypothesis of the JICA support component in the previous section. The contents of the questionnaire are as shown in Attachment 1.

The questionnaire was distributed to the engineering faculties of the 11 universities with the cooperation of MoECRT, and 10 universities responded. The contents of the answer results are as shown in Table 36 and Table 37 below.

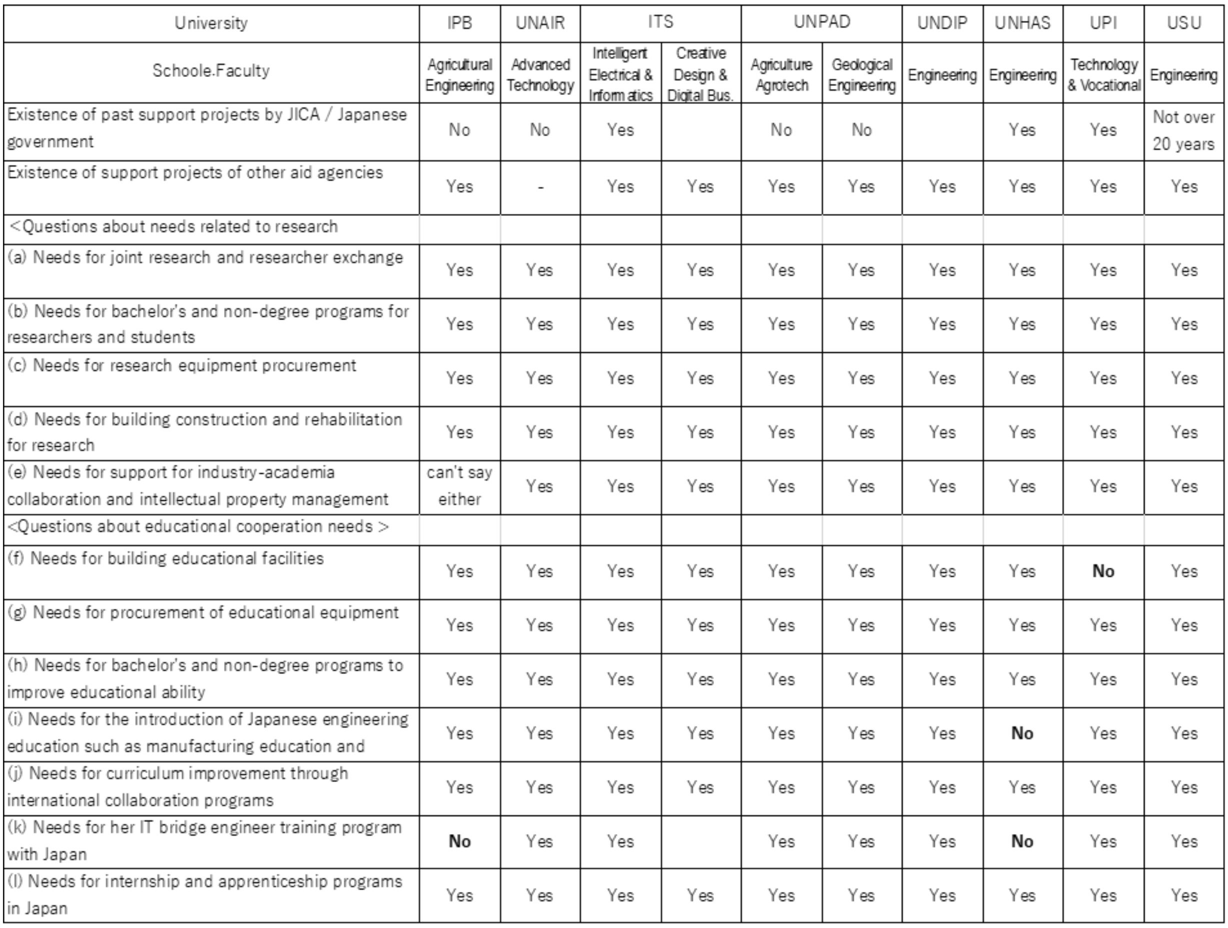
3.3.5 Assistance needs of universities in engineering

The questionnaire asked about the assistance needs for each of the hypotheses of assistance components and their background and needs contents. The following is a Yes/No answer summary on existence of the needs.

Table 36 Yes/No Answer Summary on Existence of the Needs (Engineering)

Engineering: Summary of Yes/No Answer for Needs of Proposed Support Components

University	UI	ITB							UGM
Schoole.Faculty	Computer Science	Electrical / Informatics	Architecture, Planning	Civil and Environment	Industrial Technology	Life Sciences	Mining and Petroleum	Art Design	
Existence of past support projects by JICA / Japanese government	No	Yes	Yes	Yes	Yes	No	Yes		Unanswered
Existence of support projects of other aid agencies	No	Yes	Yes	Yes		Yes			
＜Questions about needs related to research									
(a) Needs for joint research and researcher exchange	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**No**	
(b) Needs for bachelor's and non-degree programs for researchers and students	Yes	Yes	Yes	Yes	can't say either	Yes	can't say either	**No**	
(c) Needs for research equipment procurement	Yes	Yes	Yes	Yes	can't say either	Yes	can't say either	Yes	
(d) Needs for building construction and rehabilitation for research	Yes	Yes	Yes	Yes	Yes	Yes	can't say either	can't say either	
(e) Needs for support for industry-academia collaboration and intellectual property management	can't say either	Yes	Yes	Yes	can't say either	Yes	can't say either	can't say either	
<Questions about educational cooperation needs >									
(f) Needs for building educational facilities	Yes	Yes	Yes	Yes	can't say either	Yes	can't say either	can't say either	
(g) Needs for procurement of educational equipment	Yes	can't say either	Yes	Yes	Yes	Yes	can't say either	Yes	
(h) Needs for bachelor's and non-degree programs to improve educational ability	Yes	can't say either	Yes	Yes	can't say either	Yes	can't say either	Yes	
(i) Needs for the introduction of Japanese engineering education such as manufacturing education and	Yes	can't say either	Yes	Yes	**No**	Yes	can't say either		
(j) Needs for curriculum improvement through international collaboration programs	Yes	can't say either	Yes	Yes	Yes	Yes	can't say either	Yes	
(k) Needs for her IT bridge engineer training program with Japan	Yes	can't say either	Yes	**No**	Yes	can't say either	can't say either	Yes	
(l) Needs for internship and apprenticeship programs in Japan	Yes	can't say either	Yes	Yes	Yes	Yes	can't say either	can't say either	



University	IPB	UNAIR	ITS		UNPAD		UNDIP	UNHAS	UPI	USU
Schoole.Faculty	Agricultural Engineering	Advanced Technology	Intelligent Electrical & Informatics	Creative Design & Digital Bus.	Agriculture Agrotech	Geological Engineering	Engineering	Engineering	Technology & Vocational	Engineering
Existence of past support projects by JICA / Japanese government	No	No	Yes		No	No		Yes	Yes	Not over 20 years
Existence of support projects of other aid agencies	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<Questions about needs related to research										
(a) Needs for joint research and researcher exchange	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(b) Needs for bachelor's and non-degree programs for researchers and students	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(c) Needs for research equipment procurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(d) Needs for building construction and rehabilitation for research	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(e) Needs for support for industry-academia collaboration and intellectual property management	can't say either	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<Questions about educational cooperation needs >										
(f) Needs for building educational facilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**No**	Yes
(g) Needs for procurement of educational equipment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(h) Needs for bachelor's and non-degree programs to improve educational ability	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(i) Needs for the introduction of Japanese engineering education such as manufacturing education and	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**No**	Yes	Yes
(j) Needs for curriculum improvement through international collaboration programs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(k) Needs for her IT bridge engineer training program with Japan	**No**	Yes	Yes		Yes	Yes	Yes	**No**	Yes	Yes
(l) Needs for internship and apprenticeship programs in Japan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

As can be seen from this table, the engineering faculties of the surveyed universities responded that there is a need for most of the JICA support component candidates presented in the hypotheses. Below, we will look at the details of the answers, including the background and content of the needs of individual universities and the problems they are aware of.

Table 37 Assistance Plan Desired by the Faculty of Engineering of the Surveyed University

University of Indonesia (UI)

1) University name	**University of Indonesia (UI)**
	Public University
2) Faculty name	Faculty of Computer Science
3) Location	Jakarta and Depok, West Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	None

5) Other foreign assistance projects	None

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Problems/Challenges: (a) There is a decrease of funding opportunities for research due to COVID19 causing a decrease in overall quantity of research outputs. (b) Contribution from faculty members to faculty's research output is uneven. (c) There is only limited or no support for student research assistantship. Plans: Regarding external funding opportunities, we plan to encourage faculty members to apply for more external funding. Joint applications involving multiple faculty members with closely aligned interests are recommended. Uneven contribution means that a small number of faculty members accounted for a majority of research output of the institution, while the rest contributed almost no research outputs to the institution. We plan to implement a partnering scheme where senior faculty members (particularly those with rather low research outputs) are asked to collaborate in tandem with one or more junior faculty members. For student research assistantship, we hope to have access to funding opportunities with sufficient amount for fully funding student research assistants.
7) Problems end plans regarding Industry & Academia collaboration	Problems: (a) Matchmaking events with industry rarely happen. On occasions, representatives from industry came to the faculty for a discussion, but unfortunately, very rarely it goes beyond discussion. (b) Lack of availability by faculty members to get involved in such projects due to time constraints and other commitments. Plans In many cases, problem (a) is closely related to problem (b). One approach we can consider is to reward faculty members who are involved in research collaboration with industry. The form of reward can be monetary or others.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** Field of Collaboration: Artificial intelligence. There are 3 labs and one research center in our faculty, namely (i) Machine Learning and Computer Vision (MLCV) lab, (ii) Information Retrieval and Natural Language Processing lab, (iii) Computer Networks, Architecture and High Performance Computing lab, and (iv) Tokopedia-UI Artificial Intelligence Center of Excellence.

	The last mentioned is a center established in collaboration with an e-commerce company, Tokopedia. All labs and the AI center are open for collaboration in various subtopics of AI, both classical approaches in AI as well as recent approaches in machine learning and deep learning. The labs are also interested in application areas of AI such as healthcare, public services, commerce and finance, and cultural heritage. Field of Collaboration: Human Computer Interaction & User Experience. The relevant lab in our faculty is the Digital Library and Distance Learning lab, whose members are open for collaboration in the lab’s focus area, namely the area of human computer interaction and user experience with strong applications on education and educational technology. Field of Collaboration: Software Engineering. The relevant lab in our faculty is the Reliable Software Engineering lab. The lab is open for collaboration in research topics concerning methods and applications of software development as well as issues concerning software quality. The lab currently has been focusing on the software product line paradigm in software engineering, though other software engineering approaches are also within scope. Field of Collaboration: Information Systems. There are two relevant labs in our faculty for this area, namely (i) Information Management lab, and (ii) E-government and E-business lab Both labs are open for collaboration in research concerning how information technology brings impact to people and organizations when applied to various aspects of their life. The studied issues include strategic planning, design, governance, project management, risk analysis, and other relevant issues. Field of Collaboration: Cybersecurity. Our faculty has one center in this area, namely the Center for Cybersecurity and Cryptography. The center is open for collaboration on various topics of information security, ranging from research on cryptography primitives and protocols, information security management, to legal aspects of information security. Joint activities in all fields of collaborations above may include joint paper writing, joint supervision of student research supervision (doctoral, master’s or undergraduate), researcher exchanges,

9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Short-term training and internship programs would be beneficial to our faculty members. Such programs may or may not be combined with a degree program, which is of a longer duration. Such degree programs may be of interest to our students or junior faculty members who have not yet obtained a doctoral degree. Other programs of interest include short-term workshops on specific topics (e.g., fully funded summer schools) or preparation to skill certifications on specific areas that are internationally recognized.
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Particularly needed is high-performance computing equipment. Such equipment is needed for state-of-the-art research in AI (machine learning, deep learning, etc.). We do have a GPU compute cluster deployed, but given the needs, the available machines are not sufficient. For the specific area of robotic research, we have a group working on smart devices for healthcare (such as ultrasound imaging, etc.). So, equipment suitable for this research would be useful. User experience research could be helped by getting access to tools and equipment for UX simulation, augmented reality, and virtual reality. We currently do not have access to such tools and equipment, hence are unable to explore research topics in those areas.
11) Needs on building construction /rehabilitation for research (Kind of construction, problems behind the needs)	**【Yes】** Lab facilities need to be expanded to fulfill the needs of faculty members and students, in particular graduate (master's and doctoral) students. Ideally, every student has his/her own physical working space in the research lab they join. This is to enable more productivity and foster research collaboration with other students and faculty members. Unfortunately, we are unable to satisfy this need due to the limited capacity of each lab. In general, the lab capacity expansion should be considered together with the construction of educational facilities as mentioned in question 16.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Neither agree nor disagree】**
13) Past research collaboration with Japan	Joint paper writing on the topic of AI application on electrocardiography analysis involving a colleague at RIKEN Center for Brain Science. Joint paper writing on the topic of educational technology with a professor at Hiroshima University.

14) Needs other than the above for research	

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Problems: to have an increasing number of qualified human resources. Though we have a sufficient number of lecturers, most of them have only temporary positions with a Master's degree qualification. Our challenge is now to have them improve their qualification to a doctoral degree, which will help them in having their tenure positions. One of the difficulties is to have financial support for their doctoral degree and the possibility to do their degree in the form of a sandwich program (as some of them are with settled families already). Plans: to have a collaboration that may help our human resources to pursue their doctoral degree, either in terms of (joint) project funding, scholarships, and joint supervisions or sandwich programs (in case they take a doctoral degree internally at our institution).
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** The existing building should be expanded to accommodate the increasing number of our student body. Thus, currently we are in the process of constructing our new building for the Faculty of Computer Science. However, we are now only able to build part of the whole construction plan, due to funding and pandemic issues. Access to philanthropy or other grants will be beneficial for us for continuing the construction of our new building as well as its supporting green facilities for sustainable environment (solar panel, etc.).
17) Needs on procurement of educational equipment (Kind of equipment, problems behind)	**【Yes】** Support for educational facilities for modern classrooms that support hybrid (online and offline) learning is needed, particularly in dealing with the current COVID-19 pandemic. Our students are widely spread in various regions in Indonesia with different needs (online or offline learning), so such facilities for hybrid learning are required. Equipment for educational labs to support the practical aspects of courses in our curriculum, such as robots or other practical AI kits, are also needed.
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** In addition to our answer on question 15, an access to opportunities for staff exchange with Japanese universities to improve the teaching ability of our human resources will be beneficial. Through our lecturers who completed their doctoral degree in Japanese universities, we already have such collaborations, but the number is still limited (both in terms of inbound and outbound).

19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Active and student-centered learning has been continuously becoming the way we are teaching our students. We still have challenges in engaging the students in participating in such active learning. This is especially true when we started to have full online learning due to COVID-19 pandemic. We do hope to gain an insight from Japanese universities in dealing with active online learning.
20) Needs on curriculum improvement through promotion of international linkage programs (Specific programs, problems behind)	**【Yes】** We currently have several double degree programs, both in the undergraduate program and Master's program. For the undergraduate program we currently only have partner universities from Australia and the UK, none from Asia. We are happy to explore partnerships from Japanese universities, not only to provide more options to our students, but also to have a different focus on the study program based on the strength of the potential Japanese universities, e.g., in AI. It will certainly involve setting up the curriculum together to fit in the planned double degree/joint degree program. Other than that, a joint supervision or a sandwich program within our doctoral program will also improve our educational program.
21) Needs on training program for IT bridge engineers (Problems or reasons behind)	**【Yes】** One of our educational performance indicators is to have our human resources equipped with professional competencies to bridge the common gap between the theoretical parts given in lectures and the skills required by students in practice. Such training programs in Japanese IT industries will help in fulfilling this need. This way, once the students graduate they will be prepared with the required practical skills, backed up with a solid theoretical background.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Our undergraduate curriculum encourages the students to do a 6-month or a year of internships with the aim to support employability and improve the students' soft skills. Most of the students do their industrial internships in Indonesia and a few of them (mainly the top students) do it abroad (such as in Silicon Valley). An opportunity to do internships in Japanese industries will provide an alternative and a different view from the cultural perspectives.
23) Other needs on education (Specific needs, problems behind)	**【Yes】** Industry-University partnership is one of the main performance indicators that we aim to fulfill. Information on any prospective collaboration to enable our faculty member engagement in industry and/or research would be much appreciated.
24) Request / comments regarding JICA support,	Regular updates of JICA supports for industry-university collaboration, particularly related to ICT competencies would be beneficial.

Institute of Technology Bandung (ITB) Electrical Engineering and Informatics

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	School of Electrical Engineering and Informatics
3) Location	West Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	Labtek 5 and Labtek 8 projetcs
5) Other foreign assistance projects	There are some but don't know exactly the names

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	problems: limited fund on research and research facilities; plans: health engineering related and quantum technology
7) Problems end plans regarding Industry & Academia collaboration	no significant problem. plans: increase number of collaborations
8) Needs on joint research/ researcher exchanges	**【Yes】** Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering
10) Needs on procurement of research equipment	**【Yes】** Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering. At present we only have limited and need to be improved facilities
11) Needs on building construction /rehabilitation for research	**【Yes】** Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering. Present situation: many old facilities

12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering
13) Past research collaboration with Japan	Research on Electrical engineering (incl. telecommunications, power and biomedical engineering) and informatics engineering. Student exchange
14) Needs other than the above for research	

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	problem: lack of interest in the field of electrical engineering. plans: promotion
16) Needs on construction of educational facilities/buildings	**【Yes】** sophisticated/smart classrooms
17) Needs on procurement of educational equipment	**【Neither Agree Nor Disagree】**
18) Needs on degree or non-degree programs for improving teaching ability	**【Neither Agree Nor Disagree】**
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Neither Agree Nor Disagree】**
20) Needs on curriculum improvement through promotion of international linkage programs	**【Neither Agree Nor Disagree】**

21) Needs on training program for IT bridge engineers	**【Neither Agree Nor Disagree】**
22) Needs on Internship / Apprenticeship program in Japan	**【Neither Agree Nor Disagree】**
23) Other needs on education	
24) Request / comments regarding JICA support,	

Institute of Technology Bandung (ITB) Architecture, Planning, and Policy Development

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	School of Architecture, Planning, and Policy Development
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	SATREP PROGRAM
5) Other foreign assistance projects	POST DISASTER PROGRAM FUNDED BY ISLAMIC DEVELOPMENT BANK

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Problem : Low research budget; Plan : To increase research fund from foreign sources and to increase collaboration with industry
7) Problems end plans regarding Industry & Academia collaboration	Problem : inadequate of network between industry and university; Plan : to invite industries in developing and implementing research output and outcome
8) Needs on joint research/ researcher exchanges	**【Yes】** low energy and carbon emission building, building information modelling (BIM), sustainable and green construction product
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** low energy and carbon emission building, building information modelling (BIM), sustainable and green construction product

10) Needs on procurement of research equipment	**【Yes】** low energy and carbon emission building, building information modelling (BIM), sustainable and green construction product
11) Needs on building construction /rehabilitation for research	**【Yes】** laboratory of low energy and carbon emission building, laboratory of building information modelling (BIM) and AI based of construction technology, laboratory of sustainable and green construction product
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** assistance in developing and managing advance green building and digital construction research center
13) Past research collaboration with Japan	to process and analyze data; to connect and to collaborate with Japanese industry; to develop research methodology
14) Needs other than the above for research	site visit to Japanese best practice research laboratories and industries, sabbatical program and training for advance data modelling and simulation

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	problem : less qualified research students who have interest in research; plan : to increase incentives of income, opportunity to improve capacity building, to join training and international internship program
16) Needs on construction of educational facilities/buildings	**【Yes】** workshop building , design studio and lab of digital and modelling
17) Needs on procurement of educational equipment	**【Yes】** equipment for workshop and practicing digital augmented reality, virtual reality
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** learning equipment in collaborative joint studio, join workshop, and join supervision
19) Needs on introducing Japanese engineering education,	**【Yes】** learning modules and methods, educational/learning props, software and electronic data processing machine

hands-on education, KOSEN education	
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** we plan to open international program in architecture, building science, wood construction technology, disaster mitigation in double degree, join degree and join supervision program
21) Needs on training program for IT bridge engineers	**【Yes】** training for trainer for building technology, green and sustainable products and, digital architecture and construction
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** student internship program for 6 months in Japanese industry
23) Other needs on education	**【Yes】** to share access regarding link of industry, scholarships, and student exchange to top 100 universities
24) Request / comments regarding JICA support,	please support with adjunct Professors, Research Fellow and Experts

Institute of Technology Bandung (ITB) Civil and Environmental Engineering

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	Faculty of Civil and Environmental Engineering
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	Centre for Infrastructure and Build Environment (CIBE)
5) Other foreign assistance projects	Ministry of Transport Tianjin Institute for Water Transport Engineering Indonesia Coastal City Disaster Prevention and Mitigation Research Centre

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Plan are to increase the intake of doctoral student; Accept/Invite Post-Doc research fellow; Support young academic staff with PhD holder to contribute in the research and publication; encourage multidiscipline research among Research Group within the faculty and functions the CIBE as the facility to collaborate among the faculty member to do joint research. The problems are the research facility in our laboratory, many of them are old and out of date. We have the document called The Faculty Strategic Planning (2021-2025). Available only in Bahasa
7) Problems end plans regarding Industry & Academia collaboration	With Construction Industry currently we have collaboration both in education and research. In education we provide customized program to meet the need of Construction Industry, for example in the area of geotechnic, bridge, water resources and management. In the area of research, we have cooperation in the area of structure engineering for example precast concrete for road construction, air pollution monitoring with car company. One of the problem the industry in most cases does not want to invest in the basic research. They prepare to invest in the technology development ready to be commercialized which is sometimes not easy.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** The same are as described in point above. (Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management)
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** The same are as described in point above. (Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management)
11) Needs on building construction /rehabilitation for research	**【Yes】** The same are as described in point above. (Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management)

12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yeas】** The same are as described in point above. (Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management)
13) Past research collaboration with Japan	The same are as described in point above. (Civil engineering not only in the area of structure engineering but also management construction, water technology and management; ocean/off shore engineering, disaster mitigation, environmental engineering and management)
14) Needs other than the above for research	Provide link and support funding for research collaboration and PhD joint supervision with Japanese University/Professor.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Lacking of collaboration within faculty member; not all lecturer could promote their expertise to external community; only certain group has already experience building network and gain external collaborators (government and private sector); Lacking of modern standard of the class
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** Modern classes, equipped with standard multimedia equipment for teaching/presentation. We need this for better atmosphere of teaching. Standard furniture in the class enabling interaction and active learner as the characteristic of today method of learning. Improvement of laboratory facilities
17) Needs on procurement of educational equipment	**【Yes】** More or less the same equipment I described at point number 23
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** I think in this case is not equipment, but rather training for staffs especially younger staff to improve their teaching method and the opportunity for more senior staff (professor) to write book, teaching material, upgrading teaching material
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Dispatch Japanese professor and stay in ITB for 1-2 semester and introduce the way of Japanese learning method. Invite our staff to Japan and introduce them to Japanese way of teaching

20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Provide opportunity for ITB educational program especially in the level of Master and Doctor program to have double degree with Japanese university
21) Needs on training program for IT bridge engineers	**【No】**
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** In general we need to teach our student to have a good soft skill. Training or internship abroad may be one of the way to improve the student's soft skill.
23) Other needs on education	-
24) Request / comments regarding JICA support,	If JICA could provide funding students (master or PhD) coming from under developed country to come to ITB to do Master Program or doctoral study, and also provide research grant for these student to do their research. This could also jointly have supervised by Japanese professor. Such program could have benefits; capacity building of the country sending the student; capacity building of the host university receiving the students and also value creation for Japanese professor/university.

Institute of Technology Bandung (ITB) Industrial Technology

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	Faculty of Industrial Technology
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	Project of Development of Bandung Institute of Technology III (L/A no.IP-533)
5) Other foreign assistance projects	-

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	we lack of laboratory equipment in some field and have a plan to get funding to provide the equipment

7) Problems end plans regarding Industry & Academia collaboration	'the collaboration between industry and academia is lacking. therefore we plan to strengthen the collaboration through training/internship and develop courses that involve industry
8) Needs on joint research/ researcher exchanges	**【Yes】** 'in the field of safety for example. occupational safety in Indonesia is far behind and need to be enhanced
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Neither Agree Nor Disagree】**
10) Needs on procurement of research equipment	**【Neither Agree Nor Disagree 】**
11) Needs on building construction /rehabilitation for research	**【Yes】** 'in the field of chemical engineering, physical engineering, and industrial engineering, some equipment must be imported from abroad
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Neither agree nor disagree】**
13) Past research collaboration with Japan	research and joint collaboration in advance materials
14) Needs other than the above for research	-

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	-
16) Needs on construction of educational facilities/buildings	**【Neither Agree Nor Disagree】**

17) Needs on procurement of educational equipment	**【Yes】** because some equipment is imported
18) Needs on degree or non-degree programs for improving teaching ability	**【Neither Agree Nor Disagree】**
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【No】**
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** need double degree to improve quality of education and attract more students
21) Needs on training program for IT bridge engineers	**【Yes】** we lack of collaboration with industries. JICA' assistance will improve the export process
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** internship of Japanese soft skill for learning Japanese hard work culture
23) Other needs on education	-
24) Request / comments regarding JICA support,	-

Institute of Technology Bandung (ITB) Life Sciences & Technology

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	School of Life Sciences & Technology
3) Location	
I. General Questions	

4) Past JICA/Japanese Gov. Projects.	none
5) Other foreign assistance projects	Yes. I was personally a member of ITB's team for a project funded by Islamic Development Bank (IDB). Project Title: Enhancement of Global Carbon Sequestration from Indonesian Tropical Forest.

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	・ SITH ITB develops research and education in engineering focusing in four major fields: 1. Bioengineering, 2. Agricultural Engineering, 3. Forestry Engineering and 4. Post-Harvest Technology. All fields concern with bio-resources. ・ Compared with biological sciences field (rooted since 1948), engineering aspect of bio-resource utilization is a relatively new field at our school with the start of the education programs as follows: Bioengineering program (2010); Agricultural Engineering (2011); Forestry Engineering (2011) and Post-Harvest Technology (2014). Therefore, those areas are still in the developmental phase. ・ We are very keen to combine our traditional strength on biological sciences with engineering perspectives to develop more efficient and sustainable ways to produce biomass and other bio-based products. ・ The main problems we are facing are (1) equipment for research at pilot-scale, (2) opportunity to conduct research at large/industrial scales.
7) Problems end plans regarding Industry & Academia collaboration	・ For most industries in Indonesia, ITB is well-known for its strength in engineering fields like civil engineering, mechanical engineering, electrical engineering or information technology. The fields of engineering related to bio-resources developed at our school are relatively new in ITB, many industries related forestry, agriculture and other bio-industries may not be aware that ITB has capability in those fields. ・ However, as our engineering graduates have entered workplaces and because of their good performance, some big industries started to recognize ITB's role in agriculture, forestry and other bio-industrial fields. ・ High-position alumni in industries could play an important role in facilitating collaboration between industry & university, however as our alumni have started to enter workforce in less ten years ago, their position are mostly still in early career, with limited opportunity to facilitate collaboration with our school. ・ Despite having many young faculty members graduated from overseas universities with great potential to develop collaborative research with industries, their interaction with industries are still limited. Therefore, there is a need to improve this situation.

	・ For engineering fields, to direct research to fulfill industrial need is crucial to accelerate the industrial advancement in Indonesia and at the same time to maintain relevance of our graduates. Communication with industries to gather information of areas needed to be researched in university is an important step to that direction
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** ・ Our school has currently active collaboration with Japanese universities in some fields, however there is a need to enlarge coverage to include engineering fields. Assistance by JICA in this regards will be very much appreciated. ・ The list of potential research collaboration including prospective Japanese universities and Japanese companies operated in Indonesia are presented ・ Many Japanese companies in Indonesia operates in the fields relevant with our faculty members' expertise, however we have so far limited access to the top management handling research & development to initiate communication.
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** ・ In the field of human resource development, JICA assistance in two areas would be beneficial. Firstly, is assistance to get scholarship for doctoral program for our faculty members (less than five persons). ・ Secondly is develop non-degree programs for our faculty members in many forms. For example, one-year post-doctoral program to facilitate research collaboration, especially on areas that we have the expertise but lack of specific research equipment. Other is short-terms research program (2-3 months) for academic recharging to learn new techniques or broadening knowledge especially for middle-career faculty members. Short visits (2-4 weeks) for activities like discussion on education/research collaboration or joining workshop/trainings. For our doctoral students, we also need Japanese partners to host them in sandwich program (3-6 months) where students could do part of their research in Japanese universities. For master or bachelor students, program could be in the form of internship in Japanese industries or research institutions. The interest of our students to get internship overseas is very high.
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** ・ We have regular budget from ITB to purchase research equipment, however the existing budget is allocated mainly to purchase basic equipment for education laboratories supporting practical classes. We still have to find additional funding sources to buy more sophisticated equipment and equipment to support large-scale experiment needed to gain insights for industrial application. ・ We provide list of major equipment needed in Appendix 2**.**

	・ We are also open to discuss with Japanese companies producing lab equipment to develop, for example, a grant scheme in which our school are provided with the equipment and in return, we host training sessions that potentially attract the use of those equipment by other institutions in Indonesia.
11) Needs on building construction /rehabilitation for research (Kind of construction, problems behind the needs)	**【Yes】** ・ Recently we have been given land concession by Ministry of Forestry and Environment to be used for education/university forest (called Gunung Geulis Education Forest) and land from ITB to be used for agriculture field station (called Haur Gombong Field Station). Both facilities are off-campus located within one-hour drive from ITB Jatinangor Campus. ・ Gunung Geulis Education Forest has an area of approximately 330 ha. The concession is awarded to ITB in 2017. SITH has prepared a comprehensive development plan document for this area, however the document is written in Indonesia language. Nevertheless, here we present the identification of the most-needed support from JICA. ・ The Education Forest is intended to be used for research and education for ITB students, faculty members and also forest-related training for wider public. At present, we need a major investment to build education and research supporting facilities. The required facilities have been identified consisting of buildings/rooms for administration, seminar/class, meeting hall, dormitory, nursery and other utilities. However, because the land is not owned by ITB (land concession given by Ministry of Forestry and Environment), ITB regulations prohibit the use of ITB fund to build assets (buildings) on land that is not owned by ITB. Therefore, we have to rely on external funding to build such facilities. Assistance from external such from JICA will be very crucial in this case. In Appendix 3, we present map of The Education Forest and indicates the site plan for supporting facilities. ・ Haur Gombong Field Station is intended to be used for agricultural research and education facilities, particularly supporting agricultural engineering program. The land of approximately 3 ha is owned by ITB, but the assignment for use by SITH only begun in 2019. Since then, SITH has managed the area and allocated some fund to build some supporting facilities. The general master plan is presented in Appendix 4. Some basic facilities have been built, but the existing facilities are still far from ideal for supporting research and education in agricultural engineering. Among the most

	needed support are for building dormitory for research students, smart-green house with IoT (Appendix 2 #6) and greenhouse with anti-virus cover (Appendix 2 #10).
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** ・ JICA assistance in this regards can be in the forms: (1) introduction to Japanese companies operating in Indonesia (particularly those listed in Appendix 2) to facilitate discussion on collaboration; (2) providing research grant for collaborative research with industries; (3) webinar on intellectual properties management, to gain insights from lesson-learnt of university-industry collaboration in Japan; webinar is attended by faculty members.
13) Past research collaboration with Japan	**【Yes】** Our school has active collaboration on research and education with several Japanese universities. The list is presented in Appendix 5.
14) Needs other than the above for research	Competent lab technician is also an important component for research. Currently opportunities for international exposure activities are available only for faculty members and students. We need a program that facilitate short-visit (up to 1 month) to Japanese university laboratories for technical upgrading of our lab technicians.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	・ To provide our student with insights on industrial-scale application, we need more opportunities for our students to have internship in industries as well as having guest lectures from industries as part of the course's modules. ・ With the availability of online meeting facility such as Zoom, setting-up online lecture from Japanese industries for example is becoming easier. Exposure to industrial-scale application would be beneficial for our students. International exposures will also increase the competitiveness of our graduates to find international jobs both in Indonesia and overseas.
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** ・ SITH engineering programs currently located in two major buildings at Jatinangor Campus : (1) Labtek IA Building for bioengineering, agriculture engineering and post-harvest technology programs; (2) Labtek VA Building for forestry engineering program ・ Labtek IA Building is a relatively new building; however there are some areas that need enhancement. We need to have security system that integrates automatic access for permitted persons and security surveillance with CCTV integrated to faculty-or campus-wide security monitoring system. Such facility is important in several respects, (1) reduce the need for personnel working after hours guarding students or faculty members working in the labs during after working hours or weekend; (2) automatic

	recording for pattern of building/room access, such information is important for evaluating the pattern of facility usage. ・ Labtek VA Building is quite old built around 1988 (shown in Appendix 6). The building was built on period before the Jatiangor campus become part of ITB, then it was part of Winaya Mukti University. Upon the hand-over the campus management to ITB in 2010, that particular building undergone minor renovation. It appears that the building was not originally designed for hosting laboratory with heavy equipment and therefore there are some safety concern. The current interior arrangement including faculty members' personal office and lighting are far from ideal. To accommodate the need for running research and education in forestry engineering field, we need a new and modern building with spacious rooms. We are very keen to seek external funding for this plan. JICA could also assist us to communicate with Japanese companies operating in forestry sectors in Indonesia for possibility of funding such a project.
17) Needs on procurement of educational equipment (Kind of equipment, problems behind)	**【Yes】** ・ Yes. We need to purchase licenses for software used for teaching and research such as Super Pro Designer, Matlab and GIS/remote sensing software. ・ Training from experts (could be online training) on the procedure to use sophisticated equipment such as bioreactor, GC-MS, HPLC and biosafety procedures would improve the qualification of our graduates.
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** For improving teaching ability, we particularly need enhancement on (1) teaching techniques suitable for hybrid learning (delivered on-line & class-room style) and (2) teaching techniques for facilitating collaborative learning among students.
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Learning for Japanese university experiences on hands-on education is interesting to increase the skill of our students. The education program enhancement are needed in the area of forestry engineering, bio-industrial engineering, agricultural engineering, post-harvest aspect of forest, agriculture and fishery products.
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** We are very keen to expand the scope of our current double-degree program with other Japanese universities. Therefore, program that facilitates us to gain insights to Japanese university curriculum will be beneficial as it will enable us to prepare the necessary strategies to prepare double degree programs with Japanese universities.
21) Needs on training program for IT bridge engineers	**【Neither Agree Nor Disagree】**

22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** ・ Short-terms internship program in Japanese industries will be most welcomed. Our students have shown high interest in having internship overseas. ・ We are also very interesting to develop 3-5 years Apprenticeship programs in Japan. All of our study programs have good quality of student intake (Indonesia-wide) and they are generally keen to seek international experiences, therefore program such as Apprenticeship in Japan is expected to gain lots of interest for students. We are ready to have further discussion for developing such a program.
23) Other needs on education	
24) Request / comments regarding JICA support,	・ I think another critical areas that JICA could contribute to ITB in general with assistance in university management in many aspects: organization, academic administration, human resource including career development, financial and other management aspects; at any levels: central offices, faculties & centers, laboratory and study programs. ・ Of course, circumstances in Indonesia and Japan could be different in many aspects, however studying how Japanese university manages their resources and programs to achieve excellence in research and education (in rather detailed manner) could help ITB to improve the management.

Institute of Technology Bandung (ITB) Mining and Petroleum Engineering

1) University name	**Institute of Technology Bandung (ITB)**
	Public University
2) Faculty name	Faculty of Mining and Petroleum Engineering
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	SATREPS
5) Other foreign assistance projects	

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	

7) Problems and plans regarding Industry & Academia collaboration	
8) Needs on joint research/ researcher exchanges	**【Yes】** Mining, Metallurgy, Oil & Gas, Geothermal
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Neither Agree Nor Disagree】**
10) Needs on procurement of research equipment (Kind of research equipment)	**【Neither Agree Nor Disagree】**
11) Needs on building construction /rehabilitation for research	**【Neither Agree Nor Disagree】**
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Neither agree nor disagree】**
13) Past research collaboration with Japan	Doctoral study researches
14) Needs other than the above for research	

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	

16) Needs on construction of educational facilities/buildings	**【Neither agree nor disagree】**
17) Needs on procurement of educational equipment	**【Neither agree nor disagree】**
18) Needs on degree or non-degree programs for improving teaching ability	**【Neither agree nor disagree】**
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Neither agree nor disagree】**
20) Needs on curriculum improvement through promotion of international linkage programs	**【Neither agree nor disagree】**
21) Needs on training program for IT bridge engineers	**【Neither agree nor disagree】**
22) Needs on Internship / Apprenticeship program in Japan	**【Neither agree nor disagree】**
23) Other needs on education	**【Neither agree nor disagree】**
24) Request / comments regarding JICA support,	

Institute of Technology Bandung (ITB) Arts and Design

1) University name	**Institute of Technology Bandung (ITB)**
	Public University

2) Faculty name	Faculty of Arts and Design
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	Center of Art Design and Language (CADL)
5) Other foreign assistance projects	

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	not in field of engineering
7) Problems end plans regarding Industry & Academia collaboration	not in field of engineering
8) Needs on joint research/ researcher exchanges	**【No】**
9) Needs on degree or non-degree HRD programs for the researchers and students	**【No】**
10) Needs on procurement of research equipment	**【Yes】** Product Design, Ceramics, conservation lab
11) Needs on building construction /rehabilitation for research	**【Neither Agree Nor Disagree】**
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Neither agree nor disagree】**
13) Past research collaboration with Japan	Mushashino Art Univ.　Kurashiki Univ. in ceramic

14) Needs other than the above for research	collaboration in conservation, material

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	
16) Needs on construction of educational facilities/buildings	**【Neither Agree Nor Disagree】** super computer multimedia processor equipment, high demand of digital multimedia creative industry and processing for design
17) Needs on procurement of educational equipment	**【Yes】** multimedia studio, CGI equipment , high demand of digital multimedia creative industry and processing for design
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** multimedia lab and conservation lab, high demand of culture preservation, cultural industry and creative industry.
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Join degree in design, Museum studies
21) Needs on training program for IT bridge engineers	**【Yes】**
22) Needs on Internship / Apprenticeship program in Japan	**【Neither Agree Nor Disagree】** internship
23) Other needs on education	workshop or training in the field of museum studies and conservation.

24) Request / comments regarding JICA support,	

IPB University

1) University name	**Institute Pertanian Bogor (IPB University)**
	Public Institute
2) Faculty name	Faculty of Agricultural Engineering and Technology
3) Location	Bogor, West Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	**【No】**
5) Other foreign assistance projects	**【Yes】** 2017 Chair of Novel Dairy Ingredients and Process Engineering Workshop (funded by the U.S. Dairy Export Council) 2017 Organizing Committee for FDA-recognized Better Process Control School (BPCS) Training for Thermal Processing (Funded by FDA and NADFC) 2016 Chair of ASEAN workshop on Food Defense and Chemical Security (Funded by USDA-FAS)

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	In IPB University especially at Faculty of Agricultural Engineering and Technology (FAET) where the mandate of engineering filed is given, the longstanding issues for engineering research capability development are infrastructures (testing instrumentations). Minor problem is the human capital (faculty capacity in the field of engineering). Our university has been planning to reshape our faculty (FAET) into Faculty of Engineering in the following year. Our university has made its strategic planning for 2019-2045 where IPB University will transform into a Techno-Socio – Entrepreneurial University.
7) Problems end plans regarding Industry & Academia collaboration	The main constraints between Industry & Academia collaboration is the sustainability of the collaborations themselves. The collaborations between Industry & Academia especially at FAET are sometimes “seasonal” due to certain circumstances (i.e., financial issues). On the other hand, most of industries in Indonesia are merely branches from main industries from overseas. Herein, such product designs and product developments are rarely carried out bottom-up. Therefore, R & D divisions that the industries in Indonesia are merely applicators for the formulations and designs that have been previously developed in the main industries from overseas.

8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** Fields of collaboration between FAET and Japanese universities / research institutes / industries: 1. Periodic grants (up to 5 years) for engineering research, especially in the area of food engineering, mechanical/agricultural engineering which also support the procuring of equipment or instrumentations 2. Workshop and Training for the human capital at FAET in certain areas of engineering, such as modelling (i.e., computational fluid dynamics) and applications of engineering software to ease engineering research. 3. Scholarship for you faculty member in the areas of engineering
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** 1. Workshop and Training for the human capital at FAET in certain areas of engineering, such as modelling (i.e., computational fluid dynamics) and applications of engineering software to ease engineering research. 2. Engineering Summer Course. We need this to increase our students' interests to work in the engineering field
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** 1. Nuclear Magnetic Resonance (NMR): Most of our research has been done in the area of metabolomics where NMR heavily does the identification of natural compound. So far, we ask third party to analyze our samples using NMR. 2. Atomic Force Microscopy (AFM): In engineering field especially for surface identification, measurement of adhesion and cohesion between materials or particles are heavily done. Therefore, this equipment is really needed at our faculty. 3. Particle size analyzer (PSA): Especially in the area of interfacial reaction, that utilizes micro emulsion or in the case of Pickering Emulsions, droplet size analysis is crucial. Looking at the trend of multiphase reaction is receiving a higher interest nowadays, many of our young faculties shifting their researches into this field.
11) Needs on building construction /rehabilitation for research	**【Yes】** At our faculty (FAET), we have an old building of pilot plant that was previously built by the help of JICA in 1977. To date this building is still operational with limited capacity due to obsolete equipment/instrumentations and building construction. Therefore, it will be helpful to boost our international publications and Industry & Academia collaborations if the

	renovation can be done unto this building.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【 Neither Agree Nor Disagree 】** Our University has been established many partnerships with the industries. Therefore, such improvement of intellectual properties management might not be that important.
13) Past research collaboration with Japan (Specific activities, problems behind)	1. The strategic partners are namely Kyoto University, Osaka University, and Nara Institute of Science and Technology. These partnerships include projects with IPB University's Science and Technology Park, student exchanges, interdisciplinary research for Indonesia's commodities, the attainment of insights into Agriculture 4.0 in Japan 2. Academic Collaboration between IPB and Japan Universities in the same academic level in terms of credit earning 3. A collaborative program in Ultra Fine Bubble Technology with Japan National Mirror Committee of ISO/TC 281 4. etc..
14) Needs other than the above for research	-

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	· The human capital of our young faculty members especially in the field of engineering · Engineering based curricula at our faculty need to be up graded
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** As we have mentioned before the pilot plant that was built by the help of JICA is also used or teaching engineering laboratories for our students. The improvement of this building will be helpful for our educational purposes especially in the field of engineering.

17) Needs on procurement of educational equipment (Kind of equipment, problems behind)	**【Yes】** 1. Nuclear Magnetic Resonance (NMR): Most of our research has been done in the area of metabolomics where NMR heavily does the identification of natural compound. So far, we ask third party to analyze our samples using NMR. 2. Atomic Force Microscopy (AFM): In engineering field especially for surface identification, measurement of adhesion and cohesion between materials or particles are heavily done. Therefore, this equipment is really needed at our faculty. 3. Particle size analyzer (PSA): Especially in the area of interfacial reaction, that utilizes micro emulsion or in the case of Pickering Emulsions, droplet size analysis is crucial. Looking at the trend of multiphase reaction is receiving a higher interest nowadays, many of our young faculty shifting their researches into this field. 4. Licensed software in the area of engineering (modelling, simulation, etc.).
18) Needs on degree or non-degree programs for improving teaching ability (Specific programs, problems behind)	**【Yes】** The most crucial issues for the development of engineering research and education at our faculty or university are: (1) research/learning equipment and building construction, (2) capacity building in terms of research capability in the area of engineering and teaching capability in order to increase students' interest in the area of engineering
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Yes, hands-on training in the field of: Food Engineering Mechanical/Agricultural Engineering
20) Needs on curriculum improvement through promotion of international linkage programs (Specific programs, problems behind)	**【Yes】** For reshaping our FAET into Faculty of Engineering, we would like to open two new Study Programs, such as: - Food Engineering - Mechanical/Agricultural Engineering It will be helpful if these two study programs have linkage with Japanese universities.
21) Needs on training program for IT bridge engineers	**【No】** -
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Typical internship program will be about 3-6 months in Japanese industries. By this, the interest of our students in the engineering field will be increased.

23) Other needs on education	**【No】**
24) Request / comments regarding JICA support,	We would like to collaborate with Japanese research institutes especially for joint international publications. It will be helpful, if scientific forum (seminar, symposium) between Japanese research institutes and faculty members of FAET can be established in the near future.

Airlangga University (UNAIR)

1) University name	**Airlangga University (UNAIR)**
	Public Community Colleges
2) Faculty name	Faculty of Advanced Technology and Multidiscipline
3) Location	Surabaya, East Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	-
5) Other foreign assistance projects	-

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Problems lies under the administration process beside the research process, researchers need to complete a lot of documents after they receive funding for research scheme. Sometimes, they worked a lot for requirement for administration process despite their work on research. My plan is to manage this kind of problems in research process.
7) Problems end plans regarding Industry & Academia collaboration	- Problem to search appropriate targeted industry to use our research product '- Can’t catch industrial need to link with our research project '- No bridging parties between industry and academia
8) Needs on joint research/ researcher exchanges (Research area)	【Yes】 Definitely yes. There are 5 majors in our faculty with 9 research groups (accessible on https://ftmm.unair.ac.id/research-groups/). 5 Majors including: data science technology, industrial engineering, electrical engineering, nanotechnology engineering, robotics and AI.
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Yes. We need JICA’s assistance in promoting our international programs, such as inbound and outbound program for staff and students. Our programs can be accessed via this link https://global.unair.ac.id/wp-content/uploads/2021/06/International-Program-Catalogue FINAL. pd.

10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Yes, for example research related on big data, we need big data infrastructure and technology to support our research. Another relevant need is related to tools and equipment to conduct research related to nanotechnology and electrical engineering field.
11) Needs on building construction /rehabilitation for research	**【Yes】** Yes, we need JICA's support for knowledge transfer, benchmarking, and recommendation.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Yes, we need your support to bridge industry and our faculty collaboration in term of research-related programs
13) Past research collaboration with Japan	I cannot provide detail information about this. However, in our faculty, we have one faculty member that currently conduct post-doctoral research in Tohoku University. He has several research collaboration and joint publications.
14) Needs other than the above for research	1. Support for staff inbound and outbound (full-time and part-time). 2. Support for student inbound and outbound (full-time and part-time). 3. More research collaboration

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	We need exposure and promotion of our international programs in Japan and collaboration in term of research and educational activities.
16) Needs on construction of educational facilities/buildings	**【Yes】** Yes, if it is possible.
17) Needs on procurement of educational equipment	**【Yes】** Yes, we still need this kind of training in order to make our educational process in pandemic effective.
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Yes. We need JICA's assistance in promoting our international programs, such as inbound and outbound program for staff and students. Our programs can be accessed via this link

	https://global.unair.ac.id/wp-content/uploads/2021/06/International-Program-Catalogue FINAL.pdf
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Yes, we need your support for broaden collaboration and networking.
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Definitely yes. However, our faculty is quite new and established in 2019. Maybe in the future we need joint degree and double degrees program.
21) Needs on training program for IT bridge engineers	**【Yes】** Yes. We are delighted if you can facilitate that program development.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Yes, degree and non-degree program collaboration are needed for our faculty.
23) Other needs on education	**【No】** All are already mentioned above
24) Request / comments regarding JICA support,	Your assistance is required for our faculty program development. We need more collaboration and partnership with Japanese government and institutions.

Institute of Technology Sepuluh November (ITS) Intelligent Electrical and Informatics Technology

1) University name	**Institute of Technology Sepuluh November (ITS)**
	Public Community College
2) Faculty name	Faculty of Intelligent Electrical and Informatics Technology (F-ELECTICS)
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	I have involved in the JICA Project in 2007, the activity was Lab-Based Education Project.

5) Other foreign assistance projects	Personally, I have never been involved. However, other faculty staffs have been involved in one or more international funding project.

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Our faculty has a motto "Bring Humanized Intelligent Technology for Society", and one of the main program is ELECTICS Go Global with the aim of expanding international cooperation with universities or research. Currently, we have capabilities in doing research but lack of international collaboration.
7) Problems end plans regarding Industry & Academia collaboration	Currently, the output of research are products that also has the potential to be commercialized. However, many research products are not proceeded to commercialization due to the lack of understanding of the researchers what are the stages that must be passed before they are ready to be commercialized. For this reason, the faculty plans to increase collaboration with industry, including on an international scale, and also to align research at university and industrial need.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** The field of research collaboration will be in the fields to support Industry 4.0 and Society 5.0, namely: Artificial Intelligence and Data Science, IoT, Robotics, Cloud Computing, Big Data, Cyber Security, and the field of Electrical Engineering (Power System, Electronics, Telecommunication, Control System), and also fields in Information Sciences.
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** We do need JICA assistance to promote degree or non- degree for researchers and students in our faculty. Currently, excellent program of our faculty are to gain the number of students and staff or researchers to have international exposures, exchange staff, joint research, joint supervision for researcher, and internship, sandwich program, and lab visit for students.
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** We do need assistance from JICA to assist us to establish research equipment and facilities to support research at international level and research products that can be commercialized. The equipment to support research on chip design, embedded systems, power systems, telecommunications, and equipment for measurement and calibration.

11) Needs on building construction /rehabilitation for research	**【Yes】** We need assistance from JICA to check the quality of our research laboratory to meet the standards, and suggestions for improvements including repairs or construction of the building.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** We need help from JICA to enhance collaboration between universities, particularly our faculty, with industry and in managing the intellectual property (IP) of researchers. Currently, we IP in software and in electronics are not getting full attention.
13) Past research collaboration with Japan	We have no research collaboration with Japanese universities that are planned in a good manner. The collaborations are only in joint supervision and receiving Ph.D. students in the sandwich scheme, exchange students and other international exposures.
14) Needs other than the above for research	We still need JICA to support how to maintain and broadening the collaboration with Japanese universities especially in research in the scope of computer and ICT related fields and electrical engineering fields. Currently, we have no research collaboration with Japanese universities, although, research funds from the government of Indonesia (DIKTI/ BRIN) are available.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	We also have no educational collaboration with Japanese universities, hence, such collaborations are very beneficial for our university especially for our faculty (F-ELECTICS ITS) with the following justifications: (1) Internationally recognized is align with the vision of our university, (2) We have International Undergraduate Program in which their students should have international exposures, (3) the cooperation program will mutually benefit the participating parties
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** We need assistance from JICA to check the quality of our educational facilities to meet the international standards, and suggestions for improvements including repairs or construction of the building.
17) Needs on procurement of educational equipment (Kind of equipment, problems behind)	**【Yes】** We do need assistance from JICA to assist us to establish educational equipment and facilities to support education at international level. We also need assistance in the procurement of the educational equipment to support education in the field of electrical engineering, computer and ICT related fields.

18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** We do need JICA assistance to promote degree or non- degree for our faculty staff. We plan to improve the skill of our faculty staff in teaching ability especially in the courses thought in English, since we have many international students and also International Undergraduate Program, and also apply international accreditation.
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** We have no experience about Japanese Style Active Learning, since we do need the assistance from JICA to assist us in implementing or to combine with the existing method in educational process.
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** We need assistance from JICA to design new curriculum to make it possible to make international collaboration with Japanese universities in Joint, Twinning, and Double Degree program. In the national program of Merdeka Belajar Kampus Merdeka, such international degree program will be recognized to be one the implementation of this program.
21) Needs on training program for IT bridge engineers	**【Yes】** We need to explore more about the IT Bridge Engineer program and other program in the scheme of export to Japan. Hence, we need the assistance of JICA to establish this program strengthen this program afterwards.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Improving the employability and soft skill of our students are very important for us, since in the future the success of our alumni is more determined by their softskill. Hence, we need to receive any assistance from JICA.
23) Other needs on education	Our faculty is the party that determines Indonesia's excellence in the fields of power systems, electronics, computer and other ICT related fields. ITS should be the leading university in this fields. So we need to get an evaluation from JICA of what needs to be improved from our learning system and the research mechanism we have, including how to build close collaboration with the industries
24) Request / comments regarding JICA support,	Although the collaboration program with JICA is carried out at the national level, if possible, collaboration for ITS can be directed to make ITS have specific advantages, namely in the field of electrical engineering (power systems, electronics, telecommunications, control systems), computers and ICT related fields (Industrial 4.0, Society 5.0), and information system.

Institute of Technology Sepuluh November (ITS) Creative Design and Digital Business

1) University name	**Institute of Technology Sepuluh November (ITS)**
	Public Community College
2) Faculty name	Faculty of Creative Design and Digital Business
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	
5) Other foreign assistance projects	Some of our faculty received funding from AusAid

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	• Majority of our faculty members do not have Doctoral Qualification, hence lack of research capability • Therefore our programs: (1) provide coaching and training for lecturers to prepare them pursuing PhD Degree (2) Initiating and developing collaboration with overseas universities (3) provide training for capacity building in research
7) Problems end plans regarding Industry & Academia collaboration	• Our problem is the low exposure of our expertise to the Industry & academia • Our Program: (1) Promotion (2) Initiating and building collaboration (3) students and lecturer mobility (4) Guest Lecture form Industry
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** ・ Industrial Product Design ・ Digital Animation and game development ・ Management of Technology and Innovation
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** In order to increase the competency of our faculty members, we would like to be assisted in the following programs ・ Degree Programs and short-term training: PhD degree for our faculty members in the area of : industrial product design, architecture and interior design, management of technology and Innovation, Digital Animation & Game Development ・ Post-doc/Internship: post-doc for our faculty members, internship for our faculty as well as students.
10) Needs on procurement of research equipment	**【Yes】** in order to improve our capability in Prototyping and Modeling, we need assistance in the procurement of the 3D Printing and CNC equipment

11) Needs on building construction /rehabilitation for research	**【Yes】** Most of our laboratories require more space. The assistance in increasing the space through the construction of new building is extremely required. We want to have a MAKELAB (Lab for prototyping), any assistance in this matter is appreciated
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Our faculties currently have some collaboration with industries, especially in the transportation design. We want to have stronger connection with industry in the area of 3D printing, digital animation, furniture design. Our 3D-Digital Lab have been working closely with hospitals, helping them in the use of 3D design for medical surgery and designing prosthesis devices. The collaboration with industries in the areas of research, students internship and recruitment.
13) Past research collaboration with Japan	International research collaboration with Japan
14) Needs other than the above for research	We would like to improve our capabilities through research collaboration/joint research. For this purpose we are very open to visiting professor from Japan universities to our campus and also the possibilities for our academic to visit Japanese Universities

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Excellent in teaching is one of our goals. Our program is to build collaboration with foreign universities to improve our teaching capabilities as well as teaching facilities.
16) Needs on construction of educational facilities/buildings	**【Yes】** As mentioned above, to improve our teaching, any assistance in construction MakeLab (the prototyping lab) is preferred
17) Needs on procurement of educational equipment	**【Yes】** 3D Printing Facilities Facilities/software for game development
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Capacity building for our faculty in term of case study teaching and e-Learning

19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** To achieve our goal in teaching excellent.
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** To improve our internationalisation program, it would be good to have joint degree program with Japanese Universities
21) Needs on training program for IT bridge engineers	
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** To strengthen our employability and entrepreneurship, we want to have: - Internship Program in Japan - Entrepreneurship training for our students. - Developing program to improve the employability and entrepreneurship
23) Other needs on education	
24) Request / comments regarding JICA support,	Thank you for the opportunity given to us to get involved in this survey.

Padjadjaran University (UNPAD) Agrotechnology

1) University name	**Padjadjaran University (UNPAD)**
	Public Community College
2) Faculty name	Faculty of Agriculture / Agrotechnology Study Program
3) Location	Bandung and Sumedang, West Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	**【No】** We do not have any previous projects funded by JICA or Japanese Government
5) Other foreign assistance projects	**【Yes】** IMHERE (Indonesia-Managing Higher Education Relevance and Efficiency) funded by World Bank (2006 – 2010)

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	As a person who work in bioengineering, I do believe it is necessary to development a center of advance breeding techniques in our university because in order to accelerate the plant breeding process in Indonesia the using of advance techniques such as genome editing is a mandatory now.
7) Problems end plans regarding Industry & Academia collaboration	Regarding Industry and Academia collaboration, we already have several MoU with Industrial and Academic institution. However, it is still necessary to obtain wider collaboration to increase the possibility to develop Faculty of Agriculture. We have many staffs who graduated from overseas and ready to use some latest technology, but unfortunately the university still has limitation to provide the equipment for such technology.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** It is important for us to develop advance bioengineering in our faculty, for example the application of advance breeding techniques. Therefore, the research related to the development of advance bioengineering are possible to carry out through the joining research with Japanese universities/research institutes.
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** In order to support the development of advance bioengineering program in our faculty, it is necessary to develop the supporting system in the faculty. For example, training for the laboratory staffs, internship or post-doc program for the researcher/lecturer.

10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Regarding the current stage of plant bioengineering study in developing new cultivars, our research equipment is not capable to do that and some of them are obsolete. The items we need in molecular study are presented below: a. PCR machines (3) (two with capabilities to run gradient PCR) b. Vortexers, and multivortexer c. Eppendorf thermomixers (2) d. Microcentrifuges (4), 3 refrigerated e. Table top refrigerated centrifuges (2) with rotors for 15 and 50ml conical tubes and microplates f. Water baths with and without shaking capabilities g. Freezer, Refrigerator h. Vacuum Concentrator (Speedvac) i. Hybridization oven j. Stratalinker for UV crosslinking/ Biosafety Cabinet for Molecular Diagnostics k. Power supplies for gel electrophoresis l. Electrophoresis chambers for DNA and protein gels (horizontal and vertical) m. Trans-blot Turbo and Iblot n. 37˚C incubator w/ rotating wheel o. 30˚C incubator (2) one w/ rotating wheel p. Personal minifuges (2) q. Nutator, rocking platforms, orbital shaker r. Germination chamber s. Growth chamber Besides, we need the screen house with new technologies as an implemented of revolution industry 4.0 in agriculture such as Weather Sensor a. Soil sensor b. Plant sensor c. Remote internet access and control (soft/hardware)
11) Needs on building construction /rehabilitation for research (Kind of construction, problems behind the needs)	**【Yes】** Our laboratory in molecular activities was built not for molecular laboratory. Therefore, the construction is needed such as: • Mechanical barriers to prevent contamination • Spatial separation of pre- and post-amplification Work areas • Area 1 – Reagent preparation

	• Area 2 – Specimen/control preparation, PCR set-up • Area 3 – Amplification • Area 4 – Product Amplification detection
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** We need JICA experience and network in building the collaboration with industry, particularly we have plan to build centre of excellence for advance breeding technique.
13) Past research collaboration with Japan (Specific activities, problems behind)	Research collaboration and joint supervision for Master/PhD program (University of Tsukuba, Kyoto University, Yamagata University and Shinshu University) Research collaboration for joint publication (University of Tsukuba and Shinshu University) Summer course program (Yamagata University)
14) Needs other than the above for research	Training is required in the utilization of new tools for new molecular tools by training of trainer program; Workshops for bioengineering researchers in the advance molecular techniques such as genome editing techniques or CRISPR/Cas9 application.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	The problems faced by our faculty is: i) teaching lab is not internationally standard; Our plans are to revitalize our laboratories to support the implementation of outcome-based education (OBE), to enhance on student centered learning and assessment, to increase collaborative exchange with prospective partners, to improve staff capacity development in excellent teaching and research and to strengthen public-private partnership. ii) lack of funding, iii) no competitive grants offered to improve program development.
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** Designing new cultivars, new biofertilizers, plant protection products and new plant cultivation techniques are required high level biosafety lab, laboratory testing and teaching laboratory with fully equipment standard. These laboratories are expected to be built. These building will support the OBE curriculum and teaching and learning in the field of bioengineering.

17) Needs on procurement of educational equipment (Kind of equipment, problems behind)	**【Yes】** Procurement of educational equipment required for bioengineering as follow: i) PCR machines (3) (two with capabilities to run gradient PCR) ii) Vortexes, and multi-vortex iii) Eppendorf thermomixers (2) iv) Microcentrifuges (4), 3 refrigerated v) Table top refrigerated centrifuges (2) with rotors for 15 and 50ml conical tubes and microplates vi) Water baths with and without shaking capabilities vii) Freezer, Refrigerator viii)Vacuum Concentrator (Speedvac) viii) Hybridization oven ix) Stratalinker for UV crosslinking/ Biosafety Cabinet for Molecular Diagnostics x) Power supplies for gel electrophoresis xi) Electrophoresis chambers for DNA and protein gels (horizontal and vertical) xii) Trans-blot Turbo and Iblot xiii) 37˚C incubator w/ rotating wheel xiv) 30˚C incubator (2) one w/ rotating wheel xv) Personal minifuges (2) xvi) Nutator, rocking platforms, orbital shaker xvii) Germination chamber xviii) Growth chamber Besides, we need the screen house with new technologies as an implemented of revolution industry 4.0 in agriculture such as Weather Sensor a. Soil sensor b. Plant sensor c. Remote internet access and control (soft/hardware)
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Postdoc and staff training are activities we need to improve our teaching and research skills. In our faculty, knowledge, facility, and new technologies are left behind and limited. These programs can facilitate our staff to update their knowledge and to improve their ability in teaching, assessment and research techniques.

19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education (Specific programs, problems behind)	**【Yes】** Joint supervision, joint teaching, staff exchange are activities that we need to improve the educational program in our faculty. Teaching and assessment are our problems. Good teaching staff are rare so there are high variation to handle big class (parallel classes).This may cause achievement on student learning outcomes are poor. We need Japanese style active learning to improve student skills (hard skill and/or soft skill). Limited facilities in the field experimental station and laboratory are our problem to improve student's skill, especially related to new or current technology.
20) Needs on curriculum improvement through promotion of international linkage programs (Specific programs, problems behind)	**【Yes】** Improvement on curriculum development for our undergraduate and postgraduate programs is extremely needed through international exchange collaboration with Japanese universities such as joint degree, double degree, twinning program, joint supervision, joint research collaboration and other academic exchange programs. The reasons behind the proposed program are, in this era, collaboration with universities partners including some Japanese reputable universities is a key success in reaching vision, implementing mission and obtaining objectives and gaining more partnerships
21) Needs on training program for IT bridge engineers (Problems or reasons behind)	**【Yes】** Proposed program for IT bridge engineers are including digital farming production system covering precision irrigation system, water and plant pest/disease management, vegetation health monitoring, introduction to cloud service and big data analysis for predicting of yield. These programs are proposed in order to improve competences of our alumni in IT application for improving crop productivity and quality, controlling pest/disease and to provide a decision support system in sustainable farming industry.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** We highly need JICA's assistance to improve our alumni employability and soft skills of our students through collaboration with Japanese industries. Before outbreaks of Covid-19, we sent 8-15 students to Japan for conducting internship in agricultural company. We do hope we can send many students to Japan to improve their employability, to run new business and gain more knowledge and skills needed for employment. This is because our alumni of undergraduate program in agrotechnology are showing a lack in self-confidence, leadership, and communication.

23) Other needs on education	**【No】** That is all we need.
24) Request / comments regarding JICA support,	We do hope JICA will assist us in improving graduate's quality, teaching and learning quality and its relevance to industry and linkage with Japanese universities.

Padjadjaran University (UNPAD) Geological Engineering

1) University name	**Padjadjaran University (UNPAD)**
	Public Community College
2) Faculty name	Faculty of Geological Engineering
3) Location	Bandung and Sumedang, West Java
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	Faculty of Geological Engineering has never had technical project assistance funded by JICA
5) Other foreign assistance projects	Construction of an educational building at the Faculty of Geological Engineering, funded by Asian Development Bank (ADB)

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Development of industrial networks related to research results our faculty member and grant for increasing our research activities.
7) Problems end plans regarding Industry & Academia collaboration	The problem in our engineering sector, in this case geology, is the lack of communication between academia and industries, so knowledge of industrial needs is very much needed in curriculum development. In addition, the basis of curriculum development in our Faculty is to increase research that can answer development problems carried out by the industrial sector.
8) Needs on joint research/ researcher exchanges (Research area)	【Yes】 In the development of research, Faculty of Geological Engineering has two Study Centers, namely the Study Center of Energy, Mineral and Coal Resources, and the Study Center of Environmental Geology and Engineering. The areas of research collaboration currently being carried out are: a. The Center for Energy, Mineral Resources and Coal Studies, oversees research groups in the field of natural resource exploration such as oil and gas resources, mineral and coal resources. mining materials, water resources exploration, and marine geology. b. The Study Center of Environmental Geology and Engineering's oversees research groups in the fields of disaster, volcanic, environmental conservation, infrastructure, urban planning, and geoparks. c. Data processing fields such as modeling in the oil and gas, mineral, geotechnical and groundwater sectors. d. Development in data retrieval through

	mapping and remote sensing technology, research methodology, Information technology and literacy. e. Development of Geological Information and Data Center.
9) Needs on degree or non-degree HRD programs for the researchers and students	【Yes】 The program that is being developed by our faculty is based on Universitas Padjadjaran's goal to reach the 500th position in the world ranking. Therefore, we need support in collaboration research, funding or research grants, and increasing publications, both in quantity and quality. We require promotion in collaboration with research institutions in Japan, include: a. Student and lecturer exchange program b. Collaborative Program Non-Degree / Short Course / Summer Program c. Research Internship collaboration research program d. Joint publications program
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Some of the equipment needed to support research and education by our faculty, among others: a. Development of 11 laboratories on behalf Faculty of Geological Engineering, such as Petrology, Paleontology, Geodynamic, Stratigraphy, Sedimen and Quaternary Geology, Geochemical, Geomorfology and Remote Sensing, Geophysic, Geotechnic, Environmental Geology, Computer and Geological Modeling. b. Laboratory Equipment: Development of supporting instruments/ equipment, robotic instrument laboratory, virtual laboratory c. Field Equipment: portable field instruments, sensors/data loggers d. High Performance Computer
11) Needs on building construction /rehabilitation for research	**【Yes】** Buildings needed to improve research a. Research Laboratory b. Education Laboratory c. Data and Information Center Building
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Introducing research results and commercializing research results of our faculty research member. In addition we need industrial and academic networks in Japan.
13) Past research collaboration with Japan (Specific activities, problems behind)	Yes, we have collaboration with Akita University in double degree program and Japan Space System for remote sensing research. Beside the two of the collaboration we also collaborate with Indonesian Japan Business Forum, Hitowa Care Service, and Liana Segrus co ltd for employment program in japan (still on progress).

14) Needs other than the above for research	a. Increasing quality of research laboratory b. Increasing quality of lecturer and researcher capacity for grant research and publication. c. Increasing of research network and collaboration between our faculty and Japan university and industries.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Universitas Padjadjaran has transformed from research university become hybrid university and another mission of Universitas Padjadjaran is to increase World ranking from rank 701 to 500 for this year.
16) Needs on construction of educational facilities/buildings (Kind of construction)	**【Yes】** Universitas Padjadjaran has tranformasted from research university become hybrid university. So, for future we have to develop our building environment become: a. Smart Building System in our education building. b. Hybrid Learning Room c. Geological Park for Miniature of Geological Model in our Faculty campus environment.
17) Needs on procurement of educational equipment	**【Yes】** a. Hybrid learning room equipment b. Studio Equipment: virtual field geology c. Outdoor Equipment
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** a. Student and lecturer exchange program b. Collaborative Program Non-Degree / Short Course / Summer Program
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** The program of working in Japan while completing a bachelor's degree is related to the workforce needs in Japan for 4-5 years. This program is under vocational program each faculty in Universitas Padjadjaran.
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Programs that are being and will be developed by our faculty and require promotion in collaboration with research institutions in Japan, include: a. Double Degree Program for undergraduate and postgraduate study programs b. Non-Degree Program / Short Course / Summer Program
21) Needs on training program for IT bridge	**【Yes】** a. Vocational program in collaboration between Japan and Universitas Padjadjaran.

engineers	b. Mentoring and briefing on Japanese language and culture. c. Employment program in Japan.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** The internship program and the distribution of labor in accordance with the specifications in Japan. Learn about Japanese culture and the work ethic of Japanese people to improve the quality of our students' work.
23) Other needs on education (Specific needs, problems behind)	**【Yes】** Indonesia, especially West Java, has a lot of productive workforce so it has the potential as a demographic bonus. Meanwhile, in Japan, there is a shortage of young workers to become workers in several sectors, such as infrastructure, health, agriculture, etc. Therefore, it is necessary to have cooperation in terms of employment so that it can be controlled legally and have international standards by Padjadjaran University and Japan.
24) Request / comments regarding JICA support,	I hope JICA could support us in development our research and education to help us reach an international grants research and development of international research network.

Diponegoro University (UNDIP)

1) University name	**Universitas Diponegoro (UNDIP)**
	Public Community College
2) Faculty name	Faculty of Engineering
3) Location	Semarang, Central Java
I. General Questions	

4) Past JICA/Japanese Gov. Projects.	**【Yes】** Activities in Architecture Department UNDIP with Japanese universities and other organizations in Japan. 1. Research collaboration with Ritsumeikan University, Akashi College National Institute of Technology, funded by Faculty of Engineering Universitas Diponegoro, the Sumitomo Foundation. 2. The scholarship was obtained from Monbukagakusho by one of the students to take the Advanced Course Program in Akashi College National Institute of Technology. 3. The scholarship was obtained from Monbukagakusho by one of the lecturers to take the doctoral program in Kobe University, and by several lecturers to take a master program in Toyohashi University of Technology. 4. Summer School program in Indonesia and Japan, with Ritsumeikan University, Akashi College National Institute of Technology, Tomakomai College National Institute of Technology, Kagoshima University, University of the Ryukyus. 5. Student Exchange activities, inbound and outbound, was with Kagoshima University, University of the Ryukyus, Akashi College National Institute of Technology. 6. Online Visiting Professor from the University of the Ryukyus, Kagoshima University, Ritsumeikan University. 7. Keynote speakers from the University of the Ryukyu, Kagoshima University, Ritsumeikan University for the International Conference on Sustainable Architectural Design and Urbanism. 8. Visiting Lecturer in Akashi College National Institute of Technology. 9. Visiting Researcher in Ritsumeikan University. 10. Collaborative Online International Learning program with Kagoshima University, a triad program with Tuskegee University USA Regardless of the above, if you have any comments regarding JICA support please write them
5) Other foreign assistance projects	**【Yes】** There are some projects in Faculty of Engineering, Universitas Diponegoro funded by Due Like sponsored by World Bank, Islamic Development Bank in 2007, Asian Development Bank in 2011, AUS Aid in 2014 The Infrastructure for the Future, Newton Fund UK in 2018

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	We need Industrial research collaboration in order to do capacity building for the lecturers. Communication and collaboration with Industry should be strengthened.
7) Problems end plans regarding Industry & Academia collaboration	The Industry and academia should have media to communicate or to dialogue with each other. Through media communication, hopefully, the interaction between the Industry and academia is getting closer and closer. This program will give academia has the perspective of the problem that the Industry needs.
8) Needs on joint research/ researcher exchanges	**【Yes】** Diponegoro University needs JICA'S assistance to improve the research capabilities
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Diponegoro University needs JICA'S assistance at the promotion of degree or non-degree for the researchers
10) Needs on procurement of research equipment	**【Yes】** Diponegoro University needs JICA'S assistance at the procurement of research equipment
11) Needs on building construction /rehabilitation for research	**【Yes】** the Faculty of Engineering, Universitas Diponegoro needs research facilities and laboratories that could cope with the rapid change in the Industry.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** the Faculty of Engineering, Universitas Diponegoro needs JICA'S assistance at the operation of the industry-academia collaboration center of the university.
13) Past research collaboration with Japan	Yes, the Faculty of Engineering, Universitas Diponegoro has several collaborations kinds of research with Japanese Universities.
14) Needs other than the above for research	- The mission of the Faculty of Engineering is to be an excellent Engineering Faculty in the International recognition in the year 2024. - There are some research equipment and the laboratory that needs to cope with the large number of students that the Faculty of Engineering has. - The Human resources, who are lectures, staff administration, and laboratory assistants, need to do capacity building in the research and teaching and learning area.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	The educational capability development is based on the Strategic Planning (Renstra) assistant. The Renstra has been evaluated every four years. The Renstra consists of the program needed to achieve the Mission of Engineering Faculty (Appendix 1).
16) Needs on construction of educational facilities/buildings	**【Yes】** Faculty of Engineering needs JICA'S assistant to construct educational facilities to meet the rapid demand for higher education and engineering education.
17) Needs on procurement of educational equipment	**【Yes】** Faculty of Engineering needs JICA'S assistance at the procurement of educational equipment.
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Faculty of Engineering needs JICA'S assistance at the promotion of degree (internship/short training) human resources to enhance the knowledge and skill of the lecturers, laboratory assistance.
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Faculty of Engineering needs JICA'S assistance to improve the educational program by introducing Japanese style in engineering education in collaboration with Japanese Universities or Kosen Technological
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Faculty of Engineering, Universitas Diponegoro needs JICA'S assistance to improve international linkage programs such as joint degree, twinning, and double degree programs.
21) Needs on training program for IT bridge engineers (Problems or reasons behind)	**【Yes】** Faculty of Engineering needs JICA'S assistance to strengthen the export process to Japan. It is a very strategic program if Faculty of Engineering could develop Training Programme for its bridge.
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Faculty of Engineering needs JICA'S assistance at the development of improving employability and soft skills of the student through the collaboration with Japanese Industry
23) Other needs on education	**【Yes】** the Faculty of Engineering needs JICA'S support to fulfill modern laboratory instruments for 12 departments to support students' competencies.

24) Request / comments regarding JICA support,	We have conducted some programs of educational collaboration with some Japan Universities, like: - Architecture Department Engineering Faculty with National College of Technology Akashi (NCTA), like the program of student exchange (in 2014 for one student; in 2015 for two students, in 2016 for one student), and program of Joint Degree (in 2019-2021 for one student) - Architecture Department Engineering Faculty with Department of Civil Engineering Faculty of Engineering the Ryukyu University in 2016 for one student - Architecture Department, Faculty of Engineering with Architecture and Architectural Engineering Program Faculty of Engineering Kagoshima University in 2017 for two students. - Collaboration in online learning (Coil) between Architecture Department and Kagoshima University Japan also Tuskegee University USA in 2019 – 2024 for five students. However, the number of students who got the funding in this program is very limited. We need more students to get a chance to go running the program. The Collaboration Programme between Faculty of Engineering, Universitas Diponegoro, and Japanese Universities have many benefits to achieve the Mission of Engineering Faculty Diponegoro University. The Renstra Faculty of Engineering is attached through the email.

Hasanuddin University (UNHAS)

1) University name	**Hasanuddin University (UNHAS)**
	Public University
2) Faculty name	Faculty of Engineering
3) Location	Makassar, South Sulawesi,
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	**【Yes】** 1. Technical Cooperation Project for the Development of the Engineering Faculty of Hasanuddin University. The project includes the Curriculum Development of Lab-Based Education (LBE) from 2009 to 2012 2. JICA Technical Assistance for Capacity Building in Engineering, Science and Technology (C-BEST) Project (2015-2020)
5) Other foreign assistance projects	**【Yes】** We have received Technical Professional Skills Development Sector Project (TPSDP) funded by ADB:

	1. Department of Civil Engineering from 2001 to 2005 2. Department of Electrical Engineering from 2002 to 2006

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	1. We are planning to establish Science Techno Park (STP) equipped with techno incubators to strengthen link and math with industry for research product downstream in the Faculty of Engineering. 2. Our research focus will be developed from basic research to applied and innovative research. However, our research is mostly basic research. We still lack of applied research that can be used by industries and societies. 3. We need for strengthening our integrated-On Land, Sea and Aerospace engineering laboratory to support an achievement of our vision Indonesian Maritime Continent basis. We need to develop Research Center for On Land Infrastructure & Transportation, Research Center of Coastal & Port Engineering and Research Center of Aerospace Engineering.
7) Problems end plans regarding Industry & Academia collaboration	The collaboration with industries and academia is crucial for the establishment of STP. The collaboration academia will strengthen our research capability while the collaboration with industries will increase our innovation products.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** 1. Renewable energy and storage 2. Marine technology 3. Robotic and Artificial Intelligent 4. Energy Conservation 5. Aerospace Technology 6. Coastal, Port & Sea Transportation Engineering
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** We need faculty and administrative staffs to support the managements of Science Techno Park. Post-doc or short term research for faculty staffs and short-term training for the administrative staff in the Japanese University or Science Techno Park.
10) Needs on procurement of research equipment	【Yes】 As mentioned in #6 that we are establishing the Science Techno Park in the Faculty of Engineering. For this STP we need equipment for the applied research and innovation activities and also the business incubators.
11) Needs on building construction	**【Yes】** As mentioned in #6 that we are establishing the Science Techno Park in the Faculty of

/rehabilitation for research	Engineering. For this STP we need to build a building to accommodate the applied research and innovation activities and also the business incubators.
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** To support the establishment of STP, the university will become the center of industry-academia collaboration. We need JICA's assistance in the operation of this collaboration center.
13) Past research collaboration with Japan (Specific activities, problems behind)	We have had several international research collaborations with Japanese university such as Kyushu University, Ehime University, Toyohashi University of Technology. The specific activities such as: 1. Joint research and publication 2. Research advisor for our researchers in the faculty 3. Visiting scholar These activities will increase the quantity and quality of research and publications at Unhas and specifically in the Faculty of Engineering.
14) Needs other than the above for research	No other needs.

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Since the pandemic of Covid-19 we facing problems in teaching and learning system. We plan to develop a hybrid system and smart system that can integrate the online and offline teaching.
16) Needs on construction of educational facilities/buildings	**【No】**
17) Needs on procurement of educational equipment	**【Yes】** We need the assistance from JICA for the procurement of educational equipment (hybrid education facilities including smart classroom).
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** We need the short-term training for our faculty staffs for doing the hybrid learning system in order to improve their capacity in various learning systems.
19) Needs on introducing Japanese engineering education,	**【No】**

hands-on education, KOSEN education	
20) Needs on curriculum improvement through promotion of international linkage programs	【Yes】 We need assistance for curriculum improvement especially how we adapt with the pandemic of Covid-19 without decreasing our learning qualities.
21) Needs on training program for IT bridge engineers	【No】
22) Needs on Internship / Apprenticeship program in Japan	【Yes】 Internship of minimum six months in Japanese industries will proved hands on experience for students to improve their skills and knowledge.
23) Other needs on education	【No】 No other specific needs.
24) Request / comments regarding JICA support,	For the establishment of STP and the improvement of educational qualities in the Faculty of Engineering, we need the support from JICA as follows: 1. The construction of STP Building 2. The procurement of equipment for STP 3. Assistance in the management of STP 4. Post-doc and short-term research for faculty staffs 5. Short-term training for administrative staffs 6. Educational facilities for supporting Hybrid and Smart Classroom 7. Internship opportunities for students in Japanese industries

Indonesia University of Education (UPI)

1) University name	**Universitas Pendidikan Indonesia (UPI)**
	Public University
2) Faculty name	Faculty of Technology and Vocational Education
3) Location	
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	【Yes】 The name of the Project from One Member of Research Joint is The Project for Implementation of Low Emission Affordable Apartments in the Hot Humid Climate of

	Indonesia toward Paris Agreement 2030: Prof. Tetsu Kubota (Hiroshima University). SATREPS Project, JICA, 2019-2022
5) Other foreign assistance projects	**【Yes】** The project names are: 1. Development and upgrading of Universitas Pendidikan Indonesia, Islamic Development Bank (IDB), 2004-2008 2. Advance Knowledge and Skills for Sustainable Growth in Indonesia (AKSI) Asian Development Bank (ADB): Theme: Development of Universitas Pendidikan Indonesia as

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	The problem is lack of facilities to conduct tests in the research Our plans are to Develop of collaborative research programs with related institutions
7) Problems end plans regarding Industry & Academia collaboration	Our Problems are: The number of lecturers who are interested in conducting technical research is quite high, but the research facilities are still inadequate. Starting in 2020-2024 FPTK UPI received grant funds from ADB, one of its activities is the provision of laboratory facilities for learning and research activities. ADB-funded laboratory developments are for Logistics, Industrial Automation Engineering and Robotics, Automotive Engineering, Renewable Energy Engineering, Industrial Chemical Engineering, and Food Industry Technology, meanwhile, the fields that have not been developed are the fields of Architecture, Civil Engineering, Electrical Engineering, Mechanical Engineering and Agroindustry. Plan: Our Expansion plans: 1. Development of Expertise Groups (KBK) as research development centers in accordance with the expertise of lecturers; 2. Improving the ability of researchers for young lecturers through grafting with senior lecturers; 3. Increasing cooperation with domestic and foreign research institutions; 4. Faculty through university funding plan to fulfill facilities for fields not supported by ADB projects.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** Our faculty need JICA's assistance aiming at promoting joint research with Japanese universities / research institutes / industries and promoting researcher exchanges in order to improve the research capabilities of universities among other Logistics,

	Industrial Automation Engineering and Robotics, Automotive Engineering, Renewable Energy Engineering, Industrial Chemical Engineering, and Food Industry Technology. Meanwhile, the fields that have not been
9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Our faculty need JICA's assistance aiming at promotion of degree or non-degree (post doc/internship/short-term training) human resource development cooperation programs with Japanese universities and research institutes for the researchers and students of our faculty in order to improve the research ability of the university Program: internship/short-term training Problem: the quality of human resources that do not yet have global competitiveness
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Our faculty need JICA's assistance aiming at procurement of research equipment, items, etc. necessary Research equipment: For Industrial Automation Engineering and Robotics, Automotive Engineering, Renewable Energy Engineering, Industrial Chemical Engineering, and Food Industry Technology. Meanwhile, the fields that have not been developed are the fields of Architecture, Civil Engineering, Electrical Engineering, Mechanical Engineering and Agroindustry Problem: The wider the research topic from each research field
11) Needs on building construction /rehabilitation for research	**【No】**
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Activities: Planning joint research programs, developing curriculum, developing production activities, scheduling lecture activities by inviting guest lecturers from industry. Problem: The understanding of the industrial world is still not optimal for the knowledge and skills of students and lecturers

13) Past research collaboration with Japan (Specific activities, problems behind)	Our Faculty have international research collaboration with Japanese Universities from One Member of Research Joint: The Project for Implementation of Low Emission Affordable Apartments in the Hot Humid Climate of Indonesia toward Paris Agreement 2030: Prof. Tetsu Kubota (Hiroshima University). SATREPS Project, JICA, 2019-2022
14) Needs other than the above for research	Our needs is Cooperation with related industries in Japan in research development efforts

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	Our Problem is : Limited laboratory facilities to develop skills and research of students and lecturers. Our Plan is: Increased Collaboration with industry or related agencies
16) Needs on construction of educational facilities/buildings	**【No】** Our needs of educational Equipment: Smart Class Room unit. Our Problem: The learning process is carried out by blended learning
17) Needs on procurement of educational equipment	**【Yes】** Our needs of educational Equipment: Smart Class Room unit. Our Problem: The learning process is carried out by blended learning
18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Our Programs are: internship/short term training. Our Problem is: There are still few human resources with international reputation
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** Our Programs all: all engineering fields Our Problem is : The lack of breadth and depth of technical knowledge from developed countries such as in Japan
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Our Programs are: internship/short term training. Our Problem is: There are still few human resources with international reputation

21) Needs on training program for IT bridge engineers	**【Yes】** Our Programs are: IT training for online leaning Our Problem is: Lack of international recognition
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** Our Programs are: Internships Our Problem is: The internship period is 6 months according to the curriculum
23) Other needs on education	**【Yes】** Our needs are Held a visiting professor from Japan
24) Request / comments regarding JICA support,	We hope that the planned assistance and cooperation program in improving the quality of higher education can be realized soon

University of North Sumatra (USU)

1) University name	**University of North Sumatra (USU)**
	Public University
2) Faculty name	Faculty of Engineering
3) Location	Medan, North Sumatra
I. General Questions	
4) Past JICA/Japanese Gov. Projects.	**【Yes】** None. The last project financed by JICA was on 1997-1998 for laboratory equipment
5) Other foreign assistance projects	**【Yes】** Several project funded by USAID for renewable energy studies, European Erasmus+ for establishing new study program in Industrial Revolution 4.0.

II. Questions on your needs for research collaboration and industrial linkage

6) Plan and problems regarding research capability development	Our plan is to develop more collaboration with local and international researchers and or institutions, and to set a centre for excellence in the field of engineering such as energy and biomaterial.
7) Problems end plans regarding Industry & Academia collaboration	We are now foster our collaboration with industry in order to send more students for apprentice, lecturer and researcher for joint research and also for our professional engineering study program.
8) Needs on joint research/ researcher exchanges (Research area)	**【Yes】** The field of researches including construction engineering, mechanical and robotics, electrical, renewable energy, chemical engineering, industrial engineering, architecture and environmental engineering. These are 7 major disciplines we have in our faculty

9) Needs on degree or non-degree HRD programs for the researchers and students	**【Yes】** Some programs may include joint research, joint publications, visiting professors, students exchange as well researcher/faculty exchanges and the use of research resources such as lab and developed equipment.
10) Needs on procurement of research equipment (Kind of research equipment)	**【Yes】** Research equipment needed including robotics and autonomous tools such as universal robotic arms and sensor systems to support industrial revolution 4.0
11) Needs on building construction /rehabilitation for research	**【Yes】** For the construction of Science and Technology Bld- Engineering Industrial teaching lab which will be provided under the PPP scheme
12) Needs on assistance on industry-academia collaboration / intellectual properties management	**【Yes】** Collaboration for international patent
13) Past research collaboration with Japan	1. International patent for Methan fermentation method with Metawater co ltd. 2. Hospital technical development with ITEC Japan
14) Needs other than the above for research	Support for e-learning system and smart classroom facilities to face the new normal

III. Questions on your needs for educational collaboration

15) Plan and problems regarding educational capability development	To achieve international accreditation and standardization following JABEE and ABET
16) Needs on construction of educational facilities/buildings	**【Yes】** Yes for Industrial teaching lab or Science techno park building under the scheme PPP
17) Needs on procurement of educational equipment	**【Yes】** Smart classroom, Virtual Learning Environment and e-laboratory/virtual laboratory

18) Needs on degree or non-degree programs for improving teaching ability	**【Yes】** Managing online class with hands-on / practical materials Developing VLE and virtual lab tools
19) Needs on introducing Japanese engineering education, hands-on education, KOSEN education	**【Yes】** KOSEN and other hands on educational in online system
20) Needs on curriculum improvement through promotion of international linkage programs	**【Yes】** Mostly for double degree in graduate program
21) Needs on training program for IT bridge engineers	**【Yes】** Especially in programming and digital technology
22) Needs on Internship / Apprenticeship program in Japan	**【Yes】** A minimum of 6 months internship and or independent research project
23) Other needs on education	**【No】** None
24) Request / comments regarding JICA support,	I think all universities are now struggling in providing quality education during covid19, so I think It is good if JICA can provide solution for the hybrid learning / online learning / e-learning program to be applied such as : - providing smart class room / open class room and also LMS for e-learning - developing virtual learning environment such as material for hybrid synchronous or asynchronous model, - developing virtual lab for hands on experience and so on . We at University Sumatera Utara are eager to discuss more about all potential joint program with JICA

3.3.6 Directions of JICA assistance

Based on the above survey results, the following is a list of JICA's assistance directions for engineering university education.

1. The conventional JICA assistance related to universities in Indonesia, especially loan aid,

comprised many component configurations, including facility construction, equipment procurement, and some human resource development fellowships. However, at least according to the results of the questionnaire survey, the needs of the Indonesian side are shifting to support in soft fields such as the improvement of research abilities and educational curricula. The JICA and other donors' assistance to other countries is also shifting to that direction.

2. The Indonesian government strongly demands that universities strengthen their productivity and competitiveness by improving their research capabilities and promoting collaboration with industry. In addition, all the universities surveyed are strongly stressing the improvement of research ability such as research cooperation, joint research, and researcher exchange with Japanese universities and research institutes. Also, Japanese universities are generally in a favorable situation to cooperate with Indonesia if the joint research with Indonesia is not merely one-sided support or the research field will yield mutual benefits in terms of, for instance, research materials and geographical characteristics, if excellent Indonesian researchers can work together, or if Japanese universities can obtain good Indonesian international students. If this kind of win-win situation is produced, the assistance for international research collaboration will be a pillar of the direction of JICA's cooperation with Indonesia in higher education.
3. Regarding degree and non-degree programs for researchers and students including studying abroad in Japan, since the proportion of PhD holder researchers and faculty is low, the needs of the Indonesian side in this are high. However, the current Indonesian government restricts overseas degree study abroad and long-term non-degree programs through loans. However, as mentioned above, studying abroad for a degree or a long-term non-degree program creates a win-win relationship with Japanese universities, and in Japan it is an important component for promoting joint research with universities. On the other hand, according to BRIN, special cases are allowed for specific purposes such as joint research implementation. In this regard, Indonesian government consideration of this matter is highly expected.
4. Regarding equipment procurement, the universities surveyed show strong needs both for the purpose of improving research ability and for the purpose of improving educational ability. Links to solid research and education plans will be important. In addition, this questionnaire survey revealed a strong need for equipment for remote learning to cope with COVID-19.
5. Regarding the construction of facilities, only a few, at least among the universities surveyed, have expressed the need to build educational facilities to meet the rapid demand for higher education. It seems that there is not much demand for this. Rather, it seems that they are seeking soft cooperation rather than facilities. On the other hand, most universities have experienced the pandemic and have expressed a need for smart buildings with learning rooms, virtual laboratories, and other facilities that support hybrid learning.
6. Regarding educational development, means suitable for Japanese support include the

introduction of Japanese engineering education such as procreation Monozukuri education and KOSEN technical college education, curriculum improvement through international cooperation programs such as twinning programs, double degree programs, and internship and apprenticeship programs in Japan. The needs of the universities in this regard are high in this survey as well. It is conceivable that this might be combined with the procurement of experimental equipment, a learning room that supports hybrid learning in the post-COVID-19 era, and the construction of a virtual laboratory.

3.4 Research for prospective JICA support programs for faculties of medicine of the target universities

As mentioned in 1.3, research was originally scheduled to be conducted at the above-mentioned 11 target universities for both the faculty of engineering and faculty of medicine in the beginning; however, the study team agreed with JICA to conduct the research regarding the faculties of medicine at only 9 universities[26] (the University of Sumatera Utara, Sriwijaya University, Padjadjaran University, Diponegoro University, Sebelas Maret University, Brawijaya University, Airlangga University, Udayana University, and the University of Mataram).

Information was collected by websites and papers as well as questionnaires from the 9 target universities as below.

Step 1： Development of questionnaire (Appendix 2)
Step 2： Issuance and dispatch of letter of request for cooperation from DIKTI, MoECRT
Step 3： Contact each university and ask it to respond to the questionnaire (Period of reply: June 16–30, 2021)
Step 4： Additional questions (Appendix 3)

3.4.1 Current status of the faculties of medicine at the target universities

3.4.1.1 Organization structure of the faculties of medicine

The organizational structure, departments, and sections of the faculties of medicine of the 9 universities are summarized in Appendix 4 based on information from the website of each university.

3.4.1.2 Governmental research funding of medical-related topics

The results of research funding for the medical-related topics subsidized at the target universities by RISPRO (Funding for Innovative Productive Research) since 2017 were identified through the website of LPDP, an organization managing scholarships and research funding in Indonesia. There

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[26] The abbreviations of the universities are as follows: University of Sumatera Utara: USU, Sriwijaya University: UNSRI, Padjadjaran University: UNPAD, Diponegoro University: UNDIP, Sebelas Maret University: UNS, Brawijaya University: UB, Airlangga University: UNAIR, Udayana University: UNUD, University of Mataram: UNRAM

have been 713 research projects in total subsidized by RISPRO since 2013 and 92 of the research projects, or approximately 13% of all subsidized projects, are medical-related according to the website. Furthermore, the number of subsidized medical-related topics has been increasing dramatically since 2020, and many of them are related to COVID-19. The results of research funding for the medical-related topics subsidized at the target universities by RISPRO are presented in Appendix 5.

3.4.1.3 Overseas activities of students and faculty (study abroad, international internships, etc.)

The current status of interactions with overseas universities/research institutes was identified as in Table 38 by inquiring from the universities regarding such activities as dispatches for internships, short-term study abroad, and practical training.

Table 38 Current status of the dispatch of students and academic staff from faculties of medicine to overseas universities and research institutes

Country	Program	Year of Dispatch	Number of Disparched	Overseas University/ Research Institute
University of Sumatera Utara				
Australia	Sandwich Program (Ph.D.)	2015	1	Flinders University
	Visiting Scholar	2016	2	Melbourne University Deakin University
	Fellowship	2017	2	The Asian Pacific Society of Respirology (APSR)
	Short-term Program	2018	1	Burnett Institute
	Clinical Fellowship	2019	1	Royal Melbourne Hospital
Cambodia	Environmental Education Training	2018	1	United Nations Institute for Training and Research (UNITAR)
China	Cardiac Intervention Fellowship	2018	1	The First Affiliated Hospital Hospital of Anhui Medical University
Czech Republic	Hands-On Training	2019	1	−
France	Fellowship	2018	1	European Respiratory Society (ERS) International Congress 2018
Germany	Academic Exchange (Ph.D.)	2016	1	Center for Regenerative Therapies, Technische Universitaet Dresden
Hungary	Hands-On Training	2018	1	−

India	Cardiac Intervention Fellowship	2018	1	Medica Institute of Cardiac Science
	Hands-On Training	2017	1	−
Japan	Academic Exchange	2018	3	Kitakyushu University
	Japan-Asia Youth Exchange Program	2018	1	
	Hand-On Seminar	2016	1	Asia Pasific Digestive Week, Kobe
	Environment Education Training	2018, 2019	3	Institute for Global Environmental Strategies JICA Kitakyushu
	Visiting Scholar	2019	1	Toranomon Hospital, Tokyo
	Training Program	2018	1	Juntendo University
Malaysia	Academic Exchange	2016-2019	14	National University of Malaysia
	Fellowship	2016-2020	55	Hospital Serdang Malaysia Hospital National University of Malaysia MABIP
	Ph.D.	2019	1	National University of Malaysia
Netherlands	Academic Exchange	2018, 2019	2	Antwerp University Hospital
	Short-term Program	2016	1	Maastricht University
Singapore	Fellowship	2018	2	Singapore General Hospital KK Women’s and Children’s Hospital
	Leadership Program	2018	1	Singhealth
South Korea	Training Program	2016	2	Asan Medical Centre, Seoul
	Hands-On Training	2018	1	
	Fellowship	2018	2	Yonsei University Korean Association for Lung Cancer
Thailand	Fellowship	2016, 2019	3	The Asian Pacific Society of Respirology CHEST Congress
	Workshop	2017, 2018	2	Kasetsart University EURAXESS ASEAN
	Short-term Program	2016	1	Thailand One Health University Network

	Competition	2016	1	Mahidol University
Turkey	Workshop	2017	1	Koc University
United Kingdom	Ph.D.	2014, 2019, 2020	3	London School of Hygiene & Tropical Medicine Glasgow University University of Manchester
Vietnam	Fellowship	2019	2	The Asian Pacific Society of Respirology
Sriwijaya University				
–				
Padjadjaran University				
–				
Diponegoro University				
Hungary	Student Exchange Program	2021	1	University of Pecs (Indonesian International Student Mobility Awards from Ministry of Education and Culture)
Japan	Student Exchange Program	2021	6	Kagoshima University (JASSO Scholarship) Kanazawa University (KUEP Scholarship)
	Ph.D.	2019, 2020	2	Kagoshima University (MEXT Scholarship, UNDIP Scholarship)
Netherlands	Ph.D.	2019, 2020	2	Radboud University (UNDIP Scholarship) The University Groningen (UNDIP Scholarship)
Taiwan	Ph.D.	2019, 2020	2	Taipei Medical University (UNDIP Scholarship) Cheng Kung University (UNDIP Scholarship)
United Kingdom	Ph.D.	2020, 2021	2	Coventry University (BPP-LN) University of Dundee (UNDIP Scholarship)
Sebelas Maret University				
Malaysia	Internship	2019	5	–(Canceled in mid-2020)
–	Student Exchange Program	Before 2020	15-20 a year	Partner universities (Scholarship funded *From Germany, France, Italy, Japan, Turkey, and other European countries)
Brawijaya University				
–				
Airlangga University				
–				
Udayana University				

Japan, Thailand, the U.S. (Hawaii), Australia	Short-term Program	2018, 2019	About 60 a year	Partner universities in 4 countries (Self-funded student exchange program)
Japan	－	－	A few	International University of Health and Welfare (Scholarship funded)
Japan, Thailand, New Zealand, Australia, Europe	Ph.D.	－	－	Partner universities Japan: Okayama University (For lecturers to obrain Ph.D. abroad with scholarship)
University of Mataram				
Australia	Master	2020	5	Curtin University University of Adelaide University of Western Australia University of Sydney James Cook University
	Ph.D.	2020	1	Curtin University
	Postdoc	2020	1	University of Sydney
Japan	Ph.D.	2020	3	Nagoya University Fukushima Medical University Juntendo University
	Short-term Program	2020	5	Kyoto University Fukushima Medical University National Institute for Infectious Disease Kobe University
	Researcher	2020	1	Toshiba General Hospital
Netherlands	Master	2020	2	KIT Royal Tropical Institute Wageningen University
	Ph.D.	2020	1	Groningen University
England	Master	2020	1	Dundee University
Vietnam	Master	2020	1	Hanoi Medical University

3.4.1.4 Job opportunities and careers

Those who graduate from faculty of medicine usually choose to work as medical practitioners or research professionals by utilizing their medical qualifications. The study team identified how job search support and career development are provided at the faculties of medicine of the target universities as in Table 39.

Table 39 The current status of job search support and career development at the faculties of medicine of the target universities

University	Job search Support and Career Development
University of Sumatera Utara	・ USU implements job search support and career development program at all faculties (http://pjk.usu.ac.id/) ・ Those who pass the completion exam at the faculty of medicine are supposed to

	participate in an internship program organized by Komite Internship Dokter Indonesia under MoH ・ Information on job vacancies is shared by colleagues ・ After completion of internship program, junior doctors are supposed to choose whether to continue to a specialist program, work in a public organization, private clinic, or hospital, or open their own clinic
Sriwijaya University	–
Padjadjaran University	–
Diponegoro University	・ Academic advisors are in charge of career development and training programs for students of faculty of medicine for 6 years ・ UNDIP provides lectures on career development from military doctors, private doctors, doctors who studied at overseas specialist program, specialists, etc., through its alumni association, IKA Medica ・ Information on job vacancies is periodically distributed to students who will graduate soon so that they can work in their preferred position within 6 months after graduation ・ The position of assistant lecturer is awarded to those who graduated or will graduate soon so that they can gain additional knowledge and skills. Also, a recommendation letter from the dean is issued so that the CV of students can be more attractive
Sebelas Maret University	・ Career development support is provided at each laboratory and each faculty, and throughout the whole university ・ The Career Development Center provides support to students in identifying jobs matching their characteristics as well as providing job fairs at a whole-university level ・ Job information from hospitals, clinics, and private/public companies and periodic training is provided at the faculty level ・ Each laboratory provides opportunities for preclinical medical students to work as laboratory assistants and for students who will graduate soon to work in group research
Brawijaya University	–
Airlangga University	–
Udayana University	・ The Career Development Center was established at the university level to provide students with job information, career seminars, and periodic job fairs ・ The Career Development Center is in charge of nurturing soft skills (skills for communication, cooperation, volunteer mentality, etc.) important for working
University of Mataram	・ Companies and public organizations provide job information to UNRAM through alumni coordinators; it is announced to students via websites ・ Issuance of a recommendation letter to students who graduated, career counseling, career development seminars, consultation for specific professionals, employment support, and introduction of mentors to those who want a professional career are provided

3.4.1.5 Academic-industrial collaboration and university start-up

The current status of academic-industrial collaboration and its achievements and start-up/entrepreneurial ventures at the faculties of medicine at the target universities were identified as in Table 40.

Table 40 Current status of academic-industrial collaboration and university start-ups at the faculties of medicine at the target universities

University	Academic-Industrial Collaboration and University Start-up
University of Sumatera Utara	・ Faculty of medicine, USU, has a close collaboration with public hospitals and private companies in North Sumatra and other provinces ・ Academic support is provided to the Public Hospital of Dr. FL TOBING SIBOLGA, Regional Public Hospital of SIBUHUAN, Regional Public Hospital of H. SAHUDDIN KUTACANE, Regional Public Hospital of Cut Nyak Dhien Meulaboh, PT. Bakti Timah Hospital, PT. SRI PAMELA MEDIKA NUSANTARA, Regional Public Hospital of Dr. Hadrianus Sinaga, Technical Implementation Unit of Regional Public Hospital, Regional Public Hospital of Pandan, Regional Public Hospital of Raja Musa Sungai Guntung, TK.II Putri Hijau Medan Hospital, and Technical Implementation Unit of Regional Public Hospital of Deli Serdang, PT. GLOBAL URBAN ESENSIAL. Also, collaboration is conducted for community health enhancement activities
Sriwijaya University	―
Padjadjaran University	―
Diponegoro University	・ Students are able to learn the basics of academic-industrial collaboration by participating in essay competitions hosted by public organizations or private companies researching herbal medicine ・ Students are entitled to work in collaboration with not only medical institutions but also public health offices, governmental organizations, and private companies during internships
Sebelas Maret University	・ Faculty of medicine, UNS, has a program in psychology and the academic staff collaborates with several private companies ・ Students from the psychology program participate in an internship program at PLN Assessment Center Implementation Unit, Mini Academy (start-up), Analysis of the Personality Development Center, school.id (start-up), and Ideas Talent Academy (start-up)
Brawijaya University	―
Airlangga University	―
Udayana University	・ UNUD provides financial support so that fundamental research can be conducted in applied research, which is developed to commercialization through partnership with private companies (e.g., a research project on emulsion of leaves of *Moringa oleifera* and its application to protection from the sun or the prevention of acne is the subject of collaboration with PT Bali Tangi (a cosmetics manufacturer) for commercialization, and a patent has already been obtained) ・ Start-ups for academic-industrial collaboration are gradually increasing ・ Nurturing research skills and research culture is necessary for product-based research as well as workshops, financial support, mentoring, and various forms of support from experienced organizations
University of Mataram	・ Faculty of Medicine, UNRAM is conducting 10–12 research collaborations with external organizations every year ・ Although most of the research collaborations are conducted with universities or research institutes, there are some collaborations with pharmaceutical companies and hospitals

3.4.1.6 Intellectual property rights in research and development

The current status of intellectual property rights at the faculties of medicine at the target universities were identified. Information on R&D and research publications about infectious diseases, especially COVID-19, have been prominent at each university since 2020, as indicated in Appendix 6.

3.4.1.7 Support from other donors

Support from other agencies and governments at the faculties of medicine at the target universities were identified as shown in Table 41

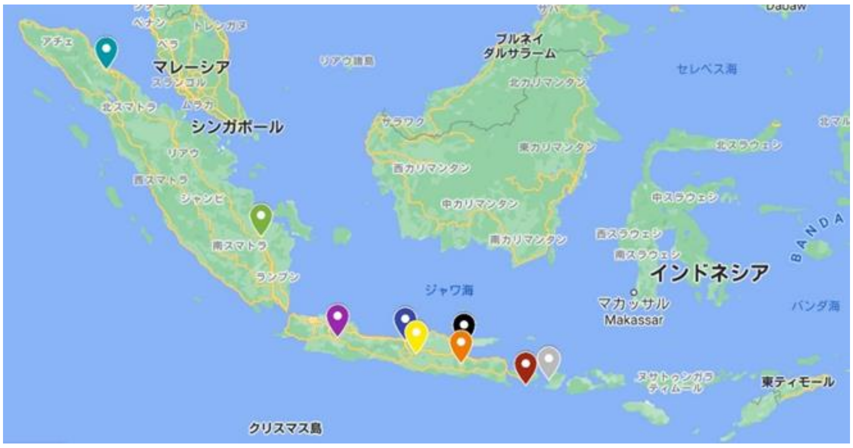
Table 41 Current status of support from other donors at the faculties of medicine of the target universities

University	Support from Other Donors
University of Sumatera Utara	・ Support for HRD and laboratory equipment such as PCR test equipment is provided by several international research institutes ・ Currently support is provided by Menzies School of Hygiene and Tropical Medicine, Oxford University
Sriwijaya University	・ IDR 13,000,000,000 was provided as financial support for the Health Professional Education Quality Program between 2010 and 2013 by World Bank
Padjadjaran University	・ Learning courses in epidemiology and biostatistics were provided for the improvement of research capacity and FD (Faculty Development) among medical staff of UNPAD by a European consortium comprising such institutions as UMC Utrecht, Elevate Health, and University College London
Diponegoro University	–
Sebelas Maret University	・ Financial support was provided for the construction of UNS hospital and medical research buildings and overseas training for HRD in the field of emerging medical fields by Islamic Development Bank ・ Financial support (IDR 5,000,000,000) for research collaboration for NCDs (SuniSEA) was provided by EU ・ Financial support (IDR 440,000,000) was provided for educational improvement such as studio equipment to edit educational movies about tropical diseases under the Health Information and Technology Implementation Scheme by Erasmus+ Program ・ Support to purchase research equipment was provided by ADB and IDB
Brawijaya University	・ IDR 500,000,000 was provided for a telemedicine program by the Ministry of Education and Culture
Airlangga University	・ JPY 77,000,000 had been subsidized for the procurement of equipment and chemical stuffs by the Japan Initiative for Global Research Network on Infectious Diseases (J-GRID) every year since 2007
Udayana University	・ PCR test equipment was provided by the government of Indonesia
University of Mataram	・ Several forms of support were provided by World Bank between 2012 and 2016 such as HRD on curriculum development or teaching methods through workshops and the procurement of a biosafety cabinet, autoclaved sterilization machine, centrifuge machine, etc. ・ HRD and research collaboration with Colorado University in the field of respiratory infectious diseases was supported under the Sustainable Higher Education Research

	Alliance by USAID ・Construction and procurement support have been provided by the Ministry of Research and Technology, BNPB, and MoH for such facilities as a PCR laboratory, BSL-2 laboratory, microscope, centrifuge machine, etc., since 2020 so that UNRAM hospital can respond to COVID-19

3.4.1.8 Health indicators in each target university locale

The locations of the faculties of medicine at the target universities are given in Figure 15, and the indicators of UHC in 3.2.2 are classified more precisely into 14 indicators and compared by the locations of the target universities in Table 42.



From west, University of Sumatera Utara, Sriwijaya University, Padjadjaran University, Diponegoro University, Sebelas Maret University, Brawijaya University, Airlangga University, Udayana University, University of Mataram

Figure 15 Location of Target Universities

Table 42 Comparison of Indicators of UHC in Each Location of Target University

University	University of Sumatera Utara	Sriwijaya University	Padjadjaran University	Diponegoro University, Sebelas Maret University	Brawijaya University, Airlangga University	Udayana University	University of Mataram	Indonesia's Country Average
Location	North Sumatra	South Sumatra	West Java	Central Java	East Java	Bali	West Nusa Tenggara	
Reproductive, maternal, newborn and child health								
1.Family planning (%)	49	66	66	65	65	67	62	58

2.Pregnancy and delivery care (%)	95	93	93	99	97	100	95	92
3.Child immunization (%)	56	70	76	86	82	95	83	72
4.Child treatment (%)	27	41	34	27	37	44	44	36
Infectious diseases								
5.1.Tuberculosis treatment (case detection rate) (%)	48	50	71	68	64	30	29	51
5.2.Tuberculosis treatment (treatment success rate) (%)	91	95	85	83	87	89	89	82
6.HIV treatment (%)	31	33	37	28	32	43	37	34
Malaria prevention	-	-	-	-	-	-	-	-
7.Water and sanitation (%)	85	78	81	81	77	79	67	77
Non-communicable diseases								
8.Prevention of cardiovascular disease (%)	54	55	41	42	45	60	60	55
9.Management of diabetes (%)	89	85	91	91	92	96	93	90
10.Cancer detection and treatment (%)	5	17	3	5	9	17	13	9
11.Tobacco control (%)	46	41	36	44	44	53	40	44
Service capacity and access								
12.Hospital access (%)	86	60	47	64	59	86	39	70
13.Health worker density (%)	33	33	17	26	27	49	37	38

14.Access to essential medicines (%)	90	92	95	91	96	97	97	92
Total	59	60	57	59	60	67	59	60

Reference: Universal Health Coverage: Tracking Indonesia's Progress, Perkumpulan PRAKARSA

Standard for the evaluation of each indicator

1. Demand for family planning satisfied by modern methods (% of married women with demand for family planning)
2. Births attended by a skilled health worker
3. Immunization (DPT, HepB3, and Measles)
4. Oral rehydration solution (ORS) therapy for child diarrhea
5. Tuberculosis effective treatment coverage (Case Detection Rate (% all forms) and Treatment Success Rate (% of new cases))
6. People living with HIV receiving antiretroviral treatment (ART)
7. People using at least basic sanitation services (% of population)
8. Prevalence of normal blood pressure
9. People with diabetes receiving treatment
10. Cervical cancer screening (Women 30–49 yrs)
11. Adults aged ≥ 15 years not smoking tobacco in the last 30 days
12. Hospital beds per capita
13. Health worker density (physicians per 100,000 people; surgeons per 100,000 people; and other health workers)
14. Access to essential medicines

Cells colored gray are indicators worse than Indonesia's national average by 10% or more. Bali shows results for the indicators of UHC prominent among the locations of target universities; however, the rest show similar scores to the national average. With regard to malaria, most of the cases are found in Papua, West Papua, and East Nusa Tenggara, causing about 40,000 deaths in Indonesia in 2017[27], but it is not so prevalent in other areas. Therefore, malaria is excluded from the above indicators.

Factors of years of life lost in the locations of the target universities are compared in Table 43.

Table 43 Comparison of Factors of Years of Life Lost in Each Location of Target University

University	Indonesia	University of Sumatera Utara	Sriwijaya University	Padjadjaran University	Diponegoro University,	Brawijaya University,	Udayana University	University of Mataram

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[27] Tracking Universal Health Coverage: 2017 Global Monitoring Report, WHO/World Bank, 2017

					Sebelas Maret University	Airlangga University		
Location		North Sumatra	South Sumatra	West Java	Central Java	East Java	Bali	West Nusa Tenggara
Cerebrovascular disease	1	1	2	2	1	1	1	1
Ischemic heart disease	2	3	1	1	3	2	2	4
Other non-communicable diseases	3	2	3	4	2	3	3	2
Tuberculosis	4	7	4	3	4	5	11	3
Other communicable diseases	5	6	6	5	5	7	9	6
Transport injuries	6	4	5	6	14	8	14	8
Diabetes mellitus	7	5	11	7	10	4	8	13
Chronic respiratory diseases	8	9	13	8	11	9	6	9
Preterm birth complications	9	12	9	13	6	11	5	5
Other malignant neoplasms	10	14	14	12	8	6	4	11
Lower respiratory infections	11	11	10	9	15	14	7	7
Neonatal encephalopathy due to asphyxia	12	8	7	10	9	16	10	10
Diarrheal diseases	13	10	12	15	7	12	12	14
Cirrhosis	14	13	15	14	13	10	13	12
Other cardiovascular and circulatory diseases	15	15	8	11	12	13	15	15

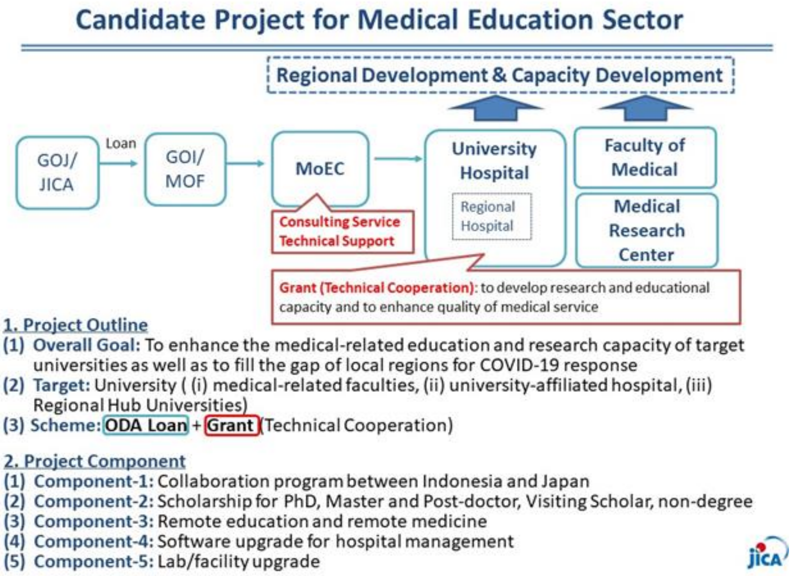
Reference: Death in Indonesia: estimating all-cause mortality, cause-specific mortality, and fatal burden attributable to smoking and air pollution, Sarah Wulf Hanson

Although the portion of NCDs is larger in years of life lost, tuberculosis, diarrhea, neonatal death, and others still frequently occur. Traffic accidents are also one of the main factors influencing years of life lost.

3.4.2 Hypothesis of components of support from JICA

Cooperation by sector loans, such as Japanese ODA loans, was considered and candidate project components were proposed by JICA as in Figure 16.

Component 1: Collaboration program between Indonesia and Japan
Component 2: Scholarship for master's, PhD, and post-doctoral students, visiting scholars, non-degree
Component 3: Remote education and remote medicine
Component 4: Software upgrade for hospital management
Component 5: Lab/facility upgrade



Candidate Project for Medical Education Sector

Regional Development & Capacity Development

GOJ/ JICA
Loan
GOI/ MOF
MoEC
Consulting Service Technical Support
University Hospital
Regional Hospital
Faculty of Medical
Medical Research Center
Grant (Technical Cooperation): to develop research and educational capacity and to enhance quality of medical service

1. Project Outline
(1) **Overall Goal:** To enhance the medical-related education and research capacity of target universities as well as to fill the gap of local regions for COVID-19 response
(2) **Target:** University ((i) medical-related faculties, (ii) university-affiliated hospital, (iii) Regional Hub Universities)
(3) **Scheme:** ODA Loan + Grant (Technical Cooperation)

2. Project Component
(1) **Component-1:** Collaboration program between Indonesia and Japan
(2) **Component-2:** Scholarship for PhD, Master and Post-doctor, Visiting Scholar, non-degree
(3) **Component-3:** Remote education and remote medicine
(4) **Component-4:** Software upgrade for hospital management
(5) **Component-5:** Lab/facility upgrade

Reference: JICA

Figure 16 Candidate Project Components of Support from JICA

The study team hypothesized 8 sub-project components as below, based on the investigation of the current status of Indonesia on the above project components.

(a) Support for construction (research buildings, university hospitals, research centers for infectious diseases, etc.)
(b) Support for procurement of equipment (research equipment, educational equipment, ICT equipment, equipment for telemedicine, etc.)
(c) Support for human resource development (short-term study program in Japan, research study,

scholarship for researcher exchange program, etc.)

(d) Development of research collaboration with Japanese research institutions for research capacity enhancement

(e) Development of international programs for medical education (twinning programs, double-degree programs, etc.)

(f) Development of e-learning courses and hybrid e-learning and face-to-face courses for medical education (curriculum, material, e-learning software, etc.)

(g) Support for academic-industrial collaboration, intellectual property right management, and hospital management

(h) Others

The relationship between JICA's candidate project components and the study team's hypotheses of sub-project components is as below.

Table 44 Relationship Between JICA's Candidate Project Components and Study Team's Hypotheses of Sub-Project Components

JICA's Candidate Project Components	Study Team's Hypotheses of Sub-Project Components
1. Collaboration program between Indonesia and Japan	(c), (d), (e) Encouragement of human exchange, research collaboration between universities in Japan and Indonesia, development of international educational program
2. Scholarship for Ph.D., Master and Post-doctor, Visiting Scholar and non-degree	(c), (d), (e) Financial support for human exchange
3. Remote education and remote medicine	(b), (f) Curriculum development of elearning program and procurement of telemedicine equipment, etc.
4. Software upgrade for hospital management	(b), (g) Capacity enhancement for hospital management system, procurement of equipment and management software
5. Lab/facility upgrade	(a), (b) Construction of research facilities, procurement of equipment

3.4.3 Questionnaire survey

3.4.3.1 Role of the university in public health and measures for infectious diseases

University hospitals of the target universities are classified as Type B or Type C healthcare units as in Table 34. Table 45 shows the current status of the cooperation framework between the university hospitals of the target universities and primary healthcare units or hospitals categorized in Type D based on the answers from each university

Table 45 Cooperation framework between the university hospitals of the target universities and the primary healthcare units in the area covered by the hospital

Univesity	Number of Primary Healthcare Units in the Area	Cooperation Framework with Primary Healthcare Unit
University of Sumatera Utara	20	・ Cooperative support is provided to primary healthcare facilities by medical students on a rotating schedule as a part of activities to contribute to society ・ Academic staff of the faculty of medicine has been working collaboratively with primary healthcare facilities for tuberculosis or community empowerment for a long time by asking outpatients to participate in research activities and issuing reference letters to higher healthcare facilities
Sriwijaya University	41	・ Under cooperation with the local health authority of Palembang, medical students are able to obtain practical experience at departments of dermatology and otorhinolaryngology and knowledge of public health through the Academic-Health System with primary healthcare facilities ・ Medical doctors and nurses who instruct medical students are appointed lecturers of UNSRI
Padjadjaran University	97	・ UNPAD covers 8 hospitals and primary healthcare facilities of 89 districts in Bandung ・ UNPAD is providing various supports for research for human resource development, education, and healthcare services by implementing the Academic Health System with several organizations in West Java, such as MoECRT, MoH, Hasan Sadikin Hospital, hospital network of West Java, and puskesmas
Diponegoro University	67	・ UNDIP covers 37 community health centers and 30 private clinics ・ Periodic workshops are held and technical lectures are provided to medical doctors of primary healthcare facilities ・ UNDIP dispatches medical students to primary healthcare facilities to help their medical activities ・ UNDIP conducts the Inter-Professional Education Program and Comprehensive Station and Family Medicine Program ・ An information-sharing system has been established by providing lectures periodically to medical personnel of primary healthcare facilities by UNDIP hospital
Sebelas Maret University	40	・ Cooperation on education (capacity enhancement), research, and community outreach activities is given to primary healthcare facilities in Surakarta, Boyolali, Karanganyar, Klaten, Sragen, Sukoharjo, and Wonogiri

		・ Workshops and webinars are provided for the above cooperative activities
Brawijaya University	71	・ UB has been trying to establish a network of primary healthcare facilities for the purpose of prevention and treatment of cardiovascular diseases in its coverage areas ・ Teleconsultation for acute cardiovascular diseases is provided to primary healthcare facilities by the cardiovascular department ・ UB conducts activities such as raising awareness among residents, education to health volunteers, and health checkups and recordings using smartphones ・ Education is provided to medical doctors and nurses at primary healthcare facilities in order to detect cardiovascular diseases at an early stage
Airlangga University	371	・ Network has been established with primary healthcare facilities for infectious diseases (NTDs, STDs, etc.) ・ Medical students are dispatched to primary healthcare facilities so that they can obtain practical training on diagnosis and hospital management as well as to provide support to medical activities there ・ Research outcomes are shared to primary healthcare facilities so that the level of medical services can be enhanced
Udayana University	200	・ Support is provided to medical doctors and nurses at primary healthcare facilities on emergencies, EKG training, and education through webinars
University of Mataram	16	・ At the time of the earthquake in Lombok in 2018, the “Building Trust in Emergencies and Disaster” system was established and UNRAM accepted injured people from primary healthcare facilities that UNRAM does not usually cover ・ Training for first responses to maternal health and orthopedic-related emergencies is provided to medical staff of primary healthcare facilities by implementing capacity enhancement training ・ UNRAM is in charge of responses to COVID-19 in its covered areas and of providing personal protective equipment and training on how to wear protective equipment, zoning in hospitals and testing, etc.

In addition, university hospitals and the faculties of medicine of the target universities have cooperative collaborations with local governments, other universities, and research institutions as in Table 46.

Table 46 Cooperative collaboration of the university hospitals and faculties of medicine at the target universities

University	Cooperative Collaboration with Other Organizations
University of Sumatera Utara	Cooperative Collaborations with Governmental Authorities ・ USU participates in the provincial/municipal meeting periodically in its professional position and contributes to policy making for COVID-19, tuberculosis, malaria, maternal and child health, etc. ・ Academic staff of the faculty of medicine have been appointed professional experts of the task force for COVID-19 in the government of North Sumatra Province and cooperate on conducting PCR tests in several places and establishing PCR test laboratories, etc.

	Cooperative Collaboration with Research Institutes ・ USU hospital is the only university hospital in North Sumatra Province, so it keeps contacting with hospitals and universities in other areas for periodic training sessions and meetings to improve knowledge and skills Difficulties in Cooperative Collaboration ・ Duplication of explanations to different stakeholders (related parties) ・ Late administrative procedures ・ Decision-making not by public health but by political consideration Equipment Required for Cooperative Collaboration ・ More DNA extraction and PCR machines for COVID-19 diagnosis are requested
Sriwijaya University	Cooperative Collaborations with Governmental Authorities ・ UNSRI is working for health programs as a professional expert for the government of South Sumatra, Palembang city, etc. ・ Training programs for COVID-19 are provided to governmental authorities Cooperative Collaboration with Research Institutes ・ Cooperations with faculty of medicine, Universitas Lampung and Universitas Padjajaran, intended to nurture specialists and improve their quality Difficulties in Cooperative Collaboration ・ Schedule coordination ・ Multiple regulations for financial staff at several organizations and coordination Equipment Required for Cooperative Collaboration ・ (Lab DNA analysis) Real-time PCR: perlu upgrade, PCR machine: perlu tambahan jumlah ・ (Lab cell culture) Flow cytometer, Cell counter (automated), Spectrophotometry, Refrigerated centrifuge 12,000 rpm, liquid nitrogen tank ・ (Herbal medicine lab) Gas chromatography, Liquid chromatography-mass spectrometry (LCMS), UV-Vis spectrometry
Padjadjaran University	Cooperative Collaborations with Governmental Authorities ・ UNPAD was requested by the governor of West Java to cooperate in the development of West Java and, under the pandemic of COVID-19, 5 academic staff members from faculty of public health were appointed to the task force, providing technical support for testing, tracking, treatment, etc. ・ UNPAD made agreements with local governments to dispatch their specialists all over Indonesia for community services as well as to maintain their quality of education and research Cooperative Collaboration with Research Institutes ・ Improvement of the quality and quantity of medical staff at Universitas Pelita Harapan, Universitas Gunadarma, etc. ・ Medical staff is dispatched to surrounding universities ・ Research collaboration is implemented by utilizing financial support from domestic/overseas organizations Difficulties in Cooperative Collaboration ・ Education of the faculty of medicine, UNPAD, is conducted also in public/private hospitals and clinics. Medical doctors working in those sites are awarded similar rights as PNS lecturers (equivalent to governmental officials); however, all the lecturers including those medical doctors will be required to obtain a National

	Lecturer Identification Number (NIDN) or Special Lecturer Identification Number (NIDK) in the future, although it seems difficult for MoECRT to evaluate medical activities at their working sites ・ It is difficult to manage public health programs at primary healthcare facilities Equipment Required for Cooperative Collaboration ・ Pharmacokinetic Laboratory, Immunology Laboratory, Molecular Genetics Laboratory, Laboratory of Parasitology and Microbiology, and Cell Culture Laboratory are used for research collaboration in infectious diseases and cancer ・ Under the COVID-19 pandemic, consumables and equipment were used for tracking infected people ・ Laboratory equipment in the field of bioinformatics is needed because UNPAD is still conducting PCR tests
Diponegoro University	Cooperative Collaborations with Governmental Authorities ・ MoU has been made for UNDIP to provide technical support with municipal and local health authorities of Semarang, Walikota, Jepara, Rembang, Slawi, Brebes, Pemalang, and Magelang ・ Periodic meetings are implemented with provincial governments ・ Information collection surveys are conducted for the policy making of provincial governments and their results are shared ・ Management of PCR test laboratory is done by working collaboratively between UNDIP hospital and provincial governments Cooperative Collaboration with Research Institutes ・ Technical training is provided on forensic medicine to Unisula, Unimus (Central Java), Atmajaya, UPN, Trisakti (Jakarta), etc. ・ Technical training is provided on community health to UPN ・ Medical staff of faculty of medicine, UNDIP is dispatched to Unimus, Unwahas (Central Java), Unswagati (West Java), etc. Difficulties in Cooperative Collaboration ・ Issuance of official letter from primary healthcare facilities is sometimes late Equipment Required for Cooperative Collaboration ・ Laboratory facilities is used to provide PCR tests to those who are suspected to be infected with COVID-19 sent from primary healthcare facilities ・ 128-slice CT scanner provided by local government is used to test for references from primary healthcare facilities to UNPAD hospital ・ Although the status of PCR laboratory and CT scanner is fine, UNDIP wants to improve its facilities due to increasing needs of test for COVID-19 (Sequencing equipment, MA-3000 Direct Mercury Analyzer, etc.)
Sebelas Maret University	Cooperative Collaborations with Governmental Authorities ・ Technical cooperation is provided for the policy making of MoH and local governments in tuberculosis control, occupational health, drug assessment, etc. ・ UNS participated in COVID-19 task force (PCR test, tracing infected people by students, education to residents) ・ Large-scale vaccination has been performed Cooperative Collaboration with Research Institutes ・ Medical staff of the faculty of medicine is dispatched to its collaborative hospitals (medical services, education for improvement of skills among staff) ・ Cooperation is made for the improvement of research and education at newly established faculties of medicine such as UNISMA Malang and UNRIYO Yogyakarta

	・ Cooperation on COVID-19 vaccine development Difficulties in Cooperative Collaboration ・ UNS is under the umbrella of MoECRT; however, puskesmas or clinics (primary healthcare facilities) are governed by the MoH or local governments (or Ministry of Domestic Affairs). Therefore, regulations for research and education are different ・ Equipment is insufficient Equipment Required for Cooperative Collaboration ・ Biomedical laboratory of UNS is utilized for research collaboration with external organizations and biomolecular-related topics are getting popular in master degree and Ph.D., so updates of facilities and equipment are needed ・ Although UNS is planning to focus on research on herbal medicine, the laboratory equipment is insufficient
Brawijaya University	Cooperative Collaborations with Governmental Authorities ・ MoU has been made with the provincial government for implementation of the PCR test and accepting infected people at Dinas Kesehatan, Jawa Timur, Saiful Anwar General Hospital, etc., and UB supports policy making for public health ・ MoU with city of Malang for implementation of training and establishment of network for cardiovascular diseases ・ UB is supporting establishment of telemedicine system at primary healthcare facilities ・ Emergency referral system (mobile ICU) is managed in city of Malang Cooperative Collaboration with Research Institutes ・ Cutting-edge research and advanced medical treatment that UB cannot conduct alone (Dr Soetomo General Hospital, Surabaya and Harapan Kita National Cardiovascular Center, Jakarta) ・ Provision of workshop with Yunlin Hospital, Taiwan, to other medical organizations ・ Collaborative program with Sant'Andrea Sapienza University ・ Big data collection for research collaboration with other universities and hospitals Difficulties in Cooperative Collaboration ・ Further knowledge and skill improvement is needed for management of the telemedicine system ・ Security is also an important point of the telemedicine system Equipment Required for Cooperative Collaboration ・ A new server is needed for stable management of telemedicine
Airlangga University	Cooperative Collaborations with Governmental Authorities ・ UNAIR is working as a professional expert for the Drug and Food Agency of MoH, city of Surabaya, and provincial government of East Java Cooperative Collaboration with Research Institutes ・ Hosting meetings with other universities and hospitals, implementing research collaboration, and formulating guidelines Difficulties in Cooperative Collaboration — Equipment Required for Cooperative Collaboration ・ Advanced equipment unavailable at university laboratories is needed, such as Sanger sequencer, NGS (Next Generation Sequencer), and Electron Microscope (TEM and SEM)

Udayana University	Cooperative Collaborations with Governmental Authorities ・ UNUD participates in COVID-19 task force ・ UNUD accepts infected people in its hospital Cooperative Collaboration with Research Institutes ・ Implementation of Inter-departmental/Inter-hospital joint research Difficulties in Cooperative Collaboration – Equipment Required for Cooperative Collaboration ・ PCR test kit, Plasmapheresis kit, CRRT for hemodialysis kit
University of Mataram	Cooperative Collaborations with Governmental Authorities ・ UNRAM supports policy making in public health by showing evidence and advancing proposals ・ UNRAM conducts PCR test and hospitalizes infected people Cooperative Collaboration with Research Institutes ・ Practical training is provided to surrounding medical/nursery schools ・ National examination for medical doctors, nurses, midwives, etc., has been implemented ・ Staff exchange program and faculty development program are implemented with Udayana University, Gadjah Mada University, Brawijaya University, and Airlangga University ・ Research collaboration is conducted and its results are shared with RSUD Provinsi NTB ・ Research results are shared with medical research institutes such as AIPKI, PERSI, and ARSPTN ・ Research collaboration is conducted with Japanese institutions such as Kyoto University and University of the Ryukyus Difficulties in Cooperative Collaboration ・ Hassles of administrative procedures for constructing collaborations ・ Shortage in funding, human resources, and equipment ・ Sharing a vision with cooperative partners Equipment Required for Cooperative Collaboration ・ Real time PCR, Inverted Microscope EVOS, Cryogenic Storage System, CO2 Incubator System and Nano Drop Spectrophotometer are still available ・ Equipment is needed such as Flow cytometry, Cell sorter machine, Sequencing machine and Laminar air flow level 3 for development of vaccines

3.4.3.2 Current status of implementation of e-learning at the faculties of medicine at the target universities

Under the COVID-19 pandemic, e-learning is encouraged at each educational organization due to difficulties in conducting face-to-face education. Although it is encouraged also at the faculties of medicine in the target universities, difficulties have been identified in conducting research activities using equipment and practical trainings online. Responses to our questionnaire from each faculty of medicine are summarized in Table 47.

Table 47　Current status of the implementation of e-learning at the faculties of medicine at the target universities

University	Current Status of Implementation of e-Learning
University of Sumatera Utara	Form of e-Learning and Its Platform ・ All lectures and case studies are conducted online (USU E-Learning Platform, Google Meet, and Zoom) ・ Practical trainings are conducted both online and face-to-face depending on the skills ・ Hospital trainings are conducted both online and face-to-face depending on the situation of pandemic ・ Non-clinical trainings for post-doctoral students are conducted online, although clinical trainings are done by face-to-face for limited periods Difficulties in Conducting e-Learning ・ Internet environment ・ Insufficient learning process (especially practical trainings)
Sriwijaya University	Form of e-Learning and Its Platform ・ Integrated teaching is conducted and skill training is conducted online using Zoom and the E-learning platform Universitas Sriwijaya Difficulties in Conducting e-Learning ・ Internet environment ・ Evaluation system
Padjadjaran University	Form of e-Learning and Its Platform ・ Face-to-face and online education are conducted in parallel under the curriculum of 2020 (lectures are online and hospital trainings are face-to-face) ・ Synchronous education such as seminars and discussions is conducted using Zoom or Google Meet, and management of handouts and asynchronous self-education are conducted by using Google Class or LiVE Unpad Difficulties in Conducting e-Learning ・ Relationship between medical practitioners and patients in the real setting and ethical issues
Diponegoro University	Form of e-Learning and Its Platform ・ Both face-to-face and online education are conducted especially for undergraduate students (lectures and practical trainings that do not need specific equipment are conducted online and trainings with particular equipment are done face-to-face on campus) ・ Asynchronous education is conducted using an education management system, Moodle-Based KULON, which was developed by UNDIP, although synchronous education is done for guidance or discussion by online such as Zoom and Teams Difficulties in Conducting e-Learning ・ Academic staff, administrative staff, and students were not familiar with the use of the existing online platform and technical points in the beginning of installation of e-learning ・ The server for learning management system is insufficient (there are errors in KULON when it is overloaded)
Sebelas Maret University	Form of e-Learning and Its Platform ・ Problem-Based Learning (Zoom) ・ On-demand/real-time lectures via Zoom and SPADA (Moodle-based e-learning management system) ・ Hybrid learning via online and face-to-face is conducted for practical trainings, skill

	training, and Skill Lab Session (those who live in the vicinity of the campus study face-to-face and those who live far away online) ・ Flipped learning is conducted for Skill Lab Session (assignments are provided and students are supposed to take a video of their practices and post in Google Drive. They have a discussion with their lecturers about their practical trainings) ・ Students have a discussion via Zoom for Lab Practice after lecturer's demonstration ・ Clinical case-based discussion is conducted via Zoom Difficulties in Conducting e-Learning ・ Dissatisfaction from students with Skill Lab Activity and the number of available videos ・ Insufficient staff capacity and equipment for conducting e-learning ・ Quality can be maintained for lectures via online, but it is difficult for practical trainings
Brawijaya University	Form of e-Learning and Its Platform ・ Updates of cardiovascular diseases and its actual cases in the city of Malang are provided to students online ・ Workshops on cardiovascular diseases are conducted online ・ Zoom and Google Meeting are used Difficulties in Conducting e-Learning ・ Participants are limited
Airlangga University	Form of e-Learning and Its Platform ・ Most of the subjects were conducted online for undergraduate, master degree and Ph.D. students when COVID-19 was expanding by using Airlangga e-learning web and Zoom ・ Clinical specialist programs are conducted, in principle, face-to-face, and partial e-learning was provided for monitoring, case reports, etc. Difficulties in Conducting e-Learning —
Udayana University	Form of e-Learning and Its Platform ・ On-demand/real-time lectures are provided online (Cisco Webex is used for general lectures, clinical skill lectures, etc.) ・ Questionnaire is distributed online for researches Difficulties in Conducting e-Learning ・ Internet environment
University of Mataram	Form of e-Learning and Its Platform ・ All the classes were provided online for undergraduates in the beginning of COVID-19 pandemic (Skills module, Basic medical science modules, Organ system modules, Emergency and family medicine modules) ・ Basic medical sciences (anatomy, physiology, biochemistry, microbiology, etc.) and practical trainings (history taking, physical examination skills, technical procedure skills, etc.) are provided online ・ Hospital trainees study online and face-to-face (50-50) ・ Most of the online classes are done using Zoom, some real-time with Google Hangout, BigBlueButton, etc. ・ Demonstration videos on clinical skills training, biomedical experiment, etc. are shared by on-demand style using Google Drive, YouTube, etc. Difficulties in Conducting e-Learning ・ Many academic staff feel that they are not familiar with e-learning and its platforms in terms of both knowledge and experience

	・ Internet environment and device capacity ・ Procurement of consumables for practical trainings ・ Simulated patients for clinical skill training ・ Safety of online exam system

3.4.3.3 Current status of implementation of telemedicine in the vicinity of the target universities

Although telemedicine is not yet popular in Indonesia, as stated before, it has gradually expanded in some areas due to the COVID-19 pandemic. The questionnaire identified how far telemedicine is known to be conducted in the vicinity of the target universities, as shown in Table 48.

Table 48 Current status of the implementation of telemedicine in the vicinity of the target universities

University	Current Status of Implementation of Telemedicine
University of Sumatera Utara	・ Telemedicine had been utilized in the beginning of the COVID-19 pandemic; however, it was not popular as of June 2021 due to low interest among citizens ・ According to the respondents to the questionnaire, there seems a relationship between low interest in telemedicine and the lower social status of patients
Sriwijaya University	・ Health consultation is conducted using video calls ・ Some doctors conduct health consultations via the Halodoc platform, issue slips of treatment details on Halodoc, and send prescribed medicine to patients using Gojek
Padjadjaran University	・ Faculty of medicine, UNPAD, communicates with COVID-19 patients using WhatsApp, Telegram, Zoom, Google Meet, etc. during self-quarantine ・ Faculty of medicine, UNPAD, dispatches 3 new general doctors to a telemedicine program and conducts diagnosis using WhatsApp or telephone ・ UNPAD invented AMARI COVID-19, a tool for detecting suspected events for infection and monitoring ・ UNPAD recognizes that patients living in rural areas are not familiar with using IT devices, the capacity of video devices is inadequate with low pixels, and signals are insufficient for telemedicine
Diponegoro University	・ Dr. Kariadi Hospital conducts virtual clinic for health consultation among existing and new patients (https://klinikvirtual.rskariadi.id/)
Sebelas Maret University	・ Telemedicine has not yet been conducted full-scale at UNS and only an online reservation system is available (website of hospital and WhatsApp) ・ Support of development for system and application for telemedicine is needed in the future ・ Mainly private hospitals and clinics conduct online enlightenment activities, especially for pregnant women, mothers of infants, diabetes patients, etc., in the vicinity of UNS
Brawijaya University	・ Telemedicine using smartphone applications such as DETAK and JANTUNGKU is conducted in the vicinity of Malang ・ DETAK is an application detecting the signs of cardiac infarction. Patients are required to stay home as much as possible under the COVID-19 pandemic, so it encourages them to ask for advice from medical facilities when detecting the signal ・ JANTUNGKU is an application raising awareness of cardiovascular diseases and provides patients with diagnosis, treatment, reference to specialist doctors, etc.
Airlangga University	・ Current status of telemedicine in their vicinity is not identified ・ UNAIR plans to develop the field of online diagnosis and treatment in the future

Udayana University	・ Online health consultation is conducted using WhatsApp for those who are infected with COVID-19 showing mild symptoms at UNUD hospital ・ Online diagnosis and online reservations for tests are conducted by Halodoc ・ Prescribed medicines are sent by Gojek and Grab
University of Mataram	・ Under Cov SIP (COVID-19 Self Isolation Program), UNRAM monitors daily symptoms, GPS information and dispatch of medicines, and responses in case of emergency for those who are infected with COVID-19 and staying at home or hotels run by UNRAM ・ Monitoring, dispatch of medicines, home care, and responses in case of emergency are conducted online especially for patients who have just undergone surgery, pregnant women, and patients with chronic diseases in order to decrease the chances to coming to hospital ・ Almost 50% of patients at UNRAM Hospital register for online exams and cooperate with data collection activities through the website or application ・ Data reporting is made through the information system of MoH Patients' data: http://sirs.yankes.kemkes.go.id/sirs Health insurance application data: http://bpjs-kesehatan.go.id Employee and student data: http://sisdmk.kemkes.go.id/home COVID-19-positive data: https://allrecord-tc19.kemkes.go.id/ ・ Information sharing is conducted among medical personnel using applications, websites, and platforms ・ Online prescription and delivery of medicines are mainly conducted in West Nusa Tenggara

3.4.4 Challenges and support needs of the faculties of medicine at the target universities

Based on the above current status, needs assessment for support was conducted at each faculty of medicine. In addition, expected outcomes for each support were also identified by the questionnaire as in Table 49.

Table 49 Support needs of the faculties of medicine at the target universities

University	Support Needs of Faculties of medicine at the target universities, and Its Expected Outcomes
University of Sumatera Utara	Support Needs ・ Construction of infectious disease center and cancer prevention/stem cell treatment center ・ Procurement of research equipment ・ Development of human resource enhancement program (student exchange program and visiting scholar program with Japanese universities) ・ Development of research collaboration program ・ Development of medical e-learning curriculum ・ Development of center for academic-industrial collaboration Expected Outcomes of Support ・ Faculty of Medicine, USU, has a vision of establishing a solid position in the field of tropical medicine and cancer prevention in Southeast Asian countries. Although it has wide range of experiences focusing on clinical research in the field of tropical medicine, basic research is limited. Therefore, it plans to expand basic research, which will benefit clinical research. Also, as it has already started research on stem cell treatment, the construction of a laboratory is late, so support of the construction

	of facilities is expected to expand the capacity of basic research ・ Expansion of the research network and implementation of research collaboration are expected through collaboration with Japanese universities. Procurement of equipment and consumables is also needed for research collaboration. Support of both capacity enhancement and construction/procurement will benefit the expansion of research capacity ・ Quality improvement is expected in terms of research capacity and provision of medical services to communities through human resource enhancement related to research capacity and equipment utilization ・ E-learning has been implemented since the COVID-19 pandemic. Development of an effective e-learning curriculum will provide effective education especially to pre-clinical students
Sriwijaya University	Support Needs ・ Updates of educational facilities, laboratories and equipment ・ Development of curriculum in basic education and medical education ・ Collaboration for research and papers, which will help increase the quality in medical biology and clinical education Expected Outcomes of the Support ・ Since there are various regulations on funding, human resources, etc., in UNS and the above support needs of human resource enhancement and construction/procurement cannot be fulfilled only with financial support from government and universities, the development of research and educational capacity is expected through JICA supports
Padjadjaran University	Support Needs ・ Construction of a research center representing West Java for COVID-19 and other emerging infectious diseases ・ Construction of a community telemedicine center and optimization of equipment ・ Support of the implementation of workshops for preventive medicine and health promotion in communities Expected Outcomes of the Support ・ Construction of research center and technical assistance will make it possible to detect COVID-19 or other newly emerging infectious diseases in West Java at an early stage and increase the capacity of prevention and management of diseases among medical personnel ・ It is expected to construct a relationship with various stakeholders in communities and accelerate community empowerment by using IT tools
Diponegoro University	Support Needs ・ Construction of medical simulation center ・ Procurement of research/educational equipment such as sequencing equipment, MA-3000 Direct Mercury Analyzer, etc. ・ Development of human resources enhancement program for increasing research and educational capacity Expected Outcomes of the Support ・ Hands-on trainings instructed directly by lecturers and practical trainings are not conducted under the COVID-19 pandemic. It is expected to increase knowledge and experience through face-to-face and online instruction by establishing simulation center with equipment for practical trainings such as mannequins for ATLS/ACLS training, etc. ・ Sequencing equipment is essential to identify variants of viruses such as COVID-19 and genetic diseases. In addition, Faculty of Medicine, UNDIP, has a collaborative relationship with National Institute of Minamata Disease and Kagoshima University

	and has conducted student/researcher exchanges and joint research on the influence of mercury exposure on health; however, these activities have been difficult due to COVID-19 and research conducted using equipment of the Japanese side has been stopped. UNDIP is able to conduct similar research by installing a 3000 Direct Mercury Analyzer and higher-quality research collaboration can be expected with Japanese institutions ・ Faculty of Medicine, UNDIP, has a cooperative relationship with Hiroshima University, Kagoshima University, Tottori University, Hokkaido University, Kyushu University, etc., and a mutually beneficial relationship can be enhanced by continuing degree/non-degree programs, visiting scholar and researcher exchanges, and research collaboration
Sebelas Maret University	Support Needs The Faculty of Medicine, UNS, contributes to society based on the three principles of education, research, and community outreach. Additionally, it is expected to conduct activities that can increase the rate of self-generated income. According to the above situation, Faculty of Medicine, UNS requests the following: ・ Construction of integrated medical research center consisting of a wet laboratory (pre-clinical, biomolecule, genomic analysis research, etc.) and dry laboratory (medical education, epidemiology, digital health, etc.) (Faculty of Medicine, UNS, is famous for its curriculum for acupuncture and herbal medicine, and construction of related research units is under consideration. Currently, drug efficacy is measured at external institutions due to lack of infrastructure and equipment) ・ Construction of small puskesmas for the purpose of both primary healthcare and education for undergraduate preclinical/clinical training students (UNS establishes their own puskesmas model through cooperation with local government so that they can contribute to society by providing medical services and educate students by providing training at the primary healthcare facility) ・ Development of international program/research collaboration program with Japanese universities (student exchange, expansion of faculty networks, etc.) ・ Support for IT infrastructure and IT capacity enhancement among staff (support both on capacity enhancement and infrastructure for development for online education is requested. Animation or VR of lectures on pharmacology, anatomy, physiology, etc., will encourage understanding of students) Expected Outcomes of the Support ・ Faculty of Medicine, UNS, is entitled to PTNBH status, similar to a corporation, and has financial independence to some extent without authentication by the central government. Construction of integrated medical research center will strengthen research capacity, in addition to increasing self-generated income. ・ UNS is promoting inter-professional education in tokology, psychology, pharmaceutical sciences, etc., and it will be accelerated, with the expectation of contributing to community medicine by establishing puskesmas with an educational role ・ Many young researchers have a Ph.D. in emerging medical fields (genomic analysis, big data, health economics, etc.) and collaboration with Japanese universities and research collaboration programs are expected to strengthen the research capacity of these researchers. In addition, the Faculty of Medicine, UNS, plans to start the International Undergraduate Program (IUP) in the field of medicine in 2023, and development of students exchange program will benefit the progress of IUP ・ Even after the COVID-19 pandemic, the importance of e-learning will not change; it will play a supplementary role to face-to-face lectures, making it is indispensable especially for generation Z. Therefore, updating the knowledge and infrastructure of IT is necessary and expected for increased educational effect
Brawijaya	Support Needs

University	・ Development of a telemedicine system and digitalization of medicine, and procurement of equipment (server, network of ambulances, doctor cars, quality increase of nurses and equipment) ・ Construction of research facilities and hospital (university hospital, laboratory, research center for cardiovascular diseases, etc.) ・ Construction of educational facilities (basic life support model of cardiovascular diseases, etc.) ・ Development of human resources enhancement programs (degree/non-degree study-abroad program) Expected Outcomes of the Support ・ Faculty of Medicine, UB, has a vision of strengthening telemedicine and the digitalization of medicine in the future, and the above support will benefit the vision of UB in all aspects
Airlangga University	Support Needs ・ Procurement of equipment, software and platform for telemedicine, and education of expertise ・ Procurement of laboratory equipment ・ Development of e-learning such as production of movies for medical treatment, interactive mannequin, and 3D movies ・ Development of joint degree program for human resource enhancement ・ Development of research collaboration program for research capacity enhancement ・ Development of hospital management Expected Outcomes of the Support ・ Strengthening the network of healthcare services is expected through development of telemedicine ・ Development of basic research and educational activities is expected ・ Educational effectiveness is expected to be strengthened by using interactive mannequins when it is possible to substitute them for actual patients ・ Quality of research and education is expected to be enhanced ・ Expansion of researcher network is expected ・ Quality of organization management as university hospital is expected to be enhanced
Udayana University	Support Needs ・ Procurement of equipment ・ Development of academic staff exchange program ・ Development of research collaboration program ・ Development of local community service Expected Outcomes of the Support ・ Research capacity of Faculty of Medicine, UNUD, is expected to be enhanced
University of Mataram	Support Needs ・ Construction of research laboratories at university hospital (vaccine subunit development, stem cell research, microbiome, and whole genome sequencing) ・ Procurement of equipment (research & ICT equipment/software for online education system, particularly plagiarism checker and secure online examination system) ・ Development of research collaboration program with Japanese institutions ・ Expansion of computer-based test center ・ Development of e-learning system contributing clinical trainings and inter-professional education in remote areas ・ Development of degree (master and Ph.D.)/non-degree (visiting scholars and research exchange) study-abroad program ・ Development of international program with Japanese universities (twinning program

and double degree program)
- Development of control system for hospital-acquired infection

Expected Outcomes of the Support

- Although UNRAM is conducting research collaboration such as genetic profiling and microbiome work, samples are tested at other institutions due to the shortage of equipment. Construction of research laboratory will enable them to test the samples by themselves, which will be of benefit not only financially but also in terms of the research capacity of staff
- Installation of both safe online examination system and plagiarism detection software is necessary for the implementation of e-learning. Because the current system is not so high-quality, installation of a trustworthy system will increase the effectiveness of e-learning
- Most of the research at the Faculty of Medicine, UNRAM, is cross-sectional studies due to the shortage of human resources and funding. Therefore, it is difficult for researchers to submit research papers to international publications. The academic staff is willing to conduct research collaborations with Japanese research institutions, which will enhance their research capacity and provide them with research experience. Mutual research between UNRAM and Japanese institutions, research environment, faculty development, student life support, etc., are expected to be developed
- Although the current computer-based test center can accommodate 120 persons, the number of people in the room is currently reduced as a safety measure against COVID-19. There are 400 students total, and multiple sessions are needed to conduct high-stakes tests. Expansion of the computer-based test center will shorten the time for the test and implement it more efficiently
- One of the missions of the Faculty of Medicine, UNRAM, is to develop medical services in remote areas and ensure the provision of educational opportunities to students to conduct medical activities in cities and rural areas of West Nusa Tenggara. However, the provision of education to students cannot be done in remote areas because there is a shortage of human resources and items for education in those areas. Therefore, the development of an e-learning system is inevitable for clinical students in remote areas. It is expected that an efficient e-learning system will contribute to the development of medical services in those areas by connecting UNRAM and mentors and students there. In addition, UNRAM is planning to conduct inter-professional education (IPE) between faculty of medicine and faculty of pharmaceutical sciences; however, both faculties have different schedules, which makes it difficult for them to conduct full face-to-face IPE. This suggests that hybrid lectures consisting of face-to-face and online instruction are more realistic. Furthermore, collaboration among specialist institutions such as nursery schools, and midwifery schools is available and active relationships among professionals are expected through e-learning
- An increase in research capacity is expected in the Faculty of Medicine, UNRAM, by providing young lecturers with a chance to obtain a further degree and to conduct post-doctoral research in Japanese universities
- Faculty of Medicine, UNRAM, is planning to open two specialist programs in the surgical department and department of obstetrics and gynecology and a new master degree program. The development of partnerships and international study programs with Japanese universities is expected to provide the programs with international insights and chances to participate in overseas conferences and clinical training abroad
- Technical support for anti-infectious disease measures and antibacterial management by Japanese university hospitals is well-known worldwide. Learning cases in Japan and installation of a hospital infection control system will enable UNRAM hospital

	to increase the quality of responses to existing/unknown infectious diseases

Chapter4 Situation and issues of vocational education in Indonesia and the needs for cooperation

4.1 Industrial trends in Indonesia and the relationship of education and training fields in polytechnics with industry

Indonesia’s nominal GDP for 2019 was $11,191 million and the nominal GDP per capita was $4,174.9, and the economy had been growing at around 5% for the last few years until the outbreak of the new coronavirus. The composition of nominal GDP is as follows: manufacturing (19.9%), agriculture, forestry, and fishing (12.8%), accommodation and food service activities (15.8%), mining and quarrying (8.1%), construction (10.5%), transportation and storage (9.1%), financial and insurance activities (4.2%), and administrative services, military, and social security (3.7%). The manufacturing sector accounts for the largest share. In terms of employment, those engaged in agriculture, forestry, and fishing accounted for the largest share (29.76%), while those engaged in manufacturing accounted for 13.6%, the third largest share by industry after agriculture, forestry, and fishing (29.76%), and wholesale and retail trade; repair of motor vehicles and motorcycles (19.23%).[28]

The table below shows the region’s gross regional product and employment as a percentage of the national total. It is clear from the table that the Java region is the center of the country in terms of both economy and employment. In terms of gross domestic product, Java accounts for 59.4% of Indonesia’s total, followed by Sumatra, which accounts for 21.4%. The same trend is seen in terms of the number of employees. Java accounts for 57.3% of Indonesia’s total, followed by Sumatra at 21.3%. According to the National Industrial Development Master Plan (RIPIN) 2015–2035, 22 Industrial Development Regions (WPPI) encompassing 21 provinces and 86 cities and districts have been established. Furthermore, according to the Medium Term National Development Plan (2020–2024), in addition to the 9 priority industrial zones *(Kawasan Industri Prioritas Nasional*), the goal is to establish 18 new industrial zones in all of Indonesia. The WPPI aims to build on the potential of each region and leverage it for the development of local industries and, ultimately, the local economy.

Table 50 Gross regional product and employment in each region as a percentage of the national total

Region	Gross regional product as a percentage of the national total *	Regional employment as a percentage of the national total **
Sumatera	21.4%	21.3%
Jawa	59.4%	57.3%
Bali & Nusa Tegggara	3.0%	5.7%
Kalimantan	8.4%	6.1%
Sulawesi	6.2%	7.0%
Maluku & Papua	2.6%	2.7%

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[28] Labour Force Situation in Indonesia (August 2020), Page 71-Page 72

Source: * Gross Regional Domestic Product of Provinces in Indonesia by Industry, BPS-Statistics Indonesia

** Labor Force Situation in Indonesia, BPS-Statistics Indonesia

Next, the situation of the major industries by region and province differs by region. The table below lists the industries that account for the largest share of regional GDP in each province belonging to the region.

Table 51 Main industries in each region

Region	Industry that accounts for the largest share of GDP for the province in the region
Sumatera	Agriculture, forestry and fishing, manufacturing, mining and quarrying
Java	Manufacturing, wholesale and retail trade; repair of motor vehicles and motorcycles
Bali & Nusa Tenggara	Accommodation and food service activities, agriculture, forestry and fishing
Kalimantan	Agriculture, forestry and fishing, mining and quarrying
Sulawesi	Agriculture, forestry and fishing
Maluku & Papua	Agriculture, forestry and fishing, manufacturing, mining and quarrying

Source: Gross Regional Domestic Product of Provinces in Indonesia by Industry, BPS-Statistics Indonesia

In the Java region, the main industries are manufacturing and wholesale and retail trade; repair of motor vehicles and motorcycles, while in other regions the main industries are agriculture, forestry, and fishing or mining and quarrying. However, since Bali Province, one of the world’s most popular tourist destinations, is located in the Lesser Sunda Islands, accommodation and food service activities are included in the main industries of the region.

Since each region and province has its own major industries, it is assumed that each polytechnic provides education and training programs with these industries in mind. In this survey, we conducted a questionnaire survey of the polytechnics covered by this study and asked about the main fields of education and training at each school. The table below shows the major industries by state, the polytechnics that are located in the province, and the major education and training fields of the polytechnics. From the table, it can be seen that there are a few polytechnics that list engineering as a major field of education and training regardless of the provinces’ major industry, but at this level of classification of industries and fields of education and training, it can be said that the major fields of education and training are aware of the major industries, although only approximately.

Table 52 Major industries in each province and major education and training sectors of polytechnics covered by this study

Region	State	Main Industry＊		Polytechnics covered by this study and located in the province	Major areas of education and training at the polytechnics＊＊
		Ranked 1st (% of GDP in the region)	Ranked 2nd (% of GDP in the region)		
Sumatera	Ache	Agriculture, Forestry and Fishing (27.9%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.6%)	Politknik Negri Lhokseumawe	Engineering, Business
	Sumatera Utara	Agriculture, Forestry and Fishing (27.9%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.6%)	Politeknik Negeri Medan	Engineering
	Sumatera Barat	Agriculture, Forestry and Fishing (22.3%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles(15.8%)	Politeknik Negri Padang	Engineering, Business
				Politeknik Pertanian Negri Payakumbuh	Agriculture
	Riau	Manufacturing (30.3%)	Agriculture, Forestry and Fishing (25.8%)	Politeknik Negri Bengkalis	Maritime
	Jambi	Agriculture, Forestry and Fishing (26.4%)	Mining and Quarrying (24.1%)	_	
	Sumatera Selatan	Mining and Quarrying (22.1%)	Manufacturing (18.8%)	Politeknik Negri Sriwijaya	Engineering
	Bengkulu	Agriculture, Forestry and Fishing (27.9%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.9%)	_	
	Lampung	Agriculture, Forestry and Fishing (28.8%)	Manufacturing (18.6%)	Politeknik Negri Lampung	Agriculture, Business
	Kepulauan Bangka Belitung	Manufacturing (19.0%)	Agriculture, Forestry and Fishing (16.6%)	Politeknik Manufaktur Negeri Bangka Belitung	(No answer)
	Kepulauan Riau	Manufacturing (37.4%)	Construction (18.0%)	Politeknik Negeri Batam	(No answer)
Jawa	DKI Jakarta	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.9%)	Manufacturing (12.7%)	Politeknik Negeri Jakarta	Engineering
	Jawa Barat	Manufacturing (43.4%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.3%)	Politeknik Negeri Bandung	(No answer)
				Politeknik Manufaktur Negri Bandung	Engineering
				Politeknik Subang	Agriculture
				Politeknik Negri Indramayu	Engineering
	Jawa Tengah	Manufacturing (34.2%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (14.5%)	Politeknik Negri Semarang	Engineering
				Politeknik Maritim Negeri Indonesia	Maritime
				Politeknik Negeri Cilacap	Engineering
	DI Yogyakarta	Manufacturing (12.7%)	Information and Communication (11.1%)	_	
	Jawa Timur	Manufacturing(29.9%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles(18.6%)	Politeknik Negri Malang	Engineering, Business
				Politeknik Elektronika Negeri Surabaya	(No answer)
				Politeknik Negri Jember	Agriculture
				Politeknik Perkapalan Negri Surabaya	Engineering
				Politeknik Negri Madium	Engineering
				Politeknik Negri Madura	Engineering, Health Science
				Politeknik Negri Banyuwangi	Humanities
	Banten	Manufacturing (34.4%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (13.5%)	_	
Bali & Nusa Tegggara	Bali	Accommodation and Food Service Activities (20.3%)	Agriculture, Forestry and Fishing (13.5%)	Politeknik Negri Bali	Humanities
	Nusa Tenggara Barat	Agriculture, Forestry and Fishing (23.5%)	Mining and Quarrying (14.4%)	_	
	Nusa Tenggara Timur	Agriculture, Forestry and Fishing (27.1%)	Public Administration and Defence; Compulsory Social Security (12.8%)	Politeknik Negeri Kupang,	(No answer)
				Politeknik Pertanian Negri Kupang	Agriculture
Kalimantan	Kalimantan Barat	Agriculture, Forestry and Fishing (23.2%)	Manufacturing (15.7%)	Politeknik Negeri Pontianak	Agriculture, Engineering
				Politeknik Negeri Sambas	Agriculture
				Politeknik Negeri Ketapang	Agriculture
	Kalimantan Tengah	Agriculture, Forestry and Fishing (20.9%)	Mining and Quarrying (15.7%)	_	
	Kalimantan Selatan	Mining and Quarrying (25.7%)	Agriculture, Forestry and Fishing (14.0%)	Politeknik Negeri Banjarmasin	Engineering, Business
				Politeknik Negeri Tanah Laut	(No answer)
	Kalimantan Timur	Mining and Quarrying (46.8%)	Manufacturing (21.0%)	Politeknik Negeri Samarinda	Engineering, Business
				Politeknik Pertanian Negeri Samarinda	Engineering, Business
				Politeknik Negeri Balikpapan	(No answer)
	Kalimantan Utara	Mining and Quarrying (27.9%)	Agriculture, Forestry and Fishing (17.2%)	_	
Sulawesi	Sulawesi Utara	Agriculture, Forestry and Fishing (30.0%)	Construction(13.5%)	Politeknik Manado	Engineering, Business, Humanities
				Politeknik Negeri Nusa Utara	Agriculture, Health Science, Engineering, Humanities
	Sulawesi Tengah	Agriculture, Forestry and Fishing (28.3 %)	Mining and Quarrying (14.8%)	_	
	Sulaweshi Selatan	Agriculture, Forestry and Fishing (21.0%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (15.2%)	Politeknik Negeri Ujung Pandang	Engineering, Business
				Politeknik Pertanian Negeri Pangkajene Kepulauan	(No answer)
				Politeknik Negeri Media Kreatif	Art
	Sulawesi Tenggara	Agriculture, Forestry and Fishing	Mining and Quarrying (21.1%)	_	
	Gorontalo	Agriculture, Forestry and Fishing (37.5%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (11.3%)	_	
	Sulawesi Barat	Agriculture, Forestry and Fishing (39.0%)	Manufacturing (10.8%)	_	
Maluku & Papua	Maluku	Agriculture, Forestry and Fishing (34.5%) Public Administration and Defence; Compulsory Social Security (9.8%)	Public Administration and Defence; Compulsory Social Security (9.8%)	Politeknik Negeri Ambon,	Engineering, Business
				Politeknik Perikanan Negeri Tual	Agriculture
	Maluku Utara	Agriculture, Forestry and Fishing (21.2%)	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (18.1%)	_	
	Papua Barat	Manufacturing (31.4%)	Mining and Quarrying (19.1%)	Politeknik Negeri Fakfak	Engineering
	Papua	Mining and Quarrying (43.0%)	Construction (10.7%)	_	

Source: *Gross Regional Domestic Product of Provinces in Indonesia by Industry, BPS-Statistics Indonesia

** Questionnaire survey to Polytechnics by this study

4.2 Overview of vocational higher education and the target of this survey

As described in Chapter 2, Section of 2.2.1.2 “Type of higher education institutions”, all six types of higher education institutions permitted in Indonesia can provide vocational education services. On the other hand, three types of higher education institutions, namely the Polytechnic, Academy, and Community Academy types, are allowed to offer only vocational education. Of these, polytechnics have the largest number of enrolled students and cover diploma and post-graduate programs. This study will focus on polytechnic education.

4.3 Basic information on polytechnics and the current situation and challenges of job-placement for students

4.3.1 Overview of polytechnics

Polytechnic education was initially initiated with the opening of *Politeknik Mekanik Swiss* in Bandung in 1976, now known as *Politeknik Manufaktur Bandung* (POLMAN), which became the model for polytechnic education in Indonesia, which develops human resources with adequate practical skills at the tertiary level.[29] The development of this polytechnic education is considered successful. Furthermore, polytechnic education continues to be developed by MoECRT, as a government project financed with the assistance of the World Bank (World Bank). In 1979, six polytechnics were established in several areas,: Medan, Palembang, Jakarta, Bandung, Semarang and Malang. Currently there are 44 state polytechnics under MoECRT spread throughout Indonesia.

As of 2019, the total number of polytechnics was 304, located at all 34 provinces in Indonesia, of which 213 are under the jurisdiction of MoECRT, and 43 are state (Negeri) polytechnics.[30] The 43 state polytechnics are located in 21 of the 34 provinces; the number of provinces increases to 31 if private polytechnic are considered.[31]

Since 2010, the government has been developing public higher education institutions, including polytechnics. One of the triggers was the unconstitutional judgement[32] against the series of Acts that

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[29] http://politeknik.or.id/detail/profil

[30] Although the number of polytechnics under the Ministry of Education is 44, as of January 2021, this survey targeted 43 polytechnics established by March 2020. Politeknik Negeri Nunukan was newly established in 2020 in North Kalimantan Province.

[31] The following provinces do not have state polytechnics under the Ministry of Education: Banten, D.I. Yogyakarta, Jambi, Bengkulu, Kalimantan Tengah, Kalimantan Utara, Gorontaro, Sulawesi Tengah, Surawesi Barat, Surawesi Tenggara, Maluku Utara, Nusa Tenggara Barat, and Papua.

[32] According to the "National Education System Law (2003 Law No. 20)" and the "Education Corporation Law (2009 Law No. 9)", all school management was to be carried out by the education corporation. Those laws were accused of violating the Constitution since these regulations meant that the education service that the state should be responsible was entrusted their responsibilities to an educational corporation. In March 2010, the Constitutional Court ruled that the part of each law that corresponds to an educational corporation was unconstitutional.

had required the establishment of an educational corporation for the management of educational institutions. In response to this judgement, the Act of Higher Education was enacted, which emphasizes the government's involvement in higher education. Immediately after the judgement, the conversion of private higher education institutions into public ones began, and the enactment of a new act (Act 2024, No. 17) clarifies the regulations for the conversion. In this context, 16 state polytechnics have been newly established since 2010, and most of them were converted from private polytechnics.[33]

According to the evaluation results of higher education institutions in Indonesia released by the Ministry of Education and Culture in August 2019, 5 polytechnics, all state polytechnics, were evaluated as Cluster 2, the second highest cluster. None of the vocational educational institutions were rated as Cluster 1, the highest cluster, while 47 polytechnics, including 21 state polytechnics, were rated as Cluster 3, the lowest. Below is the list of the top 20 schools.

1. **Politeknik Elektronika Negeri Surabaya (Score 2.276 – Cluster 2)**
2. **Politeknik Negeri Bandung (Score 2.037 – Cluster 2)**
3. **Politeknik Negeri Malang (Score 1.867 – Cluster 2)**
4. **Politeknik Negeri Semarang (Score 1.756 – Cluster 2)**
5. **Politeknik Pertanian Negeri Payakumbuh (Score 1,720 – Cluster 2)**
6. **Politeknik Negeri Ujung Pandang (Score 1.587 – Cluster 3)**
7. **Politeknik Negeri Jakarta (Score 1.582 – Cluster 3)**
8. **Politeknik Negeri Padang (Score 1.582 – Cluster 3)**
9. **Politeknik Pertanian Negeri Pangkajene Kepulauan (Score 1.565 – Cluster 3)**
10. **Politeknik Negeri Bali (Score 1.498 – Cluster 3)**
11. **Politeknik Negeri Manado (Cluster 3)**
12. **Politeknik Negeri Sriwijaya (Cluster 3)**
13. Politeknik Caltex (Cluster 3)
14. **Politeknik Negeri Medan (Cluster 3)**
15. **Politeknik Perkapalan Negeri Surabaya (Cluster 3)**
16. **Politeknik Negeri Lampung (Cluster 3)**
17. Politeknik Indonusa Surakarta (Cluster 3)
18. **Politeknik Negeri Lhokseumawe (Cluster 3)**
19. Akademi Akuntansi YKPN (Cluster 3)
20. **Politeknik Negeri Madiun (Cluster 3)**

(Bold: State polytechnic under MoECRT)

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[33] Taishi Wake, "A Study on the Transformation of National University Development Policy in Indonesia"

4.3.2 Survey of polytechnics

For the purpose of proposing the direction of JICA's cooperation in the vocational education sector, existing information and data were first collected by referring to websites and reviewing documents. A questionnaire survey and interview survey of polytechnics were then conducted as follows.

Step 1: Creating a questionnaire form
Step 2: Issuing a letter from the Ministry of Education and Culture to the polytechnics concerned
Step 3: Contacting all polytechnics and requesting that they answer the questionnaire (questionnaire period, October 6–23, 2020)
Step 4: Reporting the summary of the questionnaire results to the Ministry of Education and Culture
Step 5: Contacting selected polytechnics to conduct interviews (January 2021)

In this survey, a questionnaire was sent to 43 polytechnics to collect basic information and data, and 37 polytechnics responded (see Attachment 8 for the result of the questionnaire). Interviews were conducted online or by visiting at five selected polytechnics (see Attachment 9 for the interviewees).

Table 53 Questionnaire Items

1. Basic Information of Polytechnics (Accreditation, Field of Study, Number of Students)
2. Job-Placement Situation of Students （1） Department or Section which supports job-placements, and its Role （2） Methodology of Job-Placement （3） Information of Companies / Institutions where students were hired or enrolled （4） List of companies of which have hired students fro last 5 years （5） Issues and challenges of job-placement
3. Expectation of cooperation from outside

As mentioned before, RPJMN 2020–2024 selected five fields as high priority for the development of Indonesia. In this survey, three fields, namely (1) transportation equipment (automobiles), (2) electricity / electronics, and (3) food processing (agro business), were selected considering their strong impact, and target polytechnics were chosen accordingly. In addition, in order to investigate the impact of location on the quality and operation of polytechnics, the locations of polytechnics, especially on Java Island and elsewhere, were also considered. Besides the field and location, the level of polytechnics was also considered, anticipating that the issues and challenges that the polytechnic faces would differ depending on its level. In terms of the interview method, the survey team was planning to visit the polytechnics directly for on-site interview, but this was prevented by the COVID-19 pandemic. Hence, the interviews were conducted online or by visits by partnered local staff.

Table 54　List of interviewed polytechnics

	Name and Location	Field	特徴	Level	Method
1	*Politeknik Elektronika Negeri Surabaya*（PENS）（Kota Surabaya, Jawa Timur）	(2)	A polytechnic that has a history of support from JICA and is a leading polytechnic in the field of electronic and electrical engineering. Ranking No.1 in the cluster evaluation of vocational education institutions 2019 by the MoECRT. Target polytechnic of PDEP and RPTV.	High	Online
2	*Politeknik Negeri Malang*（POLINEMA）（Kota Malang, Jawa Timur）	(1), (2)	A polytechnic that has conducted deep collaboration with industry. Ranking No.3 in 2019 evaluation. Target polytechnic of PDEP and RPTV.	High	Visit
3	*Politeknik Negeri Jember*（POLIJE）（Kabupaten Jember, Jawa Timur）	(3)	A leading polytechnic in the field of agriculture. Might have local industry collaboration for food processing. Ranking No.24 in 2019 evaluation. Target polytechnic of PEDP.	Middle	Visit
4	*Politeknik Negeri Banjarmasin*（POLIBAN）（Kota Banjarmasin, Kalimantan Selatan）	(1), (2)	A polytechnic that is located outside Java. Close to big industrial city and might have collaboration with local industry.	Middle	Online
5	*Politeknik Negeri Nusa Utara*（POLNUSTAR）（Kabupaten Kepulauan Sangie, Sulawesi Utara）	(3)	A polytechnic that is located outside Java, and islands area. Active in marine affairs field. Far from big cities, and might face difficulties in collecting students and acquiring budget.	Low	Online

Table 55　Items of Interview

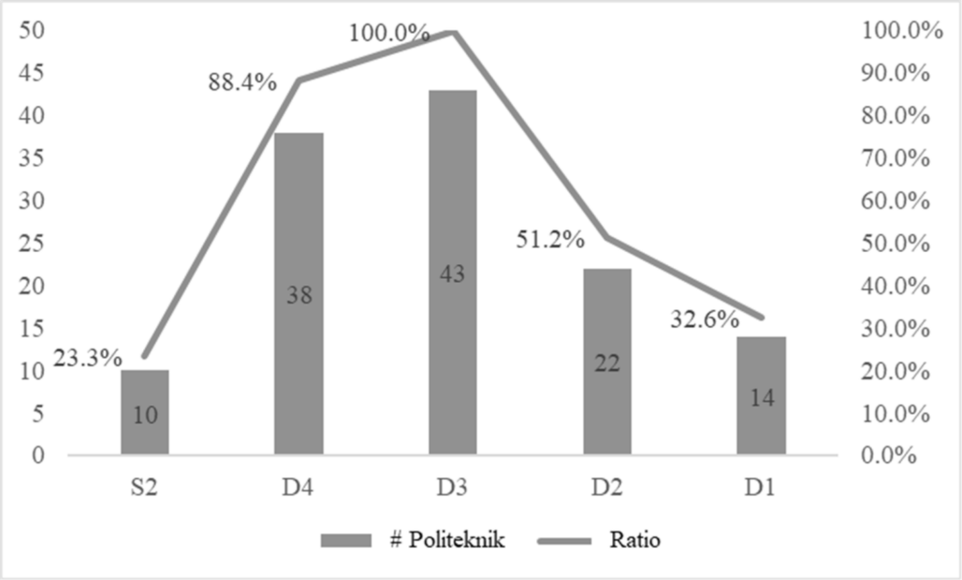
1. History and Overview of Polytechnic
2. Management (Budget, Organization, Method of procurement of facilities and its maintenance)
3. Quality improvement of education (curriculum development, teaching staff development)
4. Collaboration with industries

The results of the questionnaire and interview surveys are summarized below for each item.

4.3.3　Basic information of the polytechnics

The 43 polytechnics targeted in this survey are located all over the country and cover a wide range of fields (list is attached as Attachment 10). The study programs that the polytechnics currently provide are diploma programs and applied master's programs (*Pascasarjana Terapan*, usually referred to as S2, which means master's degree). The diploma program ranges from 1 to 4, where the numbers correspond to the period of study. Diploma 4 is at the same level as a bachelor's degree *(Sarjana*, commonly referred to as S1).

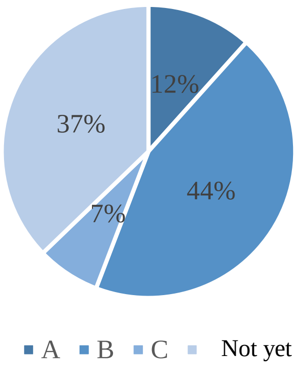
The figure below shows the number and ratio of diploma programs and applied master's programs of each polytechnic. All polytechnics offer the Diploma 3 program, and many offer the Diploma 4 program. Ten polytechnics offer applied master's programs, showing that polytechnics offer a high level of education programs. At this moment, there is no polytechnic that offers an applied doctoral program, but it is possible to do so under the Act, and in fact some polytechnics are planning to launch such a program.



Source: Questionnaire survey result

Figure 17 Number of study program that 43 polytechnics offered by degree level

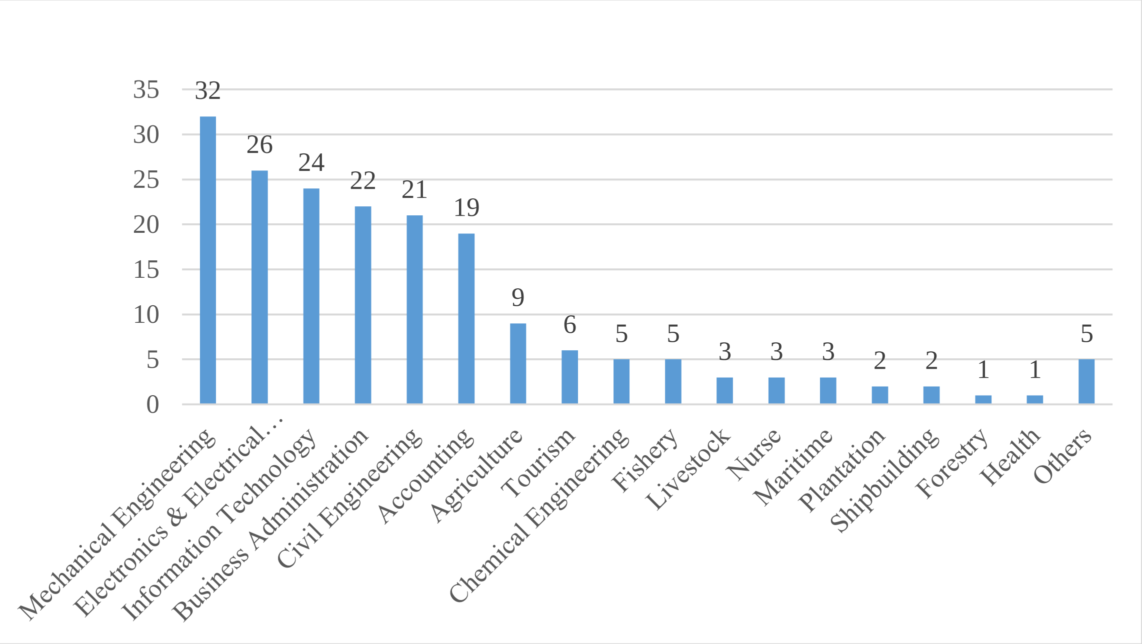
The status of acquisition of accreditation as an institution is as shown in the figure below. 37% of polytechnics have not acquired accreditation, which is one of issues that polytechnics face. The possible influences of "no" or "low" accreditation status, although they were not necessarily found through the survey, are; 1) the number of applicants to the polytechnic may decrease since the accreditation is one of key factors to evaluate the quality of the institution, 2) students might have difficulties in finding jobs since industries sometimes give minimum accreditation score when recruiting students.



Source: Questionnaire survey result

Figure 18 Accreditation as an institution acquisition status

In terms of the field of study, mechanical engineering is the most common, followed by electrical / electronic engineering and information engineering. In other words, there are many polytechnics that provide engineering education. On the other hand, polytechnics offer many kinds of fields of study other than engineering, such as business management (the fourth most common), accounting (the sixth most common), agriculture, tourism, fishing, and nursing.

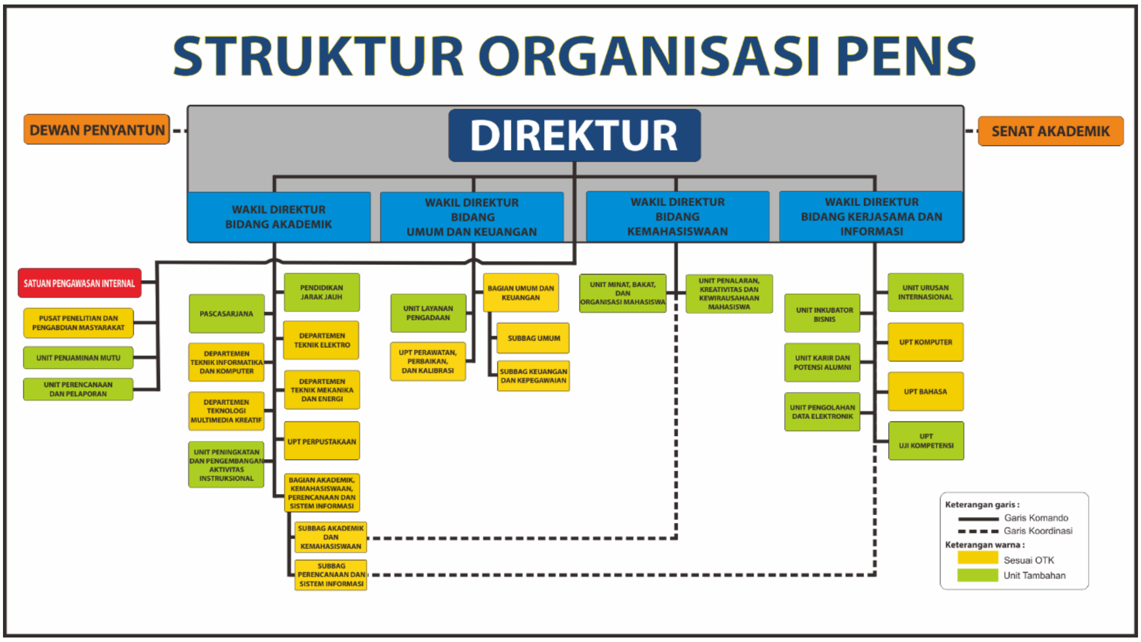


Source: Questionnaire survey result

Figure 19 Number of study program by field of study

4.3.4 Organization and management system

Under the Director (*Direktur*), polytechnics have four vice-directors (*Wakil Direktur*), one each for (1) academic affairs, (2) general and financial affairs, (3) students affairs, and (4) cooperation and information affairs. There are also departments under the direct control of the Director. The following is an organizational chart of *Politeknik Elektronika Surabaya*.



Source: Website of PENS

Figure 20 Organizational structure of PENS

For educational programs, the study programs are provided at each department (*jurusan*) as subordinate organization of the Vice-Director for Academic Affairs. When establishing a new study program, the polytechnic should obtain approval from MoECRT. The curriculum is being improved on a regular basis, sometimes receiving advice from industry. All of the polytechnics interviewed in this survey answered that local industry was involved in improving the curriculum.

In order to strengthen the state polytechnics under MoECRT, a forum has been set up to which all polytechnics join. The forum organizes regular activities, including monthly meetings, planning of exchange programs for faculty and staff, and strengthening of cooperation with industry. The current secretariat of the forum is PENS.

4.3.5 Budget

The revenue of polytechnics is broadly divided into the state budget (APBN) allocated by the central government, and the revenue from its own activities (PNBP). PNBP mainly consists of tuition fees from students (UKT: *Uang Kuluah Tunggal*), and also partly consists of outsourced research income. UKT is set at 8 levels according to household income. The following is the budget status of the five polytechnics interviewed.

Table 56 Budget of 5 polytechnics

Polytechnic (base year)	Budget Amount（Amount of PNBP and its portion）
PENS (2020)	Approx 80 bil rupiah（Approx 36 bil rupiah: 45%）
POLINEMA（2020）	Approx 140 bil rupiah（Approx 70 bil rupiah: 50%）
POLIJE（2020）	Approx 138 bil rupiah（Approx 68 bil rupiah: 49%）
POLIBAN（2019）	Approx 76 bil rupiah （Approx 11 bil rupiah: 14%）
POLNUSTAR (2019)	Approx 17.6 bil rupiah（Approx 3 bil rupiah: 17%）

Source: Interview result

It can be seen that PENS, which ranks first in the cluster evaluation, POLINEMA, which ranks third, and POLIJE, which is a medium-level polytechnic located on Java Island, have a relatively large budget and a high proportion of PNBP. On the other hand, POLIBAN, located outside Java, and POLNUSTAR, located outside Java and relatively low-level, have low budgets and low PNBP ratios. According to interview surveys, much of the budget is spent on operational fees and equipment maintenance, and is not enough to cover facility construction, new equipment purchases, teacher strengthening, or student program support, which depend on external support such as the Polytechnics Education Development Project (PEDP)[34] of ADB and the Revitalization of Vocation Education (RPTV)[35] of the Ministry of Education and Culture, and donations from companies. These forms of external support are not consistent.

4.3.6 Teaching staff

The status of teaching staff is divided into civil servants (*Pegawai Negeri Sipil*: PNS) and government employees based on employment contracts (*Pegawai Pemerintah dengan Perjanjian Kerja*: P3K), which both have status as civil servants (*Aparatur Sipil Negara*: ASN), and non-civil servants. PNS and P3K-status staff are hired via selection procedures by the Indonesian government personnel authorities, while non-civil servants can be hired by each polytechnic. The position of

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[34] This is a project which provided equipment and human resources development assistance and the National Skill Fund (NSF) to 34 public and private polytechnics under the Ministry of Education. Budget size was 8.5 million USD for loans and 4.9 million USD for grants.

[35] A project executed by the Ministry of Education, supporting 12 polytechnics as pilot programs. The contents were curriculum improvement, teacher strengthening, student ability qualification system, instructor dispatch from industry, cooperation with industry, strengthening teaching industry.

teaching staff is called Dosen (Lecturer), which is one of the functional official positions (*Jabatan Fungsional*) granted by the MoECRT, and has the types of *Guru Besar* (Professor), *Lektor Kepala* (Associate Professor), *Lektor* (Lector), and *Asisten Ahli* (Expert Assistance).

The teaching staff qualification (*Sertifikasi Dosen*), which was previously required only for university faculty members, has been required for polytechnic faculty members since 2019. The conditions to acquire this qualification are (1) two years or more of teaching experience, (2) having a position of *Asisten Ahli* or higher, and (3) passing the qualification test.

Although a master's degree or higher is required, some teaching staff still do not have a master's degree, as shown in the table below. Interview results revealed that all polytechnics recommend that the teaching staff obtain doctoral degrees.

Methods for improving teaching staff quality include internships at companies and other educational institutions including polytechnics, and short-term training. The purpose of internships at companies is to acquire the latest technology and skills and to grasp the needs of industry, while that at other higher education institutions is to acquire and develop management and teaching skills. Internships at companies bring subsequent collaboration between the polytechnic and companies, which in turn lead to the employment of students and improvement of polytechnic programs.

Table 57　Degree status of Teaching Staff at Polytechnics

	D1-D4	S1	S2	S3	Professions	Specialist
Full time	21	204	7,097	618	2	6
Part time	48	153	190	5	7	0
Total	69	357	7,287	623	9	6

Source: Higher Education Statistics 2019

According to the data of MoECRT, the percentage of master's degree and doctoral holders at all polytechnics is 87% and 7%, respectively. On the other hand, 24% of the teaching staff at PENS, the high-ranking polytechnic, have a doctoral degree. Interview results showed that the doctoral degree holding rate of teaching staff varies greatly across polytechnics. POLIBAN, located on Kalimantan Island, stated that the physical distance from Java Island, on which many of Indonesia's leading universities are located, is a barrier to teaching staff outside Java Island obtaining a degree. In fact, although POLIBAN is a medium-level polytechnic, there is only one instructor with a doctoral degree.

Table 58 Number of teaching staff with degree acquisition status

Polytechnic (Year)	Bachelor	Master	Doctoral
PENS（2020）	0	147	47
PELINEMA（2020）	5	493	76
PELIJE（2020）	0	259	31
POLIBAN (2017)	0	166	1
POLNUSTAR (2019)	4	57	3

Source: Interview result

4.3.7 Cooperation with industry

All of the interviewed polytechnics were strongly aware of the importance of cooperation with industry, and each polytechnic responded that it was actively engaged in cooperation with industry by conducting activities such as internship programs for students or teaching staff, acceptance of lecturers from industry, and joint research activities. Through these activities, polytechnics can recognize the needs of human resources in the industrial world. In fact, very few respondents of the questionnaire survey stated that they did not fully understand the needs of the industrial world. However, it seems that cooperation with industry is often conducted on the basis of each department or study program, and the strength of the cooperation depends on the department. A system is being put in place to encourage the polytechnics to systematically promote collaboration with industry.

4.3.8 Research activities

According to the questionnaire survey, 24 polytechnics (67%) have set up an “innovation center” or similar department. Regarding the implementation of contract research, 24 polytechnics (67%) answered that they conducted it. Regarding joint research with other educational / research institutions and companies, 26 polytechnics (74%) answered that they conducted it, showing that not a few polytechnics have established a system in which the polytechnic plays a role that contributes to solving problems required by society and industry, and that a relatively large number of polytechnics actually carry out contract research and joint research.

On the other hand, not a few polytechnics also answered that a lack of budget, facilities / equipment, and contact with the outside world are challenges they face.

4.3.9 Job-placement support and tracer studies

According to the questionnaire survey, various methods were used to help students find a job. Although each polytechnic has an employment support department, the name of the department is different at each polytechnic, and it is not often the case that professional staff such as career counselors are assigned. In addition, the activities vary at each polytechnic, and there were some that actively supported for job-placement by holding a job fair, while others simply started the department.

As mentioned above, the questionnaire survey shows that students found jobs in a variety of ways. On the other hand, the interview survey found that, in many cases, the teaching staff at each study program themselves supported students in finding jobs through their individual connections, since the support system of the polytechnic itself, such as a “career support office,” is not well developed. In fact, not a few polytechnics answered that they did not assign specialists in departments for students’ employment even if they have such departments.

With regard to the implementation of tracer surveys of alumni, 31 out of 35 polytechnics answered that they conducted such surveys. On the other hand, according to the interviews, some reported that the alumni response was poor, and they felt the need to develop a platform and software to implement the tracer survey effectively and efficiently (POLIBAN).

As for the organizations that hired students, polytechnics located in the area of major industries could send the students to those industries (POLIBAN), while the other polytechnics could find organizations to accept students in another area (POLNUSTAR).

In the questionnaire, almost all polytechnics (35) answered that it was difficult for students to find jobs that could utilize their skills. On the other hand, only 5 polytechnics answered that they did not fully understand the human resource needs of the industry, that means that many polytechnics grasp these needs. Also, as mentioned above, polytechnics are trying to improve the curriculum to better reflect the needs of industry. Therefore, although polytechnics strive to provide educational programs that can produce the human resources required by industry, they have difficulties in “job matching” between students and industry. There is a possibility that the situation can be improved by strengthening the employment support system of polytechnics. In this respect, the activities of Japanese educational institutions might be a good example since their support system for students seeking a job is well organized and developed. The details of the Japanese education institutions will be described in the following section.

4.3.10 Other remarkable activities

One of the remarkable activities of polytechnics is an attempt to provide online education / training. In February 2021, PENS and the Embassy of Republic of Indonesia in Tokyo signed a memorandum of understanding, and polytechnics in Indonesia planned to provide online vocational education and training to Indonesian trainees staying in Japan.

The *Kampus Merdeka* policy mentioned above has also led to the promotion of activities among polytechnics. For example, *Politeknik Negeri Medan and Politeknik Negeri Lhokseumawe* signed an agreement in March 2021, giving teaching staff exchanges and opportunities for students to study at each campus.

4.3.11 Challenges

Challenges or issues that polytechnics are facing currently as reported in the questionnaire and interview surveys are as follows.

Disparities between polytechnics

The disparity between polytechnics (including the degree status of teaching staff, cooperation with industry, research ability, and budget) seems to be largely due to the location and assistance history of other donors. For instance, a high-level polytechnic conducts research activities with high achievement like universities, while a low-level polytechnic has insufficient facilities and equipment. Since there are successful cases of high-level polytechnics, it is necessary to share their experience and know-how with other polytechnics to raise the level of all polytechnics in Indonesia. The presence or absence of major industries in the vicinity has a great impact on cooperation with industry and employment of students.

Insufficient job-placement support for students

Key organizations for cooperation with industry and job-placement for students are not well established or developed. Hence, the teaching staff still rely on their individual networks when students seek jobs. In order to enhance the job-placement service, it is important to strengthen the functions of the employment support department.

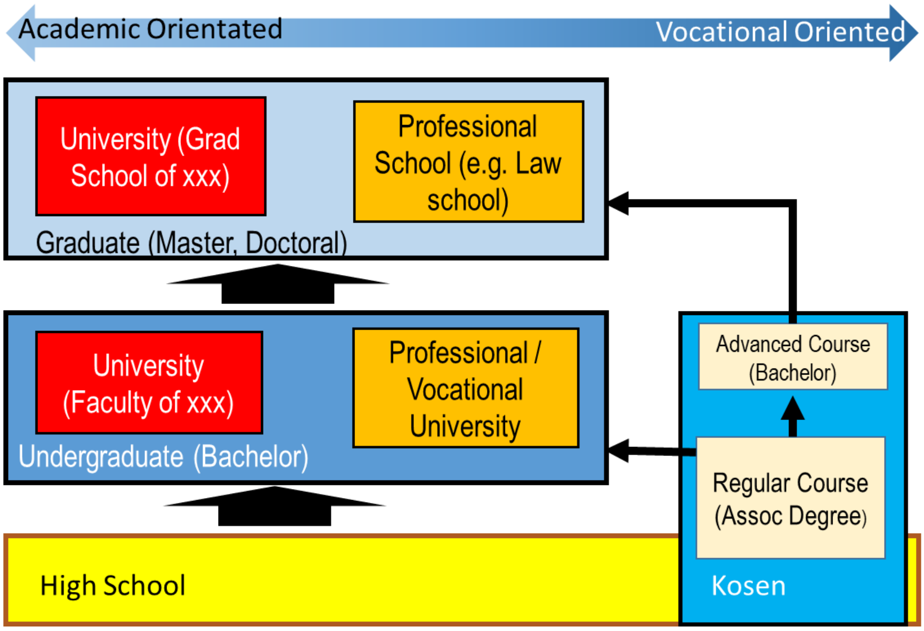
4.4 Management and job-placement services at Japanese vocational education institutions

4.4.1 Overview of Japanese vocational education institutions

In the era of high economic growth after the Second World War, there was a plan to introduce a dual education system combining education and on-site training, and there was also a request from the industry to establish five-year vocational colleges. The Institute of Technology (hereinafter referred to as “kosen”) is one of the institutions established to meet the requests. Although kosen are highly evaluated by industry for producing the human resources demanded by industry, its presence in terms of the number of institutions and students is by no means large, and the dual system was not incorporated into the education system of kosen to form a system as in Germany. Rather, the Japanese education system has not so much emphasized the viewpoint of occupation, and it is even said that there is a lack of “vocational relevance (significance).” In addition, at Japanese universities, the number of students in the fields of humanities and social sciences accounts for half of the total, creating a Japanese structure in which the content learned at the university is not linked to a profession. Due to this structure, lacking a strong connection between education and profession, companies that require many high-quality laborers have established internal systems to provide education and training on their own. This system was supported by the unique Japanese employment system, which employs fresh graduates for life, and internal training systems have been firmly developed.

However, the rapid change of the economic and social environment has rendered Japanese companies unable to maintain the lifetime employment system or internal training, and educational institutions are expected to provide practical education to produce the human resources required by industry. In response to such requests, professional universities and junior colleges have been institutionalized.

In Japan, institutions responsible for vocational education at the higher education level include graduate schools (including professional graduate schools), universities (including junior colleges, professional universities, and professional junior colleges), kosen, and vocational schools. The following schematic presents the roles of each institution.



Source: Made by Survey Team referring "MEXT Points of the establishment of Professional University"

Figure 21 System of Japanese secondary and higher education Institution

Of these, professional universities / junior colleges, junior colleges, kosen, and vocational schools are responsible for vocational / technical education. The survey team selected a recently approved professional university and kosen with a unique educational system, and conducted interviews with these institutions. The outline of these institutions is as follows.

1. Professional University

Professional universities are higher education institutions that have been approved by the School

Education Law revised in 2019 for the purpose of producing human resources with practical and applied skills to carry out professions that require specialization. It is said that the following circumstances were behind the institutionalization of professional universities.

(a) Economic and social conditions

- Rapid changes in industrial structure (4th Industrial Revolution, intensifying international competition)
- Changes in employment structure
- Declining birthrate and aging population, declining working-age population

(b) Situation surrounding higher education

- Increasing the rate of entrance to higher education (universalization of higher education)
- Mismatch of needs with industry
- Expectations and requests for more active social contribution

In order to respond to these situations, professional universities have been newly established to provide education for advanced practical skills (human resources who can perform specialized work with the strength of advanced practical skills supported by theory) and rich imagination (new goods and services in response to changes).

The following four points are the characteristics of professional universities.

Table 59 Points of Professional University system

1）Policy of Curriculum
• Develop the curriculum by themselves in collaboration with industry, and constantly review it. • Consider the development of practical and applied skills, and the development of professional ethics. • Mandatory establishment of "Cooperation Association" with local industry and society to implement curriculum development.
2）Curriculum which contains Practical and Applied Education
• 40 credits or more (approximately 600 hours or more) of lesson subjects by practical training (of which 20 credits (300 hours or more) are "on-site practical training" at companies, etc.) are required for graduation. • In principle, the number of students who receive the class at the same time should be 40 or less.
3）A mechanism that teaching staff and professionals are easy to study
• Approximately 40% or more of the required full-time faculty members are practitioner faculty members (those who have approximately 5 years or more of work experience in the field of specialization and have a high level of practical ability) and half of the practitioner faculty members has high research ability (requires either a teaching experience at a university, has master's degree or higher, or research achievements at a company) • Professional university (4 years program) courses can be divided into the first and second parts. • Establish a system for selecting enrollees and accrediting credits in consideration of professional workers
4）Degree, Accreditation
• A bachelor's (professional) degree of XX will be granted to graduates of professional universities

(the name of the major field is added to XX) • Receive an evaluation of the comprehensive status of university education and research (certification evaluation by institution) every 7 years, and an evaluation of a professional university (certification evaluation by field) every 5 years.

Source: Made by Survey Team referring "MEXT Points of the establishment of Professional University"

2. Koesn

Kosen were institutionalized in 1961 in order to meet the demands of industry for the training of engineers to support the remarkable economic growth after the war. Later, in 1967, the establishment of a department related to commercial ships was institutionalized, and in 1991, the fields were expanded and other departments for fields besides engineering and commercial ships were approved.

The characteristic of a kosen is that it is a higher education institution that accepts junior high school graduates and provides consistent engineering education for five years, in which practical education is provided at an early stage. The curriculum is designed to provide the same knowledge and skills as are offered at universities, and kosen students are able to acquire them when they graduate at the age of 20. Currently, there are 57 kosen, of which 51 are national, 3 are public, and 3 are private.

After the regular course (5-year program), an associate degree is granted. Some graduates of the regular course find a job and some go on to higher education. If the students wish to go on to higher education, they can transferred to the 3rd year of a university or an advanced course (2-year program) at a kosen. A bachelor's degree will be granted when they graduate from the advanced course. The degree of the advanced course is equivalent to the degree of university graduation, and it is possible to go on to graduate school. In the case of national kosen, approximately 60% of the graduates of regular course get a job, while approximately 40% go on to advanced course or bachelor program, and about 60% of the graduates of the advanced course get a job, while the other 40% go on to graduate school.

According to the medium-term plan announced in 2019 by the National College of Technology, which establishes and operates the National College of Technology, the following plans are made.

National Kosen Institute which organizes and manages all national kosen released Mid-term Plan in2019. Below is the brief description of the Plan.

Table 60 Outline of mid-term plan of National Kosen Institute

1. Measures to be taken to achieve the goal of improving the quality of services and other services provided to the public
1.1 Issues related to educational service
Secure new student • Disseminate the characteristics and attractiveness of kosen to society to secure new students • Promote efforts to secure female students and international students
Curriculum development • Develop curriculums reflecting social needs, based on the efforts to guarantee the quality of education through the "Model Core Curriculum", as well as joint education such as internships in collaboration with industry, joint research, and collaborative education programs with universities

• In order for students to become engineers who can play an active role overseas, enhance overseas study abroad and internship programs based on the credit recognition system and credit transfer agreements, and improve students' English proficiency and international communication skills • Enhance opportunities for students to participate in various hands-on activities such as robot contests and volunteer activities
Secure diverse and excellent teaching staff • A doctoral degree is required for open recruitment of teaching staff in charge of specialized subjects • Introduce a cross-appointment system to enable the placement of human resources in companies and universities as teaching staff • Promote recruitment of foreign teaching staff • Implement faculty development to improve teaching ability
Improve quality of education • Promote sharing of educational methods and teaching materials based on the characteristics of each kosen, implement practical education based on the model core curriculum, and constantly review the model core curriculum by the PDCA cycle. • Improve the quality of education through self-inspection / evaluation and third-party evaluation, and share evaluation results among kosen • Promote problem-based learning (PBL) for practical education aimed at solving problems faced by the society and industry, and implement educational programs, teaching materials development, and internships in collaboration with industry • Toward the sophistication of kosen education, establish a place for periodic cooperation and discussion with the institute of engineering to train teaching staff, improve the curriculum, connect kosen and institute of engineering education, and exchange personnel
Students support, daily life assistance • In close cooperation with the Japan Student Services Organization, provide information on scholarship systems to students, and enhance the scholarship system with the support of industry • Promote career education from the lower grades, and enhance the system that contributes to career development, including provision of company's information, job information, and consultation system. In addition, conduct a satisfaction survey at the time of graduation and enhance the network formation with graduates by coordinating with the alumni association
1.2 Issues on social cooperation
• Disseminate information on the research fields of teaching staff and the results of joint research and contract research so that they can be useful in solving problems in industry and society • Kosen Research Administrator (KRA) and regional joint techno center grasp the needs of industry and society and promote acceptance of joint research and contract research • Take discretionary budget measures, which can be implemented by the decision of each president, based on the activities of each kosen in order to promote the dissemination of information on initiatives based on the strengths, characteristics, and regional background of each kosen to society
1.3 Issues on international relations
• Collaborate with embassies abroad and related organizations such as JICA to promote a correct understanding of the "Japanese College of Technology Education System (KOSEN)" • For the three countries that already have liaison offices, i.e. Mongolia, Thailand, and Vietnam, work on support in response to requests while coordinating and discussing with the governments of each country

Source: Kosen mid-term plan (released on March 2019), English translation by survey team

4.4.2 Interview survey of Japanese vocational education institutions

As mentioned above, in this survey, professional universities and kosen were targeted, and one institution was selected as a sample from each category: Kaishi Professional University, located in Niigata City, Niigata Prefecture, and Oyama Kosen, located in Oyama City, Tochigi Prefecture. Kaishi Professional University and Oyama Kosen are contracting institutions; the former (professional university) is a newly established institution while the latter (kosen) is a traditional institution, although both are aiming to produce human resources to industry. Consideration of their activities would greatly benefit polytechnic education in Indonesia. In addition, both Kaishi Professional University and Oyama Kosen closely cooperate with local industries, and the cooperation is utilized in the improvement of education as well as job-placement of students.

Interview Survey Items
①Student employment status (employment support method, employing companies)
②Operation and management system (budget, organization, equipment / facility management method)
③Improving the quality of education (curriculum development, human resources development)
④Cooperation with industry

Table 61 Overview of Target Institution

	Oyama Kosen	Kaishi Professional University
Status	Kosen	Professional University
Location	Oyama City, Tochigi Prefecture	Niigata City, Niigata Prefecture
Quota of New Students	200 (Regular Course), 20 (Advanced Course)	160
Number of students	1,011 名 (Regular Course), 50 (Advanced Course)	152 (1st grade students only)
Number of teaching staff	121	38
Field	Mechanical engineering, electrical and electronic engineering, material engineering, architecture	Business, Informatics Entrepreneurship
Characteristic	Surrounded by factory complex. Located about 80 km from Tokyo, at a key point of transportation	Established by the newly approved professional university system. Belongs to the NSG Group, which runs universities and vocational schools, and other businesses

4.4.2.1 Job-placement status of students

One of the characteristics of Japanese educational institutions at both the secondary and higher education level is careful support of students for job-placement or going on to higher education. In fact, a high employment rate is one of the important factors of the social reputation of educational institutions, and the educational institution thus has a high motivation to realize the high employment rate of students. Regarding job-placement support in the past, there were many forms of technical guidance, such as introductions to alumni students, how to write resumes and application documents, and preparation for interviews. With the increasing importance of vocational education at educational institutions, career education methods and an in-house training system, in addition to the technical assistance mentioned before, are unified and incorporated into the curriculum, so that students can acquire the abilities necessary for social and vocational independence.

In particular, this point is emphasized as the purpose of establishment of professional universities, where in fact long-term in-house training is mandatory. However, the establishment of professional universities has been newly approved in recent years, and none of the professional universities has produced graduates, so it is difficult to evaluate the system at this moment.

One of the characteristics of kosen is their high job-placement rate. The rate for kosen overall has reached almost 100% in recent years. Each kosen has a department that supports students' job-placement, and they have been providing career education since the first year so that students can draw up a career plan after entering industry. In providing job-placement support, they provide detailed guidance, including how to write an application form and how to respond at the interview. As for the methods of job-placement, in general a company that wants to hire students sends a job offer to kosen, and the kosen recommends suitable students to the company. When recommending students to the company, the teaching staff at the kosen in charge considers the skill and aptitude of students as well as students' motivation to the job to avoid mismatch with the job. Students can find a job by themselves, but the number of those who do so is not high. Apparently, a large number of job offers is sent from companies every year.[36] Every year, there are new companies offering jobs based on the reputation of the high skill of kosen students.

On the other hand, it cannot be ignored that many students go on to a higher level of education. Regarding the career paths of all national kosen graduates in 2020, 58% of the students received jobs while 39% went on to higher education; almost half went on to the advanced course at kosen while the rest transferred to university. There may be various factors for kosen students to go on to higher education, but one of the strongest factors is the issue of degrees. Kosen students are conferred associate degrees, not bachelor's degrees, even though the kosen provides the same level of educational content as the engineering programs at universities, and in fact the students themselves have knowledge and skills comparable to those of university graduates. At the same time, industries tend to require master's degree when hiring engineers. As a background to these social changes, it is undeniable that the relative status of kosen students, despite their high skill and competency, is declining. Increasingly, there is a growing tendency for kosen to become a "transit institution" to universities.[37]

4.4.2.2 Management (budget, organization, equipment/facility maintenance)

The management system of professional universities is not much different from that of universities. A small difference from universities is that there is no obligation to set up some facilities such as sports grounds. Their budget is the same as that of universities, and student payments (tuition fees), in the case of private universities, account for about 70% of the total budget, while "private school subsidies"

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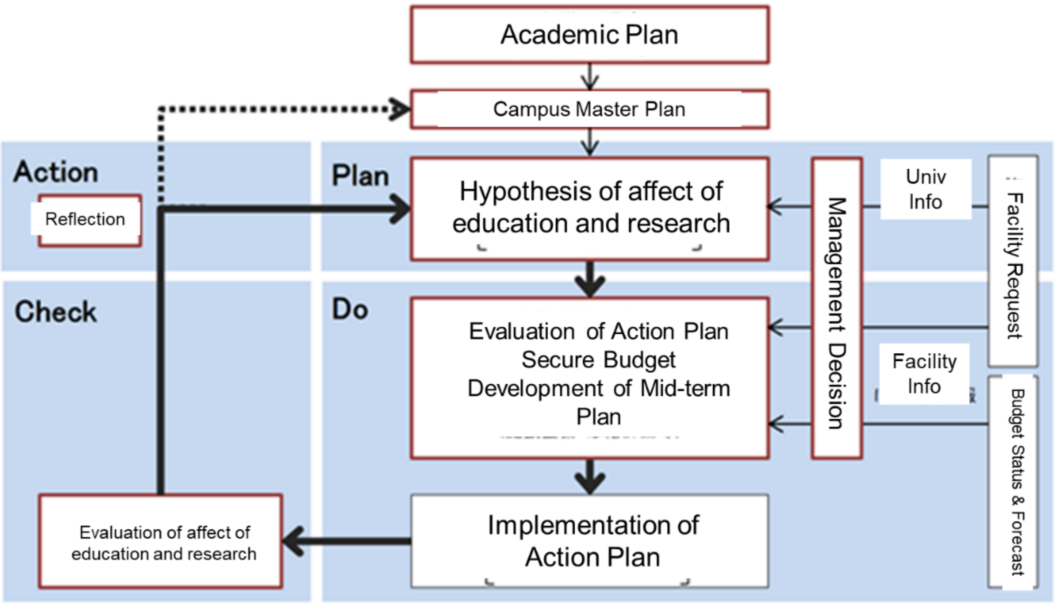
[36] For instance, Tokyo Kosen received 2066 job offers for 104 students in 2020, for a job offering rate of 19.9.

[37] Moriki Terada, "Japanese Vocational Education

from the central government account for about 10%.

Regarding the university facility management, the government has established a PDCA cycle as shown in the figure below and built a mechanism to continuously improve the education and research environment. This is a model assuming a national university, but there is no great difference from the method for private universities. However, private universities must bear the development and maintenance costs of the facility by themselves. In private universities as a whole, expenditures such as facility maintenance account for about 13% of total expenditures, and their impact on finances is not small. In the case of private universities, more systematic financing and efficient facility installation and operation are required.



Source: MEXT Study group on comprehensive management of facilities of national universities (March 2015)

(English Translation by Survey Team)

Figure 22 PDCA cycle of facility management to formulate medium-term action plan

National kosen are managed by the National College of Technology Organization, which is responsible for the operation of each kosen. The budget is allocated according to the scale of each kosen, mainly considering the number of students and teaching staff. Each kosen has independence in deciding how to use the budget. Increasing the acquisition of external funds is an issue for all kosen, and they are trying to increase the amount of contracted joint research. The facilities and equipment are also managed by the National College of Technology Organization. Each kosen makes a lineup of necessary facilities and equipment and places a request. As for maintenance, each kosen has made a medium- to long-term plan and performs appropriate maintenance according to the plan.

4.4.2.3 Quality improvement of education (curriculum development and HRD)

In the case of kosen, 1-week and 2-week internship programs are implemented in the 4th year of the regular course and the 1st year of the advanced course, respectively. When the companies send job offers to kosen, the kosen inquires as to the possibility of accepting internship students, and then sends internship students to the companies that answer affirmatively.

The curriculum of the kosen has been reformed since 2019 under the initiative of the National College of Technology Organization. One of the reforms is the introduction of the “model core curriculum” system. The “core” is the basic abilities that engineers should have in common, such as mathematics and engineering basics, and abilities by specialization including experiments and practical training, and the “model” is general-purpose skills, human power, and cross-disciplinary abilities such as creative thinking abilities. Based on the model core curriculum, each kosen builds its own unique content for specific subjects.

Regarding the training of teaching and administrative staff, FD or Faculty Development and SD or Staff Development is regularly conducted to improve the teaching method, class management, and other activities. In April 2020, an SD / FD promotion team was set up for systematic and planned training. Work regulations allow the teaching staff leave to obtain a degree. There is also a system for dispatching to external organizations such as universities from a few months to one year. As for the degree acquisition status, most teaching staff of specialized subjects already have doctoral degrees. Some teaching staff of general subjects, such as language education, do not have doctoral degrees.

There are many teachers originally from industry at kosen. For instance, 30% of the teaching staff at Oyama Kosen used to work in industry. The mid-term plan of the National College of Technology Organization calls for the introduction of a cross-appointment system, in which kosen teaching staff also belong to companies or universities, and vice versa. There is no example of cross-appointment at Oyama Kosen, but about 10 teaching staff of kosen are already using this system.

4.4.2.4 Cooperation with industry

Oyama Kosen established the “Oyama Kosen Regional Cooperation Association” in 2013 to hold exchange meetings with students and joint research support in collaboration with local industries. The establishment of the association is relatively new, but even before its establishment there was close cooperation with local industries. Other kosen have similar cooperative associations. In the association with Oyama Kosen are about 200 companies, which is quite large compared to other kosen associations, while some kosen have cooperation with 300 companies. The needs of the industrial world can be grasped through the activities of the above-mentioned cooperative associations, and the opportunity for joint research in particular is a very good opportunity for kosen to grasp the needs of the industrial world. This is because kosen hold long discussions before launching joint research so as to understand the issues that the companies are facing, and the discussion itself helps the kosen side to understand the needs of industries. In particular, there are many technical consultations with small- and medium-sized enterprises. Some companies state that it is easier to have consultations with kosen than universities, due to their easier access and close relationships.

4.4.3 Collaborative activity between kosen, universities, and local government

As an example of cooperation between kosen, universities, and local governments, it is worth noting the cooperation for the development of digital human resources between Ube Kosen, the Faculty of Engineering of Yamaguchi University, and the Ube City Hall, which they established because in the near future, society as a whole will be digitized, and all citizens will be required to acquire basic digital knowledge and skills. In addition, this will be required not only in private companies but also in the public sector to tackle many issues efficiently and effectively using digital technology. With this background, they are working in collaboration with local governments by leveraging the strengths of kosen and universities with the aim of developing digital human resources throughout the region.

4.5 Issues and needs of hiring polytechnic students by Japanese companies in Indonesia

4.5.1 Basic data of Japanese companies in Indonesia

According to a survey by the JETRO Indonesia[38], as of August-November 2019, 1,489 companies stated that they had Indonesian bases on their website. 92.7% of the bases are located in JABPDATABEK[39], the greater Jakarta metropolitan area, including the province of Jakarta, West Java, and Banten. If we include other provinces in Java, Central Java, and East Java, the ratio reaches 97.7%, meaning that almost all bases of Japanese companies are on Java Island. The number of manufacturing companies is 871, while that of non-manufacturing companies is 618. The top three fields in the manufacturing industry are 1) transportation equipment parts (including automobiles / motorcycles) (218), 2) electrical machinery / electronic equipment (including the parts production) (69), and 3) metal products (including plating) (61). The top three fields in the non-manufacturing sector are 1) wholesale / retail (including trading) (247), 2) construction / plant (75), 3) and transportation / warehouse (71). There are 43 companies in the food / agricultural and fishery processed products field in the manufacturing industry, which is the sixth largest in the manufacturing industry.

4.5.2 Outline of the needs survey

In order to understand the requirements and expectations for graduates from polytechnic institutes and other vocational training institutions, and to analyze the associated issues, a questionnaire survey and interview survey were conducted. The outline of the survey is shown below.

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[38] List of Japanese companies operating in Indonesia, January 2020, JETRO Jakarta Office

[39] An acronym for the major cities of Jakarta (Capital Territory), Bogor (West Java), Depok (West Java), Tangerang (Banten), and Bekasi (West Java).

Table 62　Outline of the needs survey

Method	Questionnaire（online）, Interview
Period	Questionnaire: from January 12 to 29, 2021 Hearing: from July to October, 2021
Target companies＊	Questionnaire: Transportation　112 companies, Electricity・Electronics　55 companies, Food processing　45 companies Hearing: Transportation　0, Electricity・Electronics　2 companies, Food processing 1 company

Note＊: They are registered in the Corporate division of Jakarta Jalan Club（JJC）（The Japan Chamber of Commerce）.

4.5.3 Results of the questionnaire survey

The questionnaire was sent to 212 companies, and there were 30 valid answers received. The major survey items are shown below.

Table 63　Survey items (Questionnaire Survey)

1. Basic information（address, establishment year in Indonesia, business field, the number of employees）
2. Employment of Indonesian staff
3. Situation of employment of Indonesian staff（Management, Engineer, Technician, Worker, Back-office section）
4. Training and Career support for Indonesian staff
5. Expectations for Higher Education

The results of the questionnaire are provided in Appendix 10.

4.5.4 Interview survey

In order to obtain more detailed information from the companies that responded to the questionnaire survey, an interview survey was conducted. Before the interview, five companies were selected based on their answers to the questionnaire and interviews were requested, but only one company responded positively to the interview. Therefore, the target companies were re-selected from the members of the Jakarta Japan Club (JJC), and finally two companies agreed to receive the interview survey.

The number of companies that received the interview survey fell so far below the target number largely due to the impact of the COVID-19, continuing from the previous year. Preparations for the interview survey began around May 2021, and the interview request was sent in June, but COVID-19 spread very rapidly from mid-June in Indonesia, and the number of infected people peaked in July. As of July, more than 80% of the companies operating in Indonesia had decided to or were considering returning their expatriates, according to JETRO's report.[40] In addition to the above situation, it is

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[40] "Strong impact of expansion of Covid-19 on unemployment rate and company's labor management (Indonesia)" JETRO Regional Analysis Report, 12 Nov 2021

assumed that this was an environment where it was difficult to answer long-term employment-related issues due to the combination of restrictions activities by the government regulation, and the impact of stagnation of economic activities.

The interview was conducted with the three companies online. Of the three companies, KAWASHIMA and MEIJI manufacture their products with the production line method, and have not yet developed new products. Therefore, they require worker-level staff and not necessarily high skills and knowledge are required. On the other hand, at EPSON, though their main activity is assembly and manufacturing products on a line, some activities require high knowledge and skills at the university / polytechnic level. Therefore, they hire both worker-level and engineer-level employees.

- PT. MEIJI FOOD INDONESIA (hereinafter referred to as "MEIJI")
  Established in 2001 by Meiji Co., Ltd. and Meiji Pharma (Singapore), major shareholders. Its main business is the manufacture and sale of confectionery such as "Meiji" biscuits.
- PT. KAWASHIMA ENGINEERING PLASTIC INDONESIA (hereinafter referred to as "KAWASHIMA")
  Established in 1997 as a production base in Indonesia for Kawashima Kogyosho Co., Ltd., which is headquartered in Suginami-ku, Tokyo. Main business is manufacture, assembly and sale of precision plastics (engineering plastics). The main customers are automobiles, motorcycle parts manufacturers, electronic equipment manufacturers, etc.
- PT. INDONESIA EPSON INDUSTRY (hereinafter referred to as "EPSON")
  Established in 1994 as a local subsidiary of Seiko Epson Corporation, its main business is the manufacture and sale of various printers including inkjet printers.

The question items for the interview are set as follows.

（1） Employment status
  - Recruitment methods and issues, etc.
  - Method of the recruitment section (system, role, function of employment support department)

（2） Collaboration with universities and polytechnics
  - Achievements of joint research and contract research with universities and polytechnics
  - Donation to establish special program
  - Acceptance of teachers (internship)
  - Acceptance of student (internship)

（3） Evaluation of vocational education in Indonesia

- Advantages and disadvantages of vocational education at universities
- Advantages and disadvantages of vocational education at polytechnics

The finding at the interviews are summarized below.

Employment Status

KAWASHIMA and MEIJI have not accepted new employees due to COVID-19 for the past two years. In addition, when recruiting new staff, both companies place more importance on their ability to adapt, work history, workplace, and work content than their educational background. On the other hand, EPSON divides the category of high school graduates and university / polytechnic graduates according to occupation.

Relationship with universities and polytechnics

KAWASHIMA and MEIJI have not collaborated with specific polytechnics or universities so far since their required human resources are at the worker level. MEIJI accepts one or two internship students every year at the request of a government agency, but this has not led to recruitment.

EPSON collaborates with 10 universities and 9 polytechnics[41], and they provide information to career centers and hold job fairs. Career centers set up at each educational institution have different degrees of activity, and there are also differences in the degree of response to recruitment needs from companies. One of the effects of the COVID-19 was that the job fair could not be held. As an alternative, alumni employees provided information through SNS. Although they have not conducted joint research or contract research with universities and polytechnics, they have dispatched employees as guest lecturers to give lectures on the required skills. There is no record of accepting teaching staff in internships, but they accept internship students. However, this program is currently suspended due to the change of organization.

Vocational education challenges

Similar opinions were heard from KAWASHIMA and MEIJI regarding the tendency of local human resources. Although they perform at a satisfactory level with respect to the instructed work, few people make opinions and suggestions for the improvement for efficient work and work environment. It is also said that there is a shortage of human resources who can take a position of management who can see the site from a bird’s-eye view or be a leader for the staff. KAWASHIMA regularly dispatches several local staff to the head office in Japan using the technical training system. The program has shown positive results, and after the staff returned from Japan, their experience in Japan has had a

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[41] Among the collaborating polytechnics, three public polytechnics under the MoECRT are PENS, POLINEMA, POLBAN, and PNJ, and the others are SV UGM, POLMAN BANDUNG, POLMAN ASTRA, ATMI SOLO, and ATMI CIKARANG.

positive effect on other staff.

All companies mentioned that they planned to entrust more advanced work (for example, maintenance of manufacturing equipment, mold design, product design) to local staff in the future, and the needs of human resources with more advanced knowledge and skills would be high.

Comparison with universities

As mentioned above, EPSON recruits students from both universities and polytechnics, and they can make comparisons by observing the situations of job-placement support and their quality as vocational educational institutions. The advantages and disadvantages of each institution are summarized below.

Table 64 Advantages and disadvantages of universities and polytechnics from the perspective of Japanese companies

	Advantage	Disadvantage
University	Institution • Active career center • It is also a research institute and stimulates students' analysis skills • Developing student skills in seminar courses in collaboration with other institutions Graduates • Slightly high analytical ability (creation, abstract / analogical thinking, etc.) • Relatively good soft skills (Communication, Presentation, Confidence)	Institution • Lack of guidance to quest professionality • Slightly less understood about industry needs Graduates • Generally, the desire / pursuit to become an expert is weak • Prefer analytical work, but reluctant to attend technical work (It seems they don't imagine what kind of work they should attend at industry) • After retirement, they tend to get a different industry / startup from the job
Polytechnic	Institution • Provide programs that allow to acquire practical skills • Teachers understand the needs of industry and utilize them in education Graduates • Quickly adapt to manufacturing and skilled work needs • Good work attitude and use the same expertise when changing jobs	Institution • Career centers are not very active Graduates • Analysis tends to be limited to the case in front • Relatively weak soft skills

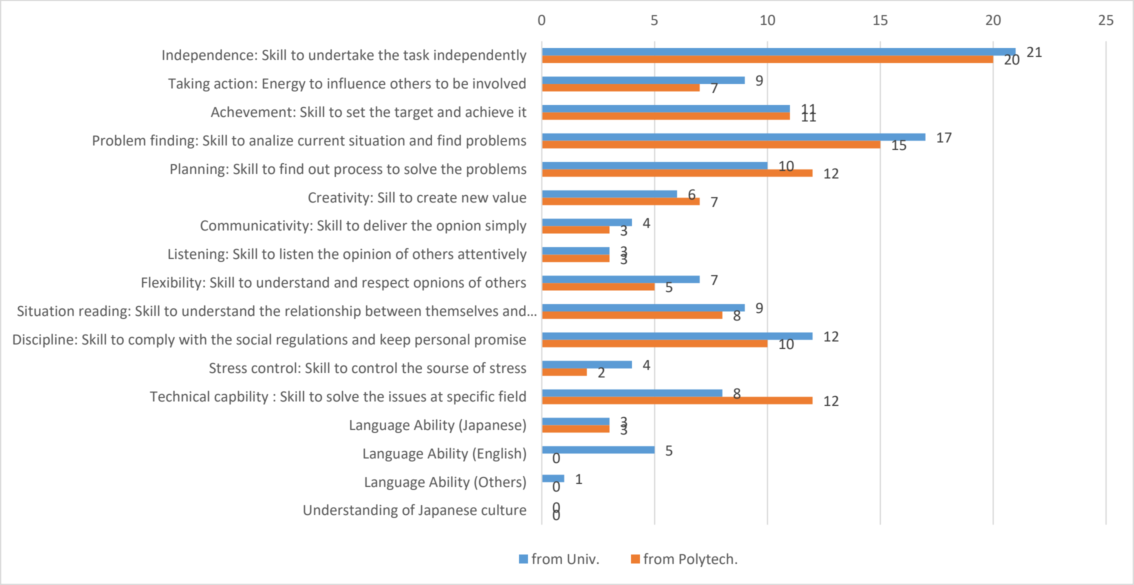
4.5.4.1 Analysis of the survey results

The needs survey was conducted when the economic situation was worsened by the worldwide spread of COVID-19. Under this circumstance, it was found that Japanese companies conducted fewer recruiting activities than before. The analysis of the survey results is shown below, taking into account this specificity.

4.5.4.2 Demand for Indonesian staff

Analysis of the questionnaire survey and interview survey yields the following results.

- In order to gather more candidates and recruit talented personnel, public methods such as advertisements on recruitment agencies, company web sites, and job fairs are more utilized than personal connections.
- Only 13.3% of the valid answers indicate different ways to recruit polytechnics graduates from university graduates.
- When the company recruits personnel with high management or technical capabilities, several Japanese companies set a qualification for each post. On the other hand, there are also several Japanese companies that do not set qualifications for any posts.
- When Japanese companies require graduates from polytechnics, they understand that those posts need high technological capabilities. (There are 7 companies whose engineer posts, 5 whose technician posts and 1 whose worker post require graduates from polytechnics.) On the other hand, there are only 3 companies whose managerial posts and 6 companies whose back-office sections require graduates from polytechnics, which is fewer Japanese companies than those that require graduates from universities. It can be presumed that insufficient information about training curriculum and its quality among Japanese companies prevents proactive recruitment, leading to targeting of graduates of polytechnics.
- It was found that independence and problem finding ability are expected for graduates from polytechnics and universities, which is the same tendency of skills and abilities expected of them. In addition to this, more technical skill is expected of graduates from polytechnics, and more communication skills such as flexibility, discipline, and familiarity with English are required of graduates from universities.
- Japanese companies that have a production line as their major business mainly tend to recruit workers as categorized personnel, and they evaluate personnel by their previous working records and adaptability to their business more than their academic backgrounds. However, there is a possibility for these Japanese company to recruit personnel who are expected to have high technical and/or managerial abilities in accordance with changes in their business form.



Source: Questionnaire survey result

Figure 23 Expected skills and abilities for graduates from polytechnics and universities

4.5.4.3 Issues and future prospects

The following points can be mentioned as the issues and future prospects of polytechnic that have been revealed by the survey of Japanese companies.

Promotion of cooperation with industry

Regarding the educational reforms that Japanese companies demand for higher education, the majority of companies answered the necessity of cooperation with industry at both universities and polytechnics (response ratio: universities: 70%, polytechnics: 80%). Some companies, such as EPSON, are actively collaborating with universities and polytechnics, for instance by holding job fairs in recruitment, but many companies have not been able to cooperate with higher education institutions, including polytechnics. One reason is that some companies have not hired human resources from higher education institutions since such high levels of skill or knowledge are not required so far. However, this situation might change as the activities of Japanese companies change, as has been indicated in interviews. The more advanced the activities Japanese companies conduct in Indonesia, the more skilled staff they will need.

Raise awareness of polytechnics

Among the companies that are hiring students at higher education levels, there are few companies that give priority to polytechnic students or distinguish hiring methods between university and polytechnic students. It may be considered that polytechnic students are regarded as equivalent to university students, and therefore that companies hire them without distinction. However, it also can be said that companies are not fully aware of polytechnics including their educational systems and advantages compared to universities. In fact, given their curriculum and educational system, polytechnics provide more practical education to acquire the knowledge and skills required by industry than universities, and the students are ready to work. It is desirable to have the company fully understand the actual situation of polytechnics, and then have the company take a strategy such as preferentially hiring polytechnic students according to the type of job. To that end, it is necessary to provide an opportunity for both sides to come to know each other by promoting the above-mentioned cooperation between industry and polytechnics.

Strengthening job-placement support

Regarding recruitment, it was expected that the majority of students obtained jobs through introductions of families, friends, and so on, but in reality, it turned out that a variety of methods was used when students found jobs, including public recruitment methods, such as agencies and websites. By recruiting publicly, companies can hire more candidates and acquire talented human resources to meet company demands. It was also found that a certain number of companies hired through referrals from schools and by conducting job fairs. On the other hand, interview surveys revealed differences in the job-placement support functions at each educational institution, and in particular, job-placement support at polytechnics is not well organized. Even if there is a need of human resources by industry, the information cannot reach the students if the contact point on the school side is unknown, or sharing information system is limited. It can be said that strengthening the job-placement support at polytechnics is also an issue in order to connect companies and polytechnics.

4.6 Trends in accepting foreign human resources in Japan

In 2019, in order to accept a wide range of foreign human resources with a certain degree of specialization and skills who are ready to work, a new status of residence of "specified skilled worker" was established. Due to the new status, the number of foreign workers at the professional and technical fields will expand (see figure below). The Japanese Government announced a policy of accepting 345,000 foreign workers in five years from April 2019 for industries with serious labor shortages. Indonesia is one of countries that can send "specified skilled workers" and the countries signed a memorandum of understanding in June 2019. The Indonesian government has set the target of sending out 70,000 in total, and initially 12,000 of the 61,000 trainees will return to Japan with the status of "specified skilled worker."[42]

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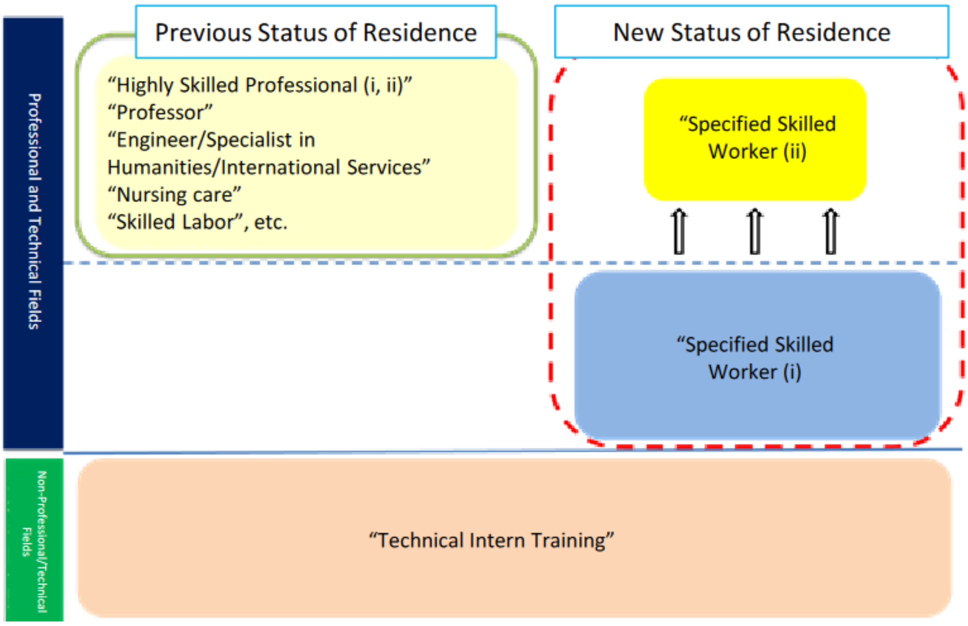
[42] An article of *Jakarta Shimbun* on 31 July 2019 https://www.jakartashimbun.com/free/detail/48772.html （last access on 20 Oct 2021）



Source: Initiatives to accept new foreign nationals and for the realization of society of harmonious coexistence, Immigration Services Agency of Japan, Dec 2021

Figure 24 Skill level for status of residence eligible to work

Behind this trend of accepting foreign human resources in Japan is the fact that Japanese companies are facing a serious labor shortage in the domestic market. Hence, "human resources" has become the keyword when thinking about the relationship between Japanese companies and developing countries. This is not the case only in Japan; other developed countries with declining birthrate have the same problems, and it is expected that it will become more difficult to secure human resources in the future, and competition for human resources will intensify. Therefore, it is important to accept and develop human resources who can play an active role in both Japan and developing countries, which will bring benefits to both countries. In addition, it is important to think about this issue not only from the perspective of procuring cheap labor, but also from the perspective of utilizing human networks for the development of overseas business and the industrial development of both countries.

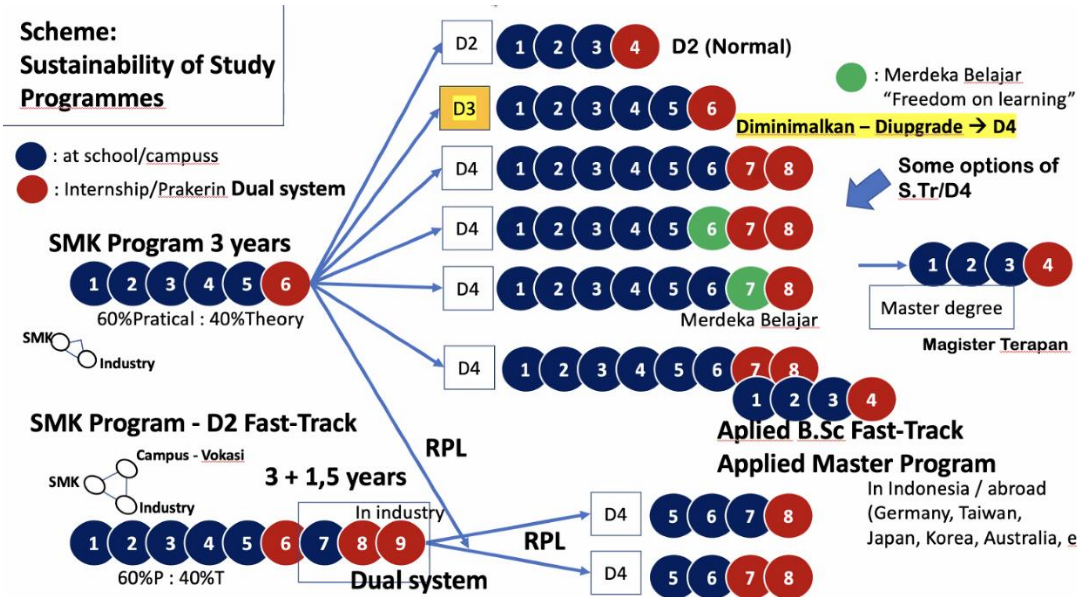
It is estimated that there will be a labor shortage of 6.44 million people in Japan in 2030. In particular, labor shortages in the medical / welfare and service fields are expected to become serious. On the other hand, it is estimated that the labor shortage in the manufacturing and construction industry will be resolved by 2030. However, this solution of shortages is at the worker level, and it is expected that there will be a shortage at the engineer level. Therefore, engineer human resources produced by vocational institutions such as polytechnics will be demanded. Some Japanese companies dispatch local workers to their base in Japan through the "jisshusei" system to offer them the opportunity to learn higher skills and gain experience. The introduction of the "specified skilled worker" category will make it easier for companies to dispatch staff to Japan, and the opportunity to work in Japan will be a strong incentive for local human resources to work at Japanese companies.

4.7 Workshop on vocational education sector

For the purpose of sharing the result of survey as well as receiving inputs from Indonesian side, the online workshop was held on 21 December 2021 inviting the Director General of Vocational Education, MoECRT and PENS, as the representative of polytechnics.

After the presentation by survey team, the Director General of Vocational Education requested the team to take it into consideration that a) the vocational education is provided not only at polytechnics but other educational institutions such as universities and institutes, b) MoECRT is currently undertaking the reform of vocational education, and c) MoECRT emphasizes on the importance of soft skills.

As for a), the general director mentioned that, in terms of the number of students, the universities and institutes were absorbing overwhelmingly larger number of students than that of polytechnics, and therefore the impact is much larger also. In these circumstances, he requested the team to find out advantages and uniqueness of the education of polytechnics. With regard to b), MoECRT is implementing vocational education reform by introducing the Dual System with reference to German educational system (see the figure below). The idea of the new system is a 4.5-year (total 9 semesters) program of combination of SMK (vocational education high school) (3 years) + Diploma 2 program (1.5 years). In the program, students are to be attending internship program at industries at the 8th and 9th semesters, the last 2 semesters before graduation. This program is similar to Japanese kosen program, which is a combination of secondary education and higher education, and the general director mentioned that they would like to refer to kosen program also. Regarding c), it is important for students to acquire not only technical skills but also soft skills such as language, communication, and leadership. In fact, Japanese companies emphasized the importance of those soft skills.



Source: The presentation file by the Director General of Vocational Education at the workshop

Figure 25 Image of reform of the vocational education in Indonesia

There are positive comments from MoECRT about the proposal that teaching staff or students engage in internships at Japanese companies and Japan, and in fact MoECRT has the budget to carry out internship programs in Indonesia and abroad. On the other hand, as the survey team was concerned, it is necessary to have a mediator between the educational institution and the internship host institution for implementation, especially when conducting the program with companies abroad as it is not easy to find the host institutions. MoECRT expected that Japanese side would give support for the implementation of the internship program.

From the polytechnic side, an issue that was not heard in the interview survey was mentioned. The issue is the excessive educational burden of teaching staff. The teaching staff at polytechnics usually have to spend about 25 hours a week on education, whose number is larger than that in Japan and the United States. Due to the large task of education, it seems difficult for teaching staff to find time to devote to cooperation with industry, and that becomes an obstacle to strengthening cooperation with industry.

Chapter5 JICA assistance for higher education and vocational education in Indonesia

5.1 JICA assistance project (hypothesis) for higher education

5.1.1 Higher education（engineering）

The direction of JICA support examined in Chapter 3 can be expressed in the form of a concrete JICA assistance project plan (hypothesis) as follows.

(1) Joint research (research cooperation)-centered research capacity development project through industry-academia-government (international triple helix collaboration

Objectives

Strengthen research capabilities with a view to increasing the number of universities entering world class universities, which is a target index for strengthening productivity and competitiveness of RPJMN 2020–2024, and upgrading the strategic science and technology infrastructure and strategic STP for full operation. Promotion of industry-academia-government international collaboration (triple helix international collaboration) centered on joint research (research cooperation).

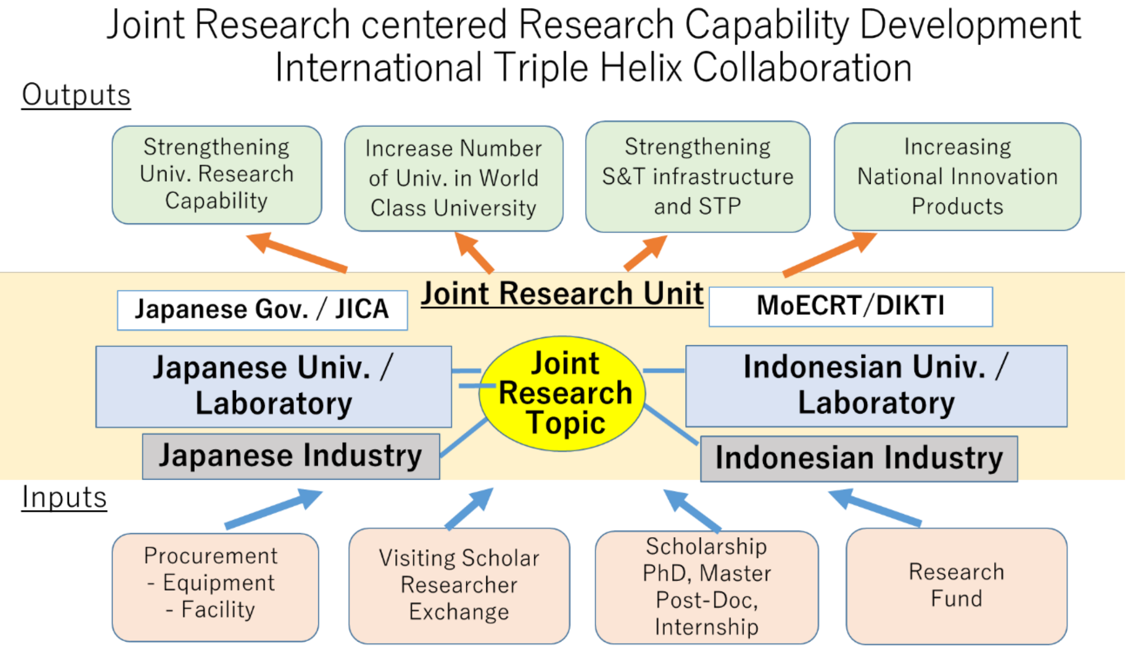


Figure 26 Joint research-centered international triple helix collaboration concept

Main Activities

- Launch joint research projects with torics that meet the local needs of the region between Indonesian and Japanese universities / research institutes / companies.
- To support the joint research projects above, several inputs shall be made, such as:

  - Construction of science and technology infrastructure / research facilities
  - Procurement of experimental equipment
  - Promotion of industry-academia collaboration
  - Study abroad for researchers with degree and non-degree
  - Invitation of visiting scholars from Japanese universities,
  - International collaborative education programs according to research themes,
  - Investment of research funds
  - Consulting services
  - In addition, depending on the theme, it is conceivable that the results will be put on the market from an early stage and commercialized, so in that case, not only research expenses but also investment in market research and consulting services for commercialization will be included in the components.
- This concept or approach is not based on a large organization such as a university or faculty, but on an Indonesian laboratory or project team that has attractive research topics and is actually conducting research. Based on the topic, the project arranges partnerships with laboratories of Japanese universities and research institutions suitable for joint research and research cooperation, and inputs necessary human resource development, necessary research exchange, necessary facilities and equipment, necessary research funds, etc. For that purpose, it is necessary to take an approach to grasp the current state of research profile and research ability of Indonesian laboratories and accumulate necessary inputs.

Candidate Universities

It is conceived that all of the universities surveyed have need of this type of project. Among them, the University of Indonesia (UI), Gadjah Mada University (UGM), Bandung Institute of Technology (ITB), IPB Universit (IPB), and Sepuluh Nopember Institute of Technology (ITS), in which strategic STP development required in RPJMN 2020–2024, will be the first candidates. However, these universities may have a large amount of support from the government and are covered by the JICA SEED-Net technical cooperation project, so there is a possibility that new JICA assistance will not be required.

The universities surveyed besides the above are also strongly motivated to improve their research abilities. They strongly advocated their own visions in their responses to the questionnaire. There is also a glimpse of the possibility of setting research topics that make it easy to build win-win relationships with Japanese universities, research institutions, and companies by taking advantage of Indonesian advantages.

This approach can be aimed at strengthening the research capacity of a single university, but it does not necessarily target a single university. It is also possible to select from laboratories from the laboratories of the university groups, with research topics that make it easy to build win-win relationships with Japanese universities, research institutions, and companies, and provide pinpointed support for research themes that transcend the boundaries of universities.

In addition, this concept can cover not only engineering fields but also science and engineering fields such as applied science, agriculture, biotechnology, and medicine.

Project Outline

● In the case of an approach that transcends the boundaries of the university

1） Executing agency: The Ministry of Education, Culture, Research and Technology (MoECRT)

2） Project site: Selected laboratories of participating universities

3） Project objectives / results (output)

- Research results (papers, patents, innovation products, startups, etc.)
- Development of research personnel
- International research collaboration / industry-academia collaboration
- Improvement of university research ability, improvement of university ranking, strengthening of university STP

4) Project components / project activities (input)

- Construction of science and technology infrastructure and research facilities
- Procurement of experimental equipment, etc.
- Activities necessary for promotion of joint research / industry-academia collaboration and commercialization
- Researchers' degree / non-degree study abroad
- Invitation of visiting scholars from a Japanese university
- International collaborative education program in line with research themes
- Consulting services, etc.

5) Assistance scheme

- Either project loan or sector loan can be used.
- If the technical cooperation scheme can be applied to some activities, that can only be done by technical professionals in a complementary manner, it will be more accepted by the borrower

6) Points to note in business design and business management

- Call for laboratories with proposals based on a certain format (Research Profile) from the participating universities with details of their plan, such as research themes, their importance, research plans, current status of research, future plans, information on Japanese laboratories that can serve as joint research partners, and industries with current status and possibility of cooperation, possibility of start-up, personnel system of laboratory, necessity of human resource development of degree / non-degree program, necessity of exchange of researchers, necessity of equipment procurement, and expected research results.

- Select excellent laboratories with a plan that includes the economic and social impact from among them. The number of selected laboratories will be within the number of units set in advance on the budget.
- Aggregate the required inputs expressed in each Research Profile and establish the components of the entire project.
- As for the project management, the executing agency is MoECRT, which manages the activities in the laboratories of multiple universities and the project activities of the university to which each tail belongs.

- <u>In the case of an approach to a single university</u>
  1） Executing agency: A single university
  2） Project site: Same single university as above
  3） Project objectives / results (output)
    - Depending on the strategic goals of individual universities (strengthening STP, etc.)
    - Research results (papers, patents, innovation products, startups, etc.)
    - Development of research personnel
    - International research collaboration / industry-academia collaboration
    - Improvement of university research ability, improvement of university ranking, strengthening of university STP,

  4） Project components / project activities (input)
    - Similar to the above, equipment procurement for laboratories, various activities necessary for promoting joint research and industry-academia collaborations and consulting services. In the case of a single university, other components included in the following (2) and (3) JICA assistance project plans (hypotheses) will be combined according to the strategic plan of the university.

  5） Assistance scheme
    - The assistance scheme will be a project loan. Sector loans are also possible if a small number of universities are targeted together.
    - If the technical cooperation scheme can be applied to some activities that can only be performed by technical professionals in a complementary manner, it will be more accepted by the borrower

(2) Engineering education development for nurturing practical engineers that meet the needs of industry and the rapid increase of higher education demand

Objectives

Expansion and improvement of the educational infrastructure, improvement of the quality and quantity of teachers, and education that meets needs, as at universities where there is a rapid quantitative increase in the demand for higher education and the provision of educational content that meets the needs of industry. The project aims at enhancing and improving training content and eliminating regional disparities in the supply of higher education.

Main activities

Introduction of the essence of Japanese-style engineering education including KOSEN technical-college-education-style Monodukuri procreation education, curriculum improvement through international collaboration programs with Japanese universities, introduction of internship and apprenticeship programs in Japan to enhance the employability and soft skills of graduates, learning rooms corresponding to e-learning, construction of facilities including virtual laboratories, procurement of equipment for experiments, training programs for teachers with degree / non-degree study abroad, etc.

Candidate universities

According to the answers to the questionnaire survey, it can be said that all of the universities surveyed have needs for this type of JICA assistance, especially since it may match the needs of the universities that expressed a strong need for educational improvement, such as the University of North Sumatra, Paddjaran University, Indonesia University of Education, Diponegoro University, and Airlangga University.

Assistance schemes

As for the JICA assistance scheme, the main part will be a project loan or sector loan specially for the procurement of facility equipment. If in some part, such as software activities, a technical cooperation scheme could be applied, it will be more acceptable by the borrower.

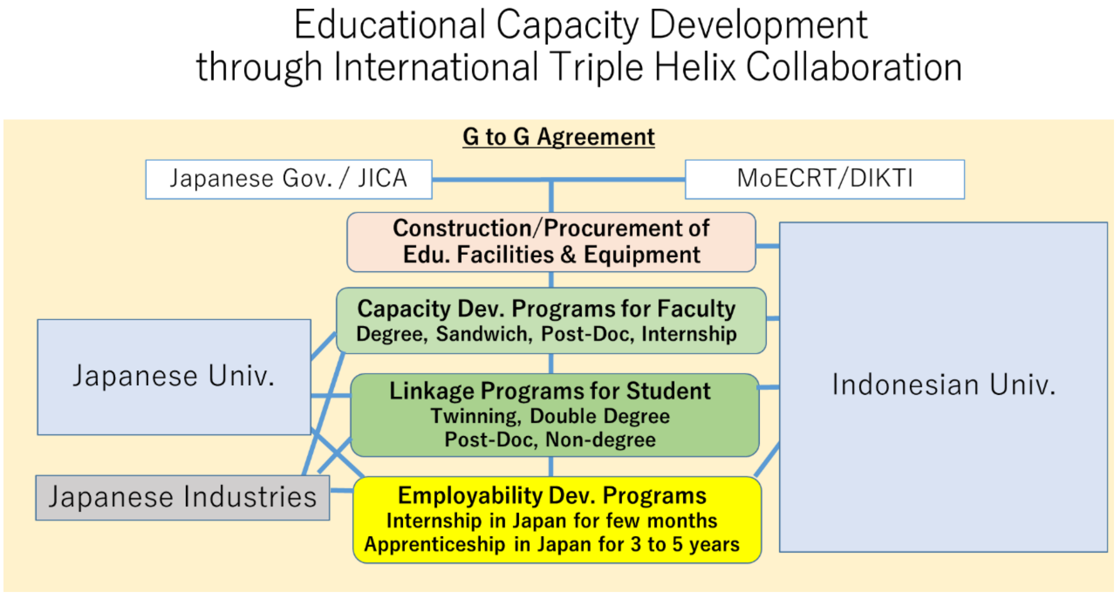


Figure 27 Concept of educational capacity development through international triple helix collaboration

(3) Development of an engineering education environment for hybrid learning to provide high-quality education corresponding to the new normal after the COVID-19 pandemic

Objectives

Many universities in Indonesia struggled to maintain the quality of education during the COVID-19 pandemic, but in the long-term perspective of the post-COVID world with engineering utilizing hybrid learning / online learning / e-learning programs, there is an urgent need to develop an environment in which education can be carried out. This project aims to promote collaboration with Japanese universities and technical colleges by sharing their experiences.

Main activities

- Construction of facilities and procurement of equipment necessary for a virtual learning environment of a hybrid synchronous or asynchronous model such as virtual labs and smart classrooms / open classrooms.
- Mutual research and educational activity support through the development of university alliances between Japan and Indonesia, development of a mechanism for sharing lectures (contents), and development of collaborative education programs.
- Study abroad in Japan to procure other equipment and materials necessary for improving education and to strengthen the abilities of university faculty members
- Promotion of collaboration with Japanese universities and technical colleges by sharing their experiences. Since Japanese higher education institutions had also difficulty maintaining their

quality of education in the pandemic, the Japanese Ministry of Education, Culture, Sports, Science and Technology announced the "University / Technical College Education Advancement Plan" to support the procurement of necessary facilities, equipment, and systems and the development of human resources in response to the COVID-19 pandemic. Under that plan, many Japanese universities and technical colleges are currently engaged in various activities, and the efforts of Japanese universities and technical colleges that produced good results and the knowledge gained from them are shared with Indonesian universities.

- Although this field does not yet have sufficient experience and knowledge for full-scale maintenance in Japan, many universities and technical colleges are working on it. It is slightly too early yet, but looking ahead a few years, it is supposed that sharing knowledge between Japan and Indonesian universities of engineering will produce good results for each party

Candidate universities

- There is a need for a hybrid learning environment for the post-COVID-19 world at all the universities surveyed.

Assistance schemes

As for the JICA assistance scheme, as in (2) above, if it is possible to combine a project loan or sector loan for the procurement of facility equipment and a loan and technical cooperation scheme for software cooperation, it will be more accepted by the borrower.

5.1.2 Higher education (faculty of medicine)

The validity and efficiency of support needs of each faculty of medicine are verified in this section by taking into consideration the basic information on higher education and public health in Indonesia and individual situations obtained by questionnaire in Chapter 2 and 3. Then, based on the overall tendencies, candidate JICA support programs are proposed.

Study team's hypotheses of sub-project components

(a) Support for construction (research building, university hospital, research center for infectious diseases, etc.)

(b) Support for procurement of equipment (research equipment, educational equipment, ICT equipment, equipment for telemedicine, etc.)

(c) Support for human resource development (short-term study program in Japan, research study, scholarship for researcher exchange program, etc.)

(d) Development of research collaboration with Japanese research institutions for research capacity enhancement

(e) Development of international program for medical education (twinning program, double-degree program, etc.)

(f) Development of e-learning and hybrid courses with e-learning and face-to-face instruction for medical education (curriculum, material, e-learning soft, etc.)

(g) Support for academic-industrial collaboration, intellectual property right management, and hospital management

(h) Others

The numbering in Table 65 is consistent with that of the above study team's hypotheses of sub-project components.

Table 65 Validity and efficiency of support needs

University	Validity and Efficiency of Support Needs
University of Sumatera Utara	Support Needs (a) Construction of an infectious disease center and cancer prevention/stem cell treatment center (b) Procurement of research equipment (c) Development of human resource enhancement programs (student exchange program and visiting scholar program with Japanese universities) (d) Development of research collaboration programs (f) Development of medical e-learning curriculum (g) Development of center for academic-industrial collaboration Validity and Efficiency of the Support (a) The infectious disease center is expected to enhance research not only on COVID-19 but also on NTDs and other emerging infectious diseases. Since Faculty of Medicine, USU, provides governmental organizations with suggestions for measures for infectious diseases such as tuberculosis or malaria, there is a public benefit for this support. Also, the rate of malignant neoplasms is high among the causes of death in the North Sumatra area, and the score of 10. Cancer detection and treatment in Table 42 "Comparison of Indicators of UHC in Each Location of Target University" in North Sumatra is more than 10% worse than the Indonesian average. Therefore, there is a significance in constructing a cancer prevention/stem cell treatment center (b) In relation to the above (a), it is necessary to procure research equipment at new research facilities (c) Since Faculty of Medicine, USU, finds itself to have insufficient research capacity for infectious diseases, cancer prevention, and stem cell treatment, there is a valid need to conduct human resource enhancement such as visiting scholars or post-doctoral researchers in Japanese universities or research institutions that have advantages in basic research (d) There is a large benefit for USU to conduct research collaboration with Japanese universities or research institutes that have advantages in basic research as in (c) (f) Faculty of Medicine, USU, identifies practical subjects and the learning process in online education as a challenge. In that respect, there is validity in the development of an e-learning curriculum; however, because Internet access is not good there, updating the infrastructure is a premise of curriculum development (g) Academic-industrial collaboration is essential to give back to society the research results supported by research capacity enhancement of (a), (b), (c), and (d). As

	Table 40 shows, Faculty of Medicine, USU, has a partnership/cooperative relationship mainly with hospitals, and few industrial collaborations are found at the time of the questionnaire (USU Hospital and its neighboring 5 small medical facilities have been conducting a demonstration experiment with MITAS Medical since November 2021). As academic-industrial collaboration has to be done for R&D, there is a valid need to support the development of a center for academic-industrial collaboration
Sriwijaya University	Support Needs (a) Updates of educational facilities and laboratories (b) Updates of equipment (d) Collaboration on research and papers, which is beneficial to increase quality in medical biology and clinical education (f) Development of a curriculum in basic education and medical education Validity and Efficiency of the Support (a) Because improvement of infrastructure in faculty of medicine cannot be expected with the current financial support from the government or university, there is a significance in subsidizing the infrastructure with JICA's support. However, further data collection is needed for a more concrete request (b) Further data collection is needed for more concrete requests for equipment, as well as the above (a) (d) Considering that Faculty of Medicine, UNSRI, operates specialist education courses in collaboration with other universities, works as a professional health program for the government, and provides the government with training for infectious diseases such as COVID-19, quality improvement of clinical education and its research has a profound effect not only for Faculty of Medicine, UNSRI, but also other organizations. There is a valid need to conduct research collaboration with Japanese universities and hospitals, and it can be useful for public good (f) Development of a curriculum for the improvement of medical education is meaningful not only for Faculty of Medicine, UNSRI, but also other organizations as well as the above (d)
Padjadjaran University	Support Needs (a) Construction of a research center for COVID-19 and other emerging infectious diseases, and community telemedicine center (b) Optimization of equipment at a community telemedicine center (h) Support for the implementation of workshops for preventive medicine and health promotion in communities Validity and Efficiency of the Support (a) Considering that UNPAD dispatches human resources to the COVID-19 task force in West Java and cooperates in technical support in testing, tracking, and treatment, it is expected that UNPAD will play a significant role in that area if there is another emerging infectious disease pandemic in the future. On that point, construction of facilities for infectious disease research for risk management is meaningful with regard to the public good and there is a valid need for it. However, only the construction of facilities would not be sufficient; nurturing research personnel and implementing research collaboration should be considered as well. In addition, Faculty of Medicine, UNPAD, is successful in the implementation of diagnosis by telephone and message applications in its telemedicine program and instructions for those who are quarantined because of COVID-19 using messaging applications. Furthermore, cooperation with local governments is encouraged for greater commitment to community services, and further support to primary healthcare is planned. This suggests there is a valid need for the construction of a community telemedicine center to some extent. On the other hand, according to

	the response to our questionnaire, patients in remote areas who are regarded as a main target of telemedicine are unfamiliar with the use of IT devices and the capacity of IT devices is not sufficient. Therefore, these problems should be tackled before the construction of facilities (b) Optimization of the equipment in the telemedicine center alone would not contribute to the dissemination of telemedicine, as well as the above (a). Installation of equipment in rural areas is also important (h) Although Faculty of Medicine, UNPAD, is currently providing support for research, education, and health services for the purpose of nurturing human resources in primary healthcare facilities, they find it difficult to manage and administer those training programs. By utilizing the human and material resources of Faculty of Medicine, UNPAD, and supporting the implementation of programs with JICA funding and the development of training components, health promotion and awareness for the prevention of diseases is raised in the whole community. Therefore, it can be regarded as meaningful in regard to the public good and there is a valid need because it aligns with the vision of Faculty of Medicine, UNPAD, to render more support to primary healthcare
Diponegoro University	Support Needs (a) Construction of a medical simulation center (b) Procurement of research/educational equipment such as sequencing equipment, MA-3000 Direct Mercury Analyzer, etc. (c) Development of human resource enhancement programs for increased research and educational capacity Validity and Efficiency of the Support (a) Construction of a medical simulation center is efficient in regard to supplementing hands-on training and practical training under the COVID-19 pandemic and installation of a learning environment providing practical medical skills after COVID-19. Faculty of Medicine, UNDIP, provides lectures on skills to medical personnel in primary healthcare facilities and training at the simulation center will increase the level of medical services of primary healthcare. Additionally, it is meaningful that Japan provides this support, as it has advantages in this field because Japanese universities and hospitals have installed simulation centers in recent years and have experience in their management and teaching methods (b) Faculty of Medicine, UNDIP, has been implementing research collaborations with Japanese universities and research institutes and the existing research, currently stopped due to COVID-19, can continue with the installation of the required equipment. It can also lead to another new research collaboration as well. In that regard, it is meaningful to support the procurement of the equipment (c) Because Faculty of Medicine, UNDIP, has a partnership and cooperative relationship with some Japanese universities, there is a basis for conducting human resource development programs such as degree, non-degree, and post-doctoral research and visiting scholar programs. It is expected that human exchange is encouraged and research capacity is enhanced in line with the support of the above (b)
Sebelas Maret University	Support Needs (a) Construction of an integrated medical research center consisting of a wet laboratory (pre-clinical, biomolecule, genomic analysis research, etc.) and dry laboratory (medical education, epidemiology, digital health, etc.), and small puskesmas for the purpose of both primary healthcare and education for undergraduate preclinical/clinical training students (Establishment of UNS Puskesmas Model) (b) Procurement of IT equipment and infrastructure for the development of e-learning (c) IT capacity enhancement among staff for the development of e-learning

(d) Development of research collaboration with Japanese universities (expansion of faculty networks)
(e) Development of international programs with Japanese universities (student exchange)
(f) Updates of capacity of staff and infrastructure for the development of e-learning

Validity and Efficiency of the Support

(a) Faculty of Medicine, UNS, is planning to establish laboratory facilities for research units related to acupuncture and herbal medicine, for which the construction of a new building is necessary. Also, drug efficiency is measured at external organizations due to inadequate infrastructure and equipment, which causes delays in implementing smooth research activities. There is a valid need to construct the integrated medical research center because the update of facilities is needed in response to the hot topics in biomolecular research for master's and Ph.D. students. Furthermore, Faculty of Medicine, UNS, finds it important to conduct community outreach activities and dispatches academic staff and students to puskesmas for the purpose of learning and teaching. Normally, the primary role of puskesmas is to protect health in the community; however, the construction of educational puskesmas will provide a place for education for academic staff and students so that they can learn by providing medical services and greater chances for inter-professional education (IPE) among midwives, psychologists, pharmacists, etc., which UNS is promoting. It is expected to contribute to community medicine. Therefore, it is highly efficient to provide support to the establishment of the UNS Puskesmas Model

(b) Faculty of Medicine, UNS, plans to install an e-learning environment not temporarily under the COVID-19 pandemic, but permanently. They have been conducting not only online lectures but also challenging attempts such as practical trainings through flipped learning in the form of hybrid face-to-face and online instruction. However, the satisfaction with and efficiency of online education currently are not good among medical students of UNS because of shortages of IT equipment and lack of a system environment for the smooth implementation of lectures and training and insufficient e-learning skills among academic staff. Installation of IT equipment and infrastructure is expected to be done in collaboration with faculty development of e-learning teaching methods for academic staff so that these problems can be addressed and the educational environment of Faculty of Medicine, UNS, can be developed

(c) Staff enhancement for skill and knowledge is necessary for the administration and management of the e-learning environment in line with the installation of the e-learning environment as well as the above (b). A training program for skill enhancement in the management of the equipment and environment is inevitable through practical trainings in Japanese institutions or visiting specialists from Japanese institutions

(d) The research capacity of Faculty of Medicine, UNS, is expected to be enhanced through the installation of new research facilities and equipment as in the above (a). In addition, Faculty of Medicine, UNS, is conducting cutting-edge research in the field of herbal therapy/herbal medicine in Indonesia. There seems to be a high demand for Japanese institutions to conduct research collaboration in characteristic fields with research institutions having profound research capacity because high synergy can be expected between institutions in both Indonesia and Japan. Although there are not many Japanese universities with which UNS has a partnership/relationship, there is a student exchange with Kyushu University and other Japanese national universities, which can lead to the development of research collaboration with those universities. Furthermore, there is a possibility of collaborating in research with other Japanese universities. That is, there is a valid

	need for this support (e) As well as the above (d), it is expected to increase the number of Japanese students who want to join a study-abroad program in Faculty of Medicine, UNS, if the research capacity in the field where UNS dominates is enhanced by the above support of (a). Because of the high demand to study in Japanese universities among medical students of UNS and increasing numbers of Japanese medical students who want to join a study-abroad program in UNS, as stated above, there is a valid need to establish an international degree program between Faculty of Medicine, UNS, and Japanese universities. It is expected to approach various Japanese universities, especially Kyushu University and Saga University, with which there are several student exchanges. (f) Development of e-learning in Faculty of Medicine, UNS can be done more efficiently by installing IT equipment, nurturing its management and administration skills, installing devices for online practical training, and implementing a training program encouraging faculty development in online teaching methods as in the above (b) and (c)
Brawijaya University	Support Needs (a) Construction of research facilities and hospitals (university hospital, laboratory, research center for cardiovascular diseases, etc.) and educational facilities (basic life support model of cardiovascular diseases, etc.) (b) Development of a telemedicine system and digitalization of medicine, and procurement of equipment (server, network of ambulances, doctor cars, quality increase of nurses and equipment) (c) Development of human resource enhancement programs (degree/non-degree study-abroad program) Validity and Efficiency of the Support (a) According to Table 42 Comparison of Indicators of UHC in Each Location of Target University, 8. Prevention of cardiovascular disease (%) in East Java shows an indicator more than 10% worse than the Indonesian average. In addition, according to Table 43 Comparison of Factors of Years of Life Lost in Each Location of Target University, ischemic heart disease is ranked second of all causes of death in East Java. Both show that cardiovascular disease is one of the primary challenges in public health in the area of UB. Faculty of Medicine, UB, has experience in research and activities such as construction of a cardiovascular disease network in the city of Malang, provision of training at primary healthcare facilities for early detection of cardiovascular diseases, etc. The construction of a research center for cardiovascular diseases and research facilities is meaningful in regard to public health and there is valid reason to support it (b) Faculty of Medicine, UB, has a variety of accomplishments such as the construction of a network of primary healthcare facilities, provision of teleconsultations for acute heart diseases at primary healthcare facilities, and the digitalization of medicine and diagnosis using smartphones and digital records of health status. Additionally, they plan to focus more on the field of health data sciences such as big data analysis. Installation of a new system for the management of primary healthcare facilities and ambulances, procurement of IT equipment for the analysis of health data, and establishment of system operation corresponding to the policy directions of Faculty of Medicine, UB. There is thus a valid need for this, considering the accomplishments of UB so far (c) Nurturing human resources in collaboration with the support of construction and procurement as in the above (a) and (b) will contribute efficiently to the development of research in cardiovascular diseases and the analysis of health data
Airlangga University	Support Needs (b) Procurement of equipment, software, and a platform for telemedicine, and

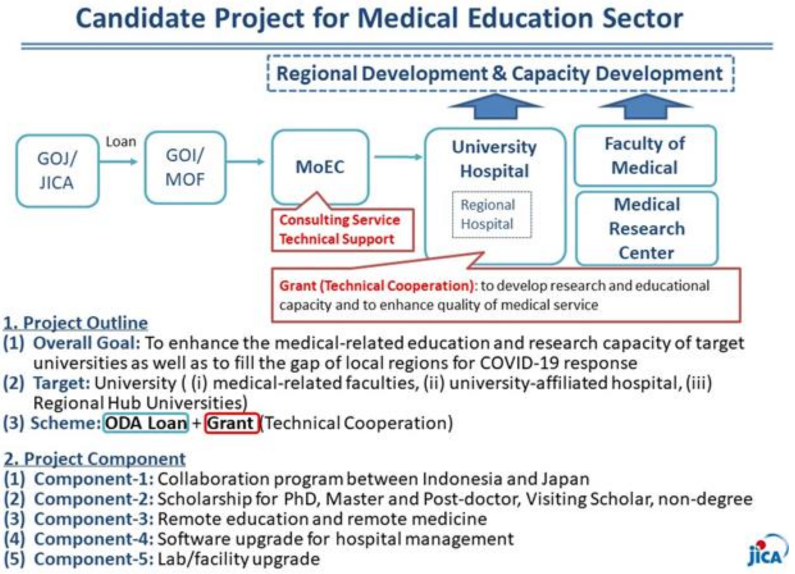
	laboratory equipment (c) Education of expertise for the development of telemedicine (d) Development of research collaboration programs for research capacity enhancement (e) Development of joint degree programs for human resource enhancement (g) Development of hospital management (h) Development of e-learning such as the production of movies for medical treatment, interactive mannequins, and 3D movies Validity and Efficiency of the Support (b) According to Appendix 5, many medical-related projects of UNAIR were adopted by Indonesia's research funding (RISPRO), which shows their high research capacity. Installation of new research equipment will enhance their research capacity further; however, they did not provide a detailed plan or concrete list of equipment, so further data collection is needed. In addition, although Faculty of Medicine, UNAIR, regards telemedicine as an important field, the current status of implementation of telemedicine in their vicinity is not identified. Therefore, further data collection is needed before the installation of equipment (c) Nurturing professional skills of telemedicine is in alignment with the policy directions of Faculty of Medicine, UNAIR; however, further data collection is needed as well as the above (b) (d) UNAIR has many partnerships with Japanese universities and many medical-related programs with them, so there are many candidates for research collaboration. Faculty of Medicine, UNAIR, has a vision of increasing their research capacity. Therefore, they expect to conduct research collaboration with Japanese universities that have advantages in basic researches. In addition, implementation of research collaboration with Faculty of Medicine, UNAIR, whose research capacity is high, seems appealing also to Japanese universities. Exchange of researchers and knowledge between Japan and Indonesia through research collaboration programs has profound efficiency. Therefore, there is a valid reason for this support. On the other hand, further data collection is needed to clarify research components and fields (e) UNAIR has many partnerships with Japanese universities, as written in the above (d), and there are some credit transfer systems with some universities; however, no double-degree/joint-degree program has been implanted. The validity of this support can be recognized as students' experiencing research in Japanese universities will lead to development of the research capacity of Faculty of Medicine, UNAIR, and human exchange is thus more encouraged (g) This benefits the management of UNAIR Hospital, and the faculty of medicine shares research results with primary healthcare facilities and enhances their medical services. In Table 42 Comparison of Indicators of UHC in Each Location of Target University, 12. Hospital access (%) and 13. Health worker density (%) show indicators in East Java w more than 10% worse than the Indonesian average. Therefore, the improvement of hospital management will lead to improvement of medical services, which is of benefit to whole communities, so the efficiency of the support is high (h) Although the development of educational materials using cutting-edge technology and procurement of equipment for medical education are requested, further investigation is needed to assess the efficiency it can provide and which fields it can influence
Udayana University	Support Needs (b) Procurement of equipment (d) Development of research collaboration and academic staff exchange programs (h) Development of local community services

	Validity and Efficiency of the Support (b) Although an update of Internet communication environment for e-learning and telemedicine is expected, details are not provided in their response to the questionnaire. Therefore, further data collection is needed (d) Although research collaboration and academic staff exchange programs are expected, their intended fields are not mentioned, as well as the above (b). Therefore, further data collection is needed (h) Support for emergent cases and EKG training is provided to medical doctors or nurses in primary healthcare facilities, which shows that Faculty of Medicine, UNUD, has been implementing supportive activities to local communities. If those supporting activities are expanded with JICA support, there is a valid reason for it. However, no details were provided on the components of planned services. Therefore, further data collection is needed
University of Mataram	Support Needs (a) Construction of research laboratories at the university hospital (vaccine subunit development, stem cell research, microbiomes, and whole genome sequencing) and expansion of the computer-based test center (b) Procurement of equipment (research & ICT equipment/software for the online education system, particularly a plagiarism checker and secure online examination system) (c) Development of degree (master and Ph.D.)/non-degree (visiting scholars and research exchange) study-abroad programs (d) Development of research collaboration programs (e) Development of international programs with Japanese universities (twinning programs and double degree programs) (f) Development of an e-learning system contributing to clinical training and inter-professional education in remote areas (h) Development of a control system for hospital-acquired infection Validity and Efficiency of the Support (a) Because Faculty of Medicine, UNRAM, commissioned some research and analyses from external institutions due to shortages of research equipment and facilities, there is always a financial burden on their research that makes it difficult for them to conduct timely research. That causes most of their research to tend to be cross-sectional, which is difficult to submit to international journals. Faculty of Medicine, UNRAM, plans to expand their research on vaccine subunit development, stem cell research, microbiomes, and whole genome sequencing. Construction of laboratory facilities for these fields will enhance their research capacity and improve their international position. Therefore, there is validity for this support (b) Procurement of research equipment for the constructed research facilities is necessary in alignment with the above (a) (c) Dispatch of students and academic staff to Japanese universities having advantages in the fields on which Faculty of Medicine, UNRAM, is focusing through degree and non-degree study-abroad programs will enhance their research capacity after they return to UNRAM. There are only three partnerships between UNRAM and Japanese universities. Expansion of relationships with Japanese universities through the dispatch of students through degree and non-degree study-abroad programs is expected to lead to the development of research collaboration programs with Japanese universities described later. Therefore, there is a valid reason for the development of degree and non-degree programs (d) In addition to the above (a) and (b), implementation of research collaboration with Japanese universities and research institutes with advantages in basic research will

	enhance the research capacity of Faculty of Medicine, UNRAM. Also, it is expected to increase the number of papers submitted to international journals and improve its position as a research institution by conducting many experimental studies collaboratively with Japanese institutions. As a result, this support can be deemed efficient (e) There are only a few partnership and cooperative relationships between UNRAM and Japanese universities, as written in the above (c). It is difficult to develop twinning programs or double-degree programs from scratch. Relationships should be constructed gradually between them by conducting degree and non-degree programs so that the number of partnerships and cooperative relationships can be increased before conducting international programs (f) In Table 42 Comparison of Indicators of UHC in Each Location of Target University, indicator of 12. Hospital access (%) is tremendously lower than the Indonesian average, which shows that access to medical services is difficult in remote areas. By increasing the knowledge and experience of medical personnel in primary healthcare facilities in remote areas, the capacity of primary healthcare facilities will be enhanced (more cases can be dealt with in primary healthcare facilities), which means that greater access to medical services can be attained. Faculty of Medicine, UNRAM, has been conducting such supportive activities. Installation of an efficient e-learning system will enable medical personnel in primary healthcare facilities to participate in trainings and lectures provided by Faculty of Medicine, UNRAM, and update their knowledge and experiences periodically without moving from their facilities. Consequently, this support can be deemed efficient (h) Faculty of Medicine, UNRAM, has been providing primary healthcare facilities with instructions on the correct way of wearing personal protective equipment and zoning in hospitals, etc. In response to COVID-19 and prospective infectious disease pandemics in the future, it is important for the academic staff of Faculty of Medicine, UNRAM, in their position of instruction to systematically deepen their knowledge and experiences in control systems for hospital-acquired infection. Additionally, Japanese medical institutions have been transferring their knowledge and skills for responses to infectious diseases to overseas institutions for some time, and the National Center for Global Center for Health provided Sulianti Saroso Infectious Diseases Hospital of Indonesia with technical support for hospital-acquired infection in 2017. This suggests that Japanese medical institutions have enough capacity to provide this support. Therefore, there is a valid need for the development of a control system for hospital-acquired infection

- The support needs from each faculty of medicine tend to be (a) and (b): construction of research centers and procurement of equipment in the fields in which each university has advantages or is planning to focus on in the future; (c), (d), and (e): development of programs to encourage research capacity and human resource enhancement in those fields; (b) and (f): development of a curriculum for online medical education and update of equipment as a means of education and research; and (b) and (g): development of academic-industrial collaboration and the update of the telemedicine system and equipment in order to give research results back to society. Those components (support needs) are requested as a consistent package by each target university
- Since research topics vary across the target universities as above, it seems difficult to establish a lump-sum sector loan for the 9 target universities. Therefore, the establishment of sector loan

seems feasible by picking some universities whose research topics are sufficiently similar and setting up consistent support packages as above by each university. This is in alignment with JICA's plan on cooperation in sector loans as Japanese Yen loans, having five components as sub-projects (Project Components 1 to 5 in the following figure), as mentioned in 3.4.2 Hypothesis of components of support from JICA.



Candidate Project for Medical Education Sector

Grant (Technical Cooperation): to develop research and educational capacity and to enhance quality of medical service

1. Project Outline
(1) **Overall Goal:** To enhance the medical-related education and research capacity of target universities as well as to fill the gap of local regions for COVID-19 response
(2) **Target:** University ((i) medical-related faculties, (ii) university-affiliated hospital, (iii) Regional Hub Universities)
(3) **Scheme:** ODA Loan + Grant (Technical Cooperation)

2. Project Component
(1) **Component-1:** Collaboration program between Indonesia and Japan
(2) **Component-2:** Scholarship for PhD, Master and Post-doctor, Visiting Scholar, non-degree
(3) **Component-3:** Remote education and remote medicine
(4) **Component-4:** Software upgrade for hospital management
(5) **Component-5:** Lab/facility upgrade

Reference: JICA

Figure 16 Candidate Project Components of Support from JICA

- Development of research collaboration with Japanese research institutions (d) is one of the candidate programs for research capacity and human resource enhancement. Although, strictly speaking, there are slight differences in the research fields on which each university is focusing, there are demands from several universities for support in research and responses to infectious diseases in broad outline. One of the ideas is that the basis of research collaboration is established by exchanging researchers, sharing knowledge, and organizing a consortium of research institutions and universities between Indonesia and Japan on some specific topics such as COVID-19, tuberculosis, and dengue. Japanese universities and research institutes will find it appealing and consider participation if the consortium addresses the topics for which Indonesia has abundant cases and a sufficient body of research, such as NTDs. This is expected to encourage capacity enhancement among health workers, which is one of the policy directions in public health mentioned in RPJMN 2020–2024 (Table 32). Furthermore, it is also expected to strengthen the health security, international competitiveness of medicine and medical equipment, and disease surveillance mentioned in RPJMN 2020–2024 through research capacity and human resource enhancement

- Support for human resource enhancement (c) is requested by more than half of the target universities. However, due to the regulations of Indonesia, degree study-abroad programs using Japanese Yen loans are currently not available. Therefore, the support is mainly for non-degree study-abroad programs such as short-term training programs and visiting scholars. Prospective program providers are sought among Japanese universities and research institutions in order to conduct short-term training programs. The study team developed a list of Japanese universities and research institutions that have conducted short-term training programs for Indonesian universities and public organizations under JICA projects (Appendix 11); a list of Japanese universities with partnerships or cooperative relationships with the target universities was also developed (Appendix 12). These lists can be useful in finding prospective training providers
- Development of curriculum (f) and procurement of equipment (b) for online medical education is expected to encourage international medical programs (e) such as twinning programs or double-degree programs between universities in Indonesia and Japan. Currently most of the international twinning programs and double-degree programs require the participants to enroll physically in both universities and participate in classes on campus. Although there are positive aspects, as participants are able to focus on their research in the exciting environment of a foreign country, there are also negative aspects, as they are supposed to spend considerable time, money, and effort on their move to the foreign country and their long-term residence there. More students and researchers will be able to participate in overseas programs by decreasing the barriers to attending international programs due to the shorter period of stay in a foreign country and by enabling them to study in the classes of Japanese universities more efficiently in Indonesia through the establishment of e-learning teaching methods and updates of the equipment for online education. Also, international programs have mainly been conducted between individual organizations of Indonesia and Japan (one-to-one) so far. However, through the development of technology for online education, it is expected that the target universities can conduct interactive lectures between multiple organizations in Indonesia and Japan by encouraging consortia among multiple universities and research institutions of Indonesia and Japan (multiple-to-multiple), and to internationalize medical education in both Indonesia and Japan by encouraging a mutual credit transfer system among the consortium universities. Internationalization of medical education will lead not only to the development of knowledge and technology of Indonesia but also to Indonesian students and researchers obtaining an awareness of international standard. This aligns with the policy directions of RPJMN 2020–2024 (capacity enhancement among health workers and strengthening of international competitiveness of medicine and medical equipment, etc.). Therefore, it is meaningful to provide support for e-learning and international programs
- Strong demand for support for academic-industrial collaboration (g) is not requested by faculties

of medicine at the target universities, and Table 40 shows that academic-industrial collaboration has not been actively conducted at the faculties of medicine at the target universities. On the other hand, technology cannot be developed only in academia; collaboration with industry is thus inevitable. Institutional Research (IR), a university department in charge of research support, has been working as a liaison between universities and industry in order to disseminate the given university's knowledge and technology (seeds) in the U.S. and Europe, which has developed into academic-industrial collaboration in those countries. This trend has appeared in Japan recently as well. IR, in charge of bridging between universities and industries, plays an important role in encouraging academic-industrial collaboration in the faculties of medicine of the target universities. In addition, IR not only plays a role in academic-industrial collaboration but also is an essential position supporting research activities such as acquiring competitive research funds. It is thus recommended that their capacity be developed as early as possible. Since many Japanese universities and research institutions have knowledge and experiences in IR and have cooperated on IR-related capacity enhancement, the implementation of measures to enhance the IR capacity of the staff of the department providing research support in the faculties of medicine at the target universities would be efficient by encouraging academic-industrial collaboration and research support. As Table 33 shows, the recovery of industrial sectors is one of the medium-term policy directions. Therefore, vitalization of industry sectors through the vitalization of academic-industrial collaboration by enhancing the capacity of IR aligns with this medium-term policy. Furthermore, strengthening of finance of health is one of the policy directions in RPJMN 2020–2024. Vitalization of industrial sectors through the encouragement of academic-industrial collaboration will generate funds for health-related research, which will accord with this policy.

5.2 Direction of cooperation for the improvement of vocational education

The following are ideas for directions for cooperation, in consideration of the current situation and issues confirmed through the survey, as well as the strengths of Japanese vocational education institutions.

Training / study program for the teaching staff and students of polytechnics

＜Program Contents＞

- Implementing an internship program for teaching staff as well as students of polytechnics at companies in Japan. The teaching staff is aiming to learn latest technology and skill while students is exploring the possibility of finding jobs in Japan. The host companies in Japan is able to access the qualities of participating students, and they may employ them if the quality is high enough after the completion of polytechnics programs.
- Students, willing to work in Japan, challenge the exam to obtain the resident status of

- Implementing joint programs between polytechnics and Japanese education institutions for institutional development

＜Issues＞

- Japanese language might be required for the implementation of the internship program in Japan, and special Japanese language training programs should be prepared
- Japanese educational institutions might not be willing to establish a joint program with Indonesian polytechnics due to unclear motivation for them to do so[43].

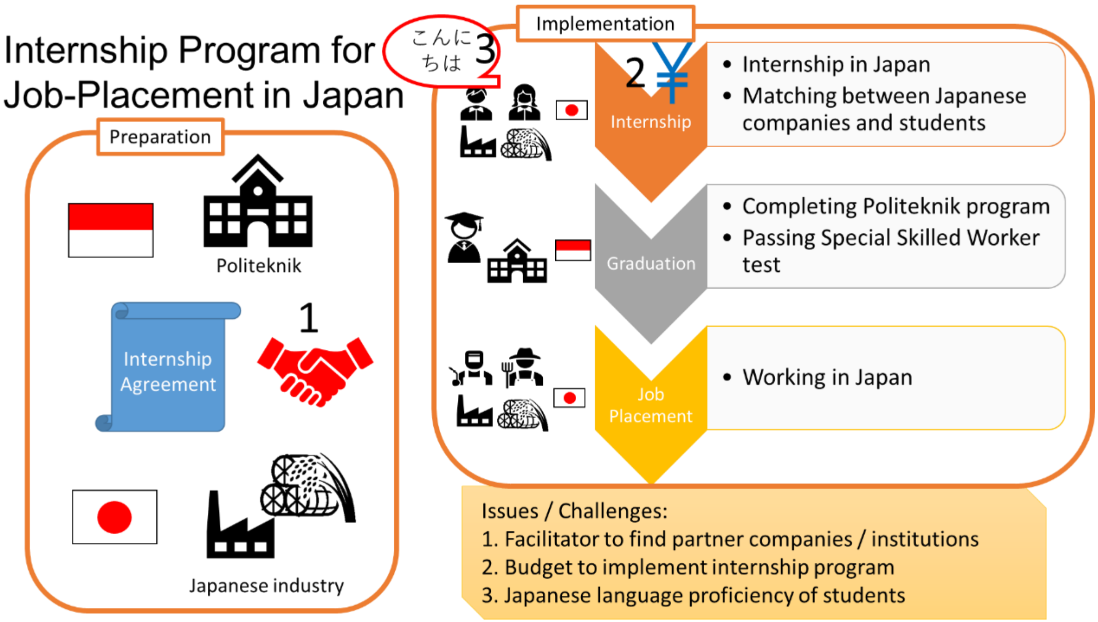


Figure 28　Image of the proposed program 1

Strengthening the functioning of job-placement services for students

＜Program Contents＞

- Establishing a job-placement service system at polytechnics, drawing on the strengths of Japanese educational institutions. Specifically, setting up an employment support department in each polytechnic, assigning specialists, and including a career education program in the curriculum.

＜Issues＞

- It is unclear whether the Japanese-style job-placement support system will be suited to Indonesia, where the recruitment system is different from that in Japan

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[43] International joint programs, such as joint degree programs and double degree programs, are often established to improve the reputation and performance of the educational institution, which naturally leads to more programs with European and American institutions with high university rankings. Also, if the field of research is in the region where the partner institution is located, it will be an incentive to open the program. If this is not the case, there is little incentive for Japanese institutions to partner with Indonesian polytechnics.

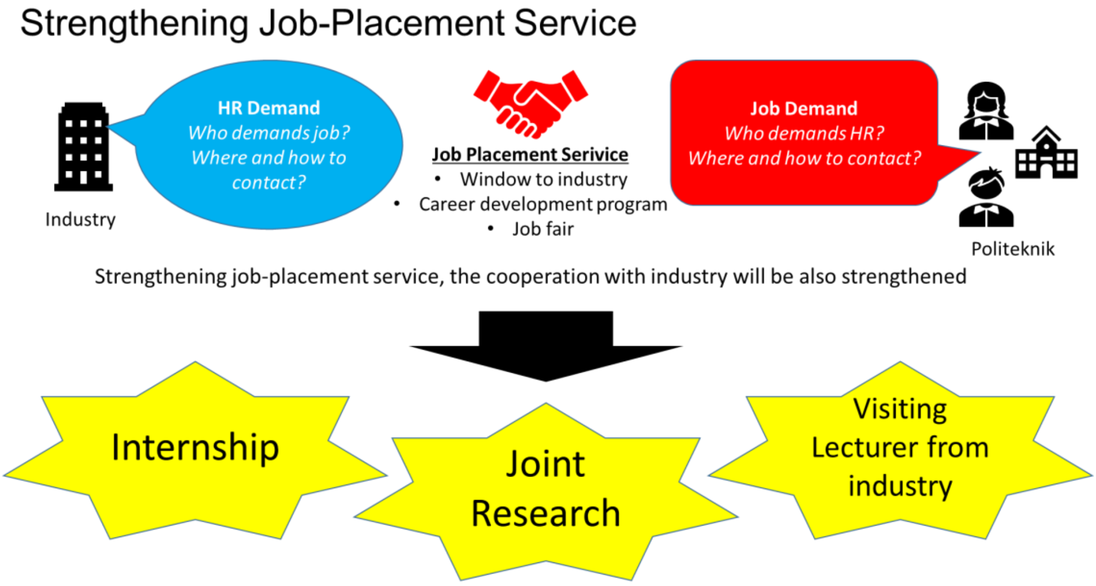

Figure 29 Image of the proposed program 2

As mentioned above, especially regarding the strengthening of job-placement support functions, the recruitment system differs in each country, so there is a possibility that the Japanese method will not work as-is in Indonesia. It would seem to be meaningful for the stakeholders to observe the situation in Japan by directly visiting and having discussions at Japanese education institutions. In addition, it would also be good to have direct discussion between educational institutions to discuss the possibility of establishing joint programs. Therefore, it is proposed that stakeholders in Indonesia, including the staff at polytechnics, visit Japan to have opportunities for inspections and discussions. Below is a proposed schedule of the training.

Proposed Program

1. Objectives

   Understand the situation of Japanese vocational education and analyze the possibility of implementing joint program with Japanese institutions and introducing Japanese-style job-placement service

2. Target participants

   Approx. 10 participants selected from officials at MoECRT and polytechnics

3. Schedule

Day	Venue	Contents
Mon	JICA	Kick off meeting

	KBRI Tokyo	Discussion with educational attaché
	X Univ	Receiving lecture on vocational education in Japan
Tue	Move to Y	
	Y Kosen	Observation of kosen management
Wed	Z Univ	Observation of university management
	A City	Observation of collaboration between local government and educational institutions
	Move to B	
Thr	B Vocational School	Observation of vocational school management
	Back to Tokyo	
Fri	JICA	Report of training

4. Follow-up of the training
   Sharing the results of the training with other polytechnics at forum

5.3 Other JICA support projects proposed related to higher education and scientific research

5.3.1 Enhancing Research and Innovation Collaboration on Health (ENRICH) Project

Section 5.1.1 on industry-academia-government international cooperation projects centered on joint research in the support plan hypothesis (1) above discussed a project prepared by BRIN with the implementing agencies of the Eijkman Institute for Molecular Biology, Andalas University, and BATAN. The project name was later changed to the Enhancing Research and Innovation Collaboration on Health (ENRICH) Project, and is currently preparing its project plan subject to JICA's ODA loan, which supported the formation of the project as part of the work of this research (Attachment 1). However, due to the reorganization of the government involving the Ministry of Research and Technology, the sub-project part of Andalas University, which was supposed to be one of the executing agencies, will be omitted, and the other parts are also planned to be significantly changed. At this point, the content is not as complete as reported in this report.

5.3.2 Faculty of Medicine, Andalas University

Andalas University was originally included in the three implementing organizations of the above ENRICH Project and its support program was one of the project components of the project. The study team had multiple discussions with the staff of Faculty of Medicine, Andalas University, and provided advice on the outline of the program, the process to achieve its goals, and details of the program components. The objectives of the program were to enhance the research capacity of Faculty of Medicine, Andalas University, and to contribute to society by commercializing the research results into products. However, in June 2021, there was a change of organizational structure of the government including BRIN, the PMU of ENRICH Project, and the governance organization of Andalas University was transferred to MoECRT. This change caused BRIN to make the decision to exclude Andalas University from the ENRICH Project. An outline of the program components of Andalas University as of June 2021 is summarized in the Research Profile in Appendix 13, and the list of Japanese universities for short-term programs, researcher exchanges, and research collaboration is developed as in Appendix 14

Appendices

Attachment

Attachment 1 : FEASIBILITY STUDY REPORT (FIRST DRAFT), January 8, 2021, Higher Education and Research Facility Development: Research and Innovation Capacity Development Project (Kemristek/BRIN-JICA), Indonesia

Questionnaire Survey on Engineering Education

Asia SEED / Oriental Consultants Global
June, 2021

1. Objectives and Background of the Questionnaire Survey

Objectives of this questionnaire survey is to find JICA's future assistance direction and potential projects for improvement of higher education in Indonesia.

The government of Indonesia has set out clear policies in RPJMN for higher education highlighting importance of actions to be taken such as:

- Promotion of cooperation with industry and community,
- Research cooperation with domestic and foreign higher education institutions,
- Improvement of new approaches in educational programs,
- Development of new funds,
- Differentiation by university,
- Focused research and development,
- Development of research powerhouse,
- Establishment of innovation ecosystem,
- Improvement of quantity and quality of R&D expenses,
- Promotion of national talent management, etc.

In response to this policy direction of Indonesia and considering the response to the needs of the world after Covid-19 pandemic, JICA has an intention to provide further assistance to the higher education sector of Indonesia according to the needs of Indonesian universities.

This questionnaire survey investigates the needs of the engineering faculties of the leading universities in Indonesia[1]. Based on the information collected by this survey, JICA will evaluate the degree of necessity of development project at each university. Therefore, it would be highly appreciated if you could answer the following questions in details so that we can evaluate precisely

2. Structure of Questionnaire and Hypotheses

For this questionnaire survey, JICA Survey team has set hypotheses as blow:

(Hypothesis 1)

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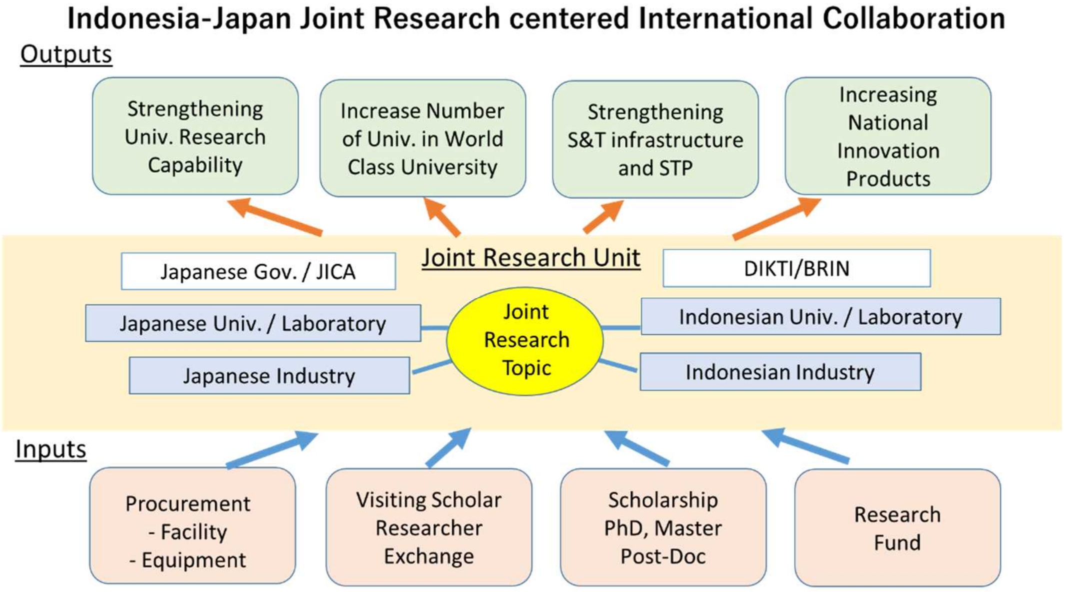
[1] In this survey, we focus on the 11 universities with PTN-BH qualifications as shown in the Attachment 1.

JICA assistance for promotion and investment to the research collaboration activities between Indonesian and Japanese higher education institutions on the research topics of Indonesian needs will be effective to support Indonesian challenges for Industry 4.0.

In order to support the achievement of the above Indonesian higher education policy goals, it may be effective to promote Joint Research project between Indonesian universities and Japanese universities, research institutes, and companies with the suitable research topics that meet the needs of Indonesia.

Inputs include construction of science and technology infrastructure and research facilities, procurement of experimental equipment, promotion of industry-academia collaboration, study abroad for researchers with degree and non-degrees, invitation of visiting scholars from Japanese universities, and international collaboration in line with research topics. The Concept Chart is as below. This concept was discussed with Ministry of Education and BRIN and agreed last year.

Concept Chart:



(Hypothesis 2)

Indonesian universities' contribution to and cooperation with industries and communities is expected to be strengthened, and JICA assistance for technology transfer based on the Japanese experiences of Industry-Academia Collaboration may be effective.

JICA assistance for technology transfer on Industry-Academia Collaboration may be able to be provided through various forms, such as training programs, expert dispatch and one of the component or consulting services of the project scheme as above.

(Hypothesis 3)

Engineering education capacity development in terms of infrastructure and human resources is required to meet the rapid increase of social demand for higher education

In order to respond the rapid quantitative increase in demand for higher education and to meet the needs of industry, it may be effective to expand and improve the educational infrastructure, and to promote international linkage between Indonesian and Japanese universities aiming to improve educational programs, eliminating regional disparities in the supply of higher education and respond the needs raised by COVID19 pandemic.

The options of inputs may be construction of school buildings, procurement of equipment, ICT infrastructure development, degree and non-degree training in Japan for the teachers, curriculum improvement by Kosen style hands-on education, international linkage program, Employability and Soft Skills development through Internship and Apprenticeship programs with Japanese industries collaboration, etc.

Based on the above hypotheses, this questionnaire is made up of 4 sections as below:

I. General questions
II. Questions on your needs for research collaboration and industrial linkage
III. Questions on your needs for educational collaboration
IV. Request and demand for JICA support

Questionnaire for Engineering

JICA is looking for the specific candidate assistance projects with Japanese ODA funds for higher education (Engineering) sector in Indonesia and expects to utilize Japanese higher education resources for Indonesian higher education development, including collaboration with Japanese universities and research institutes, in relation to the activity plan of your university in line with Indonesia's higher education development policy.

Please select an answer from the options and mark it with "✓". If you answer "yes", please describe the specific contents, background, and purposes.

Question Items

I. General questions

1) University name：

2) Faculty/department responding to this questionnaire survey:

3) Staff responding to this questionnaire survey:

Names and Email addresses

4) If you have ever had any assistance projects in the field of engineering funded by JICA or Japanese Government, please write down the name of the projects.

Past and present assistance projects in the field of engineering funded by JICA or Japanese Government

5) If you have ever had any foreign assistance projects in the field of engineering funded not by Japan but by bilateral or multilateral development agencies such as World Bank, Asian Development Bank (ADB), USAID etc., please write down the name of the projects.

Foreign assistance projects in the field of engineering funded by bilateral or multilateral development agencies

II. Questions on your needs for research collaboration and industrial linkage

6) What are your problems and plans regarding research capability development of your university / faculty in the field of engineering? If you have any written development plans, please provide us.

Your plan and problems regarding research capability development of your university / faculty in the field of engineering

7) What are your problems and plans regarding Industry & Academia collaboration in your university / faculty in the field of engineering? If you have any written development plans, please provide us.

Your problems and plans regarding Industry & Academia collaboration in your university / faculty in the field of engineering

8) Does your university / faculty have needs for JICA's assistance aiming at promoting **joint research with Japanese universities / research institutes / industries** and promoting **researcher exchanges** in order to improve the research capabilities of universities?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down the fields of research collaboration you can think of, and present situation of the researches behind your needs.

9) Does your university / faculty have needs for JICA's assistance aiming at promotion of **degree**

or non-degree (post-doc/internship/short-term training) human resource development cooperation programs with Japanese universities and research institutes for the researchers and students of your university in order to improve the research ability of the university?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

<u>If you answer "yes", please write down what kind of programs you can think of, and what are your problems or reasons behind your needs.</u>

10) Does your university / faculty have needs for JICA's assistance aiming at **procurement of research equipment, items, etc.** necessary for improving university research capabilities?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down what kind of research equipment or items you need, and what problems you have right now?

11) Does your university / faculty have needs for JICA's assistance aiming at **building construction / rehabilitation of research facilities, laboratories, etc.** to improve the research capacity of the university?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

<u>If you answer "yes", please write down what kind of construction you can think of, and what are your problems or reasons behind your needs.</u>

12) Does your university / faculty have needs for JICA's assistance aiming at operation of **industry-academia collaboration center of University,** improvement of **intellectual properties management**, etc.?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down what are the specific activities you can think of, and what are your problems or reasons behind your needs.

13) If your university / faculty has ever had any international research collaboration with Japanese universities / research institutes, please write down their major activities.

International research collaboration with Japan

14) Please write down, if you have needs for **other than the above** for JICA's support in activities to improve the research ability of the university.

Needs for other than the above and your problems or reasons behind your needs.

III. Questions on your needs for educational collaboration

15) What are your problems and plans regarding educational capability development of your university / faculty in the field of engineering? If you have any written development plans, please provide us.

Your plan and problems regarding educational capability development of your university / faculty in the field of engineering

16) Does your university / faculty have needs for JICA's assistance aiming at **construction of educational facilities / buildings**, etc. to meet the rapid demand for higher education and engineering education?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down what kind of construction you can think of, and what are your problems or reasons behind your needs.

17) Does your university / faculty have needs for JICA's assistance aiming at **procurement of educational equipment** such as experimental training and equipment for e-learning necessary for improving educational programs?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down what kind of equipment you can think of, and what are your problems or reasons behind your needs.

18) Does your university / faculty have needs for JICA's assistance aimed at promotion of **degree or non-degree (internship/short term training) human resource development cooperation programs** with Japanese universities and research institutes for improving their teaching ability?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", please write down what are the specific programs you can think of, and what are your problems or reasons behind your needs.

19) Does your university / faculty have needs for JICA's assistance aiming at improvement of educational programs by introducing **Japanese style engineering education including hands-on education (Japanese style active learning) in collaboration with Japanese universities or KOSEN technical colleges**?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

If you answer "yes", what are the specific programs you can think of, and what are your problems or reasons behind your needs.

20) Does your university / faculty have needs for JICA's assistance aiming at curriculum

improvement through promotion of **international linkage programs with Japanese universities such as joint degree, twinning, and double degree** programs?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

<u>If you answer "yes", please write down what are the specific programs you can think of, and what are your problems or reasons behind your needs.</u>

21) Does your university / faculty have needs for JICA's assistance aiming at program development to strengthen exports to Japan, such as a **training program for IT bridge engineers**, etc.?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

<u>If you answer "yes", please write down what are the specific programs you can think of, and what are your problems or reasons behind your needs.</u>

22) Does your university / faculty have needs for JICA's assistance aimed at program development to improve **Employability and Soft Skills** of the students through collaboration with Japanese industries, such as **Internships and 3-5 years Apprenticeship programs** in Japan?

☐ Yes ☐ No ☐ Neither Agree Nor Disagree

<u>If you answer "yes", please write down what are the specific programs you can think of, and what are your problems or reasons behind your needs.</u>

23) Please write down, if you have needs for **other than the above** for JICA's support in activities to improve the educational programs of the university.

<u>Specific needs for other than the above, and your problems or reasons behind your needs.</u>

IV. Requests and Comments for JICA support

24) Regardless of the above, if you have any comments regarding JICA support, please write them.

Requests / Comments

Thank you very much for your cooperation. According to the above-mentioned information and requests from your university, JICA will consider if there is possibility to organize the development project as you wish

Attachment 1: Questionnaire address list (Universities / faculties with PTN-BH qualifications)

1) Universitas Indonesia (UI)
    - Faculty of Engineering
    - Faculty of Computer Science
2) Institut Teknologi Bandung（ITB）
    - Faculty of Arts and Design
    - Faculty of Civil and Environmental Engineering
    - Faculty of Earth Sciences and Technology
    - Faculty of Industrial Technology
    - Faculty of Mechanical and Aerospace Engineering
    - Faculty of Mining and Petroleum Engineering
    - School of Architecture, Planning, and Policy Development
    - School of Electrical Engineering and Informatics
3) Universitas Gadjah Mada (UGM)
    - Faculty of Engineering
4) IPB University (IPB)
    - Faculty of Agricultural Technology
5) Universitas Airlangga (UNAIR)
    - Faculty of Advanced Technology and Multidiscipline
6) Institut Teknologi Sepuluh Nopember (ITS)
    - Faculty of Science and Data Analytics
    - Faculty of Industrial Technology and System Engineering
    - Faculty of Intelligent Electrical and Informatics Technology
    - Faculty of Civil, Planning, and Geo Engineering
    - Faculty of Marine Technology
    - Faculty of Vocational Studies
    - Faculty of Creative Design and Digital Business
7) Universitas Padjadjaran (UMPAD)
    - Faculty of Agricultural Industrial Technology
    - Faculty of Geological Engineering
8) Universitas Diponegoro (UNDIP)
    - Faculty of Techniques
9) Universitas Hasanuddin (UNHAS)
    - Faculty of Engineering
10) Universitas Pendidikan Indonesia (UPI)
    - Faculty of Technology and Vocational Education

11) Universitas Sumatera Utara (USU)
    - Faculty of Computer Sciences and Information Technology
    - Faculty of Engineering

Questionnaire Survey on Medical Education

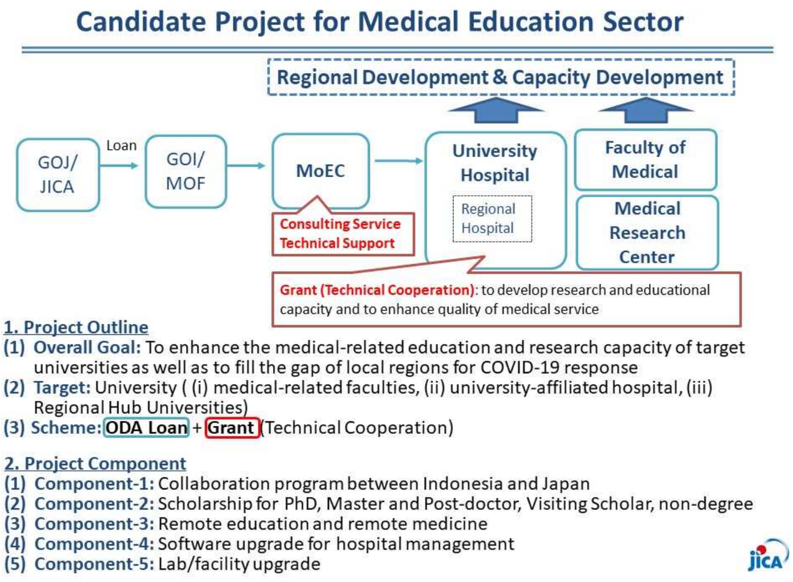
Asia SEED / Oriental Consultants Global
June, 2021

Background and Objectives of the Questionnaire Survey

The government of Indonesia is planning to accelerate 1) human resource and science & technology development, 2) sustainable economic development, 3) fair development, and 4) strong nation and governance under the VISION 2045, especially "1) human resource and science & technology development" emphasizing the importance of further development of human resource through the provision of fair education. In response to this policy direction of Indonesia, the government of Japan is raising support for nurturing human resources in higher education in Indonesia. The necessity of development and improvement of higher education institutes is high in order to achieve Indonesia's VISION 2045.

Japan International Cooperation Association (JICA) has implemented many cooperative projects in Indonesia and contributed to the development of higher education and encouragement of friendly relationship between Indonesia and Japan, and is planning to support the challenges caused by the pandemic of Covid-19, especially in the field of higher education. The following concept of prospective supporting project (Candidate Project for Medical Education Sector) was shared with Ministry of Education, Indonesia and the basic consensus was obtained.

This questionnaire survey aims to assess the current status of medical schools and university hospitals among the selected universities such as healthcare system, medical education, demand for support, etc. Based on the information collected by this survey, JICA will evaluate the degree of necessity of development project at each university. Therefore, it would be highly appreciated if you could answer the following questions in details so that we can evaluate precisely.



Candidate Project for Medical Education Sector

Grant (Technical Cooperation): to develop research and educational capacity and to enhance quality of medical service

1. Project Outline
(1) **Overall Goal:** To enhance the medical-related education and research capacity of target universities as well as to fill the gap of local regions for COVID-19 response
(2) **Target:** University ((i) medical-related faculties, (ii) university-affiliated hospital, (iii) Regional Hub Universities)
(3) **Scheme:** **ODA Loan** + **Grant** (Technical Cooperation)

2. Project Component
(1) **Component-1:** Collaboration program between Indonesia and Japan
(2) **Component-2:** Scholarship for PhD, Master and Post-doctor, Visiting Scholar, non-degree
(3) **Component-3:** Remote education and remote medicine
(4) **Component-4:** Software upgrade for hospital management
(5) **Component-5:** Lab/facility upgrade

Structure of This Questionnaire

This questionnaire is made up of 5 sections as below.

1. General questions
2. Questions on healthcare system in the nearby provinces/districts of your university
3. Questions on e-learning of medical education
4. Questions on telemedicine
5. Request and demand for support

General information on your university is obtained from the questions of section 1. In section 2, the role of your university/university hospital in the healthcare system in your province/district is identified. For the questions of section 3 and 4, the current status of use of information technology is assessed. Support for information technology for medical education/medical use could be one of the prospective projects if it is evaluated as further development is needed in response to the pandemic of Covid-19 and provision of medical services to remote areas. In addition, demand for supporting projects and request to JICA from your university are provided in section 5.

1. General questions

1) University name

2) Section/department responding to this questionnaire survey

3) Name of the staff responding to this questionnaire survey

4) Contact information of the staff in charge (phone number, WhatsApp)

2. Questions on healthcare system in the nearby provinces/districts of your university

Indonesia adopts referral healthcare system. Patients see general doctors at designated local/district medical facilities (primary healthcare facilities) called puskesmas and see specialist doctors at university hospitals if they need further specialist diagnosis and treatment. University hospitals are playing a role to oversee the status of public health not only in your province but also nearby provinces of your university as the top of hierarchy of medical services.

5) Please provide the number and the name of primary healthcare facilities (local/district medical facilities such as pusukesmas or private clinics) which send patients to your university hospital (e.g. Approximately 20; A clinic, B clinic, C hospital, etc.) and upper-level (tertiary) healthcare facilities (other university hospitals or general

hospitals) which your university sends patients to (e.g. 1; xx General Hospital) under referral system

Primary healthcare facilities

Number:____ Name of those facilities:______________________________

Upper-level (tertiary) healthcare facilities

Number:____ Name of those facilities:______________________________

6) How does your institute cooperate with primary healthcare facilities (puskesmas or private clinics)? (e.g. Providing technical lectures/human resources/information sharing platform, etc.)

7) How does your institute cooperate with other medical institutes/university hospitals? (e.g. Providing highly advanced medical treatment to patients in other university hospitals, skill enhancement among lecturers in those institutes, etc)

8) How does your institute cooperate with provincial/district government? (e.g. Having meetings with provincial health authorities, supporting provincial government in development of policies on public health, conducting PCR test and hospitalizing those who test positive for Covid-19, etc.)

9) Do you have any challenges/difficulties when you implement cooperative activities with other organizations mentioned in 6), 7) and 8)? If so, what are the challenges/difficulties? (e.g. Although technical advices for policy making are provided to governmental officers, they do not understand fully due to lack of knowledge, etc.)

Yes / No / No idea (Please choose among the choices)

If your answer is yes, what are the challenges/difficulties?

10) Are there any specific medical equipment/items/facilities used for the regional cooperative activities? (e.g. PCR test kit/device, laboratory for the joint research with local parties, etc.) If so, what are they? What is the current

status of those equipment/items/facilities? Still available, insufficient, need updated, further devices needed, etc.

Yes / No / No idea (Please choose among the choices)

If your answer is yes, please answer the following additional questions.
What are they?

Please describe their current status (still available, insufficient, update needed, etc.)

3. Questions on e-learning of medical education

Most of the universities find it difficult to provide face-to-face classes during the Covid-19 pandemic. In order to decrease the chance of getting infected in classrooms, online classes/experiments/practical trainings are getting more popular although the system and teaching methods still need to be improved.

11) Are online classes/experiments/practical trainings conducted for students of Faculty/Graduate School of Medicine during the Covid-19 pandemic? If conducted, what kind of classes/experiments/practical trainings are provided online (e.g. Classes (biology, epidemiology), experiments (sketch in pathologic experiment, orientation seminar for animal experiment), practical trainings (diagnostic interview, OSCE), etc.) and how are they done? (e.g. On-demand style or real-time style, etc.) Which platform is used? (e.g. Zoom, Google, etc.) Are there any obstacles/difficulties in providing online classes? (Internet access, device, teaching method, etc.)

Yes / No / No idea (Please choose among the choices)

If your answer is yes, please answer the following additional questions.
What kind of classes/experiments/practical trainings are provided online?

How are they done?

Which platform is used?

What are the obstacles/difficulties in providing online classes/experiments/practical trainings?

4. Questions on telemedicine

Patients are recommended not to visit hospitals directly if they feel symptoms such as having a fever or coughing under these circumstances. Telemedicine (online diagnosis, online prescription, etc.) can be one of the solutions to prevent spread of infections in hospitals by decreasing the chances of visiting hospitals. Also, telemedicine is expected to provide diagnosis and prescription to those who live in remote areas where access to medical facilities is difficult.

12) Is any form of telemedicine used in your university hospital? If so, what kind of consultancy is provided to

whom? (e.g. online medical exam to those who are pregnant, diagnosis to Covid-19 close contact persons, etc.) Which platform is used? (e.g. telephone, mobile phone application, etc.)

Yes / No / No idea (Please choose among the choices) If your answer is yes, please answer the following additional questions. What kind of consultancy is provided to whom? Which platform is used?

13) Please provide examples of use of telemedicine in the provinces/districts around your university if you know (e.g. general physicians from private hospitals are providing online diagnosis by using Halodoc, those who have tested positive for Covid-19 are able to receive prescribed medicine at home by using Gojek)

5. Request and demand for support

JICA is collecting information on the need/demand/request for the supports on development of medical institutes in Indonesia so that it can develop projects between Indonesia and Japan. The followings ((a) to (g)) are examples of the project.

Examples of the project

- *(a) Support on establishment of facilities (research institute, university hospital, center for infectious diseases, pharmaceutical laboratory, etc.)*
- *(b) Support on procurement of equipment (equipment for research, education, ICT, medicine, online-education system, telemedicine, etc.)*
- *(c) Support on human resource development (scholarship for study in Japan (Degree/Non-degree), visiting scholar and researcher exchange between your university and Japanese universities, etc.)*
- *(d) Support on joint research programs with Japanese institutes aiming at development of research capacity*
- *(e) Support on development of international medical programs (twining program or double-degree program between your university and Japanese universities, etc.)*
- *(f) Support on development of e-learning on medicine (curriculum, material, e-learning soft, etc.) or new course on medicine consisted of face-to-face/online lecture*
- *(g) Support on development of center for academic-industrial cooperation, intellectual property management on research, hospital management, etc.*

14) Please describe freely the concrete ideas for support from Japan and cooperation between Indonesia and Japan which your university seeks. You are able to develop your own ideas based on, but not limited to, the above-mentioned examples of (a) to (g) (multiple answers allowed).

15) Please describe the reasons why the supports described in 14) are expected and how they will result in.

16) Have you already received any other funds/grants from other donors for the improvement of medical facilities/equipment or capacity building among medical personnel in your university? If so, which donors provided you with funds/grants and what was the support about? (e.g. Asian Development Bank provided IDR10,000,000,000 to refurbish laboratory and purchase research equipment for bio-molecular, KOICA supported grant in dispatching post-doc researchers from your university to research institutes in Korea for research collaboration in the field of xx, etc.)

Yes / No / No idea (Please choose among the choices)

If your answer is yes, please answer the following additional questions.
Which donors provided you with funds/grants?

What was the support about?

Thank you very much for your cooperation. According to the above-mentioned information and requests from your university, JICA will consider if there is possibility to organize the development project as you wish.

Additional Inquiries of the Needs Assessment Survey for JICA's Funding

Thank you very much for your kindest reply to our questionnaire. Based on the answers from each university, we are compiling the collected data and developing a report to JICA. However, we still need the following information related to;

1) students/faculty members studying abroad
2) job-placement assistance/support on student's career
3) activity on academic-industrial cooperation and start-up company, and
4) patent and intellectual property right on developed products/techniques

I would highly appreciate if you could provide me with the answers or reference data for those topics **by 16 Aug, 2021**.

1) Please provide the annual number of students/faculty members studying abroad from faculty of medicine of your university, form of study abroad (exchange student, internship, visiting scholar, etc.), and destination (name of university, research institute, company, etc.)

2) Is there any job-placement assistance/career support provided to students of faculty of medicine? If so, what kind of assistance/support is provided?

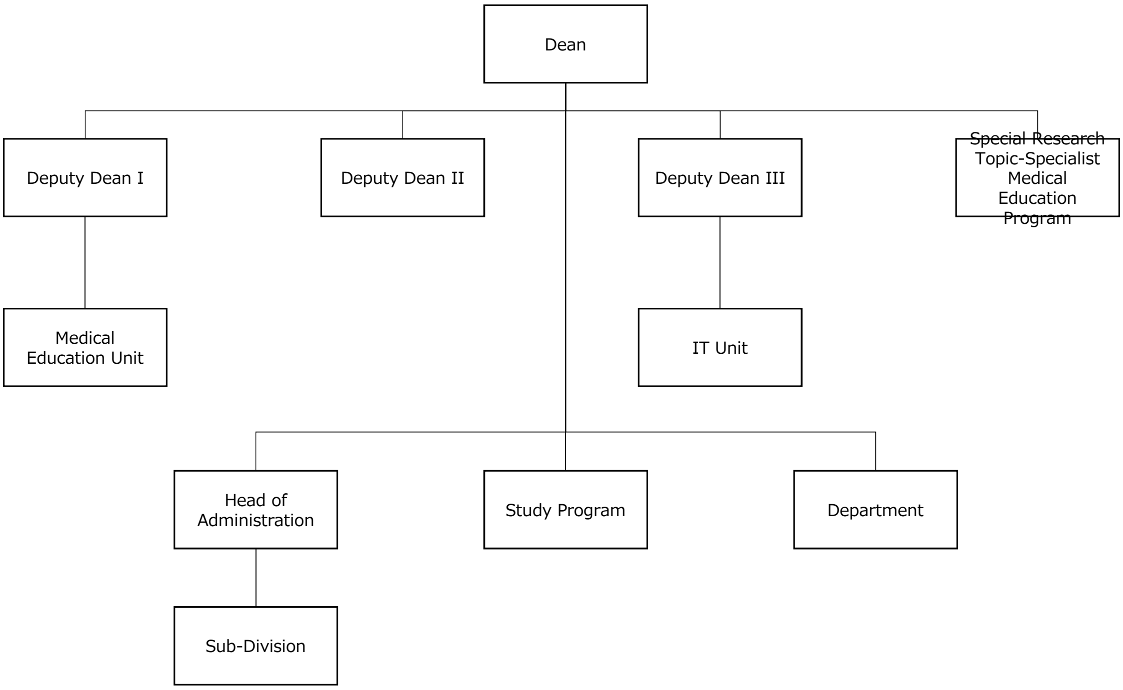
3) Please provide the annual number of academic-industrial cooperation activities at faculty of medicine, and form of activities (joint research, R&D, endowment, etc.)

4) Please provide the annual number of patents and intellectual property rights on products/techniques developed by faculty of medicine, and details of the patents and intellectual property rights

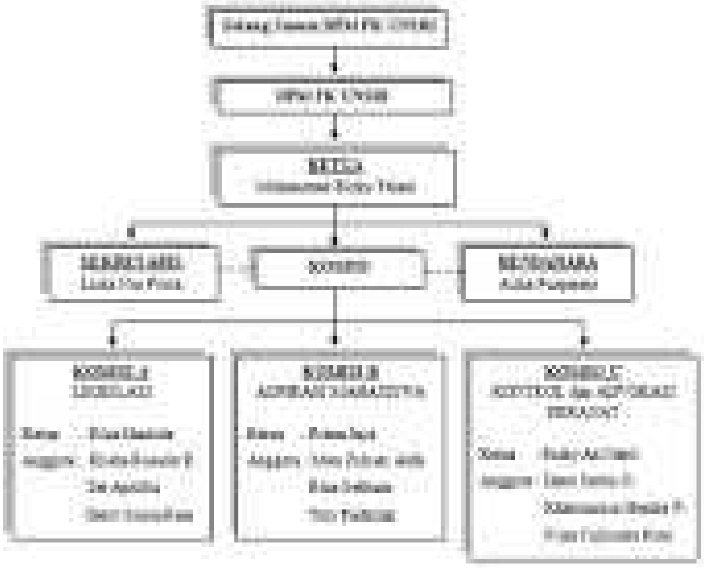
If you have a list or reference data containing such information (whether in English or Bahasa Indonesia), please provide it to me instead of answering the above topics, which will reduce your time and effort. Thank you very much again for your continuous attention on this matter. I am very much looking forward to hearing from you.

Sincerely yours,
Asia SEED

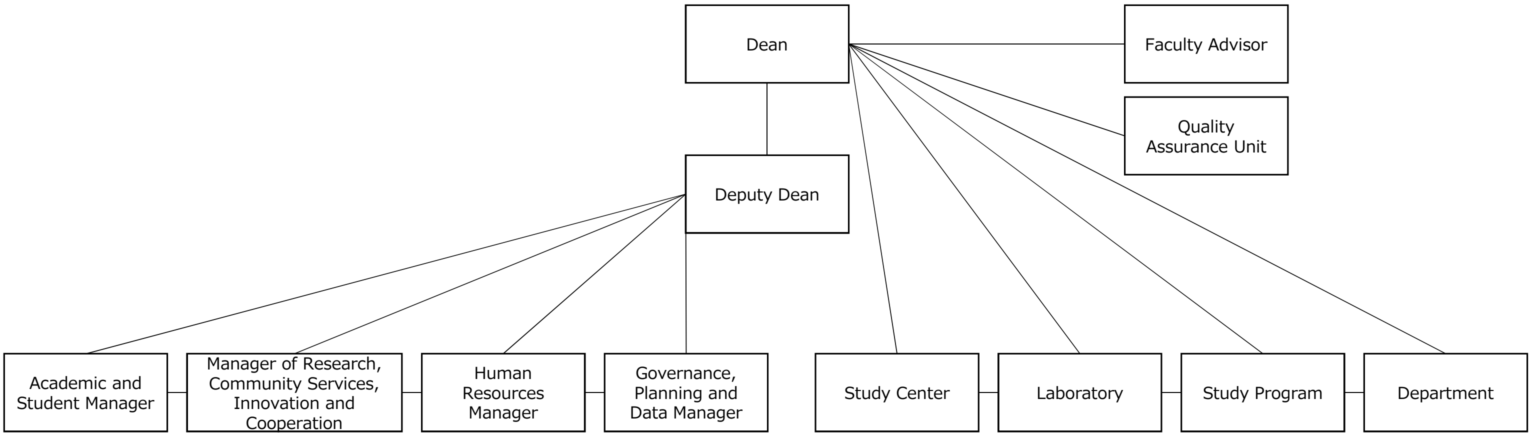
Faculty of Medicine, University of Sumatera Utara



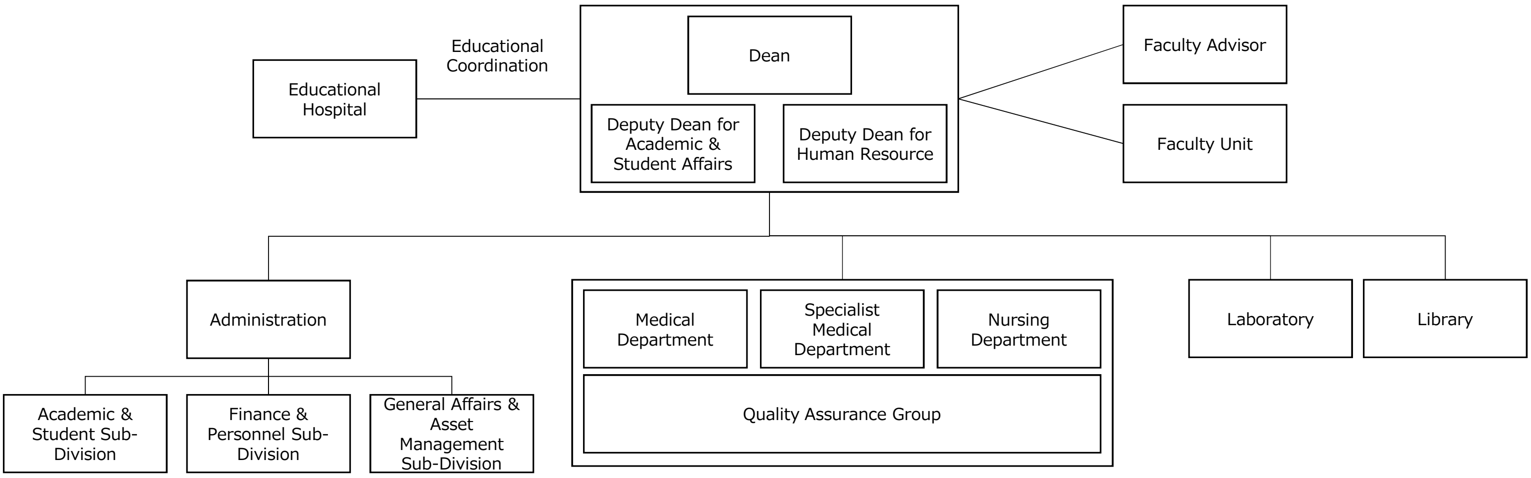
Faculty of Medicine, Sriwijaya University



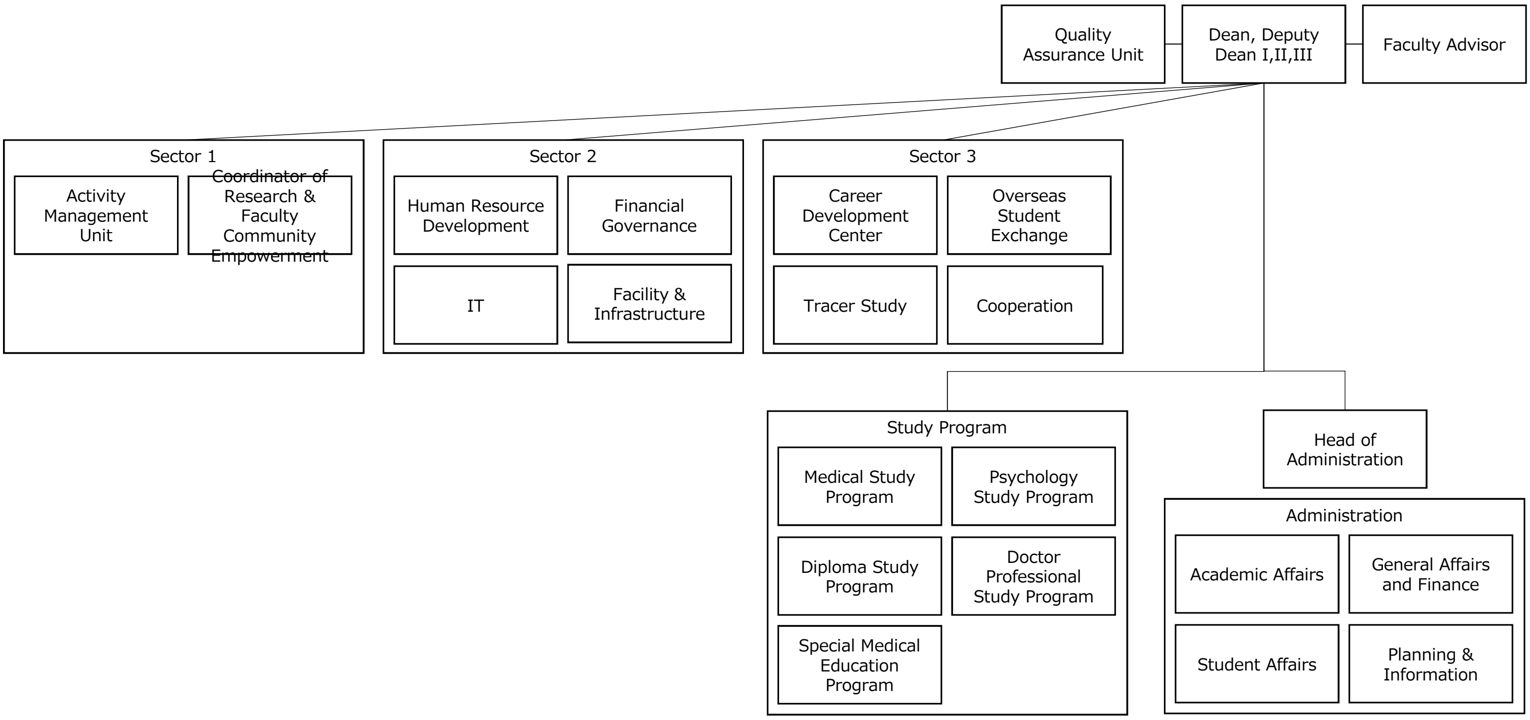
Faculty of Medicine, Padjadjaran University



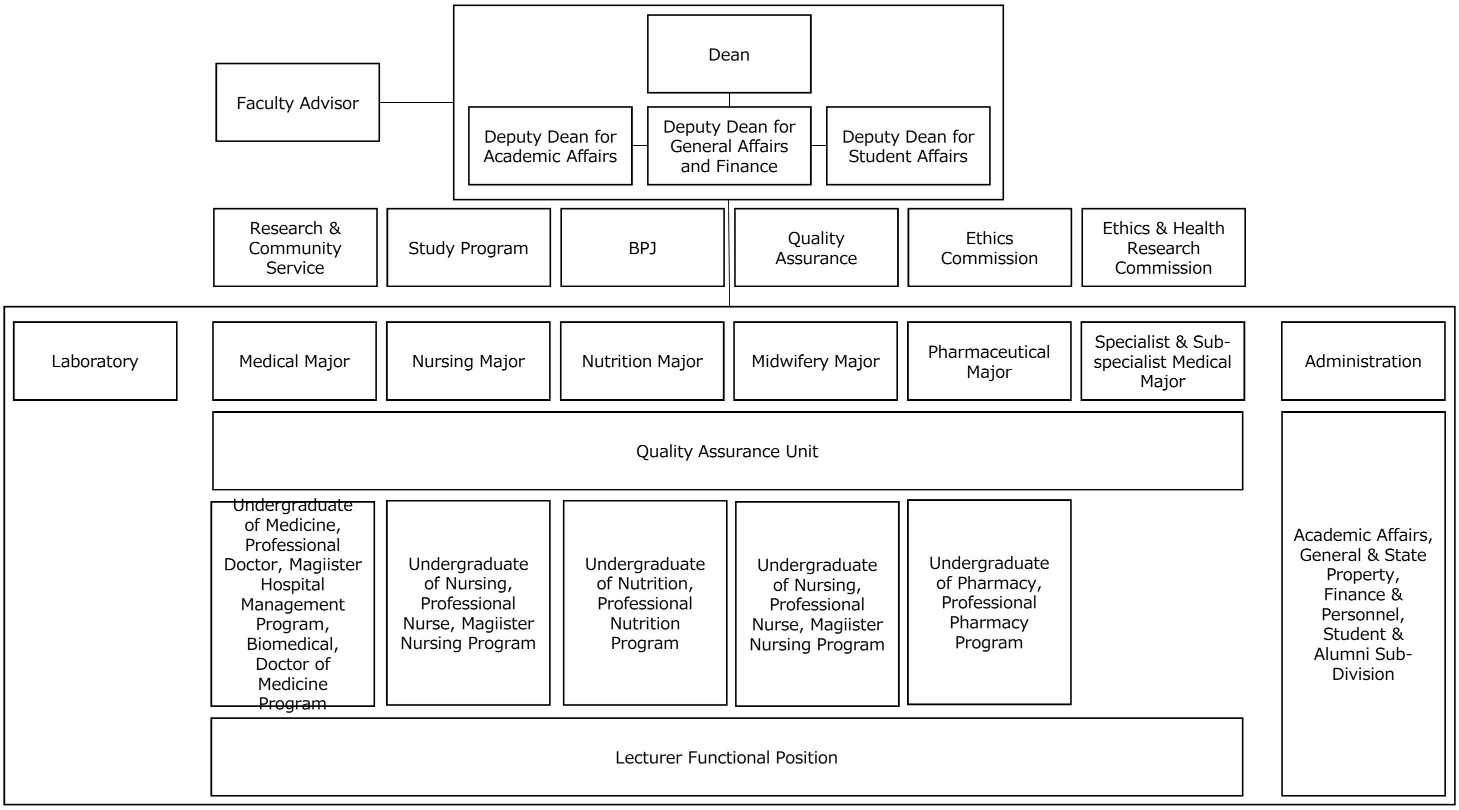
Faculty of Medicine, Diponegoro University



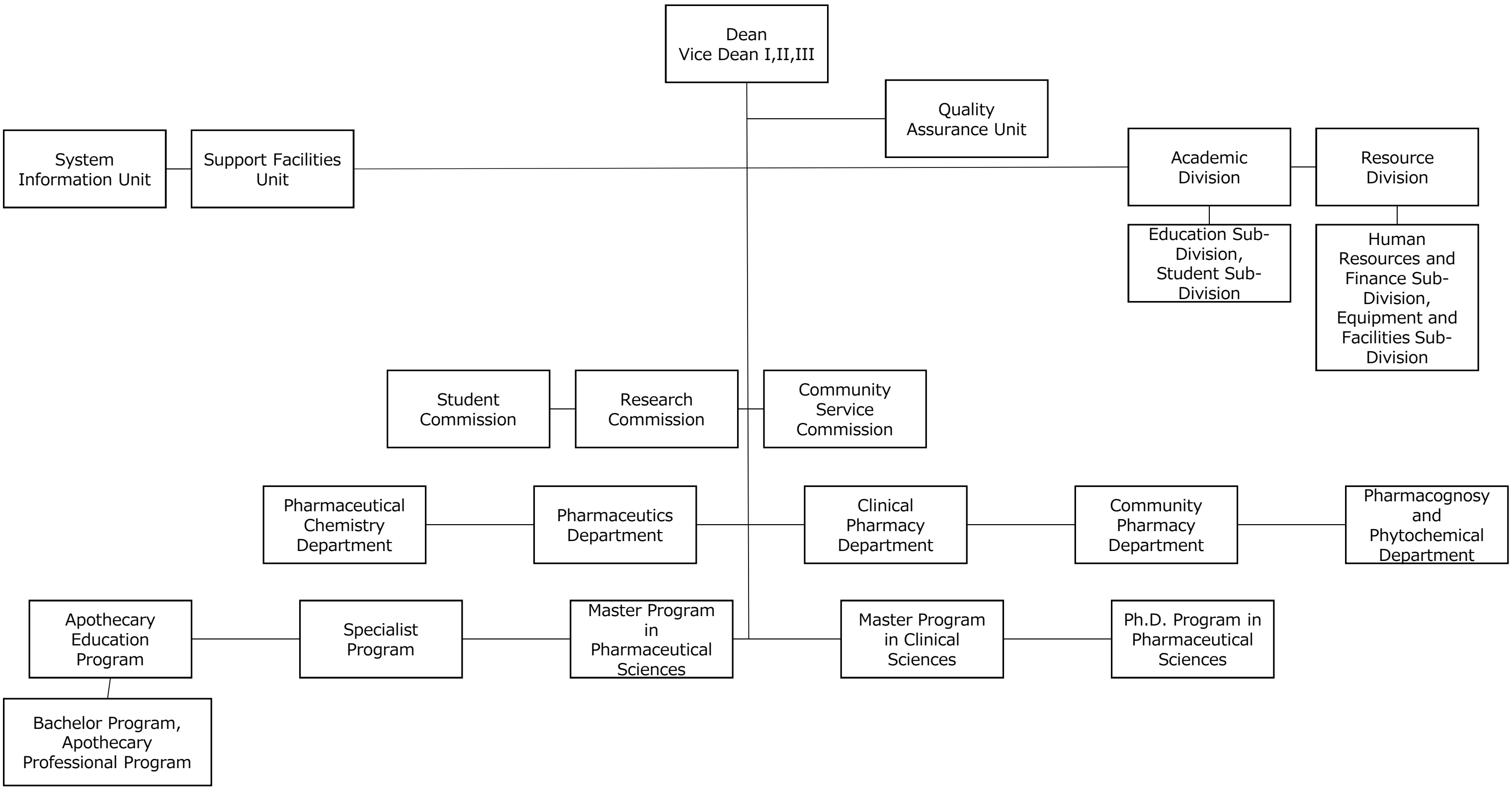
Faculty of Medicine, Sebelas Maret University



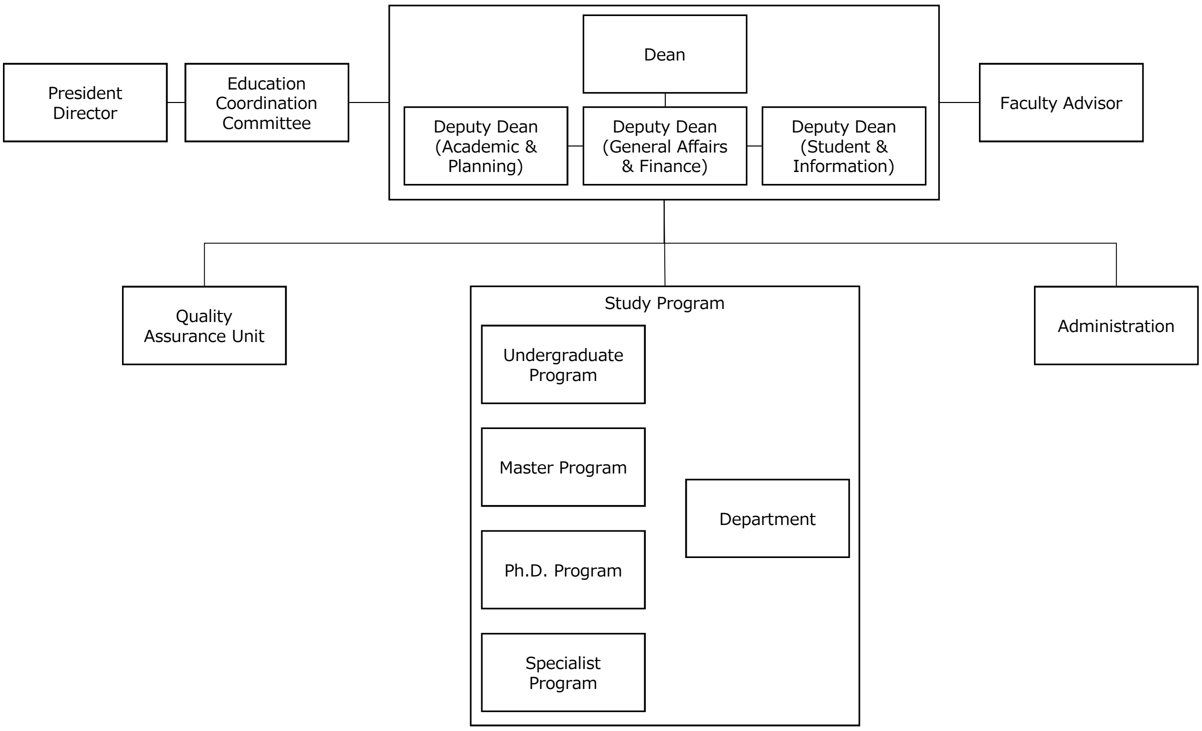
Faculty of Medicine, Brawijaya University



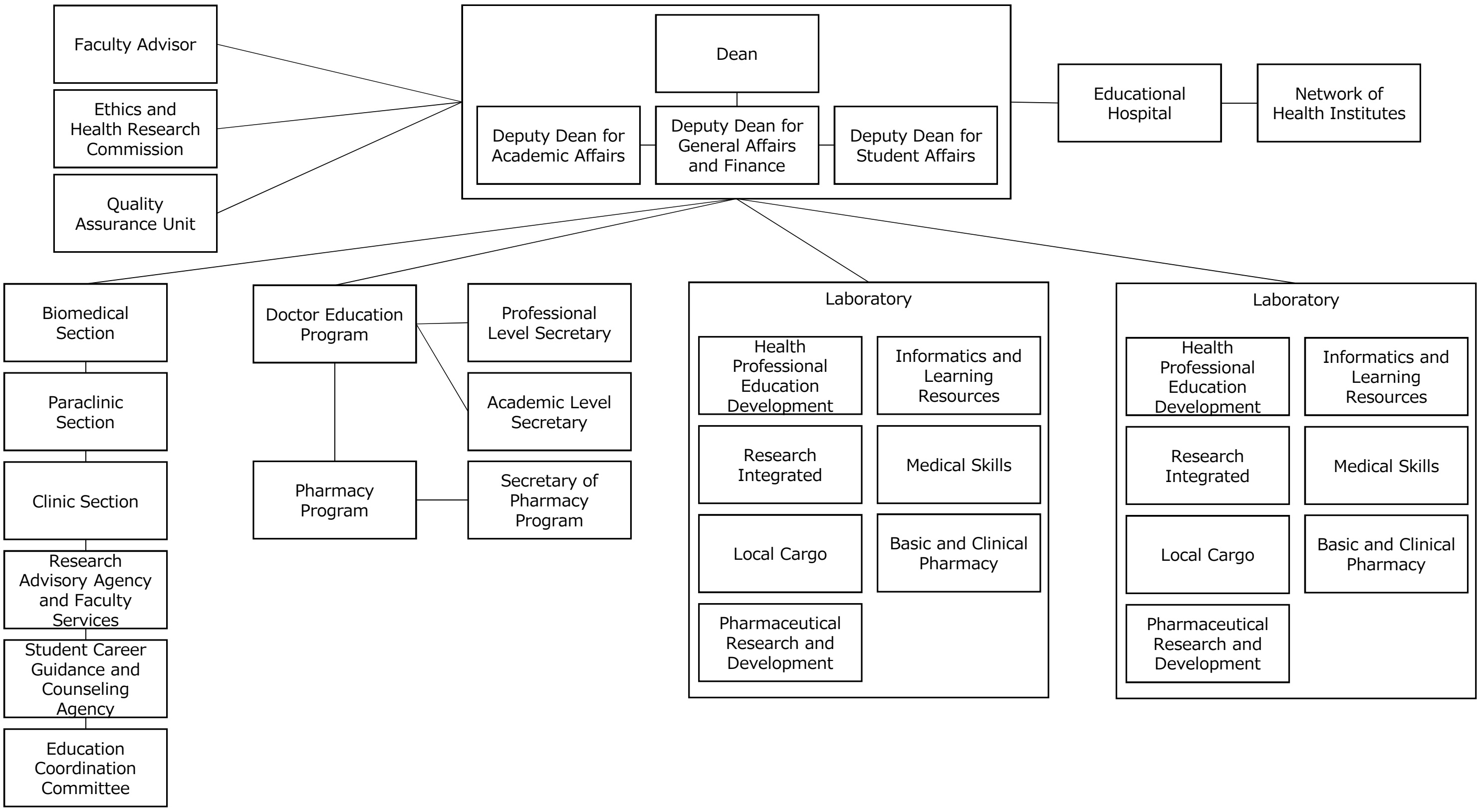
Faculty of Medicine, Airlangga University



Faculty Medic and Health Sciences, Udayana University



Faculty of Medicine, University of Mataram



List of Research Grant (RISPRO) Subsidized to Medical-Related Topics at Target Universities

University	Research Title Adopted by RISPRO
University of Sumatera Utara	・The effectiveness of Apium graveolens L supplementation in pregnancy in the prevention of COVID19 ・Nucleotide Sequence Analysis Sars-Cov-2 Java Strain and Natural Killer Cell Cytolytic Activity and Analysis in Covid-19 Patients ・A Grabah Wash Place From Alofane Clay As An Alternative Natural Hand Sanitizer To Kill Viruses And Pathogenic Bacteria In The Prevention And Overcoming Of The Covid-19 Outbreak ・Healthcare Assistant Robot for Covid-19 Patients ・Eleven March University Portable Ventilator ・Psychological Risk Profiling of the Covid-19 Pandemic by Province Socio-Economic Level and Individual Personality Type: A Multilevel Model ・The Tradition of Disease Treatment (Pandemic) and Handling of Disaster Tragedy by the Javanese Society in the XIX Century Fiber Centhini Ancient Manuscript ・Community Empowerment For Management And Rehabilitation Of Covid-19 (Prevent Covid-19)
Sriwijaya University	－
Padjadjaran University	・THE ROLE OF COMPLEMENT COMPONENT C1Q IN TUBERCULOSIS AND DIABETES CO-MORBIDITY ・YOGURT BASED ON PURPLE SWEET (IPOMOEA BATATAS)—: EXPLORATION OF PRE-CLINICAL TESTING TO THE CLINIC PHASE 2 TOWARDS FUNCTIONAL BEVERAGE PRODUCTS FOR DYSLIPIDEMIC INDIVIDUALS ・DEVELOPMENT OF CIPLUKAN HERBAL CAPSULES (PHYSALIS ANGULATA LINN.) AS ANTI-FIBROSIS IN LUNG AND LIVER FIBROSIS DISORDERS ・DEVELOPMENT OF A "MICROBIOME FRIENDLY" MOISTURIZER PROTOTYPE CONTAINING CATELICIDIN LL-37 AS MAIN THERAPY OF CHILDHOOD ATOPIC DERMATITIS ・DEVELOPMENT OF SUICIDE PREVENTION STRATEGIES BASED ON EDUCATIONAL INSTITUTIONS ・DESIGN, PRODUCTION, IN VITRO AND IN VIVO TESTING RED WHITE DENTAL IMPLANT PROTOTYPES FOR MEDICAL EQUIPMENT DEVELOPMENT IN INDONESIA ・DEVELOPMENT OF PUBLIC AND PRIVATE PARTNERSHIP POLICY IN MANAGING TUBERCULOSIS IN PURWAKARTA DISTRICT ・DEVELOPMENT OF WEB-BASED POSYANDU REPORTING APPLICATION SYSTEM AND MACHINE LEARNING IMPLEMENTATION FOR PREDICTION AND RECOMMENDATIONS IN THE FRAMEWORK OF MULTI PARTNER PENTA-HELIX COLLABORATION ・Quinine Multicenter Clinical Trial for Covid-19 Control in Indonesia
Diponegoro University	・DEVELOPMENT OF STANDARD MEDICAL OZONE GENERATOR FOR NATIONAL MEDICAL APPLICATION NEEDS
Sebelas Maret University	－
Brawijaya University	・EARLY DETECTION OF AUTOIMMUNE THYROID DISEASE THROUGH RAPID TEST BASED ON THYROID PEROXIDASE (TPO) AND THYROID STIMULATING HORMONE RECEPTOR (TSHR) FOR IMPROVING HEALTH SERVICES FOR PREGNANT MOTHERS ・In Silico Study: Molecular Docking of Indonesian Natural Ingredients Against Coronavirus Diseases 2019 (Covid-19)

	・Development of Spike Protein as a Coronavirus Vaccine Candidate Based on Delivery With Live Bacterial Vector ・Indonesian Herbal As Antivirus In Coronavirus Diseases 2019 (Covid-19) And Interleukin-6 Activity Inhibitor ・Development Study of Specific Detection of Covid-19 on Orf1Ab and Spike Protein
Airlangga University	・PRODUCTION OF GANDARUSA (JUSTICIA GENDARUSSA BURM.F) Phytopharmaceutical CAPSULES AS A MEN'S KB DRUG ・INDUSTRIALIZATION OF BOVIN HYDROXYPATITE AS A BIOCOMPATIBLE BONEGRAFT RAW MATERIAL ・INNOVATION DEVELOPMENT OF NIGELLA SATIVA BASED ANTI-INFLAMMATION TOothpaste PRODUCTION AS INDUSTRIAL PROSPECTS IN THE FIELD OF DENTAL HEALTH ・POLICY DEVELOPMENT OF HEALTHY STOP MODEL AROUND SCHOOL IN BANYUWANGI THROUGH PARTNERSHIP OF SCHOOLS, TRADERS AND THE GOVERNMENT ・Phase II Clinical Trials Celery Herb Extract Capsule Formula (Apium Graveolens L.) for Therapy in Patients with Stage 1 Hypertension ・Production of Mineral (hydroxyapatite) Beef Bone with Freeze Dried Stem Cell Secretome for Bone Defect Therapy ・Innovation and fabrication of dental implant materials with porous structures struktur ・Negative Pressure Type Portable Isolation Room for Covid-19 Patients ・Laboratory testing for confirmation of test results Development of rapid test kits (ag and ab detection) for detection of SARS-CoV-2 . infection ・Development of RNA Biosensor Based Portable Detection Kit For Covid-19 ・Mechanical Ventilator Device Design and Implementation for Covid-19 Situation ・Development of the COVID-19 distribution visualization application and analysis of its spread prediction ・Covid-19 Virus RNA-Polymerase Inhibitor Design And Synthesis
Udayana University	－
University of Mataram	－

Reference：Website of LPDP

List of Intellectual Property Rights Registered by Faculty of Medicine at Target Universities

Year Registered	Patent／Copyright	Content of IPR（Bahasa Indonesia）	Content of IPR（English）	Registration Number
University of Sumatera Utara				
2015	Copyright	Buku: Kolesterol : Dua Zat Gizi Yang Bekerja Menurunkannya	Book: Cholesterol: Two Nutrients that work to lower It	00090557
2015	Copyright	Buku: Tatalaksana Gawat Darurat Penyakit Endokrin	Book: Endocrine Disease Emergency Management	00090560
2016	Copyright	Buku: Karsinoma Nasofaring Kanker Kanker Tenggorokan	Book: Nasopharyngeal Carcinoma Throat Cancer	00090559
2016	Copyright	Buku: Infeksi Menular Seksual	Book: Sexually Transmitted Infection	00090111
Sriwijaya University				
—				
Padjadjaran University				
—				
Diponegoro University				
2018	Simple Patent	Proses Pembuatan Serbuk Bawang Merah Dengan Varian Rasa Original, Asin dan Pedas	The process of making onion powder with original, salty and spicy flavor variants	IDS000001826
2019	Simple Patent	Alat Pemanas Air Tenaga Matahari Menggunakan Pemanas Pipa Logam Bebentuk Spiral dan Cairan Ethylene Glycol	Solar water heater using spiral shaped metal pipe heaters and liquid ethylene glycol	IDS000002308
2019	Simple Patent	Proses Pembuatan Teh Berbahan Daun Simpur (Dillenia indica)	The Process of making tea based on simpur leaves (Dillenia indica)	SID201805246/ IDS000002598
2019	Simple Patent	Formula Steroid Topikal dengan Tambahan Zat Aktif Ekstrak Daun Kecubung (Datura metel) Sebagai Pengobatan Dermatitis Kontak Iritan	Topical Steroid Formula with added active substance of Amethyst Leaf extract (Datura metel) as treatment of irritant contact dermatitis	SID201805288/ IDS000002675
2019	Simple Patent	Produk Serbuk Kayumanis (Cinnamomum burmannii) Sebagai Penurun Marker Stres Oksidatif	Cinnamoum powder products (Cinnamomum burmannii) as a lowering oxidative stress marker	SID201805283/ IDS000002669
2019	Simple Patent	Penggunaan Beta Glukan dengan Dosis Optimum Sebagai	Use of Beta Glucan with optimum dosage as a stimulator of peripheral	SID201900201/ IDS000002721

		Stimulator Peripheral Blood Mononuclear Cells (PBMCs) Dalam Memproduksi Sitokin Secara In Vitro	blood monnoclear cells (PBMCs) in producing cytokines in Vitro	
2020	Simple Patent	Bubuk Rimpang Kunyit (Curcuma domestica) Hasil Blansing Sebagai Pencegah Nefropati Diabetik	Turmeric rhizome powder (Curcuma domestica) results blanching for preventing Diabetic Nephropathy	SID201805291/ IDS000002756
2020	Simple Patent	Metode Modifikasi Enzimatik Pati Resisten Dari Pisang Batu (Musa balbisiana colla)	Modification Method of Resistant starch Enzymatic from Stone Banana (Musa balbisiana colla)	SID201900198/ IDS000002757
2020	Simple Patent	Proses ekstraksi zingerone dari rimpang jahe menggunakan air subkritis	Extraction process of zingerone from ginger rhizome using subcritical water	IDS000002818
2020	Simple Patent	Proses Pembuatan Gel Anti Polutan Berbahan Dasar Lidah Mertua (Sansevieria trifasciata)	The Proses of making anti pollutan gel based on mother-in-law's tongue (Sansevieria trifasciata)	SID201805287/ IDS000002905
2021	Copyright	PRO-MOMMA	PRO-MOMMA	EC00202114485
Sebelas Maret University				
2020	Copyright	Karya Sinematografi SUNI-SEA Project: A Success Story of Pospindu Participant	Cinematographic Works SUNI-SEA Project: A Success Story of Pospindu Participant	000236454
2020	Copyright	Book - Stroke Iskemik Akut: Dasar dan Klinis	Acute Ischemic Stroke: Basic and Clinical	000227313
2020	Copyright	Karya Sinematografi Diabetes Melitus di Era Covid-19	Cinematographic Works Diabetes Mellitus in the Covid-19 Era	000236449
2020	Copyright	Karya Sinematografi Edukasi Penggunaan Glukometer	Cinematographic Works Education of use Glucometer	000236452
2020	Copyright	Ceramah Curcumin And VCO As Adjuvant Treatment	Lecture Curcumin And VCO As Adjuvant Treatment	000239380
2020	Copyright	Buku Akupuntur Pada Sindrom Ovarium Polikistik	Book: Acupuncture in Polycystic Ovarian Syndrome	000228704
2020	Copyright	Buku Mentruasi: Fisiologi, Patologi Gangguan, dan Tatalaksana	Book: Menstruation: Physiology, Pathology of Disorders, and Management	000229115
2020	Copyright	Kompilasi Ciptaan / Data Database: Analisis Gut Microbiome Pada Orang	Compilation of Creations / Data Database: Gut Microbiome Analysis in	000235972

		Dekat Dengan Hewan Ternak	People Close to Livestock	
2020	Copyright	Kompilasi Ciptaan / Data Desain Penelitian: Persistensi Penggunaan Obat Gagal Jantung Sebagai Prediktor Luaran Klinik dan Biaya Pada Pasien Gagal Jantung Sistolik	Compilation of Creations / Data Research Design: Persistence of Heart Failure Drug Use as a Predictor of Clinical Outcomes and Costs in Systolic Heart Failure Patients	000235973
2020	Copyright	Kompilasi Ciptaan / Data Desain Penelitian: Peningkatan Transaminase Serum Yang Berkaitan Dengan Kadar Isoniazid dan Rifampisin Dalam Serum Penderita Tuberkulosis Paru Yang Mendapat Obat Anti Tuberkulosis Kombinasi Dosis Tetap di Yogyakarta	Compilation of Creations / Data Research Design: Increased Serum Transaminase related with Isoniazid and Rifampicin Levels in Serum of Pulmonary Tuberculosis Patients who receiving Fixed-Dose Combination Anti-Tuberculosis Drugs in Yogyakarta"	000235974
2020	Copyright	Buku: Mentruasi: Fisiologi, Patologi Gangguan dan Tatalaksana	Book: Menstruation: Physiology, Pathology of Disorders, and Management	000229115
2020	Copyright	Buku: Akupuntur Pada Sindrom Ovarium Polikistik	Book: Acupuncture in Polycystic Ovarian Syndrome	000228704
2020	Copyright	Buku: Pemeriksaan Parasitologis Pada Pasien Diare Di Layanan Primer	Book: Parasitological Examination of Diarrhea Patients in Primary Care	000202597
2020	Copyright	Buku: Model Pembelajaran Antar Profesi Kesehatan Dengan Pendekatan Kesehatan Keluarga Sebagai Unit Terkecil Dari Masyarakat	Book: Learning Model Between Health Professions With Family Health Approach As The Smallest Unit Of Society	000209191
2020	Copyright	Buku Panduan / Petunjuk: Protokol Penelitian BRAIN MAPPING DAN ANALISIS STRES ANAK USIA DINI PADA SEKOLAH DENGAN PROGRAM	Guidebook: Research Protocol BRAIN MAPPING AND STRESS ANALYSIS OF EARLY CHILDREN IN SCHOOL WITH SPECIAL PROGRAMS	000188457

		KHUSUS MELALUI PENDEKATAN NEUROSAINS	THROUGH A NEUROSYSTIC APPROACH	
2020	Copyright	Program Computer: CadaVar Neuro	Computer Program: CadaVar Neuro	000182984
2020	Copyright	Karya Rekaman Video: Video 360 Neuroanatomi: Pendahuluan	Cinematographic Works: Video 360 Neuroanatomy: Introduction	000176318
2020	Copyright	Karya Rekaman Video: Webinar 'Virtual and Augmented Reality Di Bidang Medis	Cinematographic Works: Webinar 'Virtual and Augmented Reality in the Medical Field	000189522
2020	Simple Patent	Ekstrak Biji Salak Pondoh (Salacca Edulis Reinw) Sebagai suplemen zat besi bagi penderita anemia	Salak Seed Extract as an iron supplement for people with anemia	IDS000002856 (Paten Sederhana, which is valid for 10 years)
2021	Copyright	Karya Sinematografi Skills Lab Pemeriksaan Fisik Sistem Respirasi Part 2 - Pemeriksaan Paru Anterior	Cinematographic Works: Skills Lab Physical Examination of the Respiratory System Part 2 - Anterior Lung Examination	000249360
2021	Copyright	Karya Sinematografi Protokol Pertemuan Tatap Muka Di Era Adaptasi Kebiasaan Baru	Cinematographic Works: Face to face meeting protocal in Era of adaptations to new habits	000250740
2021	Copyright	Karya Sinematografi Protokol Jeda Waktu Istirahat Selama Kegiatan Tatap Muka Di Era Adaptasi Kebiasaan Baru	Cinematographic Works: Protocols for break time during face to face meeting in Era of adaptations to new habits	000254254
2021	Copyright	Modul: Cadre Training Module: Using Algorithm For Early Detection of Non-Communicable Disease At Posbindu	Module: Cadre Training Module: Using Algorithm For Early Detection of Non-Communicable Disease At Posbindu	000246560
2021	Copyright	Booklet Penggunaan Aloritma Dalam Rangka Deteksi Dini Penyakit Tidak Menular Di Posbindu	Booklet: Use of Algorithms for Early Detection of Non-Contagious Diseases in Posbindu	000246610
2021	Copyright	Karya Sinematografi Skills Lab Pemeriksaan Fisik Sistem Respirasi Part 1 - Pemeriksaan Paru Anterior	Cinematographic Works: Skills Lab Physical Examination of the Respiratory System Part 1 - Anterior Lung Examination	000249345
2021	Copyright	Modul:	Module:	000247964

		Modul Antraks	Anthrax module	
2021	Copyright	Modul: Modul Mikosis Paru	Lung mycoses module	000247965
2021	Copyright	Modul: Modul Fever-Based Disease	Module: Fever-Based Disease module	000253947
2021	Copyright	Program Computer: Aplikasi Epi-Smart (Epidemiology Learning Sebelas Maret)	Computer Program: Application Epi-Smart (Epidemiology Learning Sebelas Maret)	000254127
2021	Copyright	Buku (Book): Buku Taeniasis	Book: Taeniasis	000259310
Brawijaya University				
－				
Airlangga University				
－				
Udayana University				
2020	Patent	Produk Kombinasi Nanoemulgel Tabir Surya Dengan Kandungan C-FENILCALIX-(4)-RESORSINARIL OKTASINAMAT DAN KUERSETIN	Combination Product of Nanoemulgel Sunscreen With C-FENILCALIX-(4)-RESORCINARIL OCTACINAMAT AND QUERCETHIN	IDP00066196 (Patent, which is valid for 20 years)
University of Mataram				
－	Patent	Entram COVID-19 Antigen	Entram COVID-19 Antigen	IPT2021098145
－	Patent	Ekstrak Buncis (Phaseolus Vulgaris Linn) sebagai penurun kadar glukosa darah	Bean Phaseolus Vulgaris Linn Extract as Glucose Blood Lowering Agent	IDP000040221
－	Copyright	Pelayanan Kesehatan Telinga Hidung Tenggorokan – Kepala Leher pada Masa Revolusi Industri 4.0: Refleksi dan Studi Kasus di NTB	ENT health service during industrial revolution 4.0: Reflection and case study in West Nusa Tenggara	EC00201939879
－	Copyright	Buku Ajar Ketrampilan Belajar bagi Mahasiswa Kedokteran	Textbook of Study skill for Medical students	EC00201992353
－	Copyright	Buku Ajar Penelitian Kedokteran Pengambilan Data Kuantitatif dan Kualitatif	Textbook of medical research: Quantitative and qualitative data collection	EC00202000086
－	Copyright	Buku Ajar Nutrisi pada Lansia	Textbook of geriatric nutrition	EC00201988696
－	Copyright	Promosi Upaya Penghentian Kebiasaan Mengorek Telinga	Promotion of efforts to stop ear-picking habits	EC00202132738
－	Copyright	Computer software on classification machine	Computer software on classification machine	EC00202034604

		for ear image based on CNN system	for ear image based on CNN system	
一	Patent	Entram COVID-19 Antigen	Entram COVID-19 Antigen	IPT2021098145

Progress of Survey on Politeknik

A) Questionnaire Survey

1. Method & Response

Questionnaire to 43 Politeknik.

Number of Target Politeknik	Number of Responding Politeknik
43	37

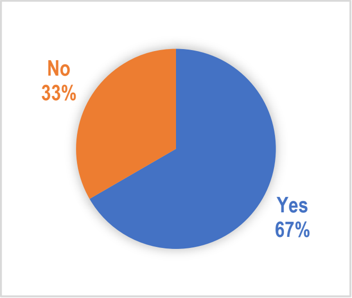
*List of Politekinik that do not answer

- Politeknik Negeri Bandung
- Politeknik Elektronika Negeri Surabaya
- Politeknik Pertanian Negeri Pangkajene Kepulauan
- Politeknik Negeri Kupang
- Politeknik Manufaktur Negeri Bangka Belitung
- Politeknik Negeri Tanah Laut

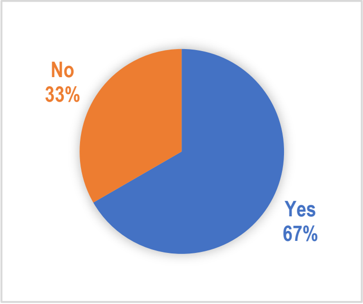
2. Summary of Answers

2.1. Research & Innovation Activities

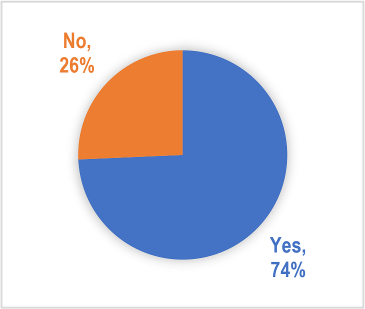
Q1 Do you have Innovation Center or similar department?



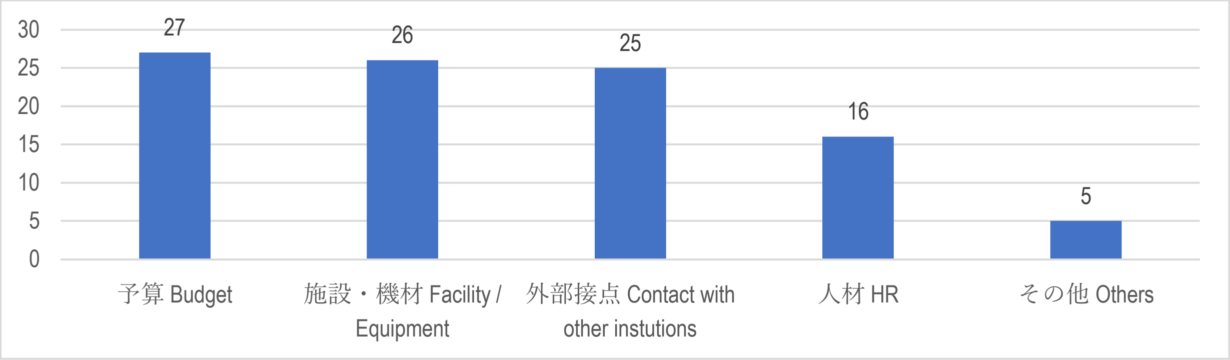
Q2 Do you receive contract research from other institutions?



Q3 Do you conduct joint research with other institutions?

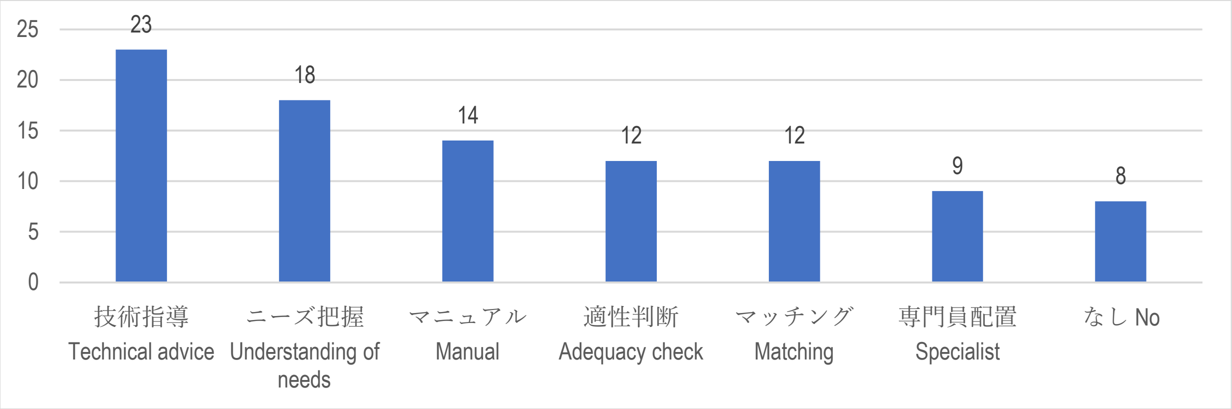


Q4 What's the challenges of Research / Innovation activities?

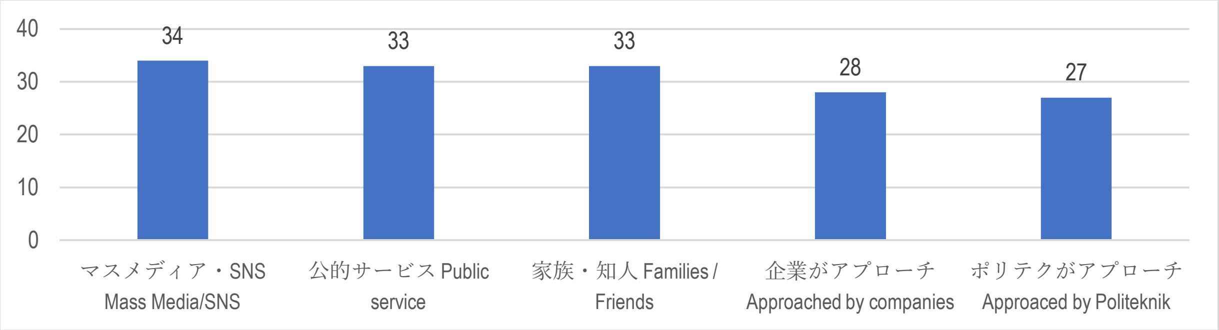


2.2. Students' Employment Situation

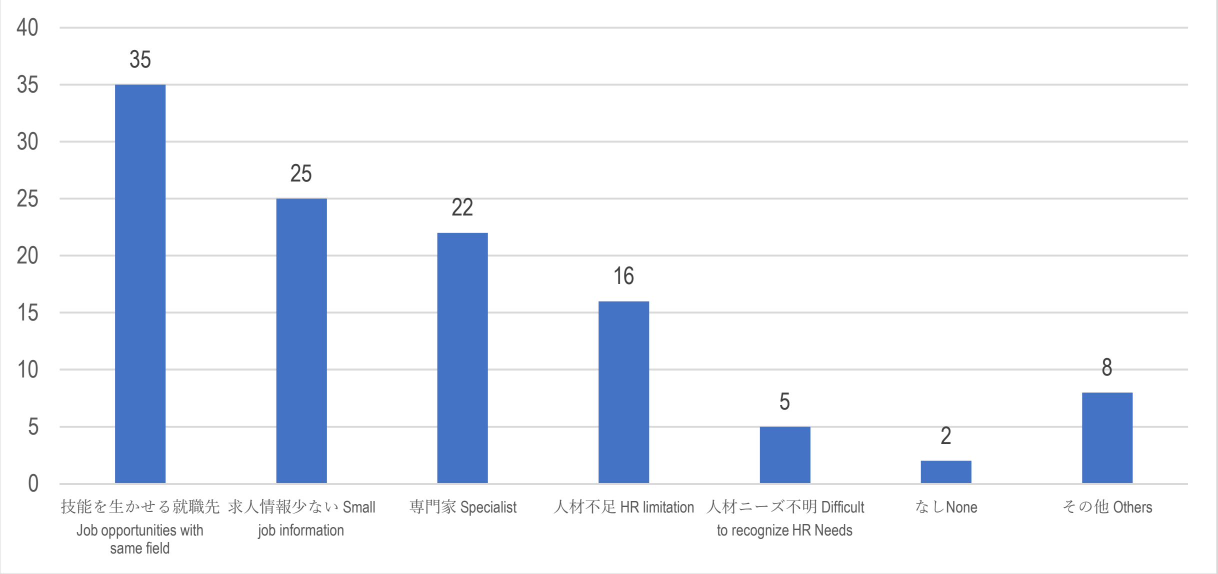
Q5 What kind of services / support do you provide for student to assist employment?



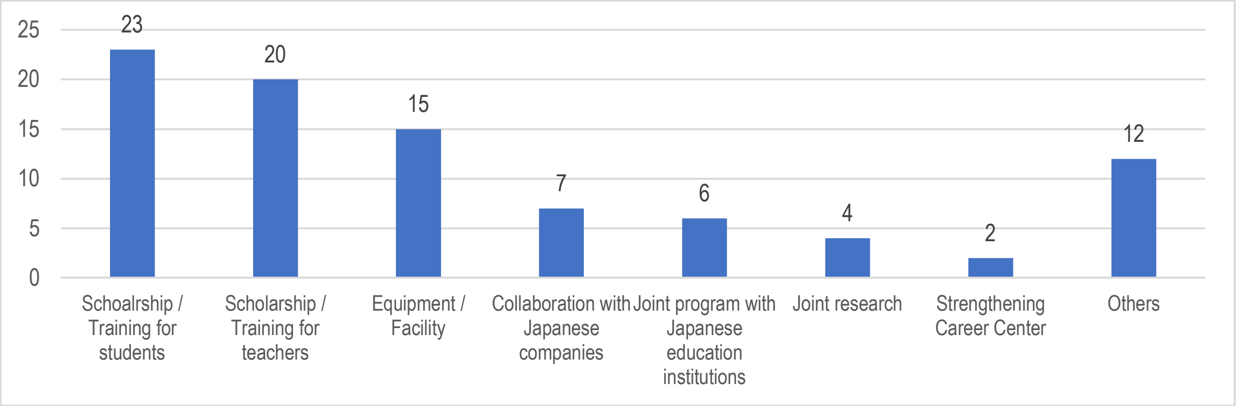
Q6 What kind of methods students use to find job?



Q7 Challenges of Students' Employment



2.3. Expectations of support from Japan



List of Interviewees

Date	Institution	Intervieww	Method
Politeknik			
20 Jan 2021	Politeknik Negeri Nusa Utara	Ferdinand Gansalangi (Vice Director for academic affairs)	Online
20 Jan 2021	Politeknike Negeri Jember	Saiful Anwar (Director) Surateno (Vice Director for academic affairs) Abi Bakri (Vice Director for general and financial affairs) Wakyu Kurnia (Vice Director for students affairs) Budi Eko Sulistyo (Vice Director for cooperation)	Offline
25 Jan 2021	Politeknik Negeri Banjarmasin	Joniriadi (Director) Ahmad Rizani (Vice Director for academic affairs） Riswan Yunida (Vice Director for general and financial affairs） Nurhidayati (Vice Director for students' affairs) Syafwansyah Effendi (Vice Director for cooperation) Manik Mutiara Sadewa (Head of study development center) Nurmahaludin (Head of research center) Susi Rosinawaty (functional officer)	Online
26 Jan 2021	Politeknik Negeri Malang	Supriatna Adhisuwignjo (Vice Director for academic affairs)	Offline
26 Jan 2021	Politekink Elektronika Negeri Surabaya	Zainal Arief（Director） Indra Adji Sulistijono（Vice Director for academic affairs） Ronny Susetyoko (Vice Director for general and financial affairs) Anang Budikarso (Vice Director for students' affairs) Edi Satriyanto (Vice Director for cooperation and information) Amang Sudarsono (Head of international affairs office) Iwan Syarief (Head of graduate program) Puja Astawa (Head of electronic engineering dep.) Tri Harsono (Head of information and computer engineering dep.) Didik SP (Head of mechanical energy dep.) Kholid Fathoni (Head of creative multimedia dep.)	Online
Japanese Vocational Education Institution			
19 Feb 2021	Kaishi Professional University	Shigeki Sakurai (Vice President） Takuya Gonbe (Administrative Division)	Online
12 Mar 2021	Oyama Kosen	Michihiro Iijima (Vice President) Makoto Ueda (Vice President) Chihiro Fukai (General Affairs Department) Kitamura (General Affairs Department) Matsunaga, Tokita, Kunaga (Headquarter of Kosen)	Offline
Workshop			
15 Dec 2021	MoECRT	Wikan Sakarinto (Director General of Vocational Education) Henri Togar Hasiholan Tambunan（Director of Institutions and Resources of Vocational Higher Education） Deny（Secretary of Director General of Vocational Education） Deis (Coordinator of Vocational Matching Fund Working Group)	Online
	Politekink Elektronika Negeri Surabaya	Aliridho Barakbah (Director） Bambang Sumantri (Vice Director I) Tri Harsono (Vice Director II) Tri Budi Santoso (Vice Director III) Amang Sudarsono (Vice Director IV) Puja Astawa (Head of Electrical Eng Dep) Udin Harun Alrasyid (Head of Computer and Informatics Eng Dep) Kholid Fathoni (Head of Creative Multimedia Technology Dep) Didik Setyo Purnomo (Head of Energy Mechanics Eng Dep) Bima Sena Bayu (Head of Graduate Program Novie Ayub (Head of Institutional Cooperation Technical Implementation Unit)	
	JICA (HQ)	Kazue Minami (South East Asia Division 1) Chieko Fukushima (South East Asia Division 1)	
	JICA (Indonesia)	Kota Tsuda	

Politeknik Basic Information

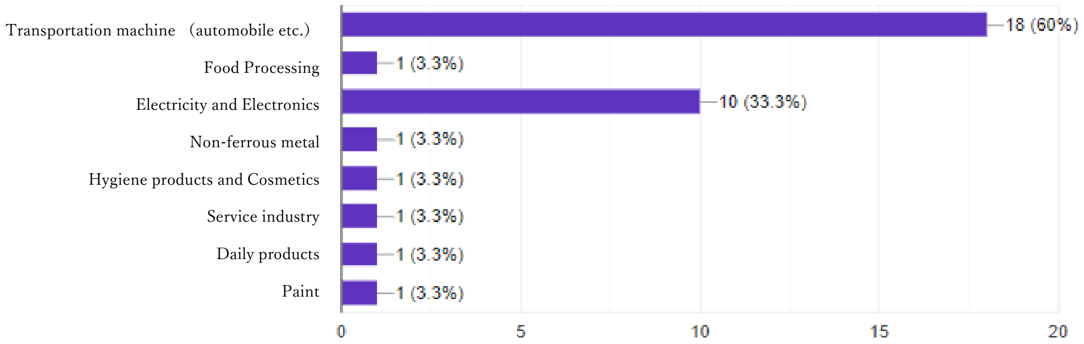
Only "active"

	Name of Politeknik	Akreditasi	Foundation Date	Location (Prov)	Location (Kot / Kab)	Electronics & Electrical Engineering	Information Technology	Mechanical Engineering	Civil Engineering	Chemical Engineering	Accounting	Business Administration	Manufacture	Agriculture	Food Product	Plantation	Livestock	Fishery	Forestry	Tourism	Health	Nurse	Maritime	Shipbuilding	Others	# of Prodi S2	# of Prodi D4	# of Prodi D3	# of Prodi D2	# of Prodi D1	# of Lectures 2019/2020	# of Students 2019/2020	Ration 2019/2020	# of Lectures 2020/2021	# of Students 2020/2021	Ratio 2020/2021
1	Politeknik Elektronika Negeri Surabaya	A	1986/5/29	Jawa Timur	Surabaya	1	1																			2	9	10	6	7	178	4,305	1:24.19	178	768	1:4.31
2	Politeknik Negeri Malang	A	1979/1/27	Jawa Timur	Malang	1	1	1	1	1	1	1														3	12	15	17	2	582	13,135	1:22.57	582	13,451	1:23.11
3	Politeknik Manufaktur Bandung	-	1977/3/24	Jawa Barat	Bandung			1																		0	3	7	3	2	96	1,123	1:11.70	96	1,070	1:11.15
4	Politeknik Negeri Jakarta	B	1982/9/22	Jawa Barat	Depok	1	1	1	1		1	1													1	2	19	14	7	2	384	7,454	1:19.41	384	7,540	1:19.64
5	Politeknik Negeri Medan	B	1982/9/20	Sumatera Utara	Medan	1	1	1	1		1	1														0	6	11	3	0	340	6,276	1:18.46	340	9	1:0.03
6	Politeknik Negeri Bandung	A	1979/1/27	Jawa Barat	Bandung	1	1	1	1	1	1	1													1	2	18	18	5	0	536	5,850	1:10.91	536	3,322	1:6.20
7	Politeknik Negeri Semarang	A	1982/8/6	Jawa Tengah	Semarang	1		1	1		1	1														1	11	12	0	0	345	4,916	1:14.25	345	5,120	1:14.88
8	Politeknik Negeri Sriwijaya	B	1982/9/20	Sumatera Selatan	Palembang	1	1	1	1	1	1	1													1	1	11	11	8	1	397	6,702	1:16.88	397	724	1:1.82
9	Politeknik Negeri Lampung	B	1984/4/7	Lampung	Bandar Lampung							1		1		1	1								1	0	10	13	7	3	204	3,625	1:17.77	204	2,984	1:14.63
10	Politeknik Negeri Ambon	B	1987/10/5	Maluku	Ambon	1		1	1		1	1														0	14	5	0	1	262	1,171	1:4.46	263	0	-
11	Politeknik Negeri Padang	B	1985/3/12	Sumatera Barat	Padang	1	1	1	1		1	1													1	0	10	12	10	0	320	4,801	1:15.00	320	4,283	1:13.38
12	Politeknik Negeri Bali	B	1985/12/3	Bali	Kab. Badung	1		1	1		1	1								1						1	7	9	3	1	365	4,942	1:13.54	365	0	-
13	Politeknik Negeri Pontianak	B	1985/12/3	Kalimantan Barat	Pontianak	1		1	1		1	1		1				1								0	9	18	2	1	311	6,225	1:20.02	311	5,791	1:18.62
14	Politeknik Negeri Ujung Pandang	B	1987/5/10	Sulawesi Selatan	Makassar	1		1	1	1	1	1														0	12	16	4	2	334	4,043	1:12.10	334	2,637	1:7.90
15	Politeknik Negeri Manado	B	1987/11/9	Sulawesi Utara	Manado	1		1	1		1	1								1						0	8	11	0	0	305	4,648	1:15.24	305	4,856	1:15.92
16	Politeknik Perkapalan Negeri Surabaya	A	1987/4/1	Jawa Timur	Surabaya																			1		1	10	4	3	0	157	2,707	1:17.24	157	2,834	1:18.05
17	Politeknik Negeri Banjarmasin	B	1987/7/13	Kalimantan Selatan	Banjarmasin	1		1	1		1	1														0	2	13	0	2	221	2,809	1:12.71	221	57	1:0.26
18	Politeknik Negeri Lhokseumawe	B	1987/10/5	Aceh	Lhokseumawe	1	1	1	1	1		1														0	9	14	7	1	317	4,347	1:13.71	317	4,455	1:14.05
19	Politeknik Negeri Kupang	-	1985/3/11	Nusa Tenggara Timur	Kupang	1		1	1		1	1								1						0	8	8	0	0	191	9,910	1:51.88	191	5,468	1:28.63
20	Politeknik Negeri Jember	B	1988/10/29	Jawa Timur	Kab. Jember		1	1				1		1			1				1					1	13	9	9	1	307	9,150	1:29.80	307	9,133	1:29.75
21	Politeknik Pertanian Negeri Pangkajene Kepulauan	B	1990/9/9	Sulawesi selatan	Kab. Pangkajene Kepulauan											1		1								1	9	6	8	0	167	1,836	1:10.99	167	1,377	1:8.25
22	Politeknik Pertanian Negeri Kupang	B	1984/4/7	Nusa Tenggara Timur	Kupang									1			1	1	1							0	5	8	7	0	152	3,994	1:26.28	152	3,838	1:25.25
23	Politeknik Perikanan Negeri Tual	-	1997/7/18	Maluku	Kab. Maluku Tenggara													1								0	6	4	0	0	92	1,405	1:15.27	92	0	-
24	Politeknik Pertanian Negeri Samarinda	C	1997/4/28	Kalimantan Timur	Samarinda									1												0	4	6	1	0	102	1,506	1:14.76	102	1,345	1:13.19
25	Politeknik Pertanian Negeri Payakumbuh	B	1989/2/6	Sumatera Barat	Kab. Lima Puluh Koto									1												0	2	9	3	0	174	1,563	1:8.98	174	1,681	1:9.66
26	Politeknik Negeri Samarinda	B	1985/12/3	Kalimantan Timur	Samarinda	1	1	1	1		1	1								1			1			0	9	22	2	1	259	6,329	1:24.44	259	0	-
27	Politeknik Negeri Media Kreatif	-	2008/10/8	DKI Jakarta	Jakarta Selatan		1													1						0	4	12	0	0	139	3,015	1:21.69	139	602	1:4.33
28	Politeknik Manufaktur Negeri Bangka Belitung	-	2010/10/18	Bangka Belitung	Kab. Bangka	1	1	1																		0	3	3	0	0	66	718	1:10.88	66	0	-
29	Politeknik Negeri Batam	B	2010/10/18	Kepulauan Riau	Batam	1	1	1				1														0	8	9	0	0	164	4,360	1:26.59	164	3,550	1:21.65
30	Politeknik Negeri Nusa Utara	-	2011/6/22	Sulawesi Utara	Kab. Kep. Sangihe		1											1				1				0	0	6	0	0	75	910	1:12.13	75	585	1:7.80
31	Politeknik Negeri Bengkalis	C	2011/7/29	Riau	Kab. Bengkalis	1	1	1	1			1											1	1		0	9	10	2	0	130	2,107	1:16.21	130	2,234	1:17.18
32	Politeknik Negeri Balikpapan	C	2011/9/9	Kalimantan Timur	Balikpapan	1		1	1		1									1						0	1	7	0	0	80	1,035	1:12.94	80	1,204	1:15.05
33	Politeknik Negeri Madura	-	2012/10/29	Jawa Timur	Kab. Sampang	1		1														1				0	0	4	0	0	57	725	1:12.72	57	723	1:12.68
34	Politeknik Maritim Negeri Indonesia	-	2012/9/19	Jawa Tengah	Semarang																		1			0	1	3	0	0	43	333	1:7.74	43	0	-
35	Politeknik Negeri Banyuwangi	-	2013/10/4	Jawa Timur	Kab. Banyuwangi		1	1	1			1														0	4	3	0	0	84	4,019	1:47.85	84	3,918	1:46.64
36	Politeknik Negeri Madiun	B	2012/10/30	Jawa Timur	Madiun	1	1	1			1	1														0	1	8	0	0	77	1,575	1:20.45	77	1,880	1:24.42
37	Politeknik Negeri Fakfak	-	2012/10/30	Papua Barat	Kab. Fakfak	1	1	1	1																	0	0	5	0	0	31	836	1:26.97	31	213	1:6.87
38	Politeknik Negeri Sambas	-	2013/2/22	Kalimantan Barat	Kab. Sambas		1	1			1															0	6	3	0	0	87	1,295	01:14.89	87	1,279	01:14.70
39	Politeknik Negeri Tanah Laut	-	2009/9/25	Kalimantan Selatan	Kab. Tanah Laut		1	1			1			1												0	0	7	0	0	45	688	1:15.29	69	1,403	1:20.33
40	Politeknik Negeri Subang	-	2014/4/1	Jawa Barat	Kab. Subang		1	1						1												0	0	4	0	0	30	275	1:9.17	30	0	-
41	Politeknik Negeri Ketapang	-	2008/4/8	Kalimantan Barat	Kab. Ketapang	1	1	1	1					1												0	2	6	0	0	63	1,433	1:22.75	63	984	1:15.62
42	Politeknik Negeri Cilacap	-	2014/10/3	Jawa Tengah	Kab. Cilacap	1	1	1																		0	1	4	2	0	71	937	1:13.20	71	1,047	1:14.75
43	Politeknik Negeri Indramayu	-	2008/7/8	Jawa Barat	Kab. Indramayu		1	1														1				0	2	4	0	0	61	1,062	1:17.41	61	67	1:1.10
																															8,401	150,095		8,426	102,432	

Appendix　Summary of Questionnaire Survey for Japanese Companies

(1) Basic Information

i) Business fields

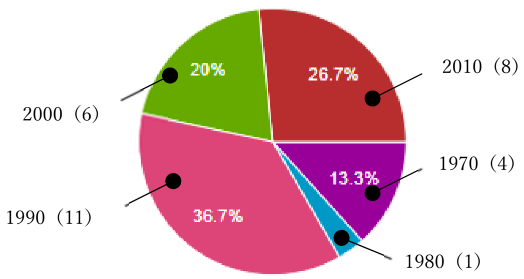


ii) Location of main offices in Indonesia and their mapping

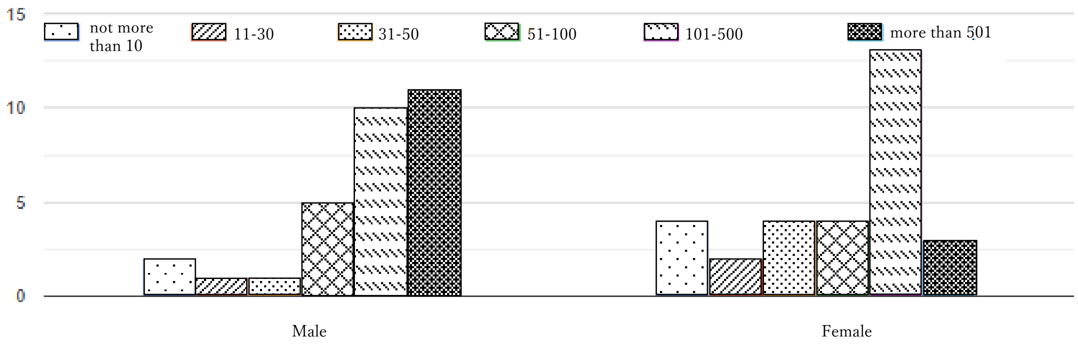
The Name of Provinces	The Number of Companies（%）
Java Island（except for Jakarta）	25（83.3%）
Java Island（Jakarta）	11（36.7%）
Sumatera Island（except for Aceh）	1（3.3%）
Lesser Sunda Island（Bali）	1（3.3%）
Kalimantan Island	1（3.3%）

Figure 1　Location mapping of the Japanese Companies

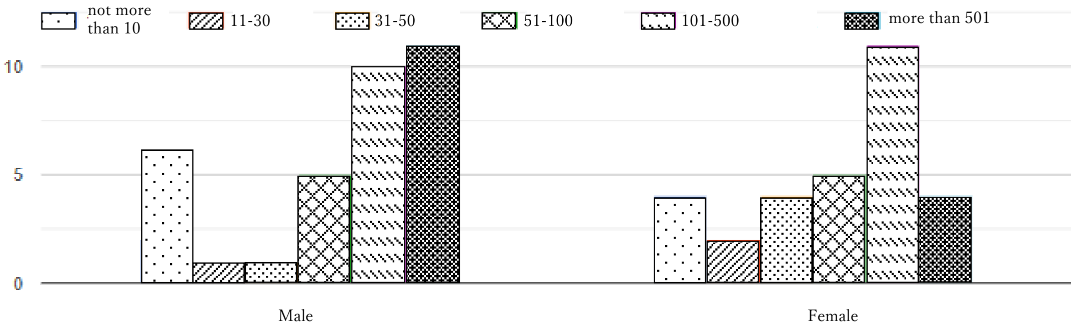
iii) The company establishment year in Indonesia



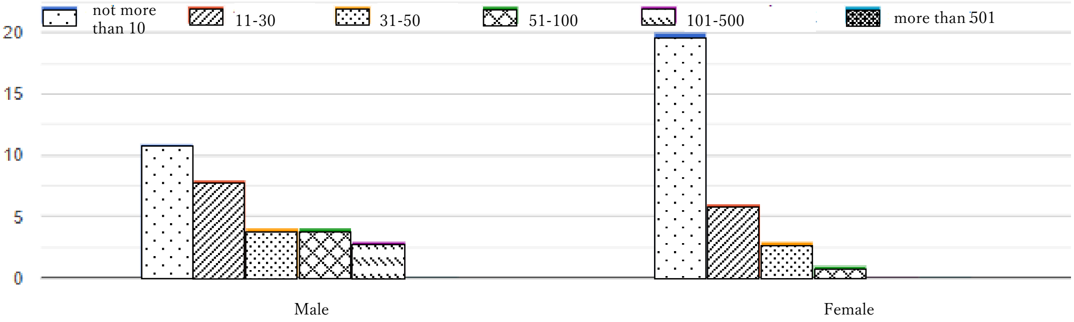
iv) The number of employees in Indonesia



v) The number of local staff out of iv)

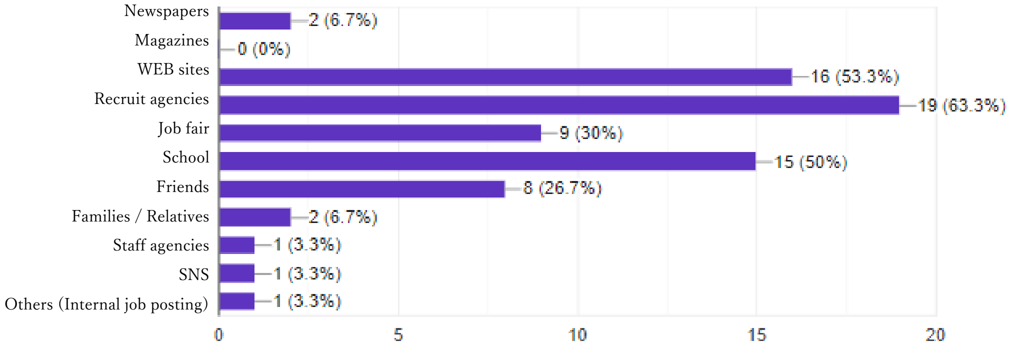


vi) The number of managerial level staff out of v)

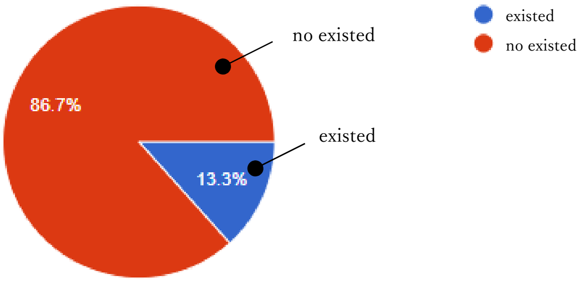


(2) Recruitment and Employment of Indonesian staff

i) Methods of recruitment(*multiple answers allowed)



ii) Differences on recruiting methods between employing Polytechnic students and University students

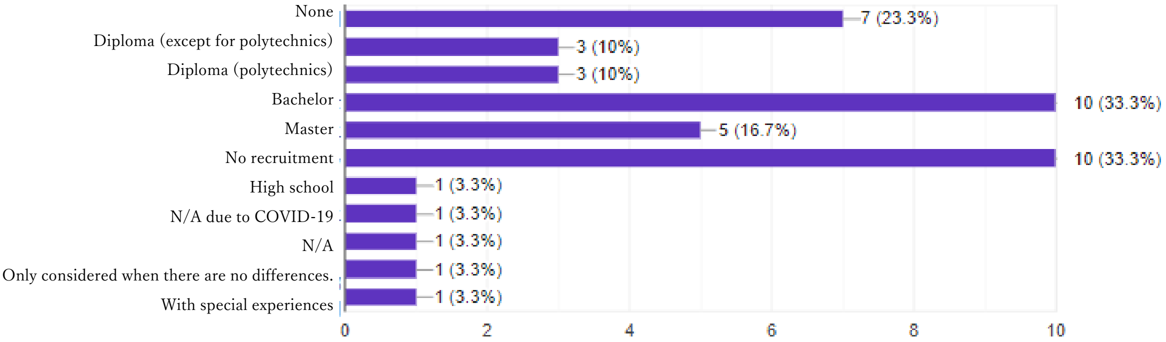


iii) Details of differences if any in ii)

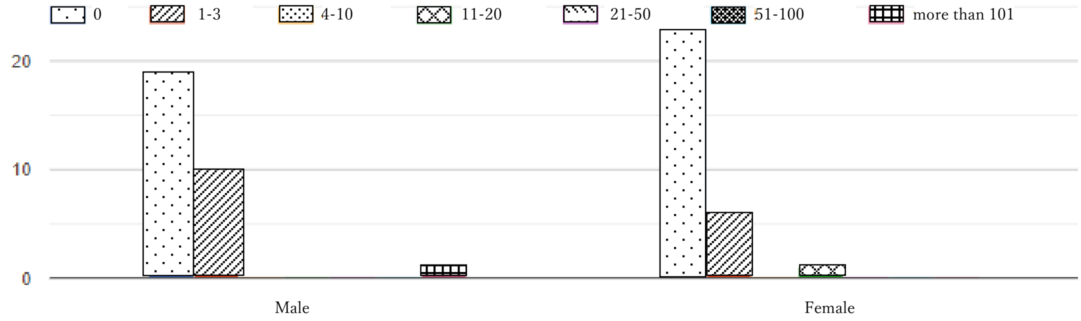
- The examination contents are different.
- The evaluation method of managerial ability is different.

* There some Japanese companies which have not ever employ students graduates from polytechnics.

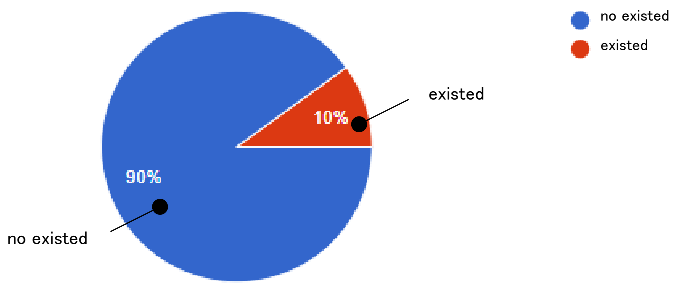
iv) Application qualifications for management level position



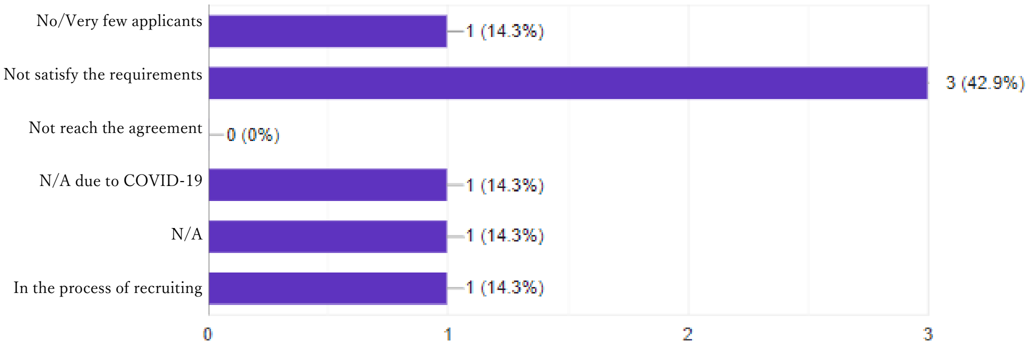
v) The number of employment of managerial level personnel (in the latest one year)



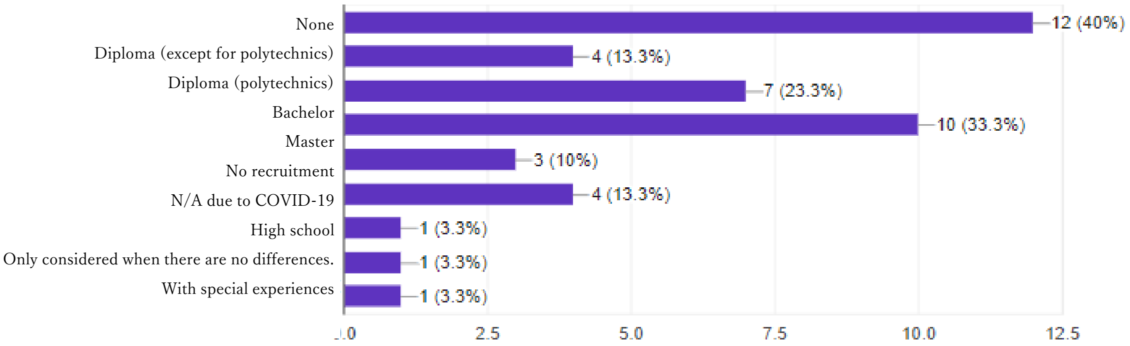
vi) Differences on the number of recruitment and employment of managerial level personnel (in the latest one year)



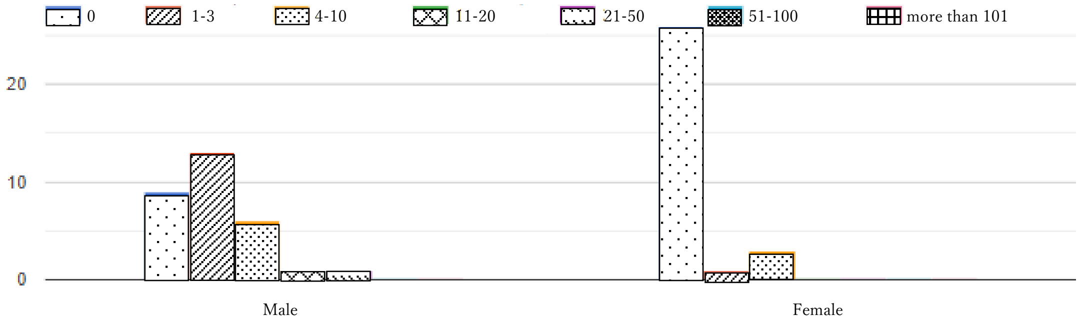
vii) Factors of differences on the number of recruitment and employment of managerial level personnel



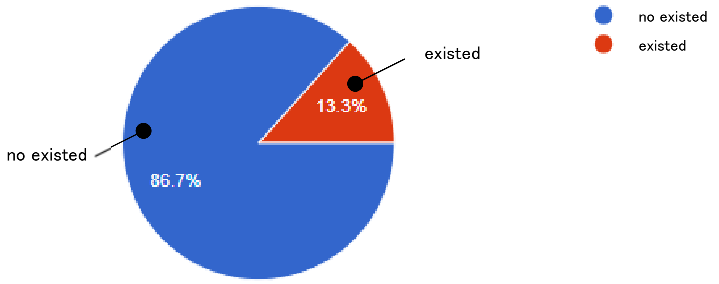
viii) Application qualifications for Engineer position



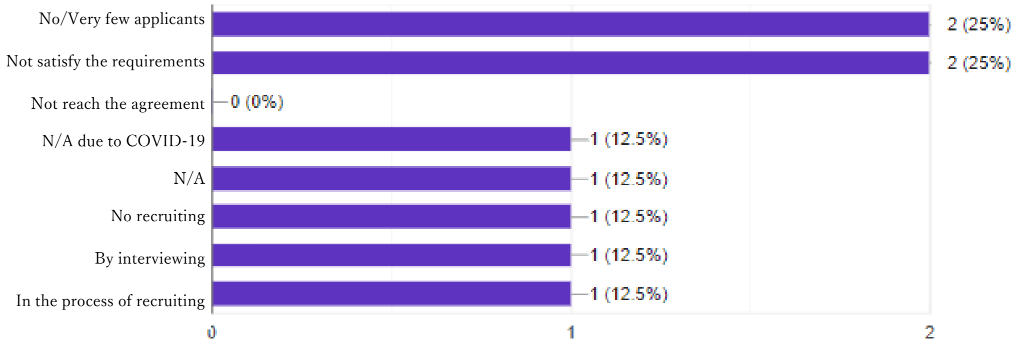
ix) The number of employment of Engineers (in the latest one year)



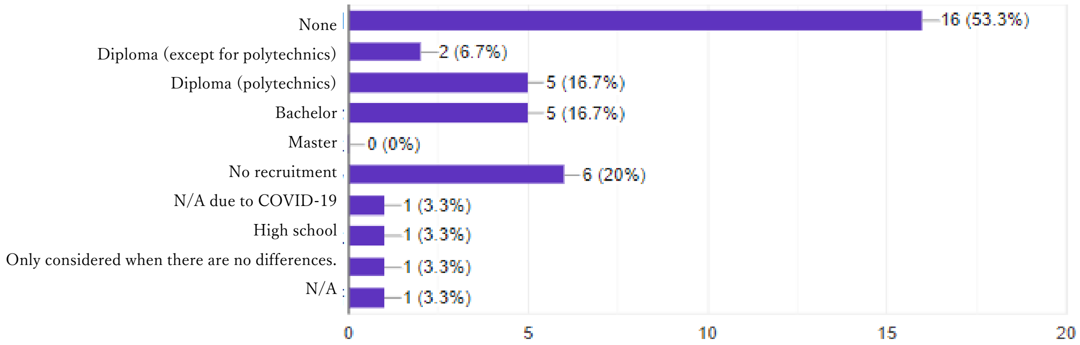
x) Differences on the number of recruitment and employment of Engineers (in the latest one year)



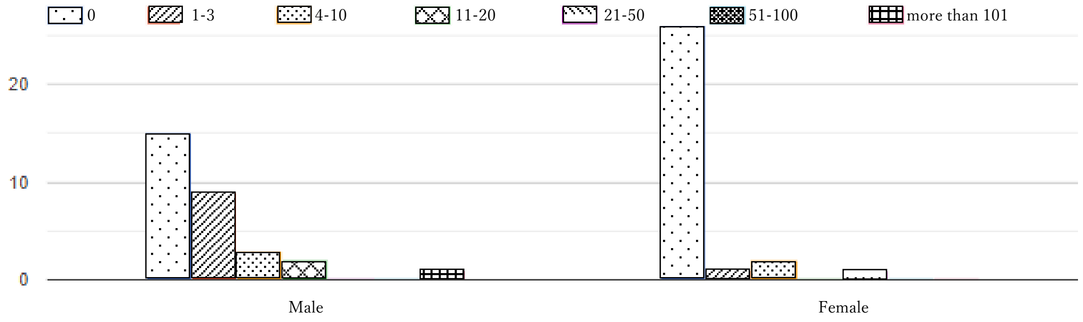
xi) Factors of differences on the number of recruitment and employment of Engineer position



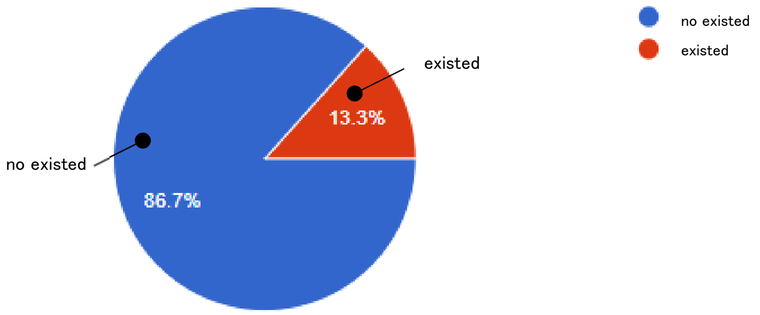
xii) Application qualifications for Technician position



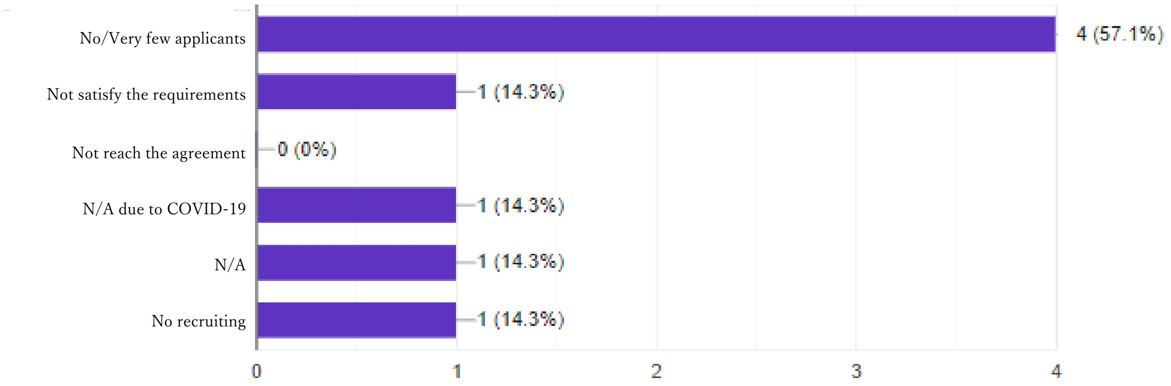
xiii) The number of employment of Technicians (in the latest one year)



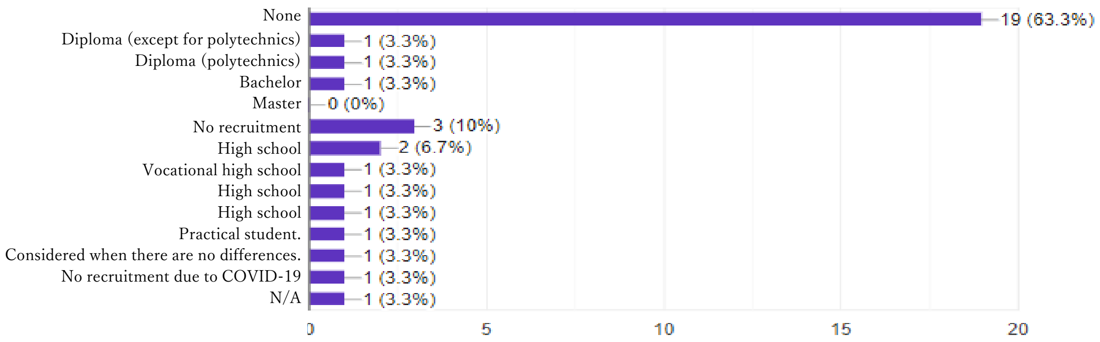
xiv) Differences on the number of recruitment and employment of Technicians (in the latest one year)



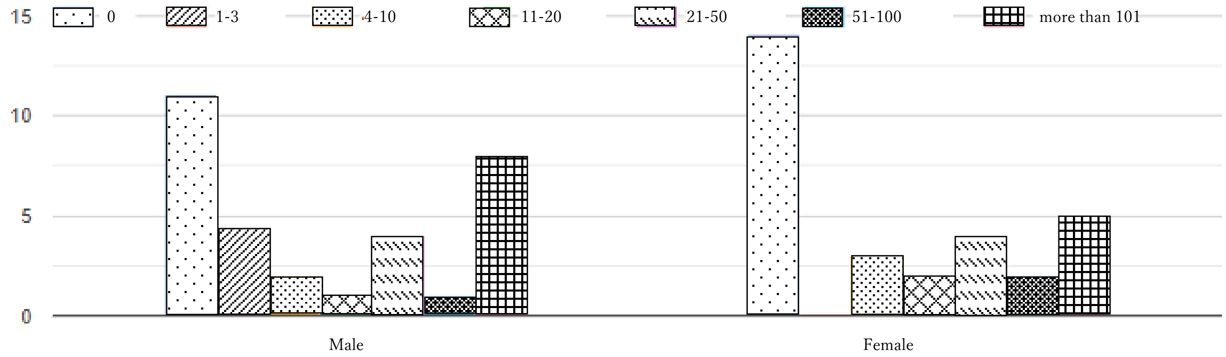
xv) Factors of differences on the number of recruitment and employment of Technician positionlpersonnel



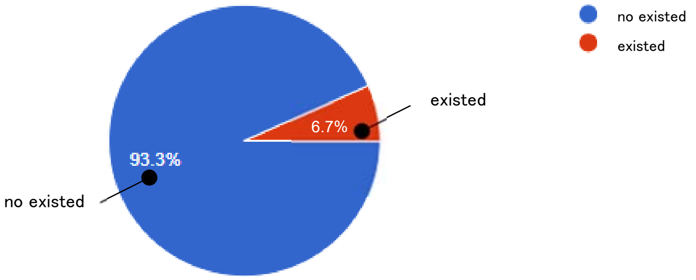
xvi) Application qualifications for Worker position



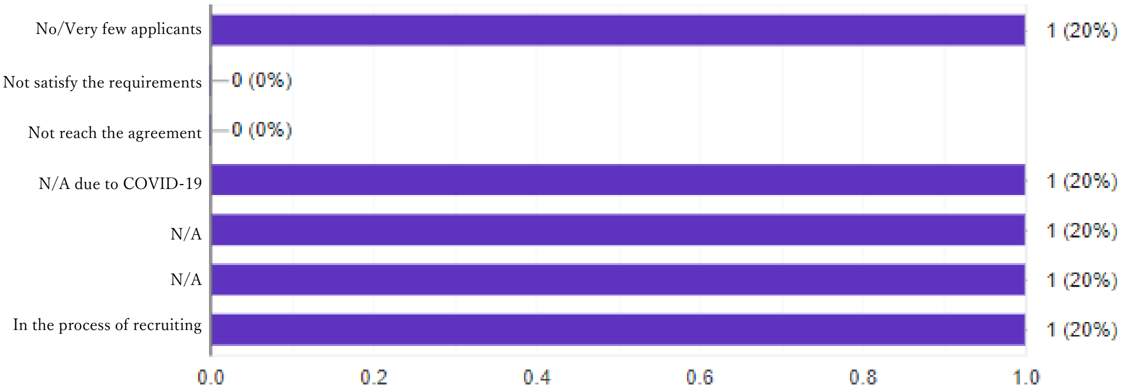
xvii) The number of employment of Workers (in the latest one year)



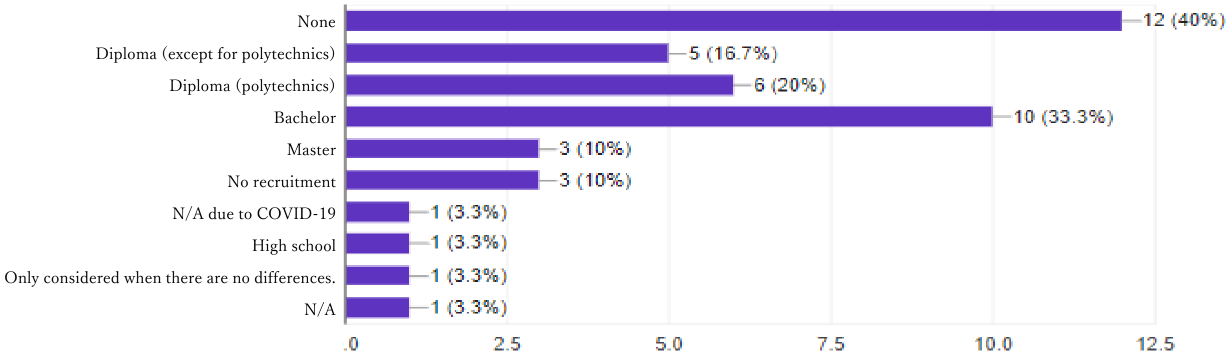
xviii) Differences on the number of recruitment and employment of Workers (in the latest one year)



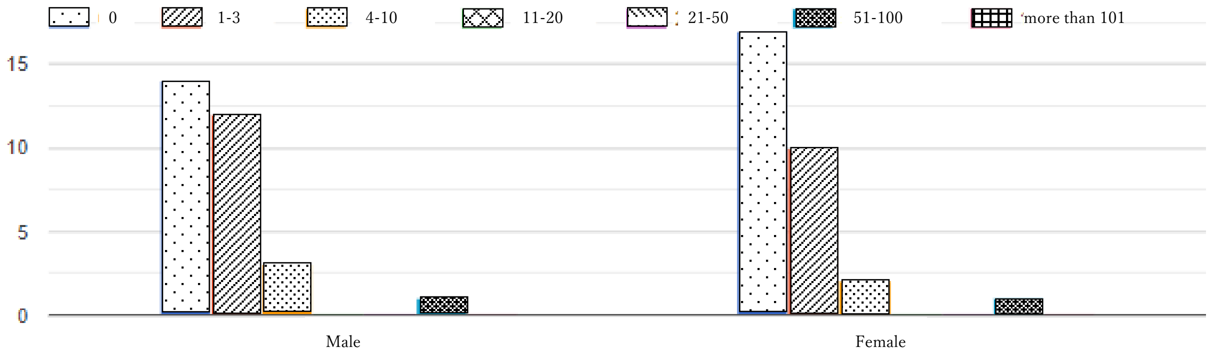
xix) Factors of differences on the number of recruitment and employment of Worker position



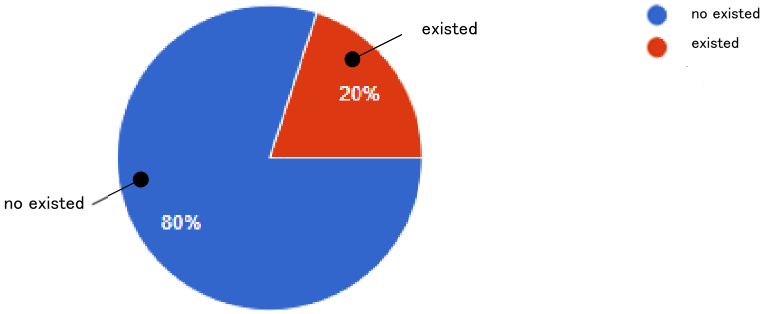
xx) Application qualifications for back-office sectional position



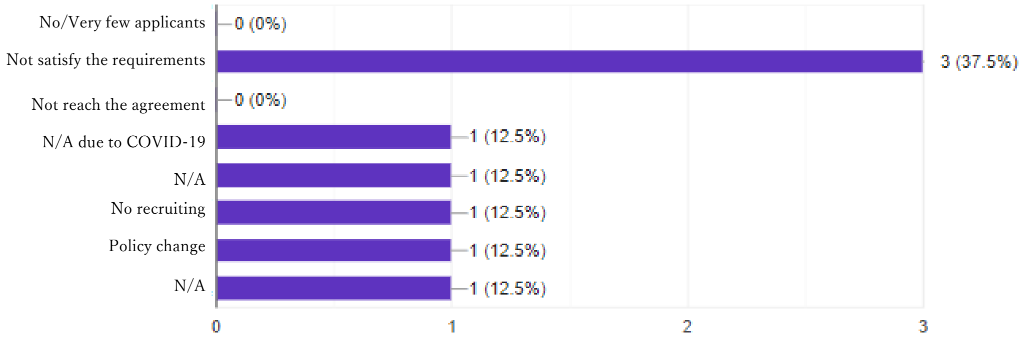
xxi) The number of employment of back-office sectional personnel (in the latest one year)



xxii) Differences on the number of recruitment and employment of back-office sectional personnel (in the latest one year)

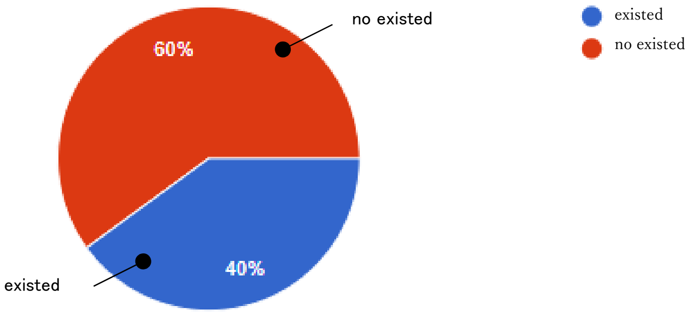


xxiii) Factors of differences on the number of recruitment and employment of back-office sectional personnel

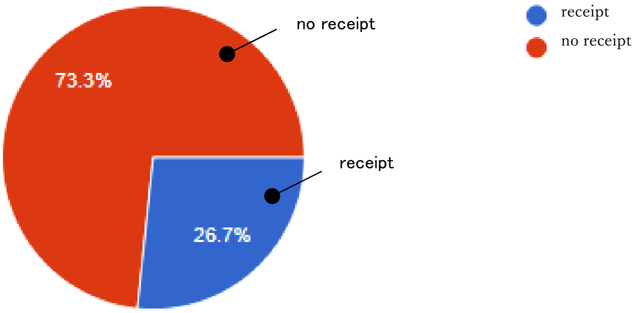


(3) Training for Indonesia staff

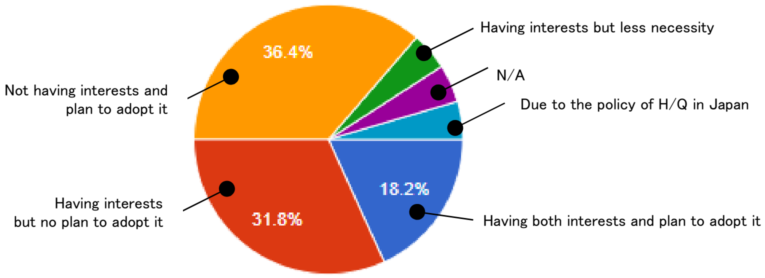
i) Internship program



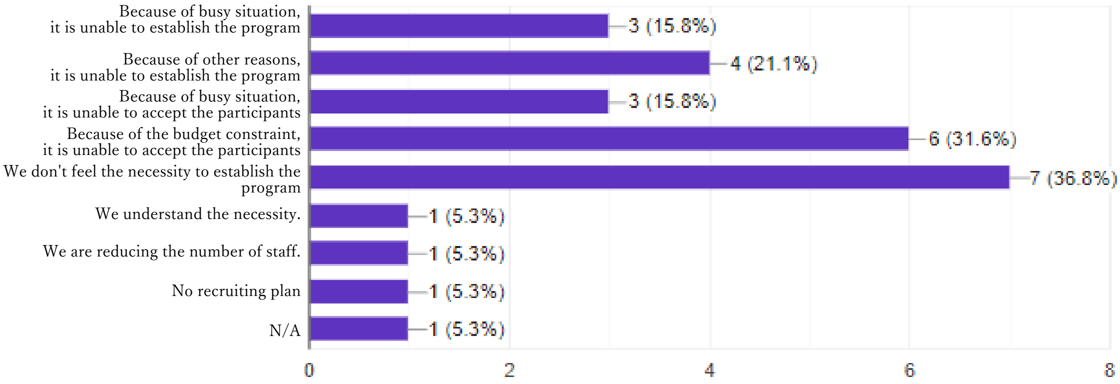
ii) Receipt or no receipt of students who applied to this program (in the latest one year), if it is existed



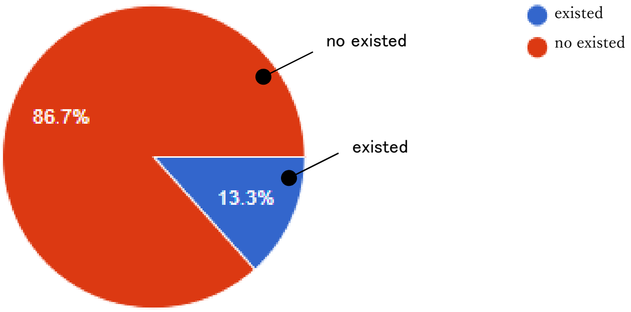
iii) Future plan and/or interest in adopting an internship program, if it is not existed



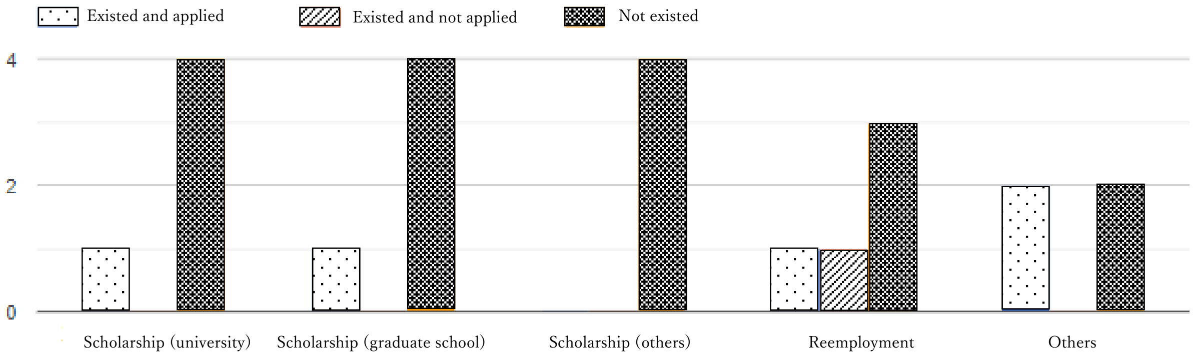
iv) Challenges and issues to adopt an internship program, if there is no future plan to adopt it



v) Career support program (Scholarship, Reemployment system, etc.)



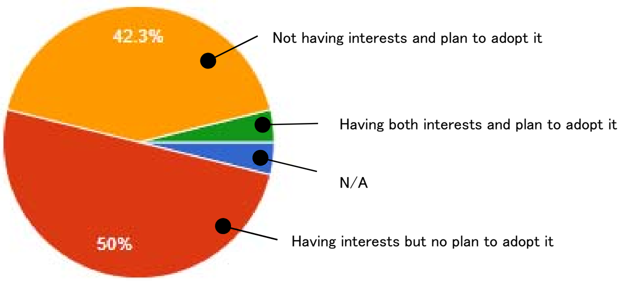
vi) Contents and status of application of them, if there are some career support program (in the past three years)



vii) Future challenges and issues, if there are some career support program

- To avoid employees leaving their jobs after completion of career promotions
- To update, adjust and acquire necessity abilities when employees are transfer from original section to other section after career promotion

viii) Future plan and/or interest in adopting an career support program, if it is not existed

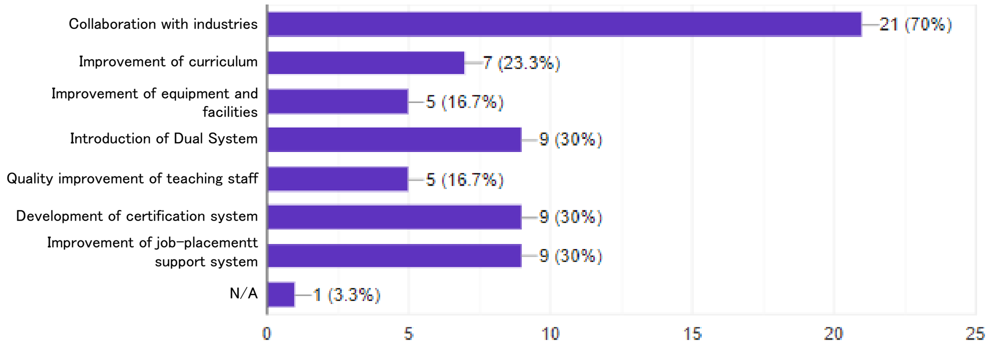


ix) Future challenges and issues, if there are not any career support program

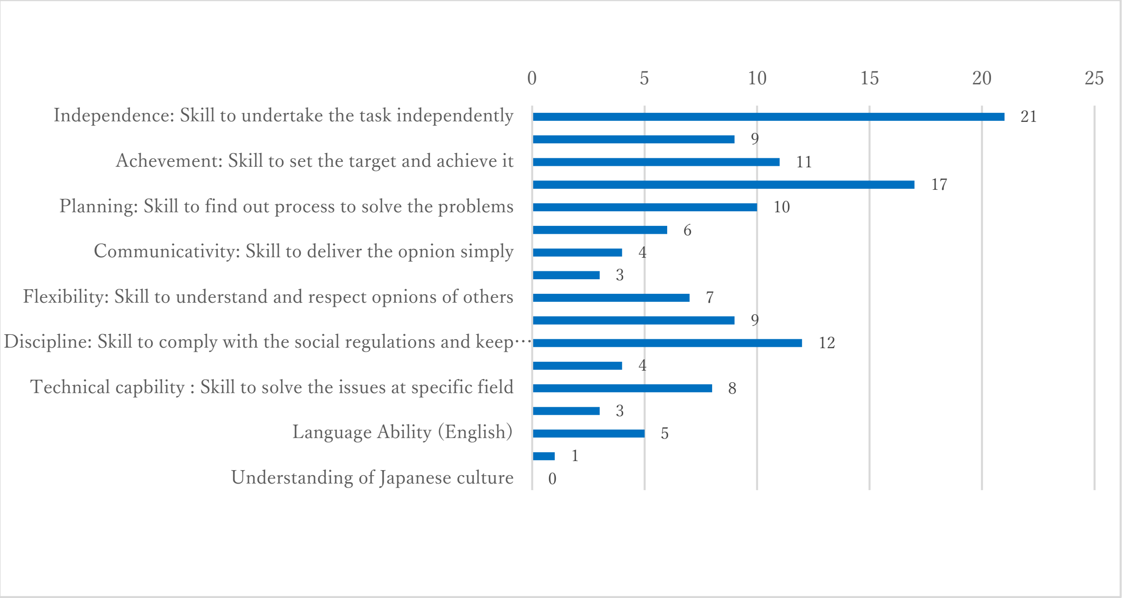
- No necessity
- Remarkable rise of personnel expenditure (due to COVID-19)
- Budget and prevention of job-hopping
- H/Q's policy

(4) Expectations for higher education

i) Educational policies which should be prioritized for Undergraduate / Graduate Program (*multiple answers allowed (at most three))

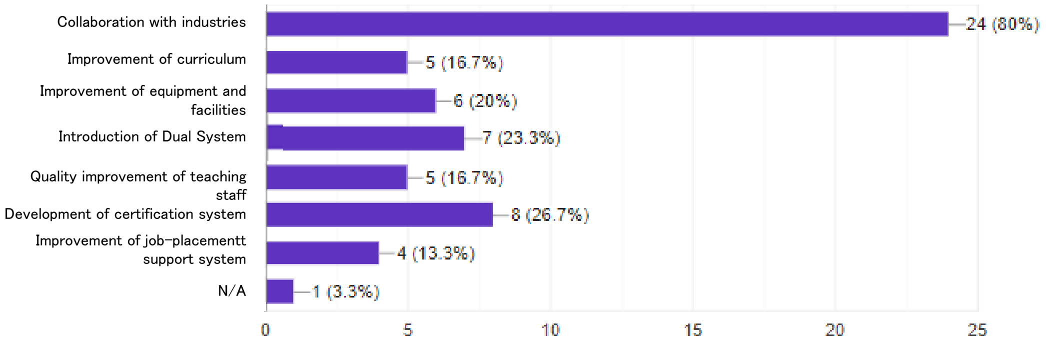


ii) Skills / Abilities which are expected for students graduate from university and/or graduate school (*multiple answers allowed (at most three))



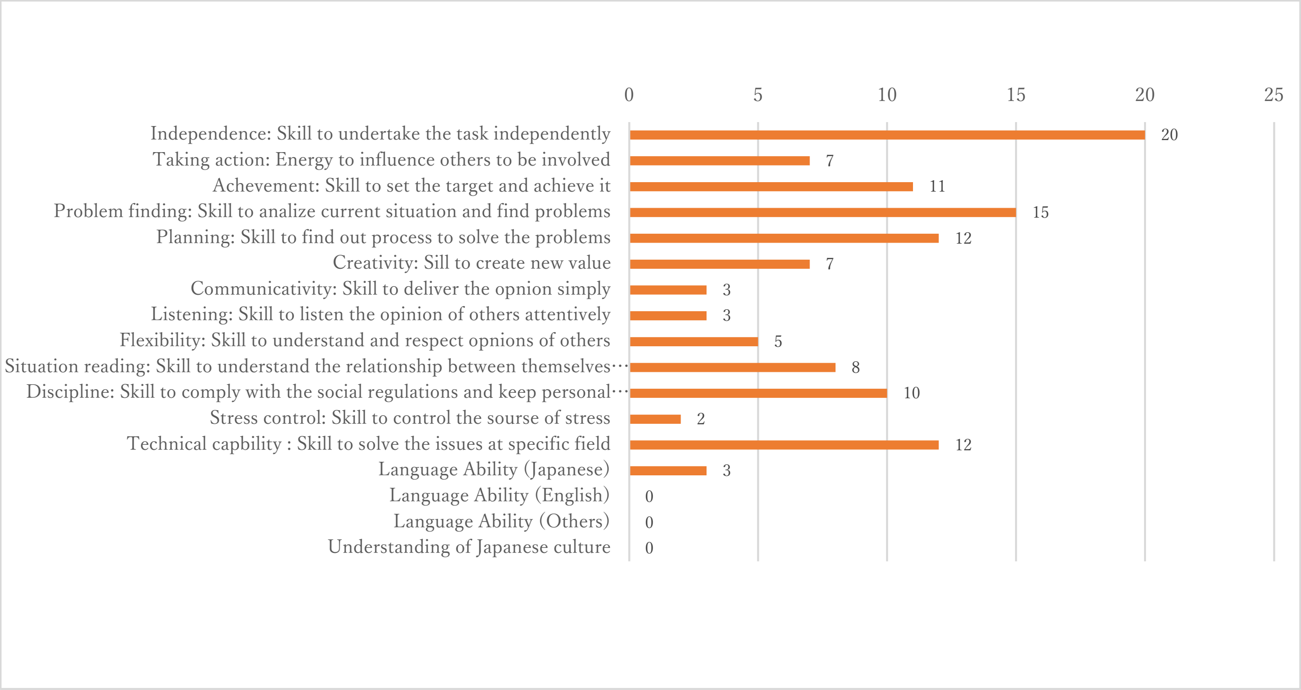
iii) Educational policies which should be prioritized for Polytechnic Program

(*multiple answers allowed (at most three)



iv) Skills / Abilities which are expected for students graduate from polytechnic institutions

(*multiple answers allowed (at most three))



List of Non-degree Program for Staff Enhancement under JICA's Project *For Reference

*The following programs are some of the shor-term trainings conducted to Indonesian organizations in the field of higher education/management

Project	Type of Training	Training Institute	Objective	Year	Duration
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Group Training on Medical Education	University of Tokyo	To enhance theory and methodology of medical education	2010	2 weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC UNIVERSITY	Group Training on University Management	University of Tokyo	To deepen knowledge of strategy and methodology of university management	2011	1 week
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Public Health	Osaka University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Public Health	Yamaguchi University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Public Health	Japanese Red Cross	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Medicine	Yamaguchi University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC UNIVERSITY	Individual Staff Enhancement in Medicine	University of Occupational and Environmental Health	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Medicine	Ehime University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Medicine	Kanto Rosai Hospital	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Medicine	Kagawa University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Pharmacy	Showa University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Pharmacy	Tokushima Bunri University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Nursing	Kobe University	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Nursing	Oita University of Nursing and Health Science	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
DEVELOPMENT OF FACULTY OF MEDICINE AND HEALTH SCIENCES SYARIF HIDAYATULLAH STATE ISLAMIC	Individual Staff Enhancement in Nursing	St. Lukes College of Nursing	To gain specialized knowledge and skills in each field	2011-2012	2-12weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Functional Planner Position	Ritsumeikan University	For Bappenas staff to gain specialized knowledge and skills in each field	2009, 2010,	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Local Economics Resource Development	International University of Japan	For Bappenas staff to gain specialized knowledge and skills in each field	2011	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Public Private Pertnership	University of Miyazaki	For Bappenas staff to gain specialized knowledge and skills in each field	2009, 2011,	2 weeks

Project	Type of Training	Training Institute	Objective	Year	Duration
Professional Human Resource Development (PHRD) III & IV	Group Training on Disaster Mitigation	Ritsumeikan University	For Bappenas staff to gain specialized knowledge and skills in each field	2011, 2012,	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Green Economy	Temple University Japan Campus	For Bappenas staff to gain specialized knowledge and skills in each field	2012, 2013	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Planning and Budgeting	National Graduate Institute for Policy Studies	For Bappenas staff to gain specialized knowledge and skills in each field	2014, 2015,	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Monitoring and Evaluation	Takushoku University	For Bappenas staff to gain specialized knowledge and skills in each field	2015, 2016,	2 weeks
Professional Human Resource Development (PHRD) III & IV	Group Training on Policy Analysis	Ritsumeikan University	For Bappenas staff to gain specialized knowledge and skills in each field	2017, 2018	2 weeks
Professional Human Resource Development (PHRD) III & IV	Small Group Training for Staff Enhancement	University of Tokyo	For mid-level Bappenas staff to gain specialized knowledge and skills in each field	2011-19	2 weeks
Professional Human Resource Development (PHRD) III & IV	Small Group Training for Staff Enhancement on Urban Planning	Ritsumeikan University	For mid-level Bappenas staff to gain specialized knowledge and skills in each field	2011-19	2 weeks
Professional Human Resource Development (PHRD) III & IV	Small Group Training for Staff Enhancement on Local Economics Resource Development	International University of Japan	For mid-level Bappenas staff to gain specialized knowledge and skills in each field	2011-19	2 weeks
Professional Human Resource Development (PHRD) III & IV	Small Group Training for Staff Enhancement on Public Private Pertnership	University of Miyazaki	For mid-level Bappenas staff to gain specialized knowledge and skills in each field	2011-19	2 weeks
Professional Human Resource Development (PHRD) III & IV	Small Group Training for Staff Enhancement on Waste Management	Temple University Japan Campus	For mid-level Bappenas staff to gain specialized knowledge and skills in each field	2011-19	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on Good Governance	Nagoya University	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2008	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on Distance Learning System	Temple University Japan Campus	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2009	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on Human Resources	Temple University Japan Campus	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2010	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on International Taxation	International University of Japan	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2010	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on Corporate Finance and Performance Analysis	Yamaguchi University	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2011	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Competency-based Training	National Graduate Institute for Policy Studies, International University of Japan	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2013, 2014	2 weeks
Professional Human Resource Development (PHRD) III & IV	Short-term Training on Fraud Accounting	Yokohama National University	For staff of Ministry of Finance to gain specialized knowledge and skills in each field	2014	2 weeks

Partnership / Agreement between University of Indonesia and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UI	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)
国立	北海道大学	Hokkaido University	MEMORANDUM OF UNDERSTANDING ON A DOUBLE DEGREE PROGRAM					○																		
国立	東北大学	Tohoku University	Academic Exchange Agreement between Tohoku University and University of Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Memorandum on Student Exchange between Tohoku University and University of Indonesia	○			○				○			5			4	1								
国立	筑波大学	University of Tsukuba	Memorandum of Understanding	○	○		○			○	○			18			7	11								
国立	千葉大学	Chiba University	Memorandum of understanding on academic exchange between Universitas Indonesia, Indonesia and Chiba University,Japan	○	○					○			22	10		22		10								
国立	千葉大学	Chiba University	Student Exchange Agreement between Universitas Indonesia, Indonesia and Chiba University,Japan	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Master and Doctoral Degrees Program between Graduate School of Engineering, Graduate School of Advanced Integration Science, Center for Environmental Remote Sensing, Chiba University and Faculty of Engineering, Faculty of Mathematic and Natural Science, Universitas Indonesia					○																		
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange Between The University of Tokyo And The University of Indonesia	○	○					○	○															
国立	東京大学	The University of Tokyo	Annex to the Academic Exchange Agreement concluded on March 2005 between Graduate School of Engineerng and Graduate School of Medicine, the University of Tokyo and Faculty of Public Health, University of Indonesia	○			○				○															
国立	東京大学	The University of Tokyo	STUDENT EXCHANGE AGREEMENT BETWEEN THE UNIVERSITY OF TOKYO, JAPAN AND UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA	○																						
国立	東京医科歯科大学	Tokyo Medical and Dental University	Agreement on Collaboration Programs between Tokyo Medical and Dental University Faculty of Dentistry, Graduate School of Dentistry and University of Indonesia Faculty of Dentistry	○	○					○				2												
国立	東京医科歯科大学	Tokyo Medical and Dental University	Memorandum on Student Exchange between Faculty of Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan, and Faculty of Dentistry, University of Indonesia, Republic of Indonesia	○			○				○			2	8		2									
国立	東京外国語大学	Tokyo University of Foreign Studies	Agreement for Academic Exchange and Cooperation	○	○					○																
国立	東京外国語大学	Tokyo University of Foreign Studies	MEMORANDUM ON STUDENT EXCHANGES	○			○				○		2	1	1	1		1								
国立	東京農工大学	Tokyo University of Agriculture and Technology	STUDENT EXCHANGE AGREEMENT BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, JAPAN	○			○			○			14	4		14		4								
国立	東京農工大学	Tokyo University of Agriculture and Technology	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, JAPAN	○			○				○															
国立	東京工業大学	Tokyo Institute of Technology	Memorandum of Understanding between Tokyo Institute of Technology, Japan and Universitas Indonesia, Republic of Indonesia	○	○					○				2			2									
国立	東京工業大学	Tokyo Institute of Technology	Student Exchange Agreement between Universitas Indonesia, Republic of Indonesia and Tokyo Institute of Technology, Japan N0:28/AOI/R/UI/2014	○			○				○			2			2									
国立	一橋大学	Hitotsubashi University	Agreement for the promotion of academic cooperation and exchange of personnel	○	○					○																
国立	一橋大学	Hitotsubashi University	Agreement for the promotion of academic cooperation and exchange of personnel	○	○					○																
国立	一橋大学	Hitotsubashi University	Student Exchange Agreement	○			○				○		2	4	1	1		4								
国立	横浜国立大学	Yokohama National University	Academic Exchange Agreement	○	○					○																
国立	新潟大学	Niigata University	Agreement of Academic Cooperation between the Faculty of Dentistry, University of Indonesia and the Niigata University Faculty of Dentistry	○	○					○																
国立	長岡技術科学大学	Nagaoka University of Technology	N/A	○	○		○			○	○			1				1								
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	金沢大学	Kanazawa University	Memorandum of Understanding on the Exchange of Students in Accordance with the Agreement for Cooperation and Exchange	○			○				○															
国立	福井大学	University of Fukui	Memorandum of Understanding between University of Indonesia and University of Fukui on Academic and Research Collaboration	○	○					○	○			2												
国立	静岡大学	Shizuoka University	Agreement on Academic Exchange	○	○	○																				

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UI	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)
国立	静岡大学	Shizuoka University	MoU Regarding Student Exchange	○			○				○															
国立	静岡大学	Shizuoka University	MoU Regarding Exchange Students enrolled in DDP Special Program					○			○															
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○															
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○															
国立	滋賀医科大学	#N/A	Memorandum of Understanding	○	○					○																
国立	京都大学	Kyoto University	AGREEMENT OF IMPLEMENTATION FOR GRADUATE STUDENTS EXCHANGE PROGRAM BETWEEN UNIVERSITAS INDONESIA AND GRADUATE SCHOOL OF GLOBAL ENVIRONMENTAL STUDIES, KYOTO UNIVERSITY	○			○				○															
国立	京都大学	Kyoto University	Agreement of Cooperation between the Graduate School of Management, Kyoto University and the Faculty of Economics and Business, Universitas Indonesia	○	○					○																
国立	大阪大学	Osaka University	N/A	○	○					○																
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	N/A	○	○					○																
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	none	○	○					○			7	21												
国立	大阪大学	Osaka University	Memorundun of understanding between Universitas Indonesia, Republic of Indonesia and Osaka University, Japan	○	○		○			○	○			8				8								
国立	大阪大学	Osaka University	Memorandum on student exchange Between Osaka University and Universitas Indonesia	○	○		○			○	○			8				8								
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○		2	8	1	1	8									
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○		7	1	6		1									
国立	神戸大学	Kobe University	N/A	○			○				○			3			3									
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	神戸大学	Kobe University	N/A	○	○		○	○					1	21					1	-	21	2				
国立	奈良女子大学	Nara Women's University	Memorandum of Understanding between Universitas Indonesia,The Republic of Indonesia and Nara Women's University,Japan	○	○	○	○			○	○															
国立	奈良女子大学	Nara Women's University	Student Exchange Agreement between Universitas Indonesia,The Republic of Indonesia and Nara Women's University,Japan	○			○				○															
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING between UNIVERSITAS INDONESIA Indonesia and OKAYAMA UNIVERSITY Japan	○	○	○	○			○	○															
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING between UNIVERSITAS INDONESIA Indonesia and OKAYAMA UNIVERSITY Japan	○	○	○	○			○	○															
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANDING ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA, AND HIROSHIMA UNIVERSITY, JAPAN	○	○	○				○				3												
国立	広島大学	Hiroshima University	SUPPLEMENTAL AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○			○				○															

Japanese University		University	Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UI	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)
国立	広島大学	Hiroshima University	TECHNICAL ACADEMIC AGREEMENT BETWEEN FACULTY OF ECONOMICS AND BUSINESS, UNIVERSITY OF INDONESIA, REPUBLIC OF INDONESIA AND GRADUATE SCHOOL OF INTERNATIONAL DEVELOPENT AND COOPERTION, HIROSHIMA UNIVERSITY, JAPAN ON COLLABORATION IN THE LINKAGE MASTER'S PROGRAM	○			○	○		○				3			2	1								
国立	山口大学	Yamaguchi University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND YAMAGUCHI UNIVERSITY	○	○	○				○																
国立	山口大学	Yamaguchi University	STUDENT EXCHANGE AGREEMENT BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND YAMAGUCHI UNIVERSITY, JAPAN	○			○						1			1										
国立	九州大学	Kyushu University	Agreement	○	○	○				○																
国立	長崎大学	Nagasaki University	Memorandum of Understanding between Universitas Indonesia, Republic of Indonesia and Nagasaki University, Japan	○	○	○	○			○	○															
国立	長崎大学	Nagasaki University	Student Exchange Agreement Between Nagasaki University and Universitas Indonesia based on the Memorandum of Understanding between Nagasaki University, Japan and Universitas Indonesia, Republic of Indonesia	○			○				○															
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Universitas Indonesia, Republic of Indonesia and Kumamoto University, Japan	○			○				○		7	3	7		1	2								
国立	熊本大学	Kumamoto University	Memorandum of Understanding between Universitas Indonesia, Republic of Indonesia and Kumamoto University, Japan	○	○	○				○																
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○															
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between Universitas Indonesia (UI), Republic Indonesia and National Graduate Institute for Policy Studies (GRIPS), Japan on Collaboration in theLinkage Master's Programs (LMP)	○	○			○						16							9	7				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Memorandum of Understanding between Universitas Indonesia, Republic of Indonesia and National Graduate Institute for Policy Studies (GRIPS), Japan	○	○	○	○			○																
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Memorandum of Understanding on Academic Exchange	○	○	○	○			○	○			5												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement of Implementation on Student Exchange	○			○				○			5												
公立	国際教養大学	Akita International University	Student Exchange Agreement between Universitats Indonesia and Akita International University	○			○				○															
公立	首都大学東京	#N/A	AGREEMENT BETWEEN TOKYO METROPOLITAN UNIVERSITY AND UNIVERSITY OF INDONESIA FOR ACADEMIC EXCHANGE AND RESEARCH COLLABORATION	○	○					○																
公立	富山県立大学	Toyama Prefectural University	ACADEMIC EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOL OF ENGINEERING, TOYAMA PREFECTURAL UNIVERSITY, JAPAN AND UNIVERSITAS INDONESIA, INDONESIA	○	○					○																
公立	富山県立大学	Toyama Prefectural University	MEMORANDUM OF AGREEMENT ON STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, TOYAMA PREFECTURAL UNIVERSITY, JAPAN AND UNIVERSITAS INDONESIA, INDONESIA	○	○						○															
公立	山梨県立大学	Yamanashi Prefectural University	Memorandum of Understanding Between Universitas Indonesia and Yamanashi Prefectural University	○	○	○	○			○	○		2	2	1	2	2	2								
公立	兵庫県立大学	University of Hyogo	Memorandum of Understanding between The Faculty of Nursing, Universitas indonesia and The College of Nursing Art and Science, and the Research Institufe of Nursing Care for People and Community, University of Hyogo	○	○					○			1													
私立	北海道医療大学	Health Sciences University of Hokkaido	Agreement on Academic Cooperation	○	○					○																
私立	亜細亜大学	Asia University	Agreement Governing Exchanges	○			○			○			23	4	21	2	2	2								
私立	亜細亜大学	Asia University	Memorandum of Understanding	○			○						49		21	28										
私立	慶應義塾大学	Keio University	Agreement of Implementation on Exchange Program between Universitas Indonesia, Republic of Indonesia and Keio University (Japan)	○	○		○			○	○		3	3	2	1		3								
私立	順天堂大学	Juntendo University	Memorandum of Understanding Between Universitas Indonesia, Republic of Indonesia and Juntendo University, Japan	○	○	○				○	○			3												
私立	上智大学	Sophia University	Memorandum of Understanding for Academic Cooperation	○	○					○				1				1								
私立	上智大学	Sophia University	Student Exchange Agreement	○			○				○															

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UI	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)	From Japan (before 2018)	From Japan (2018)	From UI (before 2018)	From UI (2018)
私立	創価大学	Soka University	Memorandum of Understanding on Academic Exchange between Universitas Indonesia, Republic of Indonesia and Soka University, Japan	○	○		○			○	○		2	1		2		1								
私立	中央大学	Chuo University	Memorandum of Understanding on Academic Cooperation between Universitas Indonesia and Chuo University	○	○	○				○																
私立	中央大学	Chuo University	Student Exchange Agreement between Universitas Indonesia and Chuo University	○			○				○		1	4	1		4									
私立	帝京大学	Teikyo University	Letter of Intent	○	○					○																
私立	明治大学	Meiji University	MEMORANDUM OF UNDERSTANDING ON ACADEMIC EXCHANGE BETWEEN UNIVERSITAS INDONESIA AND MEIJI UNIVERSITY	○	○	○				○																
私立	明治大学	Meiji University	AGREEMENT ON THE IMPLEMENTATION OF THE STUDENT EXCHANGE PROGRAMME BETWEEN UNIVERSITAS INDONESIA AND SCHOOL OF POLITICAL SCIENCE AND ECONOMICS, MEIJI UNIVERSITY	○			○				○		6			6										
私立	立教大学	Rikkyo University	Memorandum of Understanding on Academic Exchange between Universitas Indonesia and Rikkyo University	○	○	○				○																
私立	立教大学	Rikkyo University	Agreement of Implementation on Student Exchange Programme between Universitas Indonesia and Rikkyo University	○			○				○															
私立	立教大学	Rikkyo University	Technical Academic Agreement on a Double Degree Program in Collaboration in the Linkage Master's Program		○			○		○			10						6	4						
私立	早稲田大学	Waseda University	University-Wide Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	University-Wide Agreement(Student Exchange)	○	○		○				○			1				1								
私立	国際大学	International University of Japan	Memorandum of Understanding	○	○		○	○		○				93			90	3			90	3				
私立	国際大学	International University of Japan	Technical Academic Agreement on the Linkage Master Progarm	○			○	○						93			90	3			90	3				
私立	南山大学	Nanzan University	Memorandum of Understanding	○	○					○																
私立	南山大学	Nanzan University	Student Exchange Agreement	○			○				○		1		1											
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○					○																
私立	立命館大学	Ritsumeikan University	STUDENT EXCHANGE AGREEMENT BETWEEN UNIVERSITAS INDONESIA, REPUBLIC OF INDONESIA AND RITSUMEIKAN UNIVERSITY, JAPAN CONCERING AIMS PROGRAM	○			○				○		4	4		4		4								
私立	神戸学院大学	Kobe Gakuin University	Memorandum for the Cooperation between Faculty of Mathmatics and Natural Sciences, University of Indonesia, and Kobe-Gakuin University		○																					
私立	神戸学院大学	Kobe Gakuin University	AGREEMENT GOVERNING EXCHANGES BETWEEN KOBE GAKUIN UNIVERSITY OF JAPAN AND UNIVERSITAS INDONESIA OF THE REPUBLIC OF INDONESIA	○	○																					
私立	立命館アジア太平洋大学	Ritsumeikan Asia Pacific University	Student Exchange Agreement	○			○				○															
私立	立命館アジア太平洋大学	Ritsumeikan Asia Pacific University	Master Dual Degree Program Agreement		○			○						3								3				

Partnership / Agreement between Institut Teknologi Bandung and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
国立	北海道大学	Hokkaido University	Memorandum of Agreement	○	○					○																
国立	北海道大学	Hokkaido University	Agreement on Student Exchange	○							○		2			2										
国立	北海道大学	Hokkaido University	Academic Exchange Agreement		○					○																
国立	北海道大学	Hokkaido University	Memorandum of Understanding	○							○			2												
国立	弘前大学	Hirosaki University	General Agreement of Cooperation Between Institut Teknologi Bandung, Republic of Indonesia And Hirosaki University, Japan	○	○	○				○																
国立	東北大学	Tohoku University	Agreement for Cultural, Educational and Scientific Cooperation between Graduate School of Engineering, Tohoku University, Japan and Bandung Institute of Technology, Indonesia	○	○	○								1												
国立	東北大学	Tohoku University	MEMORANDUM OF UNDERSTANDING ON STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, TOHOKU UNIVERSITY, JAPAN AND Institute of Technology Bandung (ITB), Indonesia								○			1												
国立	東北大学	Tohoku University	Agreement for Educational and Research Cooperation between the Graduate School of Environmental Studies, Tohoku University and Institut Technologi Bandung	○	○					○																
国立	東北大学	Tohoku University	Memorandum of Understanding, the Graduate School of Environmental Studies, Tohoku University and Institut Technologi Bandung	○	○					○																
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Tohoku University, Japan and Institut Teknologi Bandung, Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Memorandum of Understanding on Student Exchange between Tohoku University, Japan and Institut Teknologi Bandung, Indonesia	○			○				○			1			1									
国立	秋田大学	Akita University	Agreement on Academic Cooperation	○	○	○				○																
国立	秋田大学	Akita University	Memorandum of Understanding on Student Exchange	○			○				○															
国立	筑波大学	University of Tsukuba	Agreement for Academic Exchanges and Cooperation	○	○		○			○	○			9			3	6								
国立	群馬大学	Gunma University	AGREEMENT ON ACADEMIC COOPERATION	○	○	○	○			○	○															
国立	千葉大学	Chiba University	Agreement for academic exchange and cooperation between Chiba University,Japan and Institut Teknologi Bandung, Indonesia	○	○					○			4	5		4		5								
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Chiba University,Japan and Institut Teknologi Bandung, Indonesia	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Master Degree Program and DoubleDoctoral Degree Program between Graduate School of Engineering, Graduate School of Advanced Integration Science, Center for Environmental Remote Sensing, Chiba University and Faculty of Visual Art and Design, Faculty of Earth Sciences and Technology, School of Life Sciences and Technology, Institut Teknologi Bandung					○																		
国立	東京大学	The University of Tokyo	AGREEMENT ON ACADEMIC EXCHANGE BETWEEN THE UNIVERSITY OF TOKYO AND INSTITUT TEKNOLOGI BANDUNG	○	○					○	○															
国立	東京大学	The University of Tokyo	AGREEMENT ON ACADEMIC EXCHANGE BETWEEN THE UNIVERSITY OF TOKYO AND INSTITUT TEKNOLOGI BANDUNG	○	○					○																
国立	東京農工大学	Tokyo University of Agriculture and Technology	AGREEMENT FOR SCHOLARLY EXCHANGE AND COLLABORATION BETWEEN INSTIUTE TEKNOLOGI BANDUNG AND THE TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY	○	○		○			○				4				4								
国立	東京農工大学	Tokyo University of Agriculture and Technology	MEMORANDUM OF UNDERSTANDING	○	○		○				○															
国立	東京工業大学	Tokyo Institute of Technology	Agreement on Academic Exchange between Tokyo Institute of Technology and Institut Teknologi Bandung	○	○					○				3			1	2								
国立	東京工業大学	Tokyo Institute of Technology	Implementing Agreement for Promotion of Student Exchange between Tokyo Institute of Technology and Institut Teknologi Bandung	○			○				○			3			1	2								
国立	東京工業大学	Tokyo Institute of Technology	Memorandum of Understanding for Joint Research Project on Transportation Engineering, Technology and Policy between Institut Teknologi Bandung, Indonesia and Tokyo Institute of Technology, Japan							○																
国立	電気通信大学	The University of Electro-Communications	AGREEMENT between Institut Teknologi Bandung and The University Of Electro-Communications Tokyo, Japan	○	○		○			○	○															

Japanese University		University	Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
国立	電気通信大学	The University of Electro-Communications	MEMORANDUM OF UNDERSTANDING BETWEEN INSTITUT TEKNOLOGI BANDUNG, INDNESIA AND THE UNIVERSITY OF ELECTRO-COMMUNICATIONS, TOKYO FOR THE EXCHANGE OF STUDENTS	○			○				○															
国立	横浜国立大学	Yokohama National University	Academic Exchange Agreement & Student Exchange Memorandum	○	○		○			○	○															
国立	新潟大学	Niigata University	Agreement for Cooperation between the Faculty of Mineral Technology, Institut Teknologi Bandung and the Faculty of Science, Niigata University	○	○					○																
国立	長岡技術科学大学	Nagaoka University of Technology	N/A	○	○		○			○	○			1				1								
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	金沢大学	Kanazawa University	Memorandum of Understanding on the Exchange of Students in Accordance with the Agreement for Cooperation and Exchange	○			○				○		3	2				2								
国立	金沢大学	Kanazawa University	Memorandum on the Implementation of the Double-Degree Master's Program in Computational Science	○				○			○			12							9	3				
国立	金沢大学	Kanazawa University	Agreement on the Double-Degree Doctoral Program	○				○			○			2								2				
国立	福井大学	University of Fukui	Agreement on Acedemic Exchange between Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung and Graduate School of Engineering, University of Fukui	○	○					○																
国立	岐阜大学	Gifu University	Memorandum of Understanding between School of Life Sciences and Technology, Institut Teknologi Bandung, Republic of Indonesia and the United Graduate School of Agricultural Science, Gifu University, Japan	○	○					○	○															
国立	静岡大学	Shizuoka University	Agreement on Academic Exchange	○	○	○																				
国立	静岡大学	Shizuoka University	MoU Regarding Student Exchange	○			○				○															
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○	○				○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○															
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○				25			25									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○			25			25									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of the Twinning Program	○		○								1			1									
国立	三重大学	Mie University	なし	○	○	○	○			○	○		2			2										
国立	京都大学	Kyoto University	Student Exchange Agreement between Graduate School of Global Environmental Studies, Kyoto University, Japan and School of Life Science and Technology, Institut Teknologi Bandung, Republic of Indonesia	○			○				○															
国立	京都大学	Kyoto University	Student Exchange Agreement between Graduate School of Global Environmental Studies, Kyoto University, Japan and School of Architecture, Planning and Policy Development, Institut Teknologi Bandung, Republic of Indonesia	○	○		○			○	○						5									
国立	京都大学	Kyoto University	Agreement to Establish a Double Master's Degree Program between Institut Teknologi Bandung and Kyoto University Japan	○			○	○			○			2							2	2				
国立	京都大学	Kyoto University	Program Description: Double Degree Program	○			○	○			○			2							2	2				
国立	大阪大学	Osaka University	Memorandum of Understanding on Academic Exchange between Graduate School of Science/School of Science Osaka University and Faculty of Mathmatics and Natural Sciences Institut Teknologi Bandung	○	○					○																
国立	大阪大学	Osaka University	Agreement on Student Exchange between Graduate School of Science/School of Science Osaka University and Faculty of Mathmatics and Natural Sciences Institut Teknologi Bandung				○				○															
国立	大阪大学	Osaka University	Agreement on a Double-Degree Program for Ph.D. courses between the Graduate School of Science, Osaka University, Japan and the Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Indonesia					○																		
国立	大阪大学	Osaka University	Agreement on a Double-Degree Program for Master courses between the Graduate School of Science, Osaka University, Japan and the Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Indonesia					○																		
国立	大阪大学	Osaka University	N/A	○	○					○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○	○					○																
国立	大阪大学	Osaka University	N/A	○	○					○																
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○			○				○															
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	N/A	○	○		○	○			○															
国立	大阪大学	Osaka University	N/A	○	○		○	○			○			2							2					
国立	大阪大学	Osaka University	N/A	○	○		○	○			○		4	8		2	3	1		2	3	1				
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○	○					○																
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○			○				○															
国立	大阪大学	Osaka University	Agreement on Academic Exchange between Osaka University and Institut Teknologi Bandung	○	○		○			○	○		1	12	1		2	10								
国立	大阪大学	Osaka University	Memorandum on student exchange Between Osaka University and Institut Teknologi Bandung	○	○		○			○	○		1	12	1		2	10								
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	鳥取大学	Tottori University	Agreement of Academic Exchange and Cooperation	○	○					○																
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN INSTITUT TEKNOLOGI BANDUNG, INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○	○	○	○			○			2	2		1		2								
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN INSTITUT TEKNOLOGI BANDUNG, INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○			○				○		1	2				2								
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN HIROSHIMA UNIVERSITY, JAPAN AND INSTITUT TEKNOLOGI BANDUNG, INDONESIA - ASEAN INTERNATIONAL MOBILITY FOR STUDENTS (AIMS) PROGRAMME -	○			○				○		1	3		1		3								
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOL OF INTEGRATED ARTS AND SCIENCES, HIROSHIMA UNIVERSITY, JAPAN AND SCHOOL OF LIFE SCIENCES AND TECHNOLOGY, INSTITUT TEKNOLOGI BANDUNG, INDONESIA	○			○				○															
国立	広島大学	Hiroshima University	MEMORANDUM FOR THE DOUBLE MASTER'S DEGREE PROGRAM BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF INDUSTRIAL TECHNOLOGY, INSTITUTE TEKNOLOGI BANDUNG, INDONESIA	○			○	○			○															
国立	広島大学	Hiroshima University	MEMORANDUM FOR THE DOUBLE DOCTRAL DEGREE PROGRAM BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF MECHANICAL AND AEROSPACE ENGINEERING, INSTITUTE TEKNOLOGI BANDUNG, INDONESIA	○			○	○			○															
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT BETWEEN FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING, INSTITUT TEKNOLOGI BANGDONG, INDONESHIA AND GRADUATE SCHOOL OF INTERNAIONTAL DEVELOPMENT AND COOPERATION, HIROSHIMA UNIVERSITY ON COLLABORTION IN THE DOUBLE MASTER DEGREE PROGRAMS	○			○	○																		
国立	広島大学	Hiroshima University	TECHNICAL ACADEMIC AGREEMENT BETWEEN GRADUATE PROGRAM OF REGIONAL AND CITY PLANNING, SCHOOL OF ARCHITECTURE, PLANNING AND POLICY DEVELOPMENT, INSTITUTE TEKNOLOGI BANDUNG, INDONESIA AND GRADUATE SCHOOL OF INTERNATIONAL DEVELOPMENT AND COOPERATION, HIROSHIMA UNIVERSITY, JAPAN ON COLLABORATION IN THE LINKAGE DOUBLE MASTER'S DEGREE PROGRAM	○			○	○						6				6								

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN RESEARCH CENTER FOR NANODEVICES AND SYSTEMS, HIROSHIMA UNIVERSITY, JAPAN AND SCHOOL OF ELECTRICAL ENGINEERING AND INFORMATICS INSTITUT TEKNOLOGI BANDUNG, INDONESIA	○	○	○				○																
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN RESEARCH CENTER FOR NANODEVICES AND SYSTEMS, HIROSHIMA UNIVERSITY, JAPAN ANDFACULTY OF MATHEMATICS AND NATURAL SCIENCES, INSTITUT TEKNOLOGI BANDUNG, INDONESIA	○	○	○				○																
国立	山口大学	Yamaguchi University	AGREEMENT FOR ACADEMIC COOPERATION BETWEEN INSTITUT TEKNOLOGI BANDUNG AND YAMAGUCHI UNIVERSITY	○	○	○				○																
国立	山口大学	Yamaguchi University	AGREEMENT FOR ACADEMIC COOPERATION BETWEEN INSTITUT TEKNOLOGI BANDUNG AND YAMAGUCHI UNIVERSITY	○			○				○			1												
国立	山口大学	Yamaguchi University	TECHNICAL ACADEMIC AGREEMENT BETWEEN GRADUATE SCHOOL OF SCIENCE AND ENGINEERING YAMAGUCHI UNIVERSITY AND SCHOOL OF ARCHITECTURE, PLANNNING AND POLICY DEVELOPMENT INSTITUT TEKNOLOGI BANDUNG ON THE IMPLEMENTATION OF THE LINKAGE MASTER PROGRAM FOR THE PARTICIPANTS OF THE PROFESSIONAL HUMAN RESOURCE DEVEROPMENT (PHRD-4)					○														1				
国立	香川大学	Kagawa University	MEMORANDUM OF AGREEMENT		○	○				○																
国立	愛媛大学	Ehime University	なし	○	○	○	○			○	○		3	7	2	2	2	2								
国立	愛媛大学	Ehime University	なし	○			○	○			○															
国立	九州大学	Kyushu University	Agreement on academic cooperation	○	○	○				○			13	2												
国立	九州大学	Kyushu University	Agreement on Student Exchange	○			○				○															
国立	九州大学	Kyushu University	Agreement for Cooperation on Double Degree Master's Program	○			○	○			○			2												
国立	九州工業大学	Kyushu Institute of Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	九州工業大学	Kyushu Institute of Technology	Exchange Appendix to the Memorandum of Understanding	○	○	○	○				○			3												
国立	熊本大学	Kumamoto University	AGREEMENT ON DOUBLE DEGREE PROGRAM FOR DOCTORAL DEGREE BETWEEN GRADUATE SCHOOL OF SCIENCE AND TECHNOLOGY (GSST) KUMAMOTO UNIVERSITY – JAPAN AND GRADUATE SCHOOL INSTITUT TEKNOLOGI BANDUNG (ITB) - INDONESIA					○																		
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Kumamoto University and Institut Teknologi Bandung	○			○				○			4				2								
国立	熊本大学	Kumamoto University	Agreement on Academic Exchange Between Kumamoto University And Institut Teknologi Bandung	○	○	○				○																
国立	大分大学	Oita University	なし	○	○																					
国立	大分大学	Oita University	なし		○					○																
国立	大分大学	Oita University	なし	○							○															
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○															
国立	北陸先端科学技術大学院大学	Japan Advanced Institute of Science and Technology	Agreement on Academic Exchange between Institut Tecknologi Bandung and Japan Advanced Institute of Science and Technology	○	○	○				○	○			8												
国立	北陸先端科学技術大学院大学	Japan Advanced Institute of Science and Technology	Agreement on Student Exchange between Institut Tecknologi Bandung and Japan Advanced Institute of Science and Technology	○							○			3												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Memorandum of Understanding on Academic cooperation	○	○	○	○			○	○		2	2												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement on Student Exchange	○			○				○		2	2												
公立	高知工科大学	Kochi University of Technology	General Agreement on Academic Exchanges	○	○					○			1		1	1										
公立	高知工科大学	Kochi University of Technology	Student Exchange Agreement	○			○				○				1											
公立	北九州市立大学	The University of Kitakyushu	Agreement on Academic Exchange	○	○					○				15												
私立	日本薬科大学	Nihon Pharmaceutical University		○	○	○				○				9												

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administra tor exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
私立	城西国際大学	Josai International University	Academic and Educational Agreement	○	○	○				○																
私立	千葉工業大学	#N/A	Agreement for Cooperation and Academic Exchange	○	○	○				○																
私立	千葉工業大学	#N/A	Memorandum for Studet Exchange Program	○			○				○															
私立	芝浦工業大学	Shibaura Institute of Technology	Agreement for Academic Exchanges and Cooperation between ITB and SIT	○	○					○			9													
私立	芝浦工業大学	Shibaura Institute of Technology	Memorandum of Student Exchange between SIT and ITB								○															
私立	芝浦工業大学	Shibaura Institute of Technology	Addendum to the Memorandum on the Student Exchange between SIT and ITB	○																						
私立	中央大学	Chuo University	Agrement of Cooperation between Faculty of Civil and Environmental Engineering in Institut Teknologi Bandung and Faculty of Science and Engineering and Graduate School of Science and Engineering in Chuo University	○	○	○				○																
私立	中央大学	Chuo University	Memorandum on Student Exchange between Faculty of Civil and Environmental Engineering in Institut Teknologi Bandung and Faculty of Science and Engineering and Graduate School of Science and Engineering in Chuo University	○			○				○															
私立	中央大学	Chuo University	Memorandum on Faculty Exchange between Faculty of Civil and Environmental Engineering in Institut Teknologi Bandung and Faculty of Science and Engineering and Graduate School of Science and Engineering in Chuo University		○					○																
私立	東京都市大学	Tokyo City University	Cooperation Agreement	○	○					○																
私立	東京理科大学	Tokyo University of Science	AGREEMENT FOR THE ACADEMIC COOPERATION BETWEEN THE INSTITUT TEKNOLOGI BANDUNG AND THE TOKYO UNIVERSITY OF SCIENCE	○	○					○																
私立	東京理科大学	Tokyo University of Science	SHORT-TERM STUDENT EXCHANGE PROGRAM WORKING AGREEMENT between SCHOOL OF BUSINESS AND MANAGEMENT INSTITUT TEKNOLOGI BANDUNG INDONESIA anb TOKYO UNIVERSITY OF SCIENCE JAPAN	○																						
私立	東京理科大学	Tokyo University of Science	Addendum to the Agreement for the Academic Cooperation between The Institut Teknologi Bandung and Tokyo University of Science Agreement concerning the double degree program in Master of Science in Management and Master of Engineering in Industrial Administration	○			○	○			○			2							2					
私立	東京理科大学	Tokyo University of Science	The Agreement for the Academic Cooperation between the Institute of Technology Bandung and the Tokyo University of Science concerning the double doctoral degree program	○			○	○			○															
私立	日本大学	Nihon University	MEMORANDUM OF INSTITUT TEKNOLOGI BANDUNG and NIHON UNIVERSITY COLLEGE OF ENGINEERING		○					○																
私立	武蔵野美術大学	Musashino Art University	General Agreement of Academic Co-relationship Between Musashino Art University and Institut Teknologi Bandung	○	○					○																
私立	明治大学	Meiji University	AGREEMENT of COOPERATION between INSTITUT TEKNOLOGI BANDUNG and MEIJI UNIVERSITY	○	○	○				○				1												
私立	明治大学	Meiji University	MEMORANDUM ON THE IMPLEMENTATION OF THE STUDENT EXCHANGE PROGRAMME BETWEEN INSTITUT TEKNOLOGI BANDUNG AND MEIJI UNIVERSITY	○			○				○			1			1									
私立	早稲田大学	Waseda University	University-Wide Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	University-Wide Agreement(Student Exchange)	○	○						○															
私立	東海大学	Tokai University	Memorandum of Understanding On Academic Exchange between Institut Teknologi Bandung and Tokai University	○	○					○																
私立	京都産業大学	Kyoto Sangyo University	Memorandum of Understanding	○	○	○	○			○	○															
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○					○																
私立	立命館大学	Ritsumeikan University	AGREEMENT FOR STUDENT EXCHANGE FOR AIMS PROGRAM BETWEEN INSTITUT TEKNOLOGI BANDUNG AND RITSUMEIKAN UNIVERSITY	○			○				○		3	5		3		5								
私立	立命館大学	Ritsumeikan University	Collabolation for The Implementation of The Linkage Master Program	○	○			○						3								3				
私立	関西国際大学	Kansai University of International Studies	LETTER OF INTENT							○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITB	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)	From Japan (before 2018)	From Japan (2018)	From ITB (before 2018)	From ITB (2018)
私立	神戸芸術工科大学	Kobe Design University	AGREEMENT FOR CO-OPERATION	○	○	○				○																
私立	神戸芸術工科大学	Kobe Design University	STUDENT EXCHANGE AGREEMENT	○			○				○			1			1									
私立	岡山理科大学	#N/A	Educational Agreement	○	○	○																				

Partnership / Agreement between Gadjah Mada University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
国立	北海道大学	Hokkaido University	Agreement of Cooperation	○	○					○																
国立	北海道大学	Hokkaido University	Academic Exchange Agreement		○					○																
国立	北海道大学	Hokkaido University	Memorandum of Understanding	○							○			6												
国立	東北大学	Tohoku University	Agreement for Educational and Research Cooperation between the Graduate School of Environmental Studies, Tohoku University and Faculty of Agriculture, Universitas Gadjah Mada	○	○					○																
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Tohoku University, Japan and Gadjah Mada University, Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Memorandum of Understanding on Student Exchange between Tohoku University, Japan and Gadjah Mada University, Indonesia	○			○				○		1	6	1		4	2								
国立	秋田大学	Akita University	MEMORANDUM OF UNDERSTANDING ON ACADEMIC EXCHANGE	○	○	○				○																
国立	山形大学	Yamagata University	MEMORANDUM OF UNDERSTANDING ON ACADEMIC EXCHANGE between UNIVERSITAS GADJAHMADA and YAMAGATA UNIVERSITY	○	○	○				○																
国立	山形大学	Yamagata University	AGREEMENT ON STUDENT EXCHANGE BETWEEN UNIVERSITAS GADJAHMADA AND YAMAGATA UNIVERSITY	○			○				○			30			14	16								
国立	山形大学	Yamagata University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN FACULTY OF AGRICULTURE,GADJAH MADA UNIVERSITY AND FACULTY OF AGRICULTURE,YAMAGATA UNIVERSITY	○	○					○																
国立	山形大学	Yamagata University	Students Exchange	○			○				○															
国立	山形大学	Yamagata University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN FACULTY OF FORESTRY,GADJAH MADA UNIVERSITY AND FACULTY OF AGRICULTURE,YAMAGATA UNIVERSITY	○	○	○				○																
国立	山形大学	Yamagata University	Students Exchange	○			○				○															
国立	山形大学	Yamagata University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN FACULTY OF AGRICULTURAL TECHNOLOGY,GADJAH MADA UNIVERSITY AND FACULTY OF AGRICULTURE,YAMAGATA UNIVERSITY	○	○	○				○																
国立	山形大学	Yamagata University	Students Exchange	○			○				○															
国立	山形大学	Yamagata University	Memorandum of Agreement on Academic Cooperation between Faculty of Biology, Universitas Gadjah Mada	○	○	○				○	○															
国立	茨城大学	Ibaraki University	Memorandum of Understanding between Universitas Gadjah Mada, Indonesia and Ibaraki University, Japan for Education and Research Cooperation	○	○	○							9	6												
国立	茨城大学	Ibaraki University	Memorandum of Agreement on Academis and Student Exchange between Universitas Gadjah Mada, Indonesia and Ibaraki University, Japan	○			○				○		9	6		2		3								
国立	筑波大学	University of Tsukuba	Memorandum of Understanding	○	○		○			○	○		4	13	1	3	9	4								
国立	宇都宮大学	Utsunomiya University	Agreement of Academic Exchange between Utsunomiya University and Universitas Gadjah Mada	○	○					○			3													
国立	埼玉大学	Saitama University	Agreement on Academic Exchange between Universitas Gadjah Mada an Saitama University	○	○	○	○			○	○		5		5											
国立	埼玉大学	Saitama University	Memorandum on Student Exchange between Saitama University and Universitas Gadjah Mada	○			○				○		5		5											
国立	千葉大学	Chiba University	Agreement for Linkage Program between Gadjah Mada University and Chiba University	○	○					○			8	19		8	1	18								
国立	千葉大学	Chiba University	Agreement for academic cooperation between Faculty and graduate school of engineering Chiba University and Faculty of mathematics and natural sciences Universitas Gadjah Mada	○	○					○	○															
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Gadjah Mada University and Chiba University	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Master Degree Program and DoubleDoctoral Degree Program between Graduate School of Advanced Integration Science, Center for Environmental Remote Sensing, Chiba University and Faculty of Geography, Universitas Gadjah Mada					○																		
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange between the University of Tokyo and Gadjahmada University	○	○	○				○																
国立	東京大学	The University of Tokyo	Memorandum on Student Exchange between Graduate School of Agricultural and Life Sciences, the University of Tokyo and Faculty of Agriculture, Gadjahmada University	○			○				○															
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange between The University of Tokyo Graduate School of Frontier Sciences and School of Engineering and Universitas Gadjah Mada Faculty of Engineering	○	○	○				○																
国立	東京外国語大学	Tokyo University of Foreign Studies	Agreement for Academic Exchange and Cooperation	○	○					○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
国立	東京外国語大学	Tokyo University of Foreign Studies	MEMORANDUM ON STUDENT EXCHANGES	○			○				○		2	1	1	1		1								
国立	東京農工大学	Tokyo University of Agriculture and Technology	AGREEMENT FOR SCHOLARLY EXCHANGE AND COLLABORATION BETWEEN UNIVERSITAS GADJAH MADA AND TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY	○	○		○			○			13	6	10	3	4	2								
国立	東京農工大学	Tokyo University of Agriculture and Technology	MEMORANDUM OF UNDERSTANDING	○	○		○				○															
国立	東京農工大学	Tokyo University of Agriculture and Technology	AGREEMENT FOR SCHOLARLY EXCHANGE AND COLLABORATION BETWEEN UNIVERSITAS GADJAH MADA AND THE TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY	○				○			○															
国立	東京工業大学	Tokyo Institute of Technology	Agreement for Cooperation between Gadjah Mada University and Tokyo Institute of Technology	○	○					○				4			2	2								
国立	東京工業大学	Tokyo Institute of Technology	Implementing Agreement for Promotion of Student Exchange between Tokyo Institute of Technology and Universitas Gadjah Mada	○			○				○			4			2	2								
国立	横浜国立大学	Yokohama National University	Academic Exchange Agreement		○					○																
国立	新潟大学	Niigata University	Memorandum of Understanding Faculty of Dentistry Niigata University and Faculty of Dentistry Universitas Gadjah Mada	○	○					○			2													
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	金沢大学	Kanazawa University	Memorandum of Understanding on the Exchange of Students in Accordance with the Agreement for Cooperation and Exchange	○			○				○			2				2								
国立	金沢大学	Kanazawa University	Memorandum on the Implementation of the Double-Degree Master's Program	○				○			○			11							3	8				
国立	岐阜大学	Gifu University	Memorandum of Understanding between Universitas Gadjah Mada and Gifu University	○	○		○			○	○		1													
国立	岐阜大学	Gifu University	Memorandum of Agreement on student and faculty exchanges between Universitas Gadjah Mada and Gifu University	○	○		○			○	○		1													
国立	岐阜大学	Gifu University	Memorandum of Agreement on the Double PhD Degree Program between The Graduate School Universitas Gadjah Mada, Indonesia and The United Graduate School of Agricultural Science Gifu University, Japan	○				○			○										2					
国立	静岡大学	Shizuoka University	Agreement on Academic Exchange	○	○	○																				
国立	静岡大学	Shizuoka University	MoU Regarding Student Exchange	○			○				○		6			6										
国立	静岡大学	Shizuoka University	MoU Regarding Exchange Students enrolled in DDP Special Program					○			○															
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○				13												
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○							○															
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○			13				3								
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange		○					○																
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○			1	4	1		4									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○		1	4	1		4									
国立	三重大学	Mie University	なし	○	○	○	○			○	○		2			2										
国立	三重大学	Mie University	なし	○	○	○	○			○	○															
国立	京都大学	Kyoto University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN THE PRIMATE RESEARCH INSTITUTE, KYOTO UNIVERSITY, JAPAN AND THE FACULTY OF VETERINARY MEDICINE, GADJAH MADA UNIVERSITY, INDONESIA	○	○					○																
国立	京都大学	Kyoto University	Agreement on Academic and Research Cooperation between the Faculty and graduate School of Economics, Kyoto University and the Faculty of Sconomics and Business, Universitas Gadjah Mada	○	○		○			○	○			3	1		5	3								
国立	京都大学	Kyoto University	Memorandum of Understanding for Academic Exchange and Cooperation between The Center for Southeast Asian Studies, Kyoto University, Japan and The Faculty of Social and Political Sciences, Universitas Gadjah Mada, Indonesia		○					○																
国立	京都大学	Kyoto University	Memorandum of Agreement among the Faculty of Medicine, Universitas Gadjah Mada and Dr. Sardjito Hospital and the Graduate School of Medicine and Faculty of Medicine, Kyoto University and Kyoto University Hospital		○					○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
国立	京都大学	Kyoto University	Student Exchange Agreement between The Faculty of Agricultural Technology, and The Faculty of Forestry, Universitas Gadjah Mada and The Faculty and Graduate School of Agriculture, Kyoto University	○			○				○			2					9	2						
国立	京都大学	Kyoto University	Agreement to Establish a Double Master's Degree Program between Universitas Gadjah Mada Indonesia and Kyoto University Japan	○			○	○			○															
国立	京都大学	Kyoto University	Agreement to Establish a Double Master's Degree Program Between Universitas Gadjah Mada and Kyoto University	○			○	○			○															
国立	大阪大学	Osaka University	Agreement on Academic Exchange between Faculty of Dentistry Universitas Gadjah Mada and Graduate School of Dentistry, Osaka University	○	○					○				6												
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○	○					○																
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○			○				○															
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○	○					○																
国立	大阪大学	Osaka University	Indonesian Academic Consortium	○			○				○															
国立	大阪大学	Osaka University	Agreement on Academic Exchange between Osaka University and Universitas Gadjah Mada	○	○	○	○			○	○			3				3								
国立	大阪大学	Osaka University	Memorandum on student exchange Between Osaka University and Universitas Gadjah Mada	○	○	○	○			○	○			3				3								
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○			1			1									
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	神戸大学	Kobe University	N/A	○			○				○		2	5	1		5									
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○	○		○	○						13						-	13	1				
国立	神戸大学	Kobe University	N/A	○			○	○																		
国立	神戸大学	Kobe University	N/A	○	○		○	○						23						-	23	2				
国立	神戸大学	Kobe University	N/A	○	○		○	○						6						-	6	1				
国立	神戸大学	Kobe University	N/A	○				○			○															
国立	奈良女子大学	Nara Women's University	Memorandum of Understanding on Academic Exchange between Universitas Gadjah Mada and Nara Women's University	○	○	○	○			○	○		1	1		1	1									
国立	奈良女子大学	Nara Women's University	Agreement on the Exchange of Students between Universitas Gadjah Mada and Nara Women's University	○			○				○		1	1		1	1									
国立	和歌山大学	Wakayama University	EXTENSION AGREEMENT FOR THE MEMORANDUM FOR COOPERATION ON STUDENT EXCHANGE AND AGREEMENT OF COOPERATION AND EXCHANGE BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND WAKAYAMA UNIVERSITY, JAPAN	○	○		○			○	○		3		3											
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND OKAYAMA UNIVERSITY, JAPAN	○	○	○				○																
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANDING FOR ACADEMIC AND EDUCATIONAL COLLABORATION BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND HIROSHIMA UNIVERSITY	○	○	○				○																
国立	広島大学	Hiroshima University		○	○					○																
国立	広島大学	Hiroshima University		○			○				○															
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOL OF BIOMEDICAL & HEALTH SCIENCES, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF VETERINARY MEDICINE, UNIVERSITAS GADJAH MADA	○			○				○															
国立	広島大学	Hiroshima University	SUPPLEMENTAL AGREEMENT TO MEMORANDUM OF UNDERSTANDING BETWEEN FACULTY OF ANIMAL SCIENCE, UNIVERSITAS GADJAH MADA, INDONESIA AND GRADUATE SCHOOL OF BIOSPHERE SCIENCE, HIROSHIMA UNIVERSITY, JAPAN	○			○				○															
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND GRADUATE SCHOOL OF BIOSPHERE SCIENCE, HIROSHIMA UNIVERSITY, JAPAN	○			○				○															

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
国立	広島大学	Hiroshima University	TECHNICAL ACADEMIC AGREEMENT BETWEEN FACULTY OF ECONOMICS AND BUSINESS, UNIVERSITAS GADJAH MADA YOGYAKARTA, INDONESIA AND GRADUATE SCHOOL OF INTERNATIONAL DEVELOPENT AND COOPERTION, HIROSHIMA UNIVERSITY, HIROSHIMA, JAPAN ON COLLABORATION IN THE LINKAGE MASTER'S PROGRAM	○			○	○		○				8			4	4								
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT TO THE ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN GRADUATE SCHOOL OF SCIENCE, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF MATHEMATICS AND NATURAL SCIENCES, UNIVERSITAS OF GADJAH MADA, INDONESIA	○	○		○				○															
国立	山口大学	Yamaguchi University	MEMORANDUM OF UNDERSTANDING BETWEEN YAMAGUCHI UNIVERSITY AND UNIVERSITAS GADJAH MADA	○	○	○				○																
国立	山口大学	Yamaguchi University	TECHNICAL ACADEMIC AGREEMENT BETWEEN GRADUATE SCHOOL OF SCIENCES AND TECHNOLOGY FOR INNOVATION YAMAGUCHI UNIVERSITY AND FACULTY OF ENGINEERING UNIVERSITAS GADJAH MADA ON THE IMPLEMENTATION OF THE LINKAGE MASTER PROGRAM FOR THE PARTICIPANTS OF THE PROFESSIONAL HUMAN RESOURCE DEVEROPMENT (PHRD-4)					○						1							1					
国立	徳島大学	Tokushima University	AGREEMENT OF ACADEMIC COOPERATION	○	○					○																
国立	徳島大学	Tokushima University	ADDENDUM TO THE AGREEMENT	○			○				○															
国立	香川大学	Kagawa University	Memorandum of Understanding on Academic Exchange	○	○	○				○				1												
国立	香川大学	Kagawa University	Deailed Rule for Academic Exchange Agreement on Student Exchnage Program	○			○				○			1												
国立	香川大学	Kagawa University	Deailed Plans for Academic Exchange Agreement on Student Exchnage Program	○			○				○			1												
国立	香川大学	Kagawa University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics		○	○				○			7	10												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Joint Degree Program (SUIJI-JDP)	○			○		○	○	○			4												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Service Learning Program (SUIJI-SLP)	○			○			○	○		7	6												
国立	愛媛大学	Ehime University	なし	○	○	○	○			○	○		33	38	2	2	3	5								
国立	愛媛大学	Ehime University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○	○				○															
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Service Learning Program (SUIJI-SLP)	○																						
国立	愛媛大学	Ehime University	Memorandum of Agreement on Academic Cooperation Between Graduate School of Science and Engineering, Ehime University And Faculty of Engineering, Universitas Gadjah Mada	○	○	○	○	○		○	○															
国立	愛媛大学	Ehime University	Memorandum of Agreement on Academic Cooperation Between Graduate School of Science and Engineering, Ehime University And Faculty of Biology, Universitas Gadjah Mada	○	○	○	○	○		○	○															
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Master Students (SUIJI-JP-Ms)	○										3			3									
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Doctor Students (SUIJI-JP-Dc)	○										1												
国立	愛媛大学	Ehime University	なし	○			○				○															
国立	高知大学	Kochi University	An Agreement for a SUIJI(Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○				○																
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Service Learning Program	○			○				○		4	4		4		4								
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Master Students	○			○				○			1			1									
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Doctor Students	○			○				○															
国立	九州大学	Kyushu University	Agreement on academic cooperation	○	○	○				○			7	2												
国立	九州大学	Kyushu University	Agreement on Student Exchange	○			○				○			6				4								
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○																
国立	佐賀大学	Saga University	Addndum to the Agreement on academic cooperation and exchange	○							○			2												
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Kumamoto University and Universitas Gadjah Mada	○			○				○		1	1	1			1								
国立	熊本大学	Kumamoto University	Memorandum of Understanding on Academic Exchange between Kumamoto University and Universitas Gadjah Mada	○	○	○				○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○			5			1	4								
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○			5			1	4								
国立	宮崎大学	University of Miyazaki	Technical Academic Agreement for Master's Double Degree Program					○						5												
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and Faculty of Economics and Business, Universitas Gadjah Mada (FEB-UGM), Yogyakarta, Indonesia on Collaboration in theLinkage Master's Programs (LMP)	○	○			○						6							2	4				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and Faculty of Engineering, Universitas Gadjah Mada (FT-UGM), Yogyakarta, Indonesia on Collaboration in theLinkage Master's Programs (LMP)	○	○			○						6							3	3				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and Faculty of Social and Political Sciences, Universitas Gadjah Mada (MAP-UGM), Yogyakarta, Indonesia on Collaboration in the Linkage Master's Program (LMP)	○	○			○						6							4	2				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Memorandum of Understanding (MOU) for Academic Collaboration between The National Graduate Institute for Policy Studies (GRIPS), Japan and Universitas Gadjah Mada (UGM), Indonesia		○	○				○																
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement on Academic Exchanges	○	○	○	○			○	○		4	5												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement on Student Exchanges	○			○				○		4	5												
公立	首都大学東京	#N/A	MEMORANDUM OF AGREEMENT BETWEEN FACULUTY OF FORESTRY UNIVERSITAS GADJAH MADA AND THE GURADUATE SCHOOL OF URBAN ENVIRONMENTAL SCIENCES AND THE FACULTY OF URBAN ENVIRONMENTAL SCIENCES, TOKYO METROPOLITAN UNIVERSITY	○	○					○																
公立	愛知県立大学	Aichi Prefectural University	AGREEMENT ON ACADEMIC EXCHANGE BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND AICHI PREFECTURAL UNIVERSITY, JAPAN	○	○																					
公立	大阪市立大学	Osaka City University	Agreement on Academic Exchange between Universitas Gadjah Mada, Indonesia and Osaka City University, Japan	○	○					○	○		1	24	1		20	4								
公立	大阪市立大学	Osaka City University	Agreement of Academic Exchange between Gadjah Mada University Graduate School of Cultural Sciences and Osaka City University Graduate School of Literature and Human Sciences	○	○																					
公立	大阪市立大学	Osaka City University	Memorandum of Agreement on Academic Cooperation between Faculty of Engineering, Universitas Gadjah Mada and Graduate School of Engineering, Osaka City University	○	○					○																
公立	大阪府立大学	Osaka Prefecture University	STUDENT EXCHANGE AGREEMENT BETWEEN UNIVERSITAS GADJAH MADA AND OSAKA PREFECTURE UNIVERSITY	○						○																
公立	大阪府立大学	Osaka Prefecture University	MEMORANDUM OF UNDERSTANDING between UNIVERSITAS GADJAH MADA, INDONESIA and OSAKA PREFECTURE UNIVERSITY, JAPAN	○	○						○															
公立	兵庫県立大学	University of Hyogo	MEMORANDUM OF UNDERSTANDING between UNIVERSITY OF HYOGO, JAPAN and UNIVERSITAS GADJAH MADA, INDONESIA	○	○					○	○															
公立	高知県立大学	University of Kochi	Memorandum of Understanding between Universitas Gadjah Mada and University of Kochi	○	○		○			○			6	5		6	11									
公立	高知県立大学	University of Kochi	Agreement of Cooperation between School of Nursing, Faculty of Medicine, Universitas Gadjah Mada Yogyakarta, Indonesia and Faculty of Nursing, University of Kochi	○	○		○			○																
公立	高知工科大学	Kochi University of Technology	Memorandum of Understanding on Academic Exchanges	○	○	○				○																
公立	高知工科大学	Kochi University of Technology	Student Exchange Agreement				○				○															
私立	青山学院大学	Aoyama Gakuin University	なし	○	○	○				○																
私立	恵泉女学園大学	Keisen University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS GADJAH MADA AND KEISEN UNIVERSITY	○	○																					
私立	国士舘大学	Kokushikan University	Agreement on Academic Exchange and Cooperation Between Gadjah Mada University and Kokushikan University	○	○		○			○	○		23		14		5									

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
私立	芝浦工業大学	Shibaura Institute of Technology	Agreement for Academic Exchanges and Cooperation between UGM and SIT	○	○					○																
私立	芝浦工業大学	Shibaura Institute of Technology	Memorandum on Student Exchange between SIT and UGM	○							○															
私立	順天堂大学	Juntendo University	Memorandum of Understanding Between Faculty of Medicine, Univeristy of Juntendo University Faculty of Medicine	○	○	○				○	○			10												
私立	上智大学	Sophia University	Memorandum of Understanding	○	○					○				3				3								
私立	上智大学	Sophia University	Student Exchange Agreement	○			○				○			3				3								
私立	昭和女子大学	Showa Women's University	Memorandum of Understanding between Showa Women's University and Universitas Gadjah Mada	○	○	○							4	3		4		3								
私立	拓殖大学	Takushoku University	PHRDP-Ⅲ	○				○						3								3				
私立	中央大学	Chuo University	Agreement of Cooperation between Universitas Gadjah Mada and Chuo University	○	○	○				○																
私立	中央大学	Chuo University	Memorandum on Student Exchange between The Gadjah Mada University and Chuo University	○			○				○		11	11	11		11									
私立	東洋大学	Toyo University	MEMORANDUM OF UNDERSTANDING between UNIVERSITAS GADJAH MADA, INDONESIA and TOYO UNIVERSITY, JAPAN	○	○					○																
私立	東洋大学	Toyo University	AGREEMENT FOR THE RECIPROCAL STUDENT EXCHANGE BETWEEN UNIVERSITAS GADJAH MADA, INDONESIA AND TOYO UNIVERSITY, JAPAN	○			○				○															
私立	明治大学	Meiji University	MEMORANDUM OF UNDERSTANDING between UNIVERSITAS GADJAH MADA and MEIJI UNIVERSITY	○	○	○				○																
私立	明治大学	Meiji University	AGREEMENT ON THE IMPLEMENTATION OF STUDENT EXCHANGE PROGRAM BETWEEN UNIVERSITAS GADJAH MADA AND MEIJI UNIVERSITY	○			○				○															
私立	立教大学	Rikkyo University	Technical Academic Agreement on a double-degree program and semester-only program in collaboration in the linkage Master's Program between Faculty of Social and Political Sciences, University of Gadjah Mada and Graduate School of Business, Rikkyo University		○			○					1						1							
私立	早稲田大学	Waseda University	University-Wide Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	University-Wide Agreement(Student Exchange)	○	○						○			1				1								
私立	東海大学	Tokai University	Memorandum of Understanding On Academic Exchange between Universitas Gadjah Mada and Tokai University	○	○					○																
私立	フェリス女学院大学	Ferris University	MEMORANDUM OF AGREEMENT BETWEEN FERRIS UNIVERSITY (YOKOHAMA, JAPAN) AND GADJAH MADA UNIVERSITY (YOGYAKARTA, INDONESIA)	○	○	○				○				2				2								
私立	フェリス女学院大学	Ferris University	Memorandum of Agreement between FERRIS UNIVERSITY(YOKOHAMA,JAPAN) and GADJAH MADA UNIVERSITY(YOGYAKARTA,INDONESIA)	○			○				○															
私立	国際大学	International University of Japan	Memorundum of Understanding	○	○		○	○		○			3	158	3		150	8			119	7				
私立	国際大学	International University of Japan	Agreement on Student Exchange Program	○	○		○				○		3	32	3		31	1								
私立	国際大学	International University of Japan	Technical Academic Agreement on Collaboration for the Implementation of the Linkage Master Program	○			○	○						31			27	4			27	4				
私立	国際大学	International University of Japan	Technical Academic Agreement on the Linkage Master Progarm	○			○	○						95			92	3			92	3				
私立	中部大学	Chubu University	Agreement on Academic Cooperation and Exchange	○	○		○			○	○															
私立	京都産業大学	Kyoto Sangyo University	Academic Agreement	○	○		○			○	○		7		7											
私立	同志社大学	Doshisha University	University-level Agreements	○	○					○																
私立	同志社大学	Doshisha University	University-level Agreements	○			○				○															
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○					○																
私立	立命館大学	Ritsumeikan University	Agreement for Student Exchange				○				○		1			1										
私立	立命館大学	Ritsumeikan University	Overseas Study Program Agreement between Ritsumeikan University and Gadjah Mada University, Indonesian Language and Culture Learning Service	○																						
私立	立命館大学	Ritsumeikan University	STUDENT EXCHANGE AGREEMENT BETWEEN UNIVERSITAS GADJAH MADA AND RITSUMEIKAN UNIVERSITY	○			○				○		1	5		1		5								
私立	立命館大学	Ritsumeikan University	Collabolation for The Implementation of The Linkage Master Program	○	○			○						7								7				
私立	立命館大学	Ritsumeikan University	Collabolation for The Implementation of The Linkage Master Program	○	○			○						4								4				
私立	関西大学	Kansai University	MEMORANDUM OF UNDERSTANDING ON ACADEMIC EXCHANGE between UNIVERSITAS GADJAH MADA and KANSAI UNIVERSITY	○	○					○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UGM	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)	From Japan (before 2018)	From Japan (2018)	From UGM (before 2018)	From UGM (2018)
私立	関西大学	Kansai University	AGREEMENT ON STUDENT EXCHAGE between UNIVERSITAS GADJAH MADA and KANSAI UNIVERSITY	○			○				○			4			4									
私立	関西国際大学	Kansai University of International Studies	MEMORANDUM OF AGREEMENT	○	○																					
私立	関西国際大学	Kansai University of International Studies	STUDENT EXCHANGE AGREEMENT								○			1			1									
私立	関西国際大学	Kansai University of International Studies	LETTER OF INTENT							○																
私立	甲南女子大学	Konan Women's University	Memorandum of Understanding	○	○					○			2													
私立	甲南女子大学	Konan Women's University	Letter of Agreement Between Faculty of Cultural Sciences, Gajah Mada University and Konan Women's University	○									2													
私立	甲南女子大学	Konan Women's University	Letter of Agreement Between Konan Women's University, Kobe, Japan and Indonesian Language and Culture Learning Service, Gajah Mada University, Yogyakarta, Indonesia	○									17													
私立	神戸薬科大学	#N/A	Memorandum of understanding between Kobe Pharmaceutical University and Universitas Gadjah Mada		○					○																
私立	広島経済大学	Hiroshima University of Economics	なし	○	○					○																
私立	広島経済大学	Hiroshima University of Economics	なし	○	○		○			○	○			1				1								
私立	広島経済大学	Hiroshima University of Economics	なし	○	○		○			○	○															
私立	福岡大学	Fukuoka University	Agreement of academic cooperation between Gadjah Mada University and Fukuoka University	○	○					○				3												
私立	立命館アジア太平洋大学	Ritsumeikan Asia Pacific University	Student Exchange Agreement	○			○				○			3				3								

Partnership / Agreement between IPB University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from IPB	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)
国立	北海道大学	Hokkaido University	Memorandum of Understanding	○	○					○																
国立	北海道大学	Hokkaido University	Academic Exchange Agreement		○					○																
国立	北海道大学	Hokkaido University	Memorandum of Understanding	○							○			4												
国立	帯広畜産大学	Obihiro University of Agriculture and Veterinary Medicine	Agreement on Academic Cooperation between Bogor Agricultural University and Obihiro University of Agriculture and Veterinary Medicine	○	○	○				○																
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Tohoku University, Japan and Bogor Agricultural University, Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Memorandum of Understanding on Student Exchange between Tohoku University, Japan and Bogor Agricultural University, Indonesia	○			○				○			1				1								
国立	山形大学	Yamagata University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN FACULTY OF AGRICULTURAL ENGINEERING AND TECHNOLOGY,BOGOR AGRICULTURAL UNIVERSITY AND FACULTY OF AGRICULTURE,YAMAGATA UNIVERSITY	○	○	○				○																
国立	山形大学	Yamagata University	Student Exchange	○			○				○															
国立	茨城大学	Ibaraki University	Memorandum of Understanding between Bogor Agricultural University, Indonesia and Ibaraki University, Japan for Education and Research Cooperation	○	○	○							20	15												
国立	茨城大学	Ibaraki University	Memorandum of Agreement on Academic and Student Exchangement between Bogor Agricultural University, Indonesia and Ibaraki University, Japan	○			○				○		20	15		1		5								
国立	茨城大学	Ibaraki University	Memorandum of Agreement on the Double Degree Masters Program between The Graduate School Bogor Agriculture University, Indonesia and The Graduate School of Agriculture Ibaraki University, Japan					○			○		20	15		1		5				4				
国立	筑波大学	University of Tsukuba	Agreement for Academic Exchanges and Cooperation	○	○		○			○	○		4	11	1	3	5	6								
国立	宇都宮大学	Utsunomiya University	Agreement of Academic Exchange between Bogor Agricultural University, Indonesia and Utsunomiya University, Japan	○	○		○			○	○			12												
国立	千葉大学	Chiba University	Agreement for academic cooperation and exchange between Chiba University,Japan and Bogor Agricultural University,Indonesia	○	○					○			3	8		3		8								
国立	千葉大学	Chiba University	Agreement for academic cooperation and exchange between Graduate School of Horticulture and Faculty of Horticulture, Chiba University,Japan and Faculty of Agriculture, Bogor Agricultural University, Indonesia	○	○					○																
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Chiba University,Japan and Bogor Agricultural University,Indonesia	○			○				○															
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Graduate School of Horticulture and Faculty of Horticulture, Chiba University,Japan and Faculty of Agriculture, Bogor Agricultural University, Indonesia	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Degree Program between Graduate School of Horticulture, Chiba University,Japan and Graduate School, Bogor Agricultural University, Indonesia					○						2			1	1			1	1				
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange between Graduate School of Agricultural and Life Sciences, the University of Tokyo and Bogor Agricultural University	○	○	○				○																
国立	東京大学	The University of Tokyo	Memorandum on Student Exchange between Graduate School of Agricultural and Life Sciences, the University of Tokyo and Bogor Agricultural University	○							○															
国立	東京農工大学	Tokyo University of Agriculture and Technology	AGREEMENT FOR SCHOLARLY EXCHANGE AND COLLABORATION BETWEEN THE BOGOR AGRICULTURAL UNIVERSITY AND THE TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY	○	○		○			○			14	17	10	4	14	3								
国立	東京農工大学	Tokyo University of Agriculture and Technology	MEMORANDUM OF UNDERSTANDING	○	○		○				○															
国立	東京農工大学	Tokyo University of Agriculture and Technology	MEMORANDUM OF AGREEMENT ON THE DOUBLE DEGREE FOR MASTER PROGRAM BETWEEN THE GRADUATE SCHOOL, BOGOR AGRICULTURAL UNIVERSITY(IPB), INDONESIA AND GRADUATE SCHOOL OF AGRICULTURE, TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY(TUAT), JAPAN	○				○			○															
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Joint Declaration of Cooperation	○	○	○	○			○	○															

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from IPB	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Joint Declaration of Cooperation Student Exchange Program	○			○				○															
国立	新潟大学	Niigata University	なし	○	○					○																
国立	信州大学	Shinshu University	MEMORANDUM OF UNDERSTANDING FOR ACADEMIC COOPERATION AND EXCHANGE BETWEEN BOGOR AGRICULTURAL UNIVERSITY, and SHINSHU UNIVERSITY	○	○					○			3													
国立	岐阜大学	Gifu University	Agreement on Student and Faculty Exchanges between Bogor Agricultural University, Indonesia and Gifu University, Japan	○	○		○			○	○		1	1												
国立	静岡大学	Shizuoka University	Agreement on Academic Exchange	○	○	○																				
国立	静岡大学	Shizuoka University	MoU Regarding Student Exchange	○			○				○															
国立	三重大学	Mie University	なし	○	○	○	○			○	○		6	6	6		6									
国立	京都大学	Kyoto University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN BOGOR AGRICULTURAL UNIVERSITY (INSTITUT PERTANIAN BOGOR) AND KYOTO UNIVERSITY	○	○					○				15												
国立	京都大学	Kyoto University	Memorandum of Understanding For on Academic and Scientific Cooperation and Exchange Activities between Graduate School of Bogor Agricultural University, and Research and Community Services Institute of Bogor Agricultural University, Indonesia and Graduate School of Global Environmental Studies, Kyoto University, Japan	○	○					○																
国立	京都大学	Kyoto University	LETTER OF AGREEMENT between THE PRIMATE RESEARCH INSTITUTE, KYOTO UNIVERSITY and THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES, BOGOR AGRICULTURAL UNIVERSITY	○	○					○																
国立	京都大学	Kyoto University	LETTER OF AGREEMENT between THE WILDLIFE RESEARCH CENTER, KYOTO UNIVERSITY and THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES,BOGOR AGRICULTURAL UNIVERSITY	○	○					○																
国立	京都大学	Kyoto University	Memorandum of Agreement between the Faculty of Human Ecology, Bogor Agricultural University and the Graduate School of Asian and African Area Studies, Kyoto University	○	○					○																
国立	京都大学	Kyoto University	Double Master's Degree Program Between Faculty of Agriculture, Bogor Agricultural University and Graduate School of Global Environmental Studies, Kyoto University	○				○			○		1	2						1		2				
国立	京都大学	Kyoto University	Student Exchange Agreement between Bogor Agricultural University / Graduate Studies, Bogor Agricultural University and the Faculty and Graduate School of Agriculture, Kyoto University	○	○		○			○	○			2												
国立	京都大学	Kyoto University	Student Exchange Agreement between Graduate School of Bogor Agricultural University, Republic of Indonesia and Graduate School of Global Environmental Studies, Kyoto University, Japan	○			○				○		1	3			5	2								
国立	京都大学	Kyoto University	Agreement to Establish a Double Master's Degree Program between Kyoto University, Japan and Bogor Agricultural University, Indonesia	○			○	○			○		1	4						1		2				
国立	京都大学	Kyoto University	Double Master's Degree Program Between Faculty of Agriculture, Bogor Agricultural University and Graduate School of Agriculture, Kyoto University	○			○	○			○			2												
国立	大阪大学	Osaka University	N/A	○	○	○				○				1				1								
国立	大阪大学	Osaka University	N/A	○			○				○			1				1								
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	鳥取大学	Tottori University	Agreement of Academic Exchange	○	○	○				○			1	1												
国立	鳥取大学	Tottori University	AGREEMENT ON STUDENT EXCHANGE	○			○				○															
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING BETWEEN OKAYAMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○	○	○			○	○															
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING BETWEEN OKAYAMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○	○	○			○	○															
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN HIROSHIMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○					○			1													
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANDING BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○	○				○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from IPB	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANDING ON STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○			○				○															
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOL OF BIOSPHERE SCIENCE, HIROSHIMA UNIVERSITY, JAPAN AND BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○			○				○															
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN GRADUATE SCHOOL FOR INTERNATIONAL DEVELOPMENT AND COOPERATION, HIROSHIMA UNIVERSITY, JAPAN AND GRADUATE SCHOOL, BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○	○				○																
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT BETWEEN NATURAL SCIENCE CENTER FOR BASICE RESEARCH AND DEVELOPMENT, HIROSHIMA UNIVERSITY, JAPAN AND CENTER FOR ENVIRONMENTAL RESEARCH, THE INSTITUTE OF RESEARCH AND COMMUNITY EMPOWERMENT, BOGOR AGRICULTURAL UNIVERSITY, INDONESIA	○	○	○				○																
国立	山口大学	Yamaguchi University	MEMORANDUM OF UNDERSTANDING BETWEEN YAMAGUCHI UNIVERSITY AND BOGOR AGRICULTURAL UNIVERSITY	○	○	○				○																
国立	香川大学	Kagawa University	General Memorandum for Academic Cooperation and Exchange	○	○					○				1												
国立	香川大学	Kagawa University	Terms and Condition for Agreement on Academic Exchange	○	○	○	○			○	○			1												
国立	香川大学	Kagawa University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics		○	○				○			7	10												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Joint Degree Program (SUIJI-JDP)	○			○		○	○	○			4												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Service Learning Program (SUIJI-SLP)	○			○			○	○		7	6												
国立	愛媛大学	Ehime University	なし	○	○	○	○			○	○		15	17			3	4								
国立	愛媛大学	Ehime University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○	○				○															
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Service Learning Program (SUIJI-SLP)	○																						
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Master Students (SUIJI-JP-Ms)	○										3			3									
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Doctor Students (SUIJI-JP-Dc)	○										1												
国立	愛媛大学	Ehime University	なし	○			○				○															
国立	高知大学	Kochi University	AGREEMENT ON ACADEMIC COOPERATION	○	○	○				○				4												
国立	高知大学	Kochi University	MEMORANDUM OF UNDERSTANDING FOR STUDENT EXCHANGES	○			○				○															
国立	高知大学	Kochi University	An Agreement for a SUIJI(Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○				○																
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Service Learning Program	○			○				○		1	3		1		3								
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Master Students	○			○				○			1				1								
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Doctor Students	○			○				○															
国立	九州大学	Kyushu University	Agreement on Academic Cooperation	○	○	○				○																
国立	九州大学	Kyushu University	Agreement on Student Exchange	○			○				○															
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○																
国立	佐賀大学	Saga University	Addndum to the Agreement on academic cooperation and exchange	○							○			1												
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○															
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○															
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○															
国立	鹿児島大学	Kagoshima University	(none)	○	○		○			○	○															
国立	琉球大学	University of the Ryukyus	Memorandum of Understanding between Bogor Agricultural University and University of the Ryukyus	○	○	○				○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from IPB	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)	From Japan (before 2018)	From Japan (2018)	From IPB (before 2018)	From IPB (2018)
国立	琉球大学	University of the Ryukyus	Student Exchange Agreement between Bogor Agricultural University and University of the Ryukyus	○			○				○			30			30									
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement on Academic Exchanges	○	○	○	○			○	○		1	6												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Memorandum on Student Exchange	○			○				○		1	6												
公立	新潟県立大学	University of Niigata Prefecture	MEMORANDUM OF UNDERSTANDING BETWEEN BOGOR AGRICULTURAL UNIVERSITY BOGOR, WEST JAVA, INDONESHIA AND UNIVERSITY OF NIIGATA PREFECTURE NIIGATA, JAPAN	○	○	○				○			13	6												
公立	滋賀県立大学	The University of Shiga Prefecture	General Agreement on Academic Exchange Between The University of Shiga Prefecture, Japan and Bogor Agricultural University, Indonesia	○	○					○				1		1										
公立	大阪府立大学	Osaka Prefecture University	MoU of Academic Exchange between Bogor Agricultural University and Osaka Prefecture University	○	○					○																
公立	大阪府立大学	Osaka Prefecture University	MoU for student exchange between Bogor Agricultural University and Osaka Prefecture University	○							○															
公立	県立広島大学	Prefectural University of Hiroshima	Agreement For The Academic and Educational Exchange Between Bogor Agricultural University (IPB), Indonesia And Prefectural University of Hiroshima, Japan	○	○	○	○			○	○															
私立	上智大学	Sophia University	General Memorandum for Academic Cooperation and Exchange	○	○					○			1			1										
私立	上智大学	Sophia University	Student Exchange Agreement	○			○				○		1			1										
私立	東京農業大学	Tokyo University of Agriculture	Memorandum of Understanding on Academic Exchange Agreement	○	○	○	○			○	○		1		1											
私立	東洋大学	Toyo University	AGREEMENT for ACADEMIC COOPERATION AND EXCHANGE		○					○																
私立	法政大学	Hosei University	General Agreement	○	○																					
私立	立教大学	Rikkyo University	Memorandum of Understanding between Bogor Agricultural University and Rikkyo University		○					○																
私立	東海大学	Tokai University	Basic Agreement for Academic Exchange Programs Between Bogor Agricultural University (IPB) and Tokai University Kyushu Campuses	○	○					○																
私立	京都先端科学大学	Kyoto University of Advanced Science	Agreement for International Exchange System between Bogor Agricultural University（IPB） and Kyoto Gakuen University	○							○															
私立	近畿大学	Kindai University	Memorandum of Understanding	○	○																					

Partnership / Agreement between Institut Teknologi Sepuluh Nopember and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITS	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○				1			1									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○			1			1									
国立	大阪大学	Osaka University	N/A	○	○					○																
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	大阪大学	Osaka University	N/A	○	○					○																
国立	大阪大学	Osaka University	N/A	○			○				○															
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○		2	1	1		1	1								
国立	鳥取大学	Tottori University	Agreement of Academic Exchange	○	○	○				○																
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN THE GRADUATE SCHOOL OF NATURAL SCIENCE AND TECHNOLOGY OKAYAMA UNIVERSITY, JAPAN AND THE INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS), REPUBLIC OF INDONESIA	○	○	○	○			○	○															
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN THE GRADUATE SCHOOL OF NATURAL SCIENCE AND TECHNOLOGY OKAYAMA UNIVERSITY, JAPAN AND THE INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS), REPUBLIC OF INDONESIA	○	○	○	○			○	○															
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN HIROSHIMA UNIVERSITY, JAPAN AND INSTITUT TEKNOLOGI SEPULUH NOPEMBER, INDONESIA	○	○	○				○																
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT BETWEEN INSITISUT TEKNOLOGI SEPULUH NOPEMBER AND HIROSHIMA UNIVERSITY, FACULTY OF ENGINEERING ON ACADEMIC AND EDUCATIONAL EXCHANGES	○	○					○				4												
国立	熊本大学	Kumamoto University	THE AGREEMENT ON DOUBLE DEGREE PROGRAM FOR MASTER'S DEGREE BETWEEN GRADUATE SCHOOL OF SCIENCE AND TECHNOLOGY (GSST) KUMAMOTO UNIVERSITY – JAPAN AND GRADUATE PROGRAM INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) – INDONESIA					○						2							2					
国立	熊本大学	Kumamoto University	THE AGREEMENT ON DOUBLE DEGREE PROGRAM FOR DOCTORAL DEGREE BETWEEN GRADUATE SCHOOL OF SCIENCE AND TECHNOLOGY (GSST) KUMAMOTO UNIVERSITY – JAPAN AND GRADUATE PROGRAM INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) – INDONESIA					○						1								1				
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Kumamoto University and the Consortium of Institut Teknologi Sepuluh Nopember	○			○				○		47	47	46	1	3	7								
国立	熊本大学	Kumamoto University	Agreement on Academic Exchange between Kumamoto University and the Consortium of Institut Teknologi Sepuluh Nopember	○	○	○				○																
公立	公立はこだて未来大学	Future University Hakodate	Memorandum of Understanding	○	○						○															
公立	大阪市立大学	Osaka City University	Memorandum of Understanding between Institut Teknologi Sepuluh Nopember, Indonesia and Graduate School of Engineering Osaka City University, Japan	○	○					○				1												
公立	大阪府立大学	Osaka Prefecture University	Agreement for Educational and Scientific Cooperation between Institut Teknologi Sepuluh Nopember, Indonesia and Osaka Prefecture University, Japan	○	○					○				1												
公立	大阪府立大学	Osaka Prefecture University	MoU for student exchange between Institut Teknologi Sepuluh Nopember, Indonesia and Osaka Prefecture University, Japan	○							○			1												
私立	芝浦工業大学	Shibaura Institute of Technology	Agreement for Academic Exchanges and Cooperation Between Shibaura Institute of Technology, Japan and Chinise Culture University, Taiwan	○	○					○			13	5												
私立	創価大学	Soka University	Memorandum of Understanding between Soka University and Institut Teknologi Sepuluh Nopember		○					○																
私立	東京工科大学	Tokyo University of Technology	Memorandum of Understanding	○	○					○																
私立	東京理科大学	Tokyo University of Science	MEMORANDUM OF UNDERSTANDING FOR ACADEMIC COOPERATION between THE TOKYO UNIVERSITY OF SCIENCE, JAPAN and THE INSTITUT TEKNOLOGI SEPULUH NOPEMBER, INDONESIA	○	○					○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from ITS	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)	From Japan (before 2018)	From Japan (2018)	From ITS (before 2018)	From ITS (2018)
私立	東京理科大学	Tokyo University of Science	IMPLEMENTATION DETAILS FOR STUDENT EXCHANGE between TOKYO UNIVERSITY OF SCIENCE, JAPAN and INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA. INDONESIA	○							○															
私立	東洋大学	Toyo University	Basic Agreement on Academic Exchange between Sepuluh Nopember Institute of Technology and Toyo University		○																					
私立	法政大学	Hosei University	General Agreement	○	○																					

Partnership / Agreement between Universitas Hasanuddin and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNHAS	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)
国立	東北大学	Tohoku University	Memorandum of Understanding on Academic Exchange between Graduate School of Agricultural Science,Tohoku University, Japan and Faculty of Agriculture, Hasanuddin University, Indonesia	○	○					○																
国立	秋田大学	Akita University	Agreement on Academic Cooperation	○	○	○				○																
国立	千葉大学	Chiba University	Agreement for academic exchange and cooperation between Hasanuddin University,Indonesia and Chiba University,Japan	○	○					○																
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Hasanuddin University,Indonesia and Chiba University,Japan	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Master Degree Program and DoubleDoctoral Degree Program between Graduate School of Advanced Integration Science, Center for Environmental Remote Sensing, Chiba University and Faculty of Mathematics and Natural Science Post Graduate Studies Program, Center for Research and Community Development, Universitas Hasanuddin, Indonesia					○																		
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Joint Declaration of Cooperation	○	○	○	○			○	○															
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Joint Declaration of Cooperation Student Exchange Program	○			○				○															
国立	富山大学	University of Toyama	Memorandum of Understanding on Academic Exchange and Cooperation	○	○					○																
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	金沢大学	Kanazawa University	Memorandum of Understanding on the Exchange of Students in Accordance with the Agreement for Cooperation and Exchange	○			○				○															
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○																
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○															
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of the Twinning Program	○		○																				
国立	京都大学	Kyoto University	Agreement Between Center for Southeast Asian Studies, Graduate School of Asian and African Area Studies, Kyoto University and Research Institute Graduate Programs Hasanuddin University	○	○					○																
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	島根大学	Shimane University	MEMORANDUM OF UNIDERSTANDING BETWEEN HASANUDDIN UNIVERSITY AND SHIMANE UNIVERSITY	○	○					○																
国立	島根大学	Shimane University	MEMORANDUM OF AGREEMENT FOR STUDENT EXCHANGE BETWEEN HASANUDDIN UNIVERSITY AND SHIMANE UNIVERSITY	○			○				○															
国立	島根大学	Shimane University	MEMORANDUM OF AGREEMENT FOR ACADEMIC EXCHANGE BETWEEN HASANUDDIN UNIVERSITY AND SHIMANE UNIVERSITY		○	○				○																
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN OKAYAMA UNIVERSITY, JAPAN AND HASANUDDIN UNIVERSITY, MAKASSAR, INDONESIA	○	○	○	○			○	○		2	2		2		2								
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN OKAYAMA UNIVERSITY, JAPAN AND HASANUDDIN UNIVERSITY, MAKASSAR, INDONESIA	○	○	○	○			○	○		2	2		2		2								
国立	広島大学	Hiroshima University	AGREEMENT OF ACADEMIC EDUCATIONAL EXCHANGE PROGRAM BETWEEN HASANUDDIN UNIVERSITY, INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○	○	○				○																
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOL OF BIOSPHERE SCIENCE, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF MARINE SCIENCE ND FISHERIES, HASANUDDIN UNIVERSITY, INDONESIA	○			○				○															
国立	徳島大学	Tokushima University	AGREEMENT OF ACADEMIC COOPERATION	○	○					○																
国立	香川大学	Kagawa University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics		○	○				○			7	10												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Joint Degree Program (SUIJI-JDP)	○			○		○	○	○			4												
国立	香川大学	Kagawa University	Memorandum of Agreement for the SUIJI Service Learning Program (SUIJI-SLP)	○			○			○	○		7	6												
国立	愛媛大学	Ehime University	なし	○	○	○	○			○	○		37	14		1	1	2								
国立	愛媛大学	Ehime University	なし	○	○					○			5													

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNHAS	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)
国立	愛媛大学	Ehime University	Memorandum of Understanding between The Government of South Sulawesi Province, Republic of Indonesia and Ehime University, Japan and Hasanuddin University, Indonesia on Human Resources Enhancement	○	○	○				○																
国立	愛媛大学	Ehime University	An Agreement for a SUIJI (Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○	○				○															
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Service Learning Program (SUIJI-SLP)	○																						
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Master Students (SUIJI-JP-Ms)	○										3			3									
国立	愛媛大学	Ehime University	Memorandum of Agreement on the SUIJI Joint Program for Doctor Students (SUIJI-JP-Dc)	○										1												
国立	愛媛大学	Ehime University	なし	○			○				○															
国立	高知大学	Kochi University	An Agreement for a SUIJI(Six University Initiative Japan Indonesia) Consortium for Sustainable Agriculture in the Tropics	○	○	○				○																
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Service Learning Program	○			○				○		2	3		2		3								
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Master Students	○			○				○			2			2									
国立	高知大学	Kochi University	Memorandum of Agreement for the SUIJI Joint Program for Doctor Students	○			○				○															
国立	九州大学	Kyushu University	Agreement on Academic Cooperation	○	○	○				○																
国立	九州大学	Kyushu University	Agreement on Student Exchange	○			○				○															
国立	九州大学	Kyushu University	AGREEMENT ON ACADEMIC COOPERATION	○	○	○				○																
国立	九州大学	Kyushu University	AGREEMENT ON ACADEMIC COOPERATION	○			○				○															
国立	九州工業大学	Kyushu Institute of Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	九州工業大学	Kyushu Institute of Technology	Students and Staff Exchange Agreement Appendix to the Memorandum of Understanding	○	○	○	○				○			4				4								
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○																
国立	佐賀大学	Saga University	Addndum to the Agreement on academic cooperation and exchange	○							○		2													
国立	熊本大学	Kumamoto University	Agreement on Student Exchange between Faculty of Engineering and Graduate School of Science and Technology, Kumamoto University and Faculty of Engineering, Hasanuddin University	○			○				○															
国立	熊本大学	Kumamoto University	Agreement on Academic Exchange between Faculty of Engineering and Graduate School of Science and Technology, Kumamoto University and Faculty of Engineering, Hasanuddin University	○	○	○				○																
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○			5				5								
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○			5				5								
国立	鹿児島大学	Kagoshima University	(none)	○	○	○				○																
国立	琉球大学	University of the Ryukyus	Memorandum of Understanding Between the Faculty of Marine Science and Fisheries, Hasanuddin University (UNHAS), Makassar, Indonesia and Tropical Biosphere Research Center, University of the Ryukyus, Okinawa, Japan	○	○	○				○																
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Agreement on Academic Exchanges	○	○	○	○			○	○			3												
国立	奈良先端科学技術大学院大学	Nara Institute of Science and Technology	Memorandum on Student Exchange	○			○				○			3												
公立	名古屋市立大学	Nagoya City University	Academic Exchange Agreement	○	○					○																
公立	岡山県立大学	Okayama Prefectural University	AGREEMENT OF COOPERATION between OKAYAMA PREFECTURAL UNIVERSITY and HASANUDDIN UNIVERSITY	○	○	○								1												

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNHAS	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)	From Japan (before 2018)	From Japan (2018)	From UNHAS (before 2018)	From UNHAS (2018)
公立	名桜大学	Meio University	Basic Agreement on International Programs Between Hasanuddin University and Meio University	○	○		○			○	○		2	6	2		6									
公立	名桜大学	Meio University	Memorandum of Understanding Between Hasanuddin University and Meio University For The Student Exchange Program	○	○		○			○	○		2	6	2		6									
私立	北里大学	Kitasato University	ACADEMIC COOPERATION AGREEMENT BETWEEN KITASATO UNIVERSITY, JAPAN AND HASANUDDIN UNIVERSITY, INDONESIA	○	○	○				○				1												
私立	慶應義塾大学	Keio University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS HASANUDDIN FACULTY OF ENGINEERING,FACULTY OF SOCIAL AND POLITICAL SCIENCE,FACULTY OF ECONOMICS,FACULTY OF MARINE SCIENCES AND FISHERY, AND KEIO UNIVERSITY GRADUATE SCHOOL OF MEDIA AND GOVERNANCE,FACULTY OF POLICY MANAGEMENT, AND FACULTY OF ENVIRONMENT AND INFORMATION STUDIES	○	○					○																
私立	中央大学	Chuo University	Agreement of Cooperation between Hasanuddin University and Chuo University	○	○	○				○																
私立	東洋大学	Toyo University	MEMORANDOM OF AGREEMENT	○	○																					
私立	早稲田大学	Waseda University	Departmental Agreement(MOU)	○	○																					
私立	同志社大学	Doshisha University	Faculty/Graduate School level Agreements	○	○					○																
私立	龍谷大学	Ryukoku University	Agreement on the Promotion of Research and Educational Exchange		○					○																
私立	神戸松蔭女子学院大学	Kobe Shoin Women's University	No English	○	○									3												

Partnership / Agreement between Universitas Pendidikan Indonesia and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UPI	From Japan (before 2018)	From Japan (2018)	From UPI (before 2018)	From UPI (2018)	From Japan (before 2018)	From Japan (2018)	From UPI (before 2018)	From UPI (2018)	From Japan (before 2018)	From Japan (2018)	From UPI (before 2018)	From UPI (2018)
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Graduate School of Education, Tohoku University (Japan) and Faculty of Education & School of Graduate Studies, Universitas Pendidikan Indonesia (Indonesia)	○	○					○																
国立	東北大学	Tohoku University	Supplement of Understanding on Student Exchange between Graduate School of Education,Tohoku University(Japan) and Faculty of Education & School of Graduate Studies, Universitas Pendidikan Indonesia (Indonesia)	○							○															
国立	茨城大学	Ibaraki University	Student Exchange Agreement between Universitas Pendidikan Indonesia, Indonesia and Ibaraki University, Japan	○			○				○			2				2								
国立	東京学芸大学	Tokyo Gakugei University	Agreement on Academic Exchange	○	○	○				○	○															
国立	東京学芸大学	Tokyo Gakugei University	Memorandum of Understanding Regarding the Exchange of Students	○							○		2													
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANSING BETWEEN HIROSHIMA UNIVERSITY, JAPAN AND UNIVERSITAS PENDIDIKAN INDONESIA, INDONESIA	○	○	○				○				8												
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT BETWEEN GRADUATE SCHOOL OF INTERNATIONAL DEVELOPMENT AND COOPERTION, HIROSHIMA UNIVERSITY, JAPN AND SCHOOL OF POSTGRADUATE STUDIES, UNIVERSITAS PENDIDIKAN INDONESIA, INDONESIA ON COLLABORATION FOR THE IMPLEMENTATION OF A DOUBLE MASTER'S DEGREE PROGRAM	○			○	○						5							5					
私立	武蔵野大学	Musashino University	Memorandum of Understanding	○	○	○				○	○															
私立	武蔵野大学	Musashino University	Student Exchange Agreement	○			○				○															
私立	同志社大学	Doshisha University	University-level Agreements	○	○					○																

Partnership / Agreement between University of Sumatera Utara and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from USU	From Japan (before 2018)	From Japan (2018)	From USU (before 2018)	From USU (2018)	From Japan (before 2018)	From Japan (2018)	From USU (before 2018)	From USU (2018)	From Japan (before 2018)	From Japan (2018)	From USU (before 2018)	From USU (2018)
国立	室蘭工業大学	Muroran Institute of Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	東北大学	Tohoku University	Agreement of Academic Exchange between Tohoku University Graduate School of Dentistry and Universitas Sumatera Utara Faculty of Dentistry	○	○					○																
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○				1			1									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○			1			1									
国立	広島大学	Hiroshima University	AN AGREEMENT FOR COOPERATION BETWEEN THE UNIVERSITY OF NORTH SUMATRA (INDONESIA) AND HIROSHIMA UNIVERSITY (JAPAN)	○	○									1												
国立	九州工業大学	Kyushu Institute of Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	九州工業大学	Kyushu Institute of Technology	Memorandum of Agreement	○	○	○	○				○															
私立	千葉商科大学	Chiba University of Commerce	Memorandum of Understanding	○	○					○																
私立	千葉商科大学	Chiba University of Commerce	Agreement concerning the Short-Term Exchange program	○	○	○					○															

Partnership / Agreement between Sriwijaya University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNSRI	From Japan (before 2018)	From Japan (2018)	From UNSRI (before 2018)	From UNSRI (2018)	From Japan (before 2018)	From Japan (2018)	From UNSRI (before 2018)	From UNSRI (2018)	From Japan (before 2018)	From Japan (2018)	From UNSRI (before 2018)	From UNSRI (2018)
国立	北海道大学	Hokkaido University	Academic Exchange Agreement	○	○					○	○															
国立	北海道大学	Hokkaido University	Memorandum of Understanding on Student Exchange	○	○					○	○															
国立	茨城大学	Ibaraki University	Memorandum of Understanding between Sriwijaya University and Ibaraki University	○	○					○			3	4												
国立	茨城大学	Ibaraki University	Memorandum of Agreemen between Sriwijaya University and Ibaraki University	○			○				○		3	4		3		4								
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	三重大学	Mie University	なし	○	○	○	○	○		○	○		6	5	6		2				3					
国立	岡山大学	Okayama University	AGREEMENT OF ACADEMIC EXCHANGE BETWEEN FAKULTAS PERTANIAN, UNIVERSITAS SRIWIJAYA AND FACULTY OF AGRICULTURE, OKAYAMA UNIVERSITY	○	○	○	○			○	○															
国立	岡山大学	Okayama University	AGREEMENT OF ACADEMIC EXCHANGE BETWEEN FAKULTAS PERTANIAN, UNIVERSITAS SRIWIJAYA AND FACULTY OF AGRICULTURE, OKAYAMA UNIVERSITY	○	○	○	○			○	○															
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANDING FOR INTERNATIONAL COOPERATION BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND UNIVERSITAS SRIWIJAYA, INDONESIA	○	○	○				○																
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT FOR STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, HIROSHIMA UNIVERSITY, JAPAN AND UNIVERSITAS SRIWIJAYA, INDONESIA	○			○				○															
国立	高知大学	Kochi University	AGREEMENT ON ACADEMIC COOPERATION	○	○	○				○																
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○																
国立	佐賀大学	Saga University	Addndum to the Agreement on academic cooperation and exchange	○							○		8													
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○		1	3	1		3									
国立	北陸先端科学技術大学院大学	Japan Advanced Institute of Science and Technology	Memorandum of Understanding on Academic Exchange between Sriwijaya University and Japan Advanced Institute of Science and Technology	○	○					○	○															
国立	北陸先端科学技術大学院大学	Japan Advanced Institute of Science and Technology	Memorandum of Agreement of Student Exchange between Sriwijaya University and Japan Advanced Institute of Science and Technology	○							○															
私立	立教大学	Rikkyo University	Memorandum of Understanding between Sriwijaya University and Rikkyo University		○					○																

Partnership / Agreement between Padjadjaran University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNPAD	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Graduate School of Engineering,Tohoku University, Japan and Faculty of Mathematics and Natural Sciences, Padjadjaran University, Indonesia	○	○	○																				
国立	東北大学	Tohoku University	MEMORANDUM OF UNDERSTANDING ON STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, TOHOKU UNIVERSITY, JAPAN AND FACULTY OF MATHEMATICS AND NATURAL SCIENCES PADJADJARAN UNIVERSITY, INDONESIA								○															
国立	東北大学	Tohoku University	Agreement on Academic Exchange between The Graduate School of Agricultural Science,Tohoku University, Japan and The Graduate School of Padjadjaran University,Indonesia	○	○					○																
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Tohoku University, Japan and Padjadjaran University, Indonesia	○	○					○																
国立	秋田大学	Akita University	Agreement on Academic Cooperation	○	○	○				○																
国立	秋田大学	Akita University	Agreement on Academic Cooperation	○	○	○				○																
国立	山形大学	Yamagata University	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN FACULTY OF MATHEMATICS AND NATURAL SCIENCES,PADJADJARAN UNIVERSITY,AND FACULTY OF AGRICULTURE,YAMAGATA UNIVERSITY	○	○					○																
国立	山形大学	Yamagata University	Students Exchange	○	○		○				○															
国立	山形大学	Yamagata University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS PADJADJARAN AND YAMAGATA UNIVERSITY	○	○	○				○																
国立	山形大学	Yamagata University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITAS PADJADJARAN AND YAMAGATA UNIVERSITY	○			○				○															
国立	筑波大学	University of Tsukuba	Agreement for Academic Exchanges and Cooperation	○	○		○			○	○		1	7	1		6	1								
国立	宇都宮大学	Utsunomiya University	AGREEMENT OF ACADEMIC EXCHANGE between Faculty of Geology Engineering,Padjadjaran University and Faculty of Regional Design, Utsunomiya University	○	○					○			3													
国立	群馬大学	Gunma University	Technical Academic Agreement For The Implementation of Master Linkage Program in Public Health between Faculty of Medicine,Universitas Padjadjaran,Bandung, Republic of Indonesia and Graduate School of Medicine Gunma University, Maebashi, Japan under The Professional Human Resource Development Project, Phase III (PHRDP-III), funded by Japan International Cooperation Agency (JICA), Loan Agreement No. IP-535, dated March 29, 2006	○	○		○	○		○			4	4	4	4	4	4								
国立	千葉大学	Chiba University	Agreement for academic cooperation and exchange between Chiba University,Japan and Padjadjaran University,Indonesia	○	○					○				1				1								
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Chiba University,Japan and Padjadjaran University,Indonesia	○			○				○															
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange between the University of Tokyo and Padjadjaran University	○	○	○				○																
国立	東京大学	The University of Tokyo	Agreement on Academic Exchange between the University of Tokyo and Padjadjaran University	○	○	○				○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○																
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○															
国立	三重大学	Mie University	なし	○	○	○	○	○		○	○		1	21	1		10				11					
国立	京都大学	Kyoto University	Memorandum of Understanding between Institute for Chemical Research, Kyoto University and Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran	○	○					○																
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	広島大学	Hiroshima University		○	○					○																
国立	広島大学	Hiroshima University		○			○				○															

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNPAD	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC COLLABORATION AND EDUCATIONAL EXCHANGE BETWEEN FACULTY OF DENTISTRY HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF DENTISTRY, PADJADJARAN UNIVERSITY, INDONESIA	○	○	○				○				3												
国立	愛媛大学	Ehime University	なし		○					○				1												
国立	九州大学	Kyushu University	Agreement for Academic Cooperation	○	○	○				○				1												
国立	九州大学	Kyushu University	Memorandum on Student Exchange	○			○				○															
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and Faculty of Economics and Business, Universitas Padjadjaran (FEB-UNPAD), Bandung, Indonesia on Collaboration in theLinkage Master's Programs (LMP)	○	○			○						10							5	5				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Memorandum of Understanding (MOU) for Academic Collaboration between The National Graduate Institute for Policy Studies (GRIPS), Japan and Universitas Padjadjaran (UNPAD), Indonesia		○	○				○																
公立	静岡県立大学	University of Shizuoka	MEMORANDUM OF UNDERSTANDING on ACADEMIC AND RESEARCH COLLABORATION	○	○																					
公立	大阪市立大学	Osaka City University	MEMORANDUM OF UNDERSTANDING BETWEEN FACULTY OF MATHMATICS AND NATURAL SCIENCES, UNIVERSITY OF PADJADJARAN, REPUBLIC OF INDONESIA AND FACULTY OF SCIENCE, OSAKA CITY UNIVERSITY, JAPAN CONCERNING THE INTERNATIONAL CHANGES AROUND THE BANDUNG BASIN WEST JAVA INDONESIA	○																						
公立	大阪府立大学	Osaka Prefecture University	Agreement for Educational and Scientific Cooperation between Padjadjaran University and Osaka Prefecture University	○	○					○	○															
私立	亜細亜大学	Asia University	Agreement Governing Exchanges	○	○		○																			
私立	順天堂大学	Juntendo University	Memorandum of Understanding Between Universitas Padjadjaran Faculty of Medicine	○	○	○				○	○			2												
私立	大東文化大学	Daito Bunka University	Agreement between Padjadjaran University and Daito Bunka University	○							○		11													
私立	拓殖大学	Takushoku University	PHRDP-Ⅲ	○				○						2								2				
私立	立教大学	Rikkyo University	General Agreement for Scholarly Exchange and Collaboration between Padjadjaran University and Rikkyo University	○	○		○			○	○															
私立	立教大学	Rikkyo University	Protocol for Student Exchange	○			○				○			2				2								
私立	立教大学	Rikkyo University	Technical Academic Agreement on a double-degree program and semester-only program in collaboration in the linkage Master's Program		○			○					8			2			5	1						
私立	早稲田大学	Waseda University	Departmental Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	Departmental Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	Departmental Agreement(MOU)	○	○																					
私立	東海大学	Tokai University	MEMORANDUM OF UNDERSTANDING between TOKAI UNIVERSITY KYUSHU CAMPUSES and FACULTY OF AGRICULTURE UNIVERSITAS PADJADJARAN	○	○					○																
私立	国際大学	International University of Japan	Technical Academic Agreement on the Linkage Master Progarm	○			○	○						28			28				28					
私立	山梨学院大学	Yamanashi Gakuin University	Memorandum of Agreement The Academic Exchange and Credit Accreditation Agreement between Yamanashi Gakuin University and Universitas Padjadjaran	○	○		○				○			5			4	1								
私立	同朋大学	Doho University	AN AGREEMENT FOR ACADEMIC EXCHANGE ANDO COOPERRATION BETWEEN FACULTY OF HUMANITIES,PADJADJARAN UNIVERSITY AND FACULTY OF LETTERS, DOHO UNIVERSITY	○	○	○																				
私立	南山大学	Nanzan University	Student Exchange Agreement	○			○				○															
私立	京都産業大学	Kyoto Sangyo University	Academic Agreement	○	○	○	○			○	○		25		25											
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○					○																
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○			○																		
私立	関西学院大学	Kwansei Gakuin University	Agreement of Cooperation Student Exchange Program	○	○		○			○	○			4			1	1								
私立	関西学院大学	Kwansei Gakuin University	Agreement for a Coordinated Bachelor's-Master's Degree Program					○						2							1	1				
私立	天理大学	Tenri University	Memorandum Concerning the Exchange Program Between Padjadjaran University and Tenri University	○	○					○																
私立	天理大学	Tenri University	Exchange Agreement Between Padjadjaran University and Tenri University	○							○			2												

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNPAD	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)	From Japan (before 2018)	From Japan (2018)	From UNPAD (before 2018)	From UNPAD (2018)
私立	福岡大学	Fukuoka University	Agreement of academic cooperation between Padjadjaran University and Fukuoka University	○	○	○	○			○			5	2												
私立	福岡大学	Fukuoka University	Memorandum for the Student Exchange between Padjadjaran University and Fukuoka University								○			1				1								

Partnership / Agreement between Diponegoro University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNDIP	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)
国立	北海道大学	Hokkaido University	Academic Exchange Agreement	○	○					○																
国立	北海道大学	Hokkaido University	Memorandum of Understanding on Student Exchange								○															
国立	北海道大学	Hokkaido University	Academic Exchange Agreement Plan of Action on Student Exchange	○	○		○			○	○															
国立	千葉大学	Chiba University	Agreement for academic exchange and cooperation between Universitas Diponegoro, Indonesia and Chiba University,Japan	○	○					○				4				4								
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Universitas Diponegoro, Indonesia and Chiba University,Japan	○			○				○															
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	東京海洋大学	Tokyo University of Marine Science and Technology	Plan of Operation on Student Exchange Program	○			○				○															
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	福井大学	University of Fukui	AGREEMENT ON ACADEMIC EXCHANGE BETWEEN FACULTY OF SCIENCE AND MATHEMATICS, DIPONEGORO UNIVERSITY AND FACULTY OF ENGINEERING, UNIVERSITY OF FUKUI	○	○																					
国立	信州大学	Shinshu University	Memorandum of Understanding for Academic Cooperation and Exchange between Faculty of Medicine, Diponegoro University, Indonesia and School of Medicine, Shinshu University, Japan	○	○		○			○	○		1	4	1		4									
国立	信州大学	Shinshu University	Agreement for Cooperation and Exchange in Research between Faculty of Medicine, Diponegoro University, Indonesia and School of Medicine, Shinshu University, Japan		○					○																
国立	信州大学	Shinshu University	Agreement for Cooperation and Exchange in Students between Faculty of Medicine, Diponegoro University, Indonesia and School of Medicine, Shinshu University, Japan	○			○				○		1	4	1		4									
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○	○					○			9			9										
国立	名古屋大学	Nagoya University	An agreement for academic exchange	○			○				○		9			9										
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○																
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○															
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	鳥取大学	Tottori University	Agreement of Academic Exchange	○	○	○				○																
国立	鳥取大学	Tottori University	MEMORANDUM FOR STUDENT EXCHANGE BASED ON THE ACADEMIC EXCHANGE	○			○				○															
国立	広島大学	Hiroshima University	BASIC AGREEMENT ON INTERNATIONAL EXCHANGE PROGRAMS BETWEEN DIPONEGORO UNIVERSITY. REPUBLIC OF INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○	○	○				○																
国立	広島大学	Hiroshima University	BASIC AGREEMENT ON INTERNATIONAL EXCHANGE PROGRAMES BETWEEN THE FACULTY OF LAW, HIROSHIMA UNIVERSITY AND THE FACULTY OF LAW, DIPONEGORO UNIVERSITY	○	○					○																
国立	広島大学	Hiroshima University	BASIC AGREEMENT ON INTERNATIONAL EXCHANGE PROGRAMES BETWEEN THE FACULTY OF LAW, HIROSHIMA UNIVERSITY AND THE FACULTY OF SOCIAL & POLITICAL SCIENCES, DIPONEGORO UNIVERSITY	○	○					○																
国立	広島大学	Hiroshima University	TECHNICAL ACADEMIC AGREEMENT BETWEEN GRADUATE SCHOOL FOR INTERNATIONAL DEVELOPMENT AND COOPERATION, HIROSHIMA UNIVERSITY, JAPAN AND MASTER PROGRAM OF URBAN AND REGIONAL DEVELOPMENT, FACULTY OF ENGINEERING, DIPONEGORO UNIVERSITY, SEMARANG, INDONESIA ON COLLABORATION IN THE LINKAGE DOUBLE MASTER'S DEGREE PROGRAM	○			○	○																		
国立	香川大学	Kagawa University	Academic Exchange Agreement	○	○	○				○				2												
国立	香川大学	Kagawa University	Deailed Rule for Academic Exchange Agreement on Student Exchnage Program	○			○				○			2												
国立	香川大学	Kagawa University	Academic Exchange Agreement	○	○	○	○			○	○			2												
国立	九州大学	Kyushu University	Agreement for Academic Cooperation and Memorandum on Student Exchange	○	○	○				○																

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNDIP	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)	From Japan (before 2018)	From Japan (2018)	From UNDIP (before 2018)	From UNDIP (2018)
国立	九州大学	Kyushu University	Agreement for Academic Cooperation and Memorandum on Student Exchange	○			○				○															
国立	九州工業大学	Kyushu Institute of Technology	Agreement	○	○	○	○			○	○															
国立	九州工業大学	Kyushu Institute of Technology	Addendum to the Agreement	○	○	○	○				○															
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○			4				4								
国立	琉球大学	University of the Ryukyus	International Exchange Agreement between Diponegoro University and the University of the Ryukyus	○	○	○				○																
国立	琉球大学	University of the Ryukyus	Student Exchange Memorandum between Diponegoro University and the University of the Ryukyus	○			○				○			19			16	3								
国立	琉球大学	University of the Ryukyus	Letter of Agreement of International Exchange Programs between The Graduate School, Diponegoro University, Indonesia, and The Graduate School of Engineering & Science, University of the Ryukyus, Japan	○				○		○	○			15							15					
公立	富山県立大学	Toyama Prefectural University	ACADEMIC EXCHANGE AND STUDENT EXCHANGE AGREEMENT BETWEEN GRADUATE SCHOOLFACULTY OF ENGINEERING, TOYAMA PREFECTURAL UNIVERSITY, JAPAN AND FACULTY OF FISHERIES AND MARINE SCIENCE, UNIVERSITAS DIPONEGORO, INDONESIA	○	○					○	○															
私立	日本大学	Nihon University	MEMORANDUM OF AGREEMENT between FAKULTAS TEKNIK UNIVERSITAS DIPONEGORO SEMAGANG,INDONESIA and NIHON UNIVERSITY COLLEGE OF ENGINEERING KORIYAMA,JAPAN		○					○																
私立	関西学院大学	Kwansei Gakuin University	Collaboration Agreement	○	○					○			8													

Partnership / Agreement between Sebelas Maret University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNS	From Japan (before 2018)	From Japan (2018)	From UNS (before 2018)	From UNS (2018)	From Japan (before 2018)	From Japan (2018)	From UNS (before 2018)	From UNS (2018)	From Japan (before 2018)	From Japan (2018)	From UNS (before 2018)	From UNS (2018)
国立	千葉大学	Chiba University	Agreement for Academic Exchange and Cooperation between Chiba University, Japan and Universitas Sebelas Maret, Indonesia	○	○					○																
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Chiba University, Japan and Universitas Sebelas Maret, Indonesia	○			○				○															
国立	岐阜大学	Gifu University	Memorandum of Understanding for Academic Co-operation between Gifu University Japan And Universitas Sebelas Maret The Republic of Indonesia	○	○		○			○	○		1													
国立	岐阜大学	Gifu University	Memorandum of Agreement between Gifu University Japan And Universitas Sebelas Maret The Republic of Indonesia	○	○		○			○	○		1													
国立	岐阜大学	Gifu University	Memorandum of Understanding for Dual PhD Degree Program between Universitas Sebelas Maret, The Republic of Indonesia and Gifu University, Japan	○				○			○															
国立	鳥取大学	Tottori University		○	○	○				○				1												
国立	鳥取大学	Tottori University		○			○				○															
国立	九州大学	Kyushu University	Agreement on Academic Cooperation	○	○	○				○			4	7												
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○				2												
私立	国士舘大学	Kokushikan University	Agreement on Academic Exchange and Cooperation Between Sebelas Maret University and Kokushikan University	○	○		○						1		1	1										
私立	東洋大学	Toyo University	Memorandum of Understanding Between UNIVERSITAS SEBELAS MARET(REPUBLIC OF INDONESIA) AND TOYO UNIVERSITY (JAPAN)	○	○		○				○															
私立	東洋大学	Toyo University	Memorandum of understanding between universitas sebelas maret and the faculty of Global and Regional Studies, Toyo University	○	○					○																
私立	久留米大学	Kurume University	Memorandom of Understanding Between UNIVERSITAS SEBELAS MARET, Surakarta, Indonesia And KURUME UNIVERSITY, Kurume, Japan	○	○					○																

Partnership / Agreement between Brawijaya University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UB	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)
国立	北海道大学	Hokkaido University	Academic Exchange Agreement Memorandum of Understanding	○	○		○			○	○															
国立	東北大学	Tohoku University	Agreement on Academic Exchange between Graduate School of Science,Tohoku University, Japan and Faculty of Mathematics and Natural Sciences, Brawijaya University, Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Memorandum of Understanding on Student Exchange between Graduate School of Science,Tohoku University, Japan and Faculty of Mathematics and Natural Sciences, Brawijaya University, Indonesia	○			○				○															
国立	東北大学	Tohoku University	Memorandum of Understanding between Tohoku University, Japan and University of Brawijaya, Indonesia	○	○		○			○	○															
国立	東北大学	Tohoku University	Agreement on Student Exchange between Tohoku University, Japan and University of Brawijaya, Indonesia	○			○				○		1	2	1			2								
国立	金沢大学	Kanazawa University	Agreement for Cooperation and Exchange	○	○					○																
国立	金沢大学	Kanazawa University	Memorandum of Understanding on the Exchange of Students in Accordance with the Agreement for Cooperation and Exchange	○			○				○			5			2	3								
国立	山梨大学	University of Yamanashi	Memorundum of Agreement	○	○					○																
国立	岐阜大学	Gifu University	Agreement on Faculty and Student Exchanges between Brawijaya University represented by the Rector, JI. Veteran, Malang 65145, East Java, Republic of Indonesia, executive authority: The Faculty of Mathematics and Natural Sciences and Gifu University represented by the President, 1-1 Yanagido, Gifu City, Gifu, Japan executive authority: The Faculty of Engineering	○	○		○			○	○															
国立	豊橋技術科学大学	Toyohashi University of Technology	Exchange Agreement	○	○	○				○				2			2									
国立	豊橋技術科学大学	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○			2			2									
国立	京都大学	Kyoto University	GENERAL MEMORANDUM FOR ACADEMIC COOPERATION AND EXCHANGE BETWEEN FACULTY OF AGRICULTURE AND FACULTY OF AGRICULTURAL TECHNOLOGY, UNIVERSITY OF BRAWIJAYA AND GRADUATE SCHOOL OF AGRICULTURE, KYOTO UNIVERSITY	○	○					○																
国立	京都大学	Kyoto University	Memorandum of Understanding for Educational and Scientific Cooperation between Faculty of Engineering / Graduate School of Engineering, Kyoto University and Faculty of Engineering / Graduate School of Engineering, Brawijaya University	○	○					○																
国立	京都大学	Kyoto University	Agreement for a Student Exchange Program between Faculty of Engineering / Graduate School of Engineering, Kyoto University and Faculty of Engineering / Graduate School of Engineering, Brawijaya University	○			○				○															
国立	京都大学	Kyoto University	STUDENT EXCHANGE AGREEMENT BETWEEN FACULTY OF AGRICULTURE AND FACULTY OF AGRICULTURAL TECHNOLOGY, UNIVERSITY OF BRAWIJAYA AND GRADUATE SCHOOL OF AGRICULTURE, KYOTO UNIVERSITY	○			○				○															
国立	大阪大学	Osaka University	MEMORANDUM OF AGREEMENT ON ACADEMIC EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING SCIENCE SCHOOL OF ENGINEERING SCIENCE OSAKA UNIVERSITY AND FACULTY OF AGRICULTURAL TECHNOLOGY UNIVERSITAS BRAWIJAYA	○	○		○			○	○															
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING BETWEEN GRADUATE SCHOOL OF NATURAL SCIENCE AND TECHNOLOGY, OKAYAMA UNIVERSITY, JAPAN AND FACULTY OF SCIENCE, BRAWIJAYA UNIVERSITY, INDONESIA	○	○	○	○			○	○		2													
国立	岡山大学	Okayama University	MEMORANDUM OF UNDERSTANDING BETWEEN GRADUATE SCHOOL OF NATURAL SCIENCE AND TECHNOLOGY, OKAYAMA UNIVERSITY, JAPAN AND FACULTY OF SCIENCE, BRAWIJAYA UNIVERSITY, INDONESIA	○	○	○	○			○	○		2													

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UB	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)	From Japan (before 2018)	From Japan (2018)	From UB (before 2018)	From UB (2018)
国立	広島大学	Hiroshima University	AGREEMENT ON ACADEMIC AND EDUCATIONAL EXCHANGE BETWEEN BRAWIJAYA UNIVERSITY, INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○	○					○			26	13												
国立	広島大学	Hiroshima University	MEMORANDUM OF AGREEMENT ON MORITO HIGHER EDUCATION INSTITUTE 3+1 PROGRAM BETWEEN UNIVERSITAS BRAWIJAYA, INDONESIA AND HIROSHIMA UNIVERSITY, JAPAN	○			○																			
国立	山口大学	Yamaguchi University	MEMORANDUM OF UNDERSTANDING BETWEEN YAMAGUCHI UNIVERSITY AND UNIVERSITY OF BRAWIJAYA	○	○	○				○																
国立	山口大学	Yamaguchi University	STUDENT EXCHANGE AGREEMENT BETWEEN YAMAGUCHI UNIVERSITY AND UNIVERSITY OF BRAWIJAYA	○			○				○		1			1										
国立	高知大学	Kochi University	AGREEMENT ON ACADEMIC COOPERATION	○	○	○				○																
国立	高知大学	Kochi University	MEMORANDUM OF UNDERSTANDING FOR STUDENT EXCHANGES	○			○				○															
国立	九州工業大学	Kyushu Institute of Technology	Memorandum of Understanding	○	○	○	○			○	○															
国立	九州工業大学	Kyushu Institute of Technology	Students and Staff Exchange Agreement Appendix to the Memorandum of Understanding	○	○	○	○				○															
国立	佐賀大学	Saga University	Academic Exchange Agreements Between Universities	○	○	○				○																
国立	佐賀大学	Saga University	Addndum to the Agreement on academic cooperation and exchange	○							○			1												
国立	長崎大学	Nagasaki University	Agreement on Academic Cooperation between Nagasaki University and University of Brawijaya	○	○	○	○			○	○			1												
国立	長崎大学	Nagasaki University	Memorandum of Understanding on Student Exchange based on Academic Cooperation Agreement between Nagasaki University and University of Brawijaya	○			○				○			1												
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Kumamoto University and University of Brawijaya	○			○				○			10			4	6								
国立	熊本大学	Kumamoto University	Agreement on Academic Exchange between Kumamoto University and University of Brawijaya	○	○	○				○																
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○			12				1								
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○			12				1								
国立	宮崎大学	University of Miyazaki	Technical Academic Agreement for Master's Double Degree Program					○						12								1				
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○			12												
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○			12												
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Technical Academic Agreement between National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and Faculty of Administrative Science, Universitas Brawijaya (FIA-UNIBRAW), Malayng, Indonesia on Collaboration in theLinkage Master's Programs (LMP)	○	○			○						7							2	5				
国立	政策研究大学院大学	National Graduate Institute for Policy Studies (GRIPS)	Memorandum of Understanding (MOU) for Academic Collaboration between The National Graduate Institute for Policy Studies (GRIPS), Japan and University of Brawijaya (UB), Indonesia		○	○				○																
公立	熊本県立大学	Prefectural University of Kumamoto	Memorandum of Understanding between Universitas Brawijaya, Indonesia and Prefectural University of Kumamoto, Japan	○	○					○																
私立	慶應義塾大学	Keio University	MEMORANDM OF UNDERSTANDING BETWEEN UNIVERSITAS BRAWIJAYA AND KEIO UNIVERSITY	○	○					○			1			1										
私立	慶應義塾大学	Keio University	LETTER OF INTENT	○	○								1			1										
私立	芝浦工業大学	Shibaura Institute of Technology	Agreement for Academic Exchanges and Cooperation between SIT UB	○	○					○																
私立	拓殖大学	Takushoku University	PHRDP-Ⅲ	○				○						3								3				
私立	立教大学	Rikkyo University	Memorandum of Understanding between University of Brawijaya and Rikkyo University		○					○																
私立	立教大学	Rikkyo University	Technical Academic Agreement on a Double Degree Program and Semester Program in Collaboration in the Linkage Master's Program		○			○		○			4							4						
私立	名城大学	Meijo University	International Cooperation Agreement between Faculty of Mathematics and Natural Science Brawijaya University and Faculty of Agriculture, Meijo University	○	○	○				○																
私立	立命館大学	Ritsumeikan University	Agreement of Cooperation	○	○					○																
私立	立命館大学	Ritsumeikan University	Research Student Exchange Agreement	○						○	○															
私立	立命館大学	Ritsumeikan University	Research Student Exchange Agreement	○							○															
私立	関西国際大学	Kansai University of International Studies	LETTER OF INTENT							○																
私立	立命館アジア太平洋大学	Ritsumeikan Asia Pacific University	Master Dual Degree Program Agreement		○			○						1								1				

Partnership / Agreement between Airlangga University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNAIR	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)
国立	岩手大学	Iwate University	Academic Exchange Agreement between Global Education Center Iwate University, Japan and Faculty of Humanities, Universitas Airlangga, Republic of Indonisia	○	○					○			6			6										
国立	岩手大学	Iwate University	Student Exchange Agreement between Global Education Center Iwate University, Japan and Faculty of Humanities, Universitas Airlangga, Republic of Indonisia	○			○				○															
国立	東北大学	Tohoku University	Memorandum of Agreement on International Exchange Programs between Graduate School of Dentistry, Tohoku University,Japan and Faculty of Dental Medicine, Airlangga University, Indonesia	○	○	○				○			1	7												
国立	新潟大学	Niigata University	Memorandum of Agreement on Academic Exchange between Faculty of Dentistry, Niigata University, Japan and Faculty of Dental Medicine, Universitas Airlangga, Indonesia	○	○					○																
国立	新潟大学	Niigata University	Agreement for Cooperation between Faculty of Medicine and Graduate School of Medical and Dental Sciences, Niigata University and Faculty of Medicine, Universitas Airlangga	○	○	○	○			○	○			1				1								
国立	新潟大学	Niigata University	Supplement of Agreement in regards to Student Exchange between Faculty of Medicine and Graduate School of Medical and Dental Sciences, Niigata University and Faculty of Medicine, Universitas Airlangga	○			○				○			1				1								
国立	福井大学	University of Fukui	MEMORANDUM OF AGREEMENT WITH REGARD TO STUDENT EXCHANGE BETWEEN FACULTY OF MEDICAL SCIENCES UNIVERSITY OF FUKUI, JAPAN AND FACULTY OF MEDICINE UNIVERSITAS AIRLANGGA, INDONESIA	○	○					○	○		1	3												
国立	大阪大学	Osaka University	なし	○	○					○																
国立	大阪大学	Osaka University	なし				○				○			1			2	1								
国立	大阪大学	Osaka University	MEMORANDUM OF AGREEMENT ON ACADEMIC EXCHANGE BETWEEN GRADUATE SCHOOL OF DENTISTRY, SCHOOL OF DENTISTRY, OSAKA UNIVERSITY, JAPAN AND FACULTY OF DENTAL MEDICINE, UNIVERSITAS AIRLANGGA, INDONESIA MEMORANDUM OF AGREEMENT ON ACADEMIC EXCHANGE BETWEEN GRADUATE SCHOOL OF DENTISTRY, SCHOOL OF DENTISTRY, OSAKA UNIVERSITY, JAPAN AND FACULTY OF DENTAL MEDICINE, UNIVERSITAS AIRLANGGA, INDONESIA	○	○					○																
国立	大阪大学	Osaka University	Agreement on Academic Exchange between Institute for Protein Research, Osaka University, Japan and Institute of Tropical Disease, University Airlangga, Indonesia	○	○					○																
国立	大阪大学	Osaka University	Memorundun of understanding between Osaka University, Japan and Universitas Airlangga, Japan on cooperation in Academic and Research Related Activities	○	○	○	○			○	○			5			1	4								
国立	大阪大学	Osaka University	Memorandum on student exchange Between Osaka University and Universitas Airlangga	○	○	○	○			○	○			5			1	4								
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	奈良女子大学	Nara Women's University	Memorandum of Understanding on Academic Exchange between the Faculty of Humanities, Universitas Airlangga and the Faculty of Letters, the Faculty of Human Life and Environment, and the Graduate School of Humanities and Sciences, Nara Women's University	○	○	○	○			○	○															
国立	奈良女子大学	Nara Women's University	Agreement on the Exchange of Students between the Faculty of Humanities, Universitas Airlangga and the Faculty of Letters, the Faculty of Human Life and Environment, and the Graduate School of Humanities and Sciences, Nara Women's University	○			○				○															
国立	広島大学	Hiroshima University	MEMORANDUM OF UNDERSTANSING BETWEEN HIROSHIMA UNIVERSITY, JAPAN AND UNIVERSITAS AIRLANGGA, INDONESIA	○	○	○				○				5												

Japanese University		University	Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNAIR	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)
国立	広島大学	Hiroshima University	BASIC AGREEMENT OF INTERNATIONAL EXCHANGE PROGRAMMES BETWEEN FACULTY OF DENTISTRY, AIRLANGGA UNIVERSITY AND FACULTY OF DENTISTRY, HIROSHIMA UNIVERSITY, JAPAN	○			○				○			13			4	6								
国立	広島大学	Hiroshima University	SUPPLEMENTAL AGREEMENT TO THE MEMORANDUM OF UNDERSTANDING ON STAFF AND RESIDENT EXCHANGE BETWEEN HIROSHIMA UNIVERSITY HOSPITAL, HIROSHIMA, JAPAN AND FACULTY OF MEDICINE, UNIVERSITAS AIRLANGGA, SURABAYA, INDONESIA		○																					
国立	広島大学	Hiroshima University	MEMORANDUM TO THE ACADEMIC AND EDUCATIONAL EXCHANGE AGREEMENTBETWEEN GRADUATE SCHOOL OF BIOSPHERE SCIENCE, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF FISHERIES AND MARINE, AIRLANGGA UNIVERSITY, INDONESIA	○			○				○															
国立	広島大学	Hiroshima University	SUPPLEMENT AGREEMENT TO THE MEMORANDUM OF UNDERSTANDING ON RESEARCHER AND STAFF EXCHANGE BETWEEN GRADUATE SCHOOL OF BIOMEDICAL AND HEALTH SCIENCES, HIROSHIMA UNIVERSITY, JAPAN AND FACULTY OF VOCATIONAL STUDIES, AIRLANGGA UNIVERSITY, SURABAYA, INDONESIA		○	○				○																
国立	山口大学	Yamaguchi University	Memorandum of Understanding between Joint Faculty of Veterinary Medicine, Yamaguchi University and Faculty of Veterinary Medicine Universitas Airlangga, Surabaya, Indonesia	○	○	○				○																
国立	山口大学	Yamaguchi University	Student Exchange Agreement between Joint Faculty of Veterinary Medicine, Yamaguchi University and Faculty of Veterinary Medicine Universitas Airlangga, Surabaya, Indonesia	○			○				○															
国立	長崎大学	Nagasaki University	Agreement on Academic Cooperation Between Nagasaki University and Airlangga University	○	○	○	○			○	○			1			1									
国立	長崎大学	Nagasaki University	Memorandum of Understanding on Student Exchange based on the Academic Cooperation Agreement between Nagasaki University and Universitas Airlanga	○			○				○			1			1									
国立	熊本大学	Kumamoto University	Memorandum of Understanding on Student Exchange between Kumamoto University, Japan and Universitas Airlangga, Republic of Indonesia	○			○				○		1	8	1		2	1								
国立	熊本大学	Kumamoto University	Memorandum of Understanding on Academic Exchange between Kumamoto University, Japan and Universitas Airlangga, Republic of Indonesia	○	○	○				○																
国立	大分大学	Oita University	なし	○	○																					
国立	大分大学	Oita University	なし		○					○																
国立	大分大学	Oita University	なし	○							○															
国立	大分大学	Oita University	なし		○					○																
国立	大分大学	Oita University	なし	○	○																					
国立	大分大学	Oita University	なし		○					○																
国立	宮崎大学	University of Miyazaki	Agreement on Academic Exchange	○	○	○	○			○	○			4				4								
国立	宮崎大学	University of Miyazaki	Memorrandum on Student Exchange	○			○				○			4				4								
国立	鹿児島大学	Kagoshima University	(none)	○	○	○				○	○															
国立	鹿児島大学	Kagoshima University	(none)	○	○	○	○			○	○			1			1									
国立	琉球大学	University of the Ryukyus	International Exchange Agreement Between Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia and Faculty of Medicine, University of the Ryukyus, Okinawa, Japan	○	○	○				○																
公立	静岡文化芸術大学	Shizuoka University of Art and Culture	Memorandum of Agreement	○	○		○				○		4	10	3	1	8	2								
公立	静岡文化芸術大学	Shizuoka University of Art and Culture	Appendix to the Memorandum of Agreement	○	○		○				○															
公立	北九州市立大学	The University of Kitakyushu	Ageement on Academic Exchange	○	○					○				1												
私立	学習院大学	Gakushuin University	COLLABORATION AGREEMENT BETWEEN GAKUSHUIN UNIVERSITY, JAPAN AND UNIVERSITAS AIRLANGGA, INDONESIA	○	○	○				○																
私立	学習院大学	Gakushuin University	APPENDIX TO COLLABORATION AGREEMENT STUDENT EXCHANGE AGREEMENT BETWEEN GAKUSHUIN UNIVERSITY, JAPAN AND UNIVERSITAS AIRLANGGA, INDONESIA	○							○															
私立	順天堂大学	Juntendo University	Memorandum of Understanding between Juntendo University, Japan and Universitas Airlangga, Indonesia on Cooperation in Academic and Research Related Activities	○	○	○				○	○			7												

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNAIR	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)	From Japan (before 2018)	From Japan (2018)	From UNAIR (before 2018)	From UNAIR (2018)
私立	星薬科大学	Hoshi University	Agreement on Academic Exchange Between Hoshi University,Japan and Faculty of Pharmacy,Airlangga University,Indonesia	○	○																					
私立	名城大学	Meijo University	International Cooperation Agreement between Universitas Airlangga, Indonesiaand Meijo University	○	○	○				○																
私立	神戸女子大学	Kobe Women's University	Memorandum of Understanding between Kobe Women's University, Japan and Universitas Airlangga, Indonesia on Cooperation in Academic and Reserch Related Activities	○	○					○																
私立	川崎医科大学	Kawasaki Medical School	MEMORANDUM OF AGREEMENT ON ACADEMIC EXCHANGE BETWEEN KAWASAKI MEDICAL SCHOOL, KURASHIKI, JAPAN AND FACULTY MEDICINE, UNIVERSITAS AIRLANGGA, INDONESIA	○	○																					
私立	日本赤十字九州国際看護大学	Japanese Red Cross Kyushu International College of Nursing	Memorandum of Agreement	○	○					○	○		2	3												

Partnership / Agreement between Udayana University and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNUD	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)
国立	旭川医科大学	Asahikawa Medical University	CONTRACT AGREEMENT BETWEEN ASAHIKAWA MEDICAL UNIVERSITY AND UDAYANA UNIVERSITY	○						○																
国立	旭川医科大学	Asahikawa Medical University	MEMORANDUM OF UNDERSTANDING BETWEEN A S A HIKAWA MEDICAL UNIVERSITY AND UDAYANA UNIVERSITY	○	○					○																
国立	茨城大学	Ibaraki University	Memorandum of Understanding between Udayana University, Indonesia and Ibaraki University, Japan for Education and Research Cooperation	○	○	○								9												
国立	茨城大学	Ibaraki University	Memorandum of Agreement between Udayana University, Indonesia and Ibaraki University, Japan for Education and Research Cooperation	○			○				○			9				1								
国立	茨城大学	Ibaraki University	Memorandum of Agreement on the Double Degree Masters Program between The Graduate School Udayana University, Indonesia and The Graduate School of Agriculture Ibaraki University, Japan					○			○			9				1				5				
国立	筑波大学	University of Tsukuba	Agreement for Academic Exchanges and Cooperation	○	○		○			○	○															
国立	千葉大学	Chiba University	Agreement for academic exchange and cooperation between Chiba University,Japan and Udayana University,Indonesia	○	○					○				10				10								
国立	千葉大学	Chiba University	Cooperating Agreement between University of Udayana, Indonesia and Center for Remote Sensing, Chiba University, Japan	○	○					○																
国立	千葉大学	Chiba University	Agreement for Student Exchange Program between Chiba University,Japan and Udayana University,Indonesia	○			○				○															
国立	千葉大学	Chiba University	Agreement for Double Master Degree Program and DoubleDoctoral Degree Program between Graduate School of Advanced Integration Science, Center for Environmental Remote Sensing, Chiba University and Post Graduate Program, Udayana University					○																		
国立	富山大学	University of Toyama	Cooperative Agreement for Academic Exchange	○	○					○																
国立	富山大学	University of Toyama	Implementing Agreement concerning the Academic Exchange	○	○						○															
国立	信州大学	Shinshu University	MEMORANDUM OF UNDERSTANDING FOR ACADEMIC COOPERATION AND EXCHANGE BETWEEN THE UNIVERSITY OF UDAYANA (UNUD) BALI, INDONESIA AND SHINSHU UNIVERSITY, JAPAN	○	○		○			○	○		2	1		2		1								
国立	信州大学	Shinshu University	AGREEMENT FOR EXCHANGE OF STUDENTS BETWEEN THE UNIVERSITY OF UDAYANA (UNUD) BALI, INDONESIA AND SHINSHU UNIVERSITY, JAPAN	○			○				○		2	1		2		1								
国立	信州大学	Shinshu University	AGREEMENT FOR COOPERATION AND EXCHANGE IN RESEARCH BETWEEN THE UNIVERSITY OF UDAYANA (UNUD) BALI, INDONESIA AND SHINSHU UNIVERSITY, JAPAN		○					○																
国立	名古屋工業大学	Nagoya Institute of Technology	AGREEMENT FOR ACADEMIC EXCHANGE AND COOPERATION BETWEEN NAGOYA INSTITUTE OF TECHNOLOGY AND UDAYANA UNIVERSITY	○	○	○				○				11												
国立	名古屋工業大学	Nagoya Institute of Technology	MEMORANDUM FOR STUDENT EXCHANGE PROGRAM BETWEEN NAGOYA INSTITUTE OF TECHNOLOGY AND UDAYANA UNIVERSITY	○			○				○			11												
国立	大阪大学	Osaka University	Agreement on academic exchange	○	○					○																
国立	大阪大学	Osaka University	Memorandum on student exchange	○			○				○															
国立	大阪大学	Osaka University	Agreement on academic exchange	○	○					○																
国立	大阪大学	Osaka University	Memorandum on student exchange	○			○				○															
国立	神戸大学	Kobe University	N/A	○	○					○																
国立	神戸大学	Kobe University	N/A	○			○				○															
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN FACULTY OF MEDICINE, UDAYANA UNIVERSITY, INDONESIA AND GRADUATE SCHOOL OF MEDICINE, DENTISTRY AND PHARMACEUTICAL SCIENCES OF OKAYAMA UNIVERSITY, JAPAN	○	○	○	○			○	○			4				4								

Japanese University		University	Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNUD	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)	From Japan (before 2018)	From Japan (2018)	From UNUD (before 2018)	From UNUD (2018)
国立	岡山大学	Okayama University	AGREEMENT OF COOPERATION BETWEEN FACULTY OF MEDICINE, UDAYANA UNIVERSITY, INDONESIA AND GRADUATE SCHOOL OF MEDICINE, DENTISTRY AND PHARMACEUTICAL SCIENCES OF OKAYAMA UNIVERSITY, JAPAN	○	○	○	○			○	○			4				4								
国立	山口大学	Yamaguchi University	MEMORANDUM OF UNDERSTANDING BETWEEN YAMAGUCHI UNIVERSITY AND UDAYANA UNIVERSITY	○	○	○				○																
国立	山口大学	Yamaguchi University	STUDENT EXCHANGE AGREEMENT BETWEEN YAMAGUCHI UNIVERSITY AND UDAYANA UNIVERSITY	○			○				○		5	1	3	2		1								
国立	山口大学	Yamaguchi University	TECHNICAL ACADEMIC AGREEMENT BETWEEN GRADUATE SCHOOL OF SCIENCE AND ENGINEERING YAMAGUCHI UNIVERSITY AND POSTGRADUATE PROGRAM UDAYANA UNIVERSITY ON COLLABORATION FOR THE IMPLEMENTATION OF THE DUAL DEGREE PROGRAM					○						3							2	1				
国立	徳島大学	Tokushima University	MEMORANDUM OF UNDERSTANDING		○																					
国立	熊本大学	Kumamoto University	Memorandum of Understanding between Udayana University, bali, Indonesia and Kumamoto University, Japan	○	○	○				○																
公立	東京都立大学	Tokyo Metropolitan University	Emorandum Of Understanding Between The Faculty Of Medicine, University Of Udayana, Indonesia And The Graduate School Of Human Health Sciences And The Faculty Of Health Sciences, Tokyo Metropolitan University, Japan	○	○					○																
公立	兵庫県立大学	University of Hyogo	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITY OF UDAYANA, BALI AND UNIVERSITY OF HYOGO, JAPAN	○	○	○				○																
公立	和歌山県立医科大学	Wakayama Medical University	Memorandum of understanding between Wakayama Medical University, Wakayama, Japan and Udayana University, Bali Indoneesia	○	○					○				7												
私立	国際医療福祉大学	International University of Health and Welfare	Memorandum of Understanding	○	○	○				○			27													
私立	芝浦工業大学	Shibaura Institute of Technology	Agreement for academic exchanges and cooperation Shibaura Institute of Technology, Japan And Udayana University, Indonesia	○	○					○																
私立	明治大学	Meiji University	MEMORAMDUM of UNDERSTANDING between UNIVERSITY OF UDAYANA and MEIJI UNIVERSITY	○	○	○				○																
私立	立教大学	Rikkyo University	Memorandum of Understanding between Udayana University and Rikkyo University							○																
私立	和光大学	Wako University	MEMORANDUM OF UNDERSTANDING BETWEEN UNIVERSITY OF UDAYANA AND WAKO UNIVERSITY	○	○					○																
私立	早稲田大学	Waseda University	University-Wide Agreement(MOU)	○	○																					
私立	早稲田大学	Waseda University	University-Wide Agreement(Student Exchange)	○	○		○				○															
私立	事業創造大学院大学	Graduate Institute for Entrepreneurial Studies	Memorandum of Understanding between The Udayana University and Graduate Institute of Entrepreneurial Studies	○	○	○				○																
私立	大阪観光大学	Osaka University of Tourism	Memorandum of Understanding between Udayana University, Indonesia and Osaka University of Tourism	○	○	○				○																
私立	大阪国際大学	Osaka International University	Memorandum of Understanding	○	○					○																
私立	大阪国際大学	Osaka International University	Detailed Regulations for Student Exchange Based on the Memorandum of Understanding	○									2	2				2								
私立	関西学院大学	Kwansei Gakuin University	MEMORANDUM OF UNDERSTANDING	○	○					○			13	4												
私立	関西学院大学	Kwansei Gakuin University	Letter of Intent "Lab. Course in Marine Biology" Agreement	○																						
私立	神戸女子大学	Kobe Women's University	Memorandum of Understanding between Kobe Women's University, Japan and University of Udayana(UNUD), Indonesia	○	○					○			4	5	4		5									
私立	神戸女子大学	Kobe Women's University		○										1			1									
私立	就実大学	Shujitsu University	Memorandum of understanding between Universitas Udayana, Bali, Indonesia and Shujitsu University, Okayama, Japan	○	○		○				○		1			1										
私立	比治山大学	Hijiyama University	Memorandum of Agreement on a Japanese Cultural Exchange Program	○									8													
私立	福山大学	Fukuyama University	Academic and Educational Agreement between Fukuyama University(JAPAN) and University of Udayana(UNUD), Indonesia	○	○																					
私立	崇城大学	Sojo University	Memorandum of Understanding	○	○					○																

Partnership / Agreement between University of Mataram and Japanese Universities

Data Source: Ministry of Education Culture Sports Science and Technology, 2018

Japanese University			Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from UNRAM	From Japan (before 2018)	From Japan (2018)	From UNRAM (before 2018)	From UNRAM (2018)	From Japan (before 2018)	From Japan (2018)	From UNRAM (before 2018)	From UNRAM (2018)	From Japan (before 2018)	From Japan (2018)	From UNRAM (before 2018)	From UNRAM (2018)
国立	東北大学	Tohoku University	Agreement on Academic Exchange between School of Engineering, Tohoku University, Japan and University of Mataram	○	○	○																				
国立	東北大学	Tohoku University	MEMORANDUM OF UNDERSTANDING ON STUDENT EXCHANGE BETWEEN GRADUATE SCHOOL OF ENGINEERING, TOHOKU UNIVERSITY, JAPAN AND UNIVERSITY OF MATARAM, INDONESIA								○															
国立	京都大学	Kyoto University	Memorandum of Understanding for Academic Exchange and Cooperation	○	○					○																
国立	京都大学	Kyoto University	General Memorandum for Academic Cooperation and ExchangebetweenThe Faculty and Graduate School of Pharmaceutical Sciences, Kyoto University and The Faculty of Mathematic and Natural Sciences, Mataram University	○	○					○																
国立	熊本大学	Kumamoto University	Student Exchange Agreement between Kumamoto University and the Consortium of Institut Teknologi Sepuluh Nopember	○			○				○			1			1									
国立	熊本大学	Kumamoto University	Agreement on Academic Exchange between Kumamoto University and the Consortium of Institut Teknologi Sepuluh Nopember	○	○	○				○																

Research Profile

(Project Title) **Strengthening COVID-19 related Health and Medical Research, Innovation and Services Managed by Science Techno Park of Andalas University**

(Name of Project Coordinator) **Dr.-ing. Ir. Uyung Gatot S. Dinata**

(Name of Department, University / Institution) **Science Techno Park, Andalas University**

For

Higher Education and Research Facility Development: Research and Innovation
Capacity Development" Project
Indonesia
(Kemristek/BRIN–JICA)

(01 June 2021)

1. Research Area, Research Topics and Research Project

1.1. Research Area

I. Development of medical products for curing and handling COVID-19 diseases (including its derivatives and mutations);

II. Strengthening of institutional capacity of Science Techno Park in facilities and human resources, and;

III. Commercialization of the COVID-19 related medical products

1.2. Research Topics

I. Development of medical products for curing and handling COVID-19 diseases (including its derivatives and mutations)

   A) Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
   B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
   C) Non-COVID ILI Rapid Test Product Development;
   D) COVID 19 Vaccine Product Development;
   E) Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
   F) Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;
   G) Five COVID-19 Nanoparticle Technology Immunomodulators;
   H) Therapeutic Technology for COVID-19 based on Herbal Products;
   I) Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
   J) Catechin-based Antibody and Stress Reduction Supplement Products;
   K) Open-Source Ventilator Product Development;
   L) CPAP (Continuous Positive Airway Pressure) Ventilator Product Development;
   M) Digital Statoscope Product Development for COVID-19 Patients;
   N) PPE (Personal Protective Equipment) Product Development for Infectious COVID-19;
   O) Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services;
   P) COVID-19 patient room disinfectant robot;
   Q) Patrol robots suspecting COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients;
   R) Wearable Sensors & Machine Learning in Handling COVID-19 Patients;
   S) Powered Air Purifying Respirator;

T) Infectious Waste Incinerator Products with Plasma Pyrolysis;

U) Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom with Nanotechnology in the New Norm;

II. Strengthening of institutional capacity of Science Techno Park in 1) Facilities / Equipment, and 2) Human Resources / Research & Innovation

1) Facilities / Equipment

Facilities / equipment utilized for the strengthening of institutional capacity of Science Techno Park and the development of medical products for curing and handling COVID-19 diseases are mentioned in Equipment List.

2) Human Resources / Research & Innovation

- Degree Program (Master Degree, Ph.D.) in Indonesia and Japan (80 persons in total)
- Non-Degree Program (capacity development training for administration and technical staff) (215 persons in total)
- Visiting Scholar Program for Research & Innovation (Research collaboration) in Japan (88 persons in total)

III. Commercialization of the COVID-19 related medical products

- Collaboration between Science Techno Park and industries (Shimadzu, Kimia Farma, Aichikikai Techno System, Shintec Hozumi Co. Ltd., Infinitigroup, etc.)

1.3. Objectives
(include *Background of research, Brief economic and social benefits from Research Outcomes)*

Background of Research

COVID-19 pandemic nowadays is a very serious problem. The virus has been infecting more than 170 million people and caused more than 3.7 million deaths in the world. It has been affecting human social life and world economy immensely. This situation could continue for the next several years without effective measures.

Andalas University (Unand) has capacity and experiences in research and innovation in the field of food, drug, and health. Unand has been developing drugs particularly for natural and herbal medicine as well as health science & technology especially for medical devices. Unand has been engaged in testing COVID-19-suspected patients, tracing the potential infection routes, and providing medical treatment in West Sumatra Province. Due to the highly skilled services of Unand, the spread of COVID-19 was slowed-down in that area. However, it is expected that Unand should develop more useful medical products such as devices, treatment, medicine, etc. to devastate the prevalence of COVID-19. The past activities in research and innovation and implementation of measures for

COVID-19 prove that Unand is capable of developing more useful medical products and commercialize them so that people can easily access them. Also, it is worth while to strengthen their facilities and human resources to accelerate their R&D.

Economic and Social Benefits

Research and development of A) - U)’s medical products will generate the improvement of protection and treatment of COVID-19 and be applied to other sickness/diseases as well. Some products will have functions to prevent people from being infected with diseases, or provide alert and awareness for disease transmission in closed rooms (i.e. office, home, mass-gathering places) or transportation/vehicles. Other products such as wearable devices or robots are expected to function as substitutes of medical practitioners, which will help their work. Equipment such as ventilators or incinerators will also be invented so that medical practitioners are able to work in a safe environment and medical wastes are safely disposed.

One of the benefits of merchandising products is the decrease in its unit price. The better quality the products have, the more popularity they gain and the more people are willing to purchase. The more people buy, the cheaper their unit price becomes. This positive cycle of commercialization will cause higher rate of usage of those products, which leads to the improvement of public health in Indonesia. Additionally, production of those goods has wide range of industrial skirts such as raw materials, manufacturers, retailers, etc. It is highly expected that the commercialization of those goods will stimulate the economy of Indonesia as well.

1.4. *Research Plan, Themes, Activities, Schedule*

Research Area	Research Topics		2022	2023	2024	2025	2026	2027	2028
I. Development of medical products	Making models and validation in a laboratory environment		🟧	🟧	🟧				
	Making product models and demonstration and test in relevant enrironment in labs				🟧	🟧			
	Making prototipes and feasibility tests in operational environment					🟧	🟧		
	Making completed products and feasibility test for production						🟧	🟧	
II. Strengthening of institutional capacity of Science Techno Park	Facilities / Equipment		🟧	🟧	🟧	🟧			
	Human Resources / Research & Innovation	Degree fellowship (Master/Ph.D.) (80 perosons)	🟩 Batch 1	🟩	🟩				
				🟦 Batch 2	🟦	🟦			
					🟨 Batch 3	🟨	🟨		
						🟫 Batch 4	🟫	🟫	
							⬜ Batch 5	⬜	⬜
		Non-degree fellowship (Administration/Technical) (135/80 persons)	🟩 Batch 1						
				🟦 Batch 2					
					🟨 Batch 3				
		Visiting Scholar for R&I (88 persons)	🟩	🟩	🟩	🟩	🟩	🟩	🟩
III. Commercialization of the COVID-19 related medical products	Production and business plan to the market							🟧	🟧

1.5. *Present research status at your Laboratory/ Department / University/ Institution*

Present status of researches and process of production/development

Andalas University has already started the fundamental research for each of the planned medical products of A) – U). Some of the research reached in-vitro process such as G) – K).

Present status of collaboration with Japanese laboratories/researchers

Topic: A) Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker
Japanese Institution and Researcher: Kobe University, Dr. Shinichiro KUROKI
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) filter Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
Japanese Institution and Researcher: Gifu University, Dr. Kohei NAKANO
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: C) Non-COVID ILI Rapid Test Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: D) COVID 19 Vaccine Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: E) Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Hirowati Ali, PhD

Topic: F) Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients at ICU;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Dwi Yulia, SpPK

Topic: G) Nanoparticle Technology Five Immunomodulator Products;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Drs. Yufri Aldi, M.Si. Apt.

Topic: H) Development of COVID-19 Therapeutic Technology based on Herbal Products;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: I) Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Friardi Ismet.

Topic: J) Development of Supplement Products for Antibody Strengthening and Stress Reduction based on Catechins;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: L) Development of CPAP (Continuous Positive Airway Pressure) Ventilator Product, Digital Stateskop for COVID-19 Patients, Product Development for Powered Air Purifying Respirator;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Ilhamdi Rusydi.

Topic: Q), R) Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Zaini.

Topic: K), T) Open Source Ventilator Product, Infectious Waste Incenerator Products with Plasma Pyroly;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Aulia, M. Eng.

Topic: O) Amira Robot Product Development (temperature detection, food delivery, medicine reminder, information) Management of Infectious Cases, patient services;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Firman Ridwan, M. ASc.

Topic: P) Disinfectant robot for COVID-19 patient room;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Hanalde Andre, MT.

Topic: N) PPE (Personal Protective Equipment) Product Development for COVID-19 Infections;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Lusi Susanti, MT.

Topic: U) Development of Stunting and Immune Booster Management Products Using Food Ingredients Based on Local Wisdom with Nanotechnology in the Era of New Normal;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Syahrial, M. Biomed.

Topic: Empowerment of Technology and Business Incubation for Science Techno Parks (STP);
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs
Researcher at Unand: Universitas Andalas Science Techno Park.

Topic: e-Business Gathering & e-Meeting of STP's COVID-19 Handling Products;
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs

Researcher at Unand: Universitas Andalas Science Techno Park.

Present status of commercialization of research outputs with industries

Topic: A) Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
Company/Institute: Institute for Researches and Community Services
Current Status of Commercialization: Product and Market development

Topic: C) Non-COVID ILI Rapid Test Product Development;
Company/Institute: PT Kimia Farma
Current Status of Commercialization: Product and Market development

Topic: D) COVID 19 Vaccine Product Development;
Company/Institute: PT Bio Farma
Current Status of Commercialization: Product and Market development

Topic: H) Development of COVID-19 Therapeutic Technology based on Herbal Products;
Company/Institute: PT Fitofarmaka Lab
Current Status of Commercialization: Product and Market development, Marketing.

1.6. Future Research Plan

Future research outputs and its commercialization

- Automated early warning detection system for airborne microorganism and viruses;
- Carbon-photocatalyst Absolut ULPA (Ultra-Low particulate air) filter;
- Non-COVID ILI Rapid Test;
- COVID 19 Vaccine;
- Tell Inducted Mesencimal Cells for Pneumonia Therapy
- Convalescent Plasma Products for Therapy
- Five Nanoparticle Immunomodulators
- Therapeutic from Herbal Products
- Herbal Medicines and Phytopharmaca from Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants
- Catechin-based Antibody and Stress Reduction Supplement
- Open-Source Ventilator
- CPAP (Continuous Positive Airway Pressure) Ventilator
- Digital Statoscope
- PPE (Personal Protective Equipment) Product
- Amira Robot (temperature detection, food delivery, medication reminder, information)
- Room disinfectant robot

- Patrol robots and handling bodies, flying robots delivery
- Wearable devices
- Powered Air Purifying Respirator
- Waste Incinerator Products with Plasma Pyrolysis
- Anti Stunting and Immune Booster

In the future we will reproduce these prototypes to be commercialized and sold in various hospitals in facilitating hospital services for patients infected with Covid19. Also, marketing for the products at niche markets, in particular, for government facilities, health facilities, public facilities (airports, seaports, convention centers, etc.) is also expected to be conducted.

Potential collaboration with Japanese laboratories/researchers

Topic: A) Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker
Japanese Institution and Researcher: Kobe University, Dr. Shinichiro KUROKI
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) filter Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
Japanese Institution and Researcher: Gifu University, Dr. Kohei NAKANO
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: C) Non-COVID ILI Rapid Test Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: D) COVID 19 Vaccine Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: E) Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and Development Programs

Researcher at Unand: dr. Hirowati Ali, PhD

Topic: F) Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients at ICU;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: dr. Dwi Yulia, SpPK

Topic: G) Nanoparticle Technology Five Immunomodulator Products;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Prof. Dr. Drs. Yufri Aldi, M.Si. Apt.

Topic: H) Development of COVID-19 Therapeutic Technology based on Herbal Products;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: I) Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Friardi Ismet.

Topic: J) Development of Supplement Products for Antibody Strengthening and Stress Reduction based on Catechins;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: L) Development of CPAP Ventilator Product, Digital Stateskop for COVID-19 Patients, Product Development for Powered Air Purifying Respirator;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Ilhamdi Rusydi.

Topic: Q), R) Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Zaini.

Topic: K), T) Open Source Ventilator Product, Infectious Waste Incenerator Products with Plasma Pyroly;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Aulia, M. Eng.

Topic: O) Amira Robot Product Development (temperature detection, food delivery, medicine reminder, information) Management of Infectious Cases, patient services;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Firman Ridwan, M. ASc.

Topic: P) Disinfectant robot for COVID-19 patient room;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Hanalde Andre, MT.

Topic: N) PPE (Personal Protective Equipment) Product Development for COVID-19 Infections;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Lusi Susanti, MT.

Topic: U) Development of Stunting and Immune Booster Management Products Using Food Ingredients Based on Local Wisdom with Nanotechnology in the Era of New Normal;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and Development Programs
Researcher at Unand: Dr. Syahrial, M. Biomed.

Topic: Empowerment of Technology and Business Incubation for Science Techno Parks (STP);
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)

Type of Collaboration: Joint Development Programs

Researcher at Unand: Universitas Andalas Science Techno Park.

Topic: e-Business Gathering & e-Meeting of STP's COVID-19 Handling Products;

Japanese Institution and Researcher: Japan Science Techno Park, (TBA)

Type of Collaboration: Joint Development Programs

Researcher at Unand: Universitas Andalas Science Techno Park.

Potential commercialization of research outputs with industries

Topic: A) Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;

Company/Institute: Institute for Researches and Community Services

Current Status of Commercialization: Product and Market development

Topic: C) Non-COVID ILI Rapid Test Product Development;

Company/Institute: PT Kimia Farma

Current Status of Commercialization: Product and Market development

Topic: D) COVID 19 Vaccine Product Development;

Company/Institute: PT Bio Farma

Current Status of Commercialization: Product and Market development

Topic: H) Development of COVID-19 Therapeutic Technology based on Herbal Products;

Company/Institute: PT Fitofarmaka Lab

Current Status of Commercialization: Product and Market development, Marketing.

2. Research Personnel

Experienced professors, senior researchers and graduate students

2.1. Indonesian Researchers

Research Coordinator

Name: Dr. -ing. Uyung Gatot S Dinata
Affiliation
<Andalas University >

Team Members

1. **Name:** Dr. Eng Muhammad Makky_
   Afflication
   < Andalas University>
2. **Name:** Dr. Eka Candra Lina_
   Afflication
   < Andalas University>
3. **Name:** Dr. Andani Eka Putra_
   Afflication
   < Andalas University>
4. **Name:** dr. Hirowati Ali, PhD_
   Afflication
   < Andalas University>
5. **Name:** dr. Dwi Yulia, SpPK_
   Afflication
   < Andalas University>
6. **Name:** Prof. Dr. Drs. Yufri Aldi, M.Si. Apt._
   Afflication
   < Andalas University>
7. **Name:** Prof. Dr. Dedi Prima Putra_
   Afflication
   < Andalas University>
8. **Name:** Dr. Friardi Ismet_
   Afflication
   < Andalas University>
9. **Name:** Prof. Dr. Dedi Prima Putra_
   Afflication
   < Andalas University>
10. **Name:** Dr. Ilhamdi Rusydi_
    Afflication
    < Andalas University>
11. **Name:** Dr. Zaini_
    Afflication
    < Andalas University>
12. **Name:** Dr. Aulia, M. Eng._
    Afflication
    < Andalas University>
13. **Name:** Dr. Firman Ridwan, M. ASc_
    Afflication
    < Andalas University>
14. **Name:** Hanalde Andre, MT._
    Afflication
    < Andalas University>
15. **Name:** Dr. Lusi Susanti, MT._
    Afflication

< Andalas University>
16.**Name:** Dr. Syahrial, M. Biomed._
Afflication
< Andalas University>
17.**Name:** Prima Fitri, MT_
Afflication
< Andalas University>
18.**Name:** Caesar Welya, MP_
Afflication
< Andalas University>
19.**Name:** Wenny Surya M, MP_
Afflication
< Andalas University>
20.**Name:** Beeri B, MSc_
Afflication
< Andalas University>

Please add another research member, including researcher from partner institutions and industries, if any.

2.2. Japanese Researchers (If any)

Research Coordinator
Name: Jichi University
Affiliation
< >

Research Coordinator
Name: Prof. Dr. Eiji Morimoto
Affiliation
< Tottori University>

Research Coordinator
Name: Prof. Kohei NAKANO
Affiliation
< Gifu University >

Team Members
Name: Prof. Shinichiro Kuroki
Affiliation
< Kobe University >

Research Coordinator
Name: Shin Kaneko, M.D, Ph.D (contacting in progress)
Affiliation
< CiRA, Kyoto University >

Research Coordinator
Name: Prof. Jun Ota
Affiliation
< The University of Tokyo >

2.3. *Collaboration with Industries (If any)*

Collaborating industries or expected collaboration industries

Name: Kimia Farma
State of collabiration
<   >

Name: Shimadzu Corporation, Japan
State of collabiration
< Developing machine/parts for biomarker detection >

Name: Japan Air Filter, Japan
State of collabiration
< Developing machine/parts for Absolute ULPA Filter with Carbon Photocatalist>

Name: Aichikikai Techno System
State of collabiration
<   >

Name: Shintec Hozumi Co.,Ltd.
State of collabiration
<   >

Name: INFINITIGROUP Indonesia
State of collabiration
<   >

Key personnel

1. Name:________________________
Affiliation
<   >

3. Supporting Activities in the Project

3.1. *Contributions through the Degree Program in the Project*

Degree Program (master/Ph.D.) is one of the components of human resource development under ENRICH Project, however, it is funded not by JPY loan but by LPDP Scholarship from Ministry of Finance, Indonesia.

Program components

Objective	Those dispatched to master/Ph.D. programs in Indonesian or Japanese universities are expected to gain knowledge and research experiences for the development of health-related products targeted under ENRICH Project. They are supposed to work for ENRICH Project after they return to Indonesia
Obligation	Upon their return, the participants are required to work for ENRICH Project until the Project Transition Period is over
Target participant	Researchers developing 21 health-related products and prospective staff with outstanding academic background
Number of participants	80 in total of master and Ph.D.
Selection	LPDP Scholarship is managed by the Indonesia Endowment Fund for Education, Ministry of Finance, Indonesia
Prospective Japanese university/institute	Unand prioritize Japanese universities in regard to dispatching degree program participants by the following points. 1. The availability of master and Ph.D. programmes linear to the requirements of study advancement for the participants, in line with

	their research topic in order to successfully develop and commercialize the 21 health-related products under ENRICH Project. 2. The availability of supervisors (professors) with expertise linear to the requirements of study advancement for the participants, in order to successfully develop, test, and finalize the 21 health-related products under ENRICH Project. 3. The availability of laboratories with equipment necessary to develop, test, and finalize the 21 health-related products under ENRICH Project. 4. Partner universities that have experienced in hosting master or Ph.D. students from Unand, and they successfully finished their study in time. 5. Japanese partner universities that have experienced in hosting professors/staff from Unand, and working in collaborative project(s) or publications. 6. Japanese partner universities that provide free tuition fee (tuition waiver) Taking the above points into consideration, the priority rank is currently as follows according to the list of partner universities; 1st prioritized universities: Kyoto University, Shimane University, Kagoshima University 2nd prioritized universities: Toyohashi University of Technology, Gifu University, Kobe University, Osaka City University 3rd prioritized universities: Jichi Medical University, Shinshu University, Ibaraki University, Okayama University, Prefectural University of Hiroshima, University of Kochi, University of Kitakyushu, Jichi Medical University, Hoshi University, Ritsumeikan University, Kindai University
Activity	Participants are expected to carry out research activities under the supervision of research coordinators or other persons in the project team. The results of their research (Master thesis or PhD dissertation) will be presented as the result of the project

Unit cost

Cost Item	**Unit**	**Unit Cost**	
		JPY	**IDR**
Application Fee	Once	At Cost	
Tuition	Year	At Cost	
Book Allowance	Year		10,000,000
Thesis Allowance	Once		30,000,000–150,000,000 (depend on degree and laboratory activities)
Conference Allowance	Once		5,000,000–15,000,000 (depend on location/countries)
Publication Allowance	Once		15,000,000–25,000,000 (depend on journal quartile)
Visa Allowance	Once		At Cost
Insurance Allowance	At Cost	At Cost	At Cost
Settlement Allowance (equivalent to Monthly Allowance)	Once	155,000	
Monthly Allowance	Month	155,000	

Family Allowance (25% of Monthly Allowance)	Month	38,750	
Airfare	Once		At Cost

Schedule: Refer to another file

3.2. *Contributions through the Non-Degree Program in the Project*

There are two schemes for Non-Degree Program. The training in the technical field is subsidized by JPY loan under ENRICH Project. 80 participants are allocated in total for this training. In regard to the training for administration staff, ADB Fund will be available and this will be conducted outside ENRICH Project although the result of the training is expected to cause a positive effect on ENRICH Project.

Program components

Objective	Those participating in Non-Degree Program are expected to gain knowledge and practical experiences both in technical development and managerial enhancement for the implementation of 21 activities proposed under ENRICH Project although JPY loan covers only the training for technical field
Obligation	Upon their return, the participants are required to work for ENRICH Project until the Project Transition Period is over
Target participant	(Training for technical staff) Participants will be recruited from technical fields in the proposed 21 activities and expected to be trained for the enhancement of machine operation, maintenance, product development, product innovation and product marketing, etc. (Training for administration staff) Participants will be recruited from administrative fields and expected to be trained for the enhancement of managerial skills, including product certification, business technology, technology transfer office, teaching industry management, etc.
Number of participants	80 for technical development training for technical personnel (funded by JPY loan under ENRICH Project) 135 for managerial enhancement training for administration staff (funded by ADB)
Selection	Application announcement will be circulated within Unand through website, social media, emails, and leaflet. Selection committee will consist of researchers who manage the 21 activities and management of LPPM Unand. Selection will be conducted based on language proficiency, technical understanding of the activity to be undertaken, and commitment of the candidate
Prospective Japanese university/institute	(Training for technical staff) Unand prioritize Japanese universities in regard to dispatching technical development training participants by the following points. 1. Japanese universities that have experienced in hosting short-term trainings for capacity building in medicine and health sciences for Indonesian participants 2. Japanese universities that have experienced in hosting short-term trainings professional human resource development for Indonesian participants According to the list of training providers which have hosted training programs for Indonesian participants, the following institutes are currently prospective training providers;

	University of Tokyo, Kobe University, Osaka University, Ehime University, Yamaguchi University, University of Occupational and Environmental Health, Kagawa University, Showa University, Tokushima Bunri University, Oita University of Nursing and Health Science, Kanto Rosai Hospital, Japanese Red Cross (Training for administration staff) In regard to dispatching managerial enhancement training participants, prospective training providers are not only Japanese institutes but also ASEAN universities. The followings are the prospective providers when they make a decision to dispatch participants to Japan; University of Tokyo, Ritsumeikan University, Nagoya University, Yamaguchi University, Yokohama National University, Takushoku University, University of Miyazaki, International University of Japan, Temple University Japan Campus, National Graduate Institute for Policy Studies
Training component	Training duration is expected between 1 and 4 weeks depending on the type of training, components, activities, etc. (Training for technical staff) Training program should include, but not limited to, the following topics; 1. Medicine and pharmacy (vaccine, rapid test, stem cell, immunomodulator, herbal medicines, phytopharmaceutical); 2. Medic and public health (including nursing); 3. HVAC system and air purifier; 4. Non-destructive technique, detection system, and bio-marker; 5. Manufacturing, mechanical system, and pneumatic system; 6. Electromedical and ventilator; 7. Robotics, sensors, electronics, control system, and Internet of Things (IoT); and 8. Laboratory equipment training Duration of training program is expected between 2 weeks and 4 weeks. (Training for administration staff) Training program should include, but not limited to, the following topics; 1. Study visit 2. Advance capacity building in leadership & management 3. Certification 4. Intellectual property 5. Industry Certification 6. Internship 7. Science Techno Park 8. Product development 9. Service 10. Business 11. Health supporting Industry 12. Empowerment of SMEs 13. Business Gathering, Meeting, Pitching & Promotion 14. Marketing Duration of training program is expected between 2 weeks and 4 weeks.

Unit cost

Cost Item	**Unit**	**Unit Cost**	
		JPY	**IDR**

Program Fee	Once	At Cost (Up to JPY1,500,000/Person)	
Per Diem	Day	7,500	
Accommodation	Day	7,500	
Insurance	Once	At Cost (Up to JPY10,000)	
Airfare (Round-trip)	Once	At Cost (Up to JPY250,000)	

Schedule: Refer to another file

3.3. *Contributions through Visiting Scholar for Research & Innovation Program in the Project*

Research collaboration in the relevant research activities is attained through visiting scholar project. 88 participants are allocated in total under ENRICH Project and all the fees mentioned below are supposed to be covered by JPY loan.

Program components

Objective	
Obligation	
Target participant	Participants for Visiting Scholar for R&I Program are recruited among researchers working on the topics of Unand under ENRICH Project
Number of participants	88 researchers from the relevant fields
Selection	TBD
Prospective Japanese university/institute	Jichi Medical University, Kobe University, University of Tokyo, Kanagawa University, Kanagawa Science Park, Tokyo Institute of Technology,
R&I component	

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment are necessary to carry out the project:

No.	Owner/ID	Descriptions	Research Topics *Refer to the topics below (A-U)	Placement/Location	Quantity	Unit Price (IDR)	Total Amount (IDR)
1	STP Unand	Cell Sorting Attune NxT Flow Cytometer Multi Laser	E, F	Andalas University Hospital	1	2,500,000,000	2,500,000,000
2	STP Unand	CELENA™ S Digital Imaging System Starter Kit - Basic PKG 570.240.000 1 570.240.000,00 - 4 objectives (I10001 / I10006 / I10007 / I10008) - 3 Phase Contrast objectives – free of charge (I10002 / I10003/ I10004) - 3 filter cubes (DAPI/GFP/RFP).	E, F	Andalas University Hospital	1	570,240,000	570,240,000
3	STP Unand	Inverted Biological Microscope LIBM-A10	E, F	Andalas University Hospital	2	126,240,000	252,480,000
4	STP Unand	LVAC-A10 Vertical Laminar Air Flow Cabinet	E, F	Andalas University Hospital	5	52,800,000	264,000,000
5	STP Unand	LVAC-B11 Vertical Laminar Air Flow Cabinet	E, F	Andalas University Hospital	2	155,520,000	311,040,000
6	STP Unand	APL170 ARA P170 CO2 Inkubator	E, F	Andalas University Hospital	1	196,000,000	196,000,000
7	STP Unand	BlueBox Transiluminator	E, F	Andalas University Hospital	12	9,120,000	109,440,000
8	STP Unand	SPECTRA OPTIA Aferesis	E, F	Andalas University Hospital	1	1,000,000,000	1,000,000,000
9	STP Unand	Component separator centrifuge	A, B, E, F	Andalas University Hospital	1	231,010,416	231,010,416
10	STP Unand	Matched cross-test tool	E, F	Andalas University Hospital	12	14,216,026	170,592,307
11	STP Unand	Automated Immunoassay system HISCL 800	E, F	Andalas University Hospital	1	634,367,000	634,367,000
12	STP Unand	Donor chair 5 sets	A, B, E, F	Andalas University Hospital	4	209,725,515	838,902,060

13	STP Unand	Sealer automatic (5 set)	E, F	Andalas University Hospital	3	97,136,028	291,408,084
14	STP Unand	Convalescent plasma donor monitoring coagulometer	E, F	Andalas University Hospital	1	773,414,500	773,414,500
15	STP Unand	HEMATOLOGY ANALYZER, XN-3000 BF (SP-10, Al, B3, BF) SET + UPS	E, F	Andalas University Hospital	1	3,179,320,457	3,179,320,457
16	STP Unand	Automated Clinical Chemistry, Analyzer JEOL JCA-BM6010/C SET + UPS	E, F	Andalas University Hospital	1	1,958,553,000	1,958,553,000
17	STP Unand	Nanosizer dan Zeta sizer	A, B, G, H	STP	1	800,000,000	800,000,000
18	STP Unand	Ultraturax	A, B, G, H	STP	2	100,000,000	200,000,000
19	STP Unand	Homogenizer-sonicator	A, B, G, H	STP	3	80,000,000	240,000,000
20	STP Unand	Freeze Drying	A, B, G, H	STP	1	300,000,000	300,000,000
21	STP Unand	Climatic chamber	A, B, G, H	STP	1	300,000,000	300,000,000
22	STP Unand	Transmission Electron Microscope	A, B, G, H	STP	1	1,400,000,000	1,400,000,000
23	STP Unand	Spektrofotometer UV Vis	A, B, G, H	STP	1	400,000,000	400,000,000
24	STP Unand	Buchi Chromatography flash/prep	A, B, I, J U	STP	1	1,688,300,000	1,688,300,000
25	STP Unand	BÜCHI ROTAVAPOR R-220 PRO - Industrial Evaporation	A, B, I, J U	STP	1	1,824,100,000	1,824,100,000
26	STP Unand	CNC milling and accessories	A, B, K, M, O, P, Q, R	STP	1	2,086,278,000	2,086,278,000
27	STP Unand	Desktop PC design CAD for CNC milling machine	A, B, K, M, O, P, Q, R	STP	12	20,000,000	240,000,000
28	STP Unand	PCB Etching Machine for making printed circuit board	A, B, K, M, O, P, Q, R	STP	1	400,000,000	400,000,000
29	STP Unand	Complete welding equipment (MIG / TIG welding etc.)	A, B, K, M, O, P, Q, R	STP	1	300,000,000	300,000,000
30	STP Unand	CNC turning and its accessories	A, B, K, M, O, P, Q, R	STP	1	1,862,960,000	1,862,960,000
31	STP Unand	Desktop PC design CAD CNC turning machine	A, B, K, M, O, P, Q, R	STP	12	20,000,000	240,000,000
32	STP Unand	CNC laser cutting 4 axis beserta kelengkapanya	A, B, K, M, O, P, Q, R	STP	1	4,631,388,000	4,631,388,000
33	STP Unand	Desktop PC design CAD for CNC laser cutting	A, B, K, M, O, P, Q, R	STP	12	20,000,000	240,000,000
34	STP Unand	Giant 3D printing	A, B, K, M, O, P, Q, R	STP	1	380,000,000	380,000,000
35	STP Unand	Laptop for design 3D Printer	A, B, K, M, O, P, Q, R	STP	15	17,000,000	255,000,000
36	STP Unand	Work Benches (vise, table grinders, drilling machines, oscilloscopes, saws etc.)	A, B, K, M, O, P, Q, R	STP	1	300,000,000	300,000,000
37	STP Unand	3D Printer	A, B, K, M, O, P, Q, R	STP	2	130,278,181	260,556,362
38	STP Unand	PCB machine (Base unit)	A, B, K, M, O, P, Q, R	STP	1	187,000,000	187,000,000
39	STP Unand	XEVO G2 XS QTOF Mass Spectrometer	A, B	STP	1	7,458,000,000	7,458,000,000
40	STP Unand	UPS 10KVA with LCD	A, B	STP	10	30,000,000	300,000,000

41	STP Unand	Foss NIR DS2500	A, B	STP	1	850,000,000	850,000,000
42	STP Unand	Generator Set Mitsubishi 40 kVa Silent	A, B	STP	3	150,000,000	450,000,000
43	STP Unand	GCMS with CDS Thermal Desorber Autosampler	A, B	STP	1	2,467,190,000	2,467,190,000
44	STP Unand	Laptop for design ULPA Filter (Lenovo Yoga Slim 9 i7 Gen11th 16GB 1TB Intel Iris W10+OHS TOUCH)	A, B	STP	8	30,000,000	240,000,000
45	STP Unand	Seek Scan package	A, B	STP	4	131,000,000	524,000,000
46	STP Unand	Smart Monitor + TV (75 Inchi)	A, B	STP	10	25,000,000	250,000,000
47	STP Unand	Seek Thermal CompactPRO – High Resolution Thermal Imaging Camera for Android USB-C	A, B	STP	20	15,000,000	300,000,000
48	STP Unand		A, B	STP	20	20,000,000	400,000,000
49	STP Unand	REVEAL FIREPRO	A, B	STP	10	22,500,000	225,000,000
50	STP Unand	NIR Measurement Packages: BUNDLE-NIRQUEST-NIR	A, B	STP	1	550,000,000	550,000,000
51	STP Unand	Android based smart phone for mobile monitoring	A, B	STP	40	10,000,000	400,000,000
52	STP Unand	Raman Measurement Packages	A, B	STP	2	300,000,000	600,000,000
53	STP Unand	HES Spectrometer (Fourier Transform Infrared Spectroscopy)	A, B	STP	2	280,000,000	560,000,000
54	STP Unand	BUNDLE-HDX-BIO	A, B	STP	3	250,000,000	750,000,000
55	STP Unand	BUNDLE-HR-PLASMA	A, B	STP	3	150,000,000	450,000,000
56	STP Unand	BUNDLE-QEPRO-FL	A, B	STP	2	450,000,000	900,000,000
57	STP Unand	Absorbance Measurement Packages	A, B	STP	2	450,000,000	900,000,000
58	STP Unand	DUSTTRAK DRX AEROSOL MONITOR 8534	A, B	STP	3	266,000,000	798,000,000
59	STP Unand	SIDEPAK PERSONAL AEROSOL MONITOR AM521	A, B	STP	3	135,000,000	405,000,000
60	STP Unand	PRIMARY CALIBRATOR 4046	A, B	STP	6	42,000,000	252,000,000
61	STP Unand	DUSTTRAK II AEROSOL MONITOR 8530EP	A, B	STP	3	150,000,000	450,000,000
62	STP Unand	SCANNING MOBILITY PARTICLE SIZER SPECTROMETER 3938	A, B	STP	2	145,000,000	290,000,000
63	STP Unand	CERTIFIER FLOW ANALYZER PLUS VENTILATOR TEST SYSTEM 4080	A, B	STP	2	175,000,000	350,000,000
64	STP Unand	AEROTRAK CLEANROOM CONDENSATION PARTICLE COUNTER 900	A, B	STP	2	150,000,000	300,000,000
65	STP Unand	Giant 3D printing	A, B	STP	2	380,000,000	760,000,000
66	STP Unand	Rotary Pleating Machine For Hepa/ulpa Air Filter Paper Folding	A, B	STP	1	1,309,000,000	1,309,000,000
67	STP Unand	Automated HEPA/ULPA Filter Scanning Test System	A, B	STP	2	440,000,000	880,000,000

68	STP Unand	Cleanroom Drying Oven (Memmert UF1060)	A, B	STP	2	285,000,000	570,000,000
69	STP Unand	Vacuum Oven 101 Litre	A, B	STP	2	271,000,000	542,000,000
70	STP Unand	FACILITY MONITORING SYSTEM	A, B	STP	2	150,000,000	300,000,000
71	STP Unand	2 unit plasma pyrolysis furnace	L, N, S, T	STP	2	500,000,000	1,000,000,000
72	STP Unand	Multilevel gas filter system	L, N, S, T	STP	10	15,000,000	150,000,000
73	STP Unand	Hydrogen storage	A, B, L, N, S, T	STP	10	15,000,000	150,000,000
74	STP Unand	Oxygen tube	L, N, S, T	STP	20	5,000,000	100,000,000
75	STP Unand	High temperature resistant electrodes	L, N, S, T	STP	5	30,000,000	150,000,000
76	STP Unand	20 kV converter module	L, N, S, T	STP	1	150,000,000	150,000,000
77	STP Unand	3 HP compressor and pressure regulator	L, N, S, T	STP	10	12,000,000	120,000,000
78	STP Unand	Roof top solar panel 15 kW	L, N, S, T	STP	3	90,000,000	270,000,000
79	STP Unand	Overvoltage and impulse voltage protection system module	L, N, S, T	STP	3	75,000,000	225,000,000
80	STP Unand	Metal mold module for waste metal processing	A, B, L, N, S, T	STP	10	15,000,000	150,000,000
81	STP Unand	Inverter module 75 kW, 20 kV	L, N, S, T	STP	1	160,000,000	160,000,000
82	STP Unand	microsteam turbine 5 kW	L, N, S, T	STP	1	150,000,000	150,000,000
83	STP Unand	Microgas turbine 5 kW	L, N, S, T	STP	1	150,000,000	150,000,000
84	STP Unand	Waste scrubber machine	L, N, S, T	STP	1	130,000,000	130,000,000
85	STP Unand	Waste sorter machine	L, N, S, T	STP	1	130,000,000	130,000,000
86	STP Unand	3D printer for manufacturing PVC piping modules and systems	A, B, L, N, S, T	STP	5	23,000,000	115,000,000
87	STP Unand	CNC plasma cutter/solder	A, B, L, N, S, T	STP	1	210,000,000	210,000,000
88	STP Unand	High precision cutting machine	A, B, L, N, S, T	STP	3	45,000,000	135,000,000
89	STP Unand	Lathe	A, B, L, N, S, T	STP	2	65,000,000	130,000,000
90	STP Unand	High temperature resistant electrodes	A, B, L, N, S, T	STP	10	8,000,000	80,000,000
91	STP Unand	Working table	A, B, L, N, S, T	STP	9	12,000,000	108,000,000
92	STP Unand	Comsol multy physic	A, B, L, N, S, T	STP	4	25,000,000	100,000,000
93	STP Unand	Current, high temperature, humidity and voltage sensors	A, B, L, N, S, T	STP	10	400,000	4,000,000
94	STP Unand	CCTV Camera	A, B, L, N, S, T	STP	10	7,000,000	70,000,000
95	STP Unand	Monitor 40 inches	A, B, L, N, S, T	STP	10	4,500,000	45,000,000
96	STP Unand	Monitor 32 inches	A, B, L, N, S, T	STP	10	3,200,000	32,000,000
97	STP Unand	Temperature sensor and arduino module	A, B, L, N, S, T	STP	10	1,000,000	10,000,000
98	STP Unand	Arduino motion sensor and module	A, B, L, N, S, T	STP	10	500,000	5,000,000
99	STP Unand	High performance PC	A, B, L, N, S, T	STP	8	13,500,000	108,000,000
100	STP Unand	Android based smart phone for mobile monitoring	A, B, L, N, S, T	STP	10	4,000,000	40,000,000

101	STP Unand	DAQ for highspeed data trasmission	A, B, L, N, S, T	STP	10	10,000,000	100,000,000
102	STP Unand	Thermal imaging sensor	A, B, L, N, S, T	STP	10	6,000,000	60,000,000
103	STP Unand	Single gas sensor (H2, O2, CO, CO2, O3)	A, B, L, N, S, T	STP	10	8,000,000	80,000,000
104		Multigas sensor	A, B, L, N, S, T	STP	8	14,000,000	112,000,000
105		mixer mill MM 500 nano	A, B, H, I, J, U	STP	2	135,000,000	270,000,000
106		Miseq (ilumina Platform)	C, D	Diagnostic and Integrated Research for Infectious Disease	1	2,065,000,000	2,065,000,000
107		BSC (Biosafety Cabinet)	C, D	Diagnostic and Integrated Research for Infectious Disease	3	77,000,000	231,000,000
108		Refrigerated centrifuge	A, B, C, D	Diagnostic and Integrated Research for Infectious Disease	1	129,300,000	129,300,000
109		DNA Hibridization	C, D	Diagnostic and Integrated Research for Infectious Disease	3	75,000,000	225,000,000
110		Gel Dock	C, D	Diagnostic and Integrated Research for Infectious Disease	2	185,000,000	370,000,000
111		Rapid Test Machine	C, D	Diagnostic and Integrated Research for Infectious Disease	1	250,000,000	250,000,000
112		DNA Sintizer	C, D	Diagnostic and Integrated Research for Infectious Disease	1	750,000,000	750,000,000
113		BSL-2 Plus	C, D	Diagnostic and Integrated Research for Infectious Disease	1	2,000,000,000	2,000,000,000
114		Microscope Inverted	C, D	Diagnostic and Integrated Research for Infectious Disease	5	42,000,000	210,000,000

A) Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;

B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
C) Non-COVID ILI Rapid Test Product Development;
D) COVID 19 Vaccine Product Development;
E) Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
F) Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;
G) Five COVID-19 Nanoparticle Technology Immunomodulators;
H) Therapeutic Technology for COVID-19 based on Herbal Products;
I) Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
J) Catechin-based Antibody and Stress Reduction Supplement Products;
K) Open-Source Ventilator Product Development;
L) CPAP (Continuous Positive Airway Pressure) Ventilator Product Development;
M) Digital Statoscope Product Development for COVID-19 Patients;
N) PPE (Personal Protective Equipment) Product Development for Infectious COVID-19;
O) Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services;
P) COVID-19 patient room disinfectant robot;
Q) Patrol robots suspecting COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients;
R) Wearable Sensors & Machine Learning in Handling COVID-19 Patients;
S) Powered Air Purifying Respirator;
T) Infectious Waste Incinerator Products with Plasma Pyrolysis;
U) Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom with Nanotechnology in the New Norm;

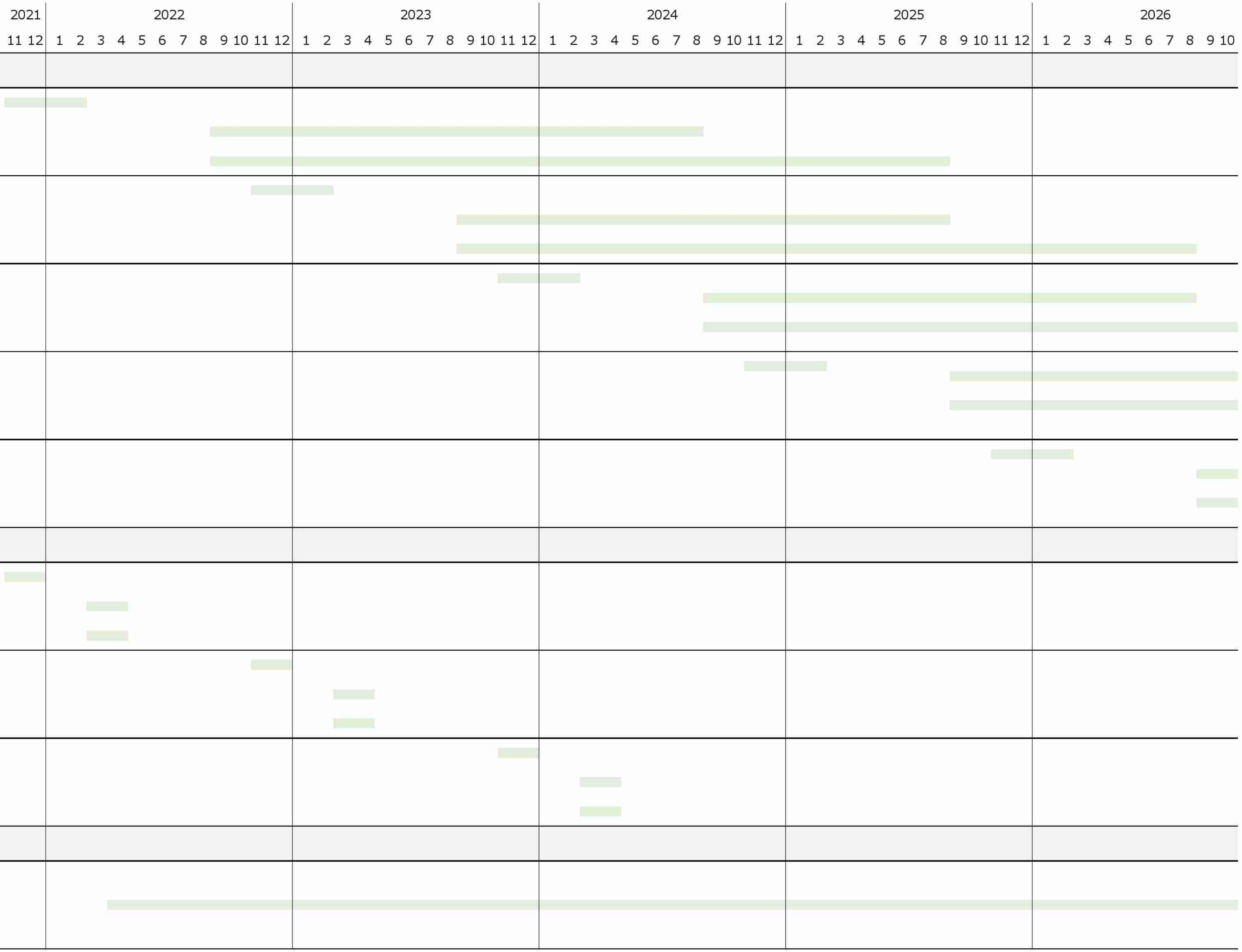
4. Expected Research Outcomes (Paper, Product, Patent, Human Resources etc.)

- Publishing papers and research outcomes under this project
- Commercialization of A) – U)’s products of Research Topics and holding a patent for each product
- Producing 48 master’s degree students, 32 Ph.D. students, 80 trainees for technical development and 135 trainees for managerial enhancement
- Dispatching 88 scholars from Andalas University to Japanese research institutes

5. Projected Research Outputs (Contribution to the society, economy etc.)

- Improvement of safety among medical practitioners
- Development of effective ways of prevention and treatment of COVID-19
- Improvement of public health
- Contribution to engineering technology/manufacturing industries in the field of health/medicine
- Boost-up of economy in Indonesia

Dispatch Schedule



Degree Program	Process	Number of Participants
Batch 1	Selection	35-40
	Dispatch (Master)	20
	Dispatch (Ph.D.)	15
Batch 2	Selection	15-20
	Dispatch (Master)	10
	Dispatch (Ph.D.)	5
Batch 3	Selection	10-15
	Dispatch (Master)	10
	Dispatch (Ph.D.)	5
Batch 4	Selection	5-10
	Dispatch (Master)	5
	Dispatch (Ph.D.)	5
Batch 5	Selection	1-5
	Dispatch (Master)	3
	Dispatch (Ph.D.)	2
Non-Degree Program	**Process**	**Number of Participants**
Batch 1	Selection	
	Dispatch (Adminis	56
	Dispatch (Technica	37
Batch 2	Selection	
	Dispatch (Adminis	35
	Dispatch (Technica	22
Batch 3	Selection	
	Dispatch (Adminis	44
	Dispatch (Technica	21
R&I		
	Research Collaboration with Japanese universities/institutes	80

Dispatch Schedule

					2027												2028												2029											
			11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Degree Program	Process	Number of Participants																																						
Batch 1	Selection	35-40																																						
	Dispatch (Master)	20																																						
	Dispatch (Ph.D.)	15																																						
Batch 2	Selection	15-20																																						
	Dispatch (Master)	10																																						
	Dispatch (Ph.D.)	5																																						
Batch 3	Selection	10-15																																						
	Dispatch (Master)	10																																						
	Dispatch (Ph.D.)	5	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩																												
Batch 4	Selection	5-10	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩																												
	Dispatch (Master)	5	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩																
	Dispatch (Ph.D.)	5																																						
Batch 5	Selection	1-5																																						
	Dispatch (Master)	3	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩																
	Dispatch (Ph.D.)	2	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩				
Non-Degree Program	Process	Number of Participants																																						
Batch 1	Selection																																							
	Dispatch (Adminis	56																																						
	Dispatch (Technic	37																																						
Batch 2	Selection																																							
	Dispatch (Adminis	35																																						
	Dispatch (Technic	22																																						
Batch 3	Selection																																							
	Dispatch (Adminis	44																																						
	Dispatch (Technic	21																																						
R&I																																								
	Research Collaboration with Japanese universities/institutes	80	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩									

Cost Breakdown of Human Resource Development

Desgree Program

1JPY: IDR 130.45

Master Degree

Fund Source	LPDP Scholarship (MoF)
Planned Number of Participants	Tentatively 48 allocated
Duration of the Program (Year)	2

Cost Item	Unit	Unit Cost		Total Cost	
		JPY	IDR	JPY	IDR
Application Fee	Once	At Cost (30,000)		30,000	
Tuition	Year	At Cost (1,000,000)		2,000,000	
Book Allowance	Year		10,000,000		20,000,000
Thesis Allowance	Once		30,000,000–150,000,000 (depen		150,000,000
Conference Allowance	Once		5,000,000–15,000,000 (depend o		15,000,000
Publication Allowance	Once		15,000,000–25,000,000 (depend		25,000,000
Visa Allowance	Once		At Cost (155,000)		155,000
Insurance Allowance (Travel Insur	Once		At Cost (700,000)		700,000
Insurance Allowance (NHI)	Month	At Cost (3000)		72,000	
Settlement Allowance (Equivalent	Once	155,000		155,000	
Monthly Allowance	Month	155,000		3,720,000	
Family Allowance (25% of Monthly	Month	38,750		930,000	
Airfare (Going)	Once		At Cost (10,000,000)		10,000,000
Airfare (Return)	Once		At Cost (10,000,000)		10,000,000
Total				6,907,000	230,855,000

Ph.D.

Fund Source	LPDP Scholarship (MoF)
Planned Number of Participants	Tentatively 32 allocated
Duration of the Program (Year)	3

Cost Item	Unit	Unit Cost		Total	
		JPY	IDR	JPY	IDR
Application Fee	Once	At Cost (30,000)		30,000	
Tuition	Year	At Cost (1,000,000)		3,000,000	
Book Allowance	Year		10,000,000		30,000,000
Thesis Allowance	Once		30,000,000–150,000,000 (Depen		150,000,000
Conference Allowance	Once		5,000,000–15,000,000 (Depend o		15,000,000
Publication Allowance	Once		15,000,000–25,000,000 (Depend		25,000,000
Visa Allowance	Once		At Cost (155,000)		155,000
Insurance Allowance (Travel Insur	Once		At Cost (700,000)		700,000
Insurance Allowance (NHI)	Month	At Cost (3,000)		108,000	
Settlement Allowance (Equivalent	Once	155,000		155,000	
Monthly Allowance	Month	155,000		5,580,000	
Family Allowance (25% of Monthly	Month	38,750		1,395,000	
Airfare (Going)	Once		At Cost (10,000,000)		10,000,000
Airfare (Return)	Once		At Cost (10,000,000)		10,000,000
Total				10,268,000	240,855,000

Non-Desgree Program

Administration Staff

Fund Source	ADB Fund
Planned Number of Participants	135
Duration of the Program (Week)	1-4 (depend on program activity)

Cost Item	Unit	Unit Cost		Total Cost	
		JPY	IDR	JPY	IDR
Program Fee	Once	At Cost (Up to 1,500,000/Person)		1,500,000	
Per Diem	Day	7,500		225,000	
Accommodation	Day	7,500		225,000	
Insurance (Travel Insurance)	Once	At Cost (Up to 10,000)		10,000	
Airfare (Round-trip)	Once	At Cost (Up to 250,000)		250,000	
Total				2,210,000	

Technical Staff

Fund Source	JPY Loan
Planned Number of Participants	80
Duration of the Program (Week)	1-4 (depend on program activity)

Cost Item	Unit	Unit Cost		Total Cost	
		JPY	IDR	JPY	IDR
Program Fee	Once	At Cost (Up to 1,500,000/Person)		1,500,000	
Per Diem	Day	7,500		225,000	
Accommodation	Day	7,500		225,000	
Insurance (Travel Insurance)	Once	At Cost (Up to 10,000)		10,000	
Airfare (Round-trip)	Once	At Cost (Up to 250,000)		250,000	
Total				2,210,000	288,294,500

Cost Breakdown of Research & Innovation

1JPY: IDR 130.45

Fund Source	JPY Loan
Planned Number of Participants	80

		Component/Cost Item	Unit	Unit Cost		# of implementation	Total Cost per Person		# of Participants	Total Cost per Program	
1. Automated Early warning detection syster				JPY	IDR		JPY	IDR	25	JPY	IDR
	Activity	Hosting conference	Once	383,289	50,000,000	2	766,577	100,000,000			
		Round-trip airfare	Once	229,973	30,000,000	2	459,946	60,000,000			
		Production of prototype fo	Once	613,262	80,000,000	1	613,262	80,000,000			
				0			0	0			
	Training	Lecture/facility usage/R&	Once	536,604	70,000,000	1	536,604	70,000,000			
		Round-trip airfare	Once	229,973	30,000,000	1	229,973	30,000,000			
Sub-Total				1,993,101	260,000,000		2,606,363	340,000,000		65,159,065	8,500,000,000
Cost Item and Unit Cost were not discussed for the following topics											
2. Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;									25		
3. Non-COVID ILI Rapid Test Product Development;									8		
4. COVID 19 Vaccine Product Development;									3		
5. Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;									2		
6. Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;									1		
7. Five COVID-19 Nanoparticle Technology Immunomodulators;									2		
8. Therapeutic Technology for COVID-19 based on Herbal Products;									1		
9. Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunos									2		
10. Catechin-based Antibody and Stress Reduction Supplement Products;									1		
11. Open-Source Ventilator Product Development;									6		
12. CPAP (Continuous Positive Airway Pressure) Ventilator Product Development;									1		
13. Digital Statoscope Product Development for COVID-19 Patients;									1		
14. PPE (Personal Protective Equipment) Product Development for Infectious COVID-19;									1		
15. Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services;									1		
16. COVID-19 patient room disinfectant robot;									1		
17. Patrol robots suspecting COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients;									1		
18. Powered Air Purifying Respirator;									1		
19. Infectious Waste Incinerator Products with Plasma Pyrolysis;									1		
20. Empowerment of COVID-19 IKM based on Technology Business Incubation (10 IKM)									2		
21. Business Gathering, Meeting & Promotion of COVID-19 Handling Products									2		
Total							2,606,363	340,000,000	88	65,159,065	8,500,000,000

Partnership / Agreement between Andalas University and Japanese Universities
Data Source: Ministry of Education Culture Sports Science and Technology, 2017

Japanese University		Agreement / Partnership / MoU	Contents of Agreement / Partnership / MoU									Total Number of		Credit Transfer				Double Degree				Joint Degree			
National/ Local Public/ Private	University	Name of Agreement / Partnership / MoU	Student exchange	Researcher exchange	Administrator exchange	Credit transfer	Double degree	Joint degree	Joint research	Tuition waiver for student exchange	Others	Dispatch from Japan	Dispatch from Andalas	From Japan (before 2018)	From Japan (2018)	From Andalas (before 2018)	From Andalas (2018)	From Japan (before 2018)	From Japan (2018)	From Andalas (before 2018)	From Andalas (2018)	From Japan (before 2018)	From Japan (2018)	From Andalas (before 2018)	From Andalas (2018)
National	Ibaraki University	Inter-University Academic Agreement	○	○	○							2													
National	Shinshu University	AGREEMENT for ACADEMIC COOPERATION AND EXCHANGE between SHINSHU UNIVERSITY, JAPAN and ANDALAS UNIVERSITY, REPUBLIC OF	○	○		○			○	○															
National	Shinshu University	MEMORANDUM OF UNDERSTANDING for EXCHANGE STUDENT between SHINSHU UNIVERSITY, JAPAN and ANDALAS UNIVERSITY, REPUBLIC OF	○			○				○															
National	Shinshu University	MEMORANDUM OF UNDERSTANDING for COOPERATION AND EXCHANGE IN RESEARCH between SHINSHU UNIVERSITY, JAPAN and ANDALAS UNIVERSITY, REPUBLIC OF INDONESIA		○					○																
National	Gifu University	Agreement on Student and Faculty Exchanges between Andalas University, Republic of Indonesia and Gifu University, Japan	○	○	○	○			○	○		2													
National	Gifu University	Memorandum of Understanding for Double PhD Degree Program between The Graduate Schools, Universitas Andalas, Republic of Indonesia and The United Graduate School of Agricultural Science, Gifu University, Japan	○				○			○															
National	Toyohashi University of Technology	Exchange Agreement	○	○	○				○				1			1									
National	Toyohashi University of Technology	Agreement Covering the Implementation of a Student Exchange Program	○			○				○			1			1									
National	Kyoto University	Memorandum of Understanding for Academic Exchange and Cooperatio between The Center for Southeast Asian Studies, Kyoto University, Japan and The Center for Biotechnology and Bioinformatics Studies, Andalas University, Indonesia		○					○																
National	Kyoto University	MEMORANDUM OF UNDERSTANDING FOR ACADEMIC EXCHANGE AND RESEARCH COOPERATION BETWEEN THE RESEARCH INSTITUTE FOR SUSTAINABLE HUMANOSPHERE, KYOTO UNIVERSITY, JAPAN AND THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES ANDALAS	○	○					○																
National	Kyoto University	Memorandum of Understanding for Academic Cooperation and Exchange between The Center for Southeast Asian Studies (CSEAS) Kyoto University, Japan and Faculty of Medicine Andalas University, Indonesia	○	○					○																
National	Kobe University	N/A (Inter-Faculty Agreement with Faculty of Medicine)	○	○					○																
National	Kobe University	N/A (Agreement on Student Exchange with Faculty of Medicine)	○			○				○															
National	Kobe University	N/A (Inter-Faculty Agreement with Faculty of Enginnering)	○	○					○																
National	Kobe University	N/A (Agreement on Student Exchange with Faculty of Engineering)	○			○				○															
National	Kobe University	N/A (Inter-Faculty Agreement with Agriculture)																							
National	Shimane University	AGREEMENT BETWEEN ANDALAS UNIVERSITY AND SHIMANE UNIVERSITY	○	○					○																
National	Shimane University	A SUPPLEMENTARY AGREEMENT FOR STUDENT EXCHANGE BETWEEN ANDALAS UNIVERSITY AND SHIMANE UNIVERSITY	○			○				○		1	4	1		4									
National	Shimane University	A SUPPLEMENTARY AGREEMENT FOR STUDENT EXCHANGE WITH DOUBLE DEGREE PROGRAM BETWEEN ANDALAS UNIVERSITY AND SHIMANE UNIVERSITY	○				○			○															
National	Okayama University	AGREEMENT OF COOPERATION BETWEEN ANDALAS UNIVERSITY REPUBLIC OF INDONESIA AND OKAYAMA UNIVERSITY JAPAN	○	○	○	○			○	○															
National	Okayama University	AGREEMENT OF COOPERATION BETWEEN ANDALAS UNIVERSITY REPUBLIC OF INDONESIA AND OKAYAMA UNIVERSITY JAPAN	○	○	○	○			○	○															
National	Kagoshima University	N/A	○	○	○	○			○	○			4			2	2								
Local public	Tokyo Metropolitan University	Memorandum of Agreement (MoA) Between Faculty of Mathematics and Natural Sciences, Andalas University, Republic of Indonesia and Graduate School of Science and Engineering, Tokyo	○	○					○																
Local public	Osaka City University	Agreement on Academic Exchange Between Andalas University, Indonesia and Osaka City University,	○	○					○	○			4												
Local public	Osaka City University	Agreement on Collaboration and Academic Exchange between Graduate School of Science, Osaka City University, Japan and Faculty of Mathmatics and Natural Sciences, Andalas University, Indonesia	○	○					○																
Local public	Prefectural University of Hiroshima	Academic Exchange Agreement Between Andalas University and Prefectural University of Hiroshima	○	○	○	○			○	○			1												
Local public	University of Kochi	Memorandum of Understanding between Andalas University and University of Kochi	○	○					○				2												
Local public	University of Kitakyushu	Agreement on Academic Exchange	○	○					○				1												
Private	Jichi Medical University	Agreement for Academic Colloaboration Between Jichi Medical University, School of Medicine and Andalas University, Faculty of Medicine	○	○					○																
Private	Hoshi University	Agreement on Academic Exchange Between Hoshi University, Japan and Andalas University, Indonesia	○	○																					
Private	Ritsumeikan University	Agreement of Cooperation	○	○					○																
Private	Kindai University	Memorandum of Understanding	○	○					○																

(a) Science and Technology Park (STP) in Indonesia

➢ Definition of Science and Technology Park (STP) and its function

Science and Technopark (STP) in Indonesia is official defined in Presidential regulation of The Republic of Indonesia No. 106 of 2017 as shown below,

"an area that professionally managed to develop and encourage sustainable economic growth through development, application of science and technology, and the growth of technology-based start-ups"

The purpose of establishment of STP is to develop and utilize science and technology to encourage economic growth in Indonesia. Main function of STP is;

- A tool for collaborative research and sustainable development between the Central government, Local Government, Universities, research Institute, and industries;
- Facilitator to increase the number of innovation-based companies through incubation and/or spin off;
- Provider of quality and value-added services

➢ Strategic developing plan of Science and Technology Park (STP) in 2015-2025[1]

Stage 1: 2015-2019

- Establishment of new Technopark (TP) and Science Park (SP)
- Strengthening of function of existing Technopark (TP）, Science park(SP) and National Science and Technology Park (N-STP)
- Mapping and evaluation system for Technopark (TP）, Science park(SP) and National Science and Technology Park (N-STP)
- Establishment of 22 Technopark (TP), Science Park (SP) and National Science and Technology Park (N-STP) as target number

Stage 2: 2020-2024

- Strengthening of function of Technopark (TP）, Science park(SP) and National Science and Technology Park (N-STP)
- Establishment of 50 ideal Technopark (TP), Science Park (SP) and National Science and Technology Park (N-STP)
- Initiation of establishment of other Science and Technology Park

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[1] Dr. Sri Setiawati, MA, Head of PUSPIPTE, "Technology Park and Incubator"

Stage 3: 2025 - after

- Establishment of total 100 of Technopark (TP）, Science park(SP) and National Science and Technology Park (N-STP)
- Evidence of contribution of Science and Technology Park to economic development

➢ **List of Science and Technology Park (STP) by administrative agency**

As of 2018, total 45 Science and Technology Parks were developed by different ministry and agencies. The table below shows a list of Science and Technology Park by different ministry and administrative agency.

Table: List of Science and Technology Park [2]（As pf 2018）

Name of Agency	Names of Science and Technology Park
Indonesian Institute of Science (LIPI)	Cibinong Science and Technology Park (S-STP), Techno Park Banyumulek-NTB
Ministry of Research, Technology, and Higher Education	PUSPIPTEK, **ITB Innovation Park**, UGM STP, STP IPB, ITS STP, University of Indonesia, UNPAD STP, Marine Science Techno Park (MSTP) UNDIP, UNAND STP, Solo Technopark, STP Sumatera Selatan, Science Park Kaltara, Science Park Prov. Papua, STP Puringbangtek, CCSTP Jember, Technopark Sragen, Sumbawa Technopark, Pondok Pusala TP Kaur Bengkulu
BATAN (National Nuclear Agency)	NSTP Nuclear Area Pasar Jumat, Agro Techno Park (ATP) Klaten, ATP Musi Rawas, ATP Polewali Mandar
BPPT (Agency for The Assessment and Application of Technology)	Cimahi Techno Park, Techno Park Grobogan, Techno Park Bantaeng, Techno Park Pelalawan, Baron Techno Park, Technopark Pelalongan, Techno Park Penajam Paser, Techno Park Lampung Tengah
Ministry of Industry	Bandung Techno Park, Tohpati Centre-Bali, Digital Science Technopark-Semarang, Batam Technopark, ICT Center of excellence-Sulawesi Selatan
Ministry of Agriculture	BPTP Lampung, Balingtan-Jawa Tengah, BPTP Sulteng, Bogor Agro Science Techno Park, Balitra-Kalimantan Selatan, Sulawesi Selatan Science Park, Cirebon Science Park, Taman Sains Enjiniring Pertanian-Banten

（Reference: Dr. Sri Setiawati, MA, Head of PUSPIPTE, “Technology Park and Incubator”）

(b) ITB Innovation Park

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[2] Names of Ministry and administrative agency in the table is used the names as of 2018

As an example of Science and Technology Park, “ITB Innovation Park” which is located under Institute of Technology Bandung. The ITB Innovation Park is designed as a hub to promote the Institute of Technology Bandung's collaboration with industry and the local community, and is managed and operated by Institute for Innovation and Entrepreneurship Development ITB (LPIK-ITB)[3]. Researchers and students in Institute of Technology Bandung utilize the ITB Innovation Park in collaboration with Institute for Innovation and Entrepreneurship Development ITB to implement innovative research and to commercialize their research outputs into Indonesians society. Therefore, the ITB Innovation Park also has a function as a strategic industry-academia collaboration center of Institute of Technology Bandung.

- <u>Organization of Institute for Innovation and Entrepreneurship Development ITB</u>

Institute of Technology Bandung has established Institute for Innovation and Entrepreneurship Development ITB to promote collaboration with industry (industry-university collaboration) and local communities and the implementation of research outcome into Indonesian society. Institute for Innovation and Entrepreneurship Development ITB has organized five administrative divisions to manage and operate various activities to promote innovation and social implementation in universities, as shown in the table below.

Organization of Institute for Innovation and Entrepreneurship Development ITB

Name of administrative division	Task
Secretary of Innovation	• Innovation Research Management • Innovation Research Collaboration • Industry Collaboration
Secretary of Entrepreneurship & Business Incubation	• Coordinate Entrepreneurship Development Program • Innovation Entrepreneurship System (IES)
Committee of Innovation	• Consist of ITB and Industry Expert • Selection Process of Innovation ITB Program • TRL Evaluation
Committee of Intellectual Property	• Consist of ITB and Industry Expert • Patent Evaluation of ITB’s Products • Encourage Patent Commercialization
Head of Monitoring, Evacuation and Budget	• LPIK-ITB’s Program Monitoring • Monitoring and Evaluation of ITB Innovation Research Program • Technology Implementation program

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[3] https://lpik.itb.ac.id/division

- <u>Educational program and service supported by LPIK-ITB</u>

Institute for Innovation and Entrepreneurship Development ITB implements various programs and provides services related to the development of innovation, including commercialization training support, entrepreneurship training programs, intellectual property rights awareness programs, and the development of an innovation ecosystem in Institute of Technology Bandung.

1. Business Incubator & Accelerator
    - Startup Development
    - Socialize and Promotion ITB's Innovation
    - Business planning for Start-up
    - Entrepreneurship collaboration and Networking
    - Business and innovation consultancy
2. Entrepreneurship Development
    - Entrepreneurship curriculum and Networking
    - Entrepreneurship seminar, workshop and exhibition
    - Collaboration program with SMEs, Industries and Government
    - Business coaching and consultancy
    - Post-graduate fellowship
3. Technology Transfer Office
    - ITB's Innovation data collection
    - Socialization and Consultation for Intellectual Property Right (IPR)
    - Training and tracking of IPR
    - IP registration assistance
    - IP licensing
    - Regulation development for IPR in ITB
    - Legal consultancy for Entrepreneurship, Business and Technology
4. Innovation Park
    - Identification of industrial potential
    - Networking Program and Innovation Ecosystem
    - Innovation Park (Clustering)
    - Innovation Gallery/Showcase of ITB

- <u>Status of Industrial-academic collaboration managed by LPIK-ITB</u>

As of November 2021, the Institute of Technology Bandung has produced 134 startups, 751 Intellectual Property Rights and 205 innovative research projects in various fields such as ICT, digital services, health and food, life sciences, energy and environment.[4]

(1) Number of Startup company developed through LPIK-ITB

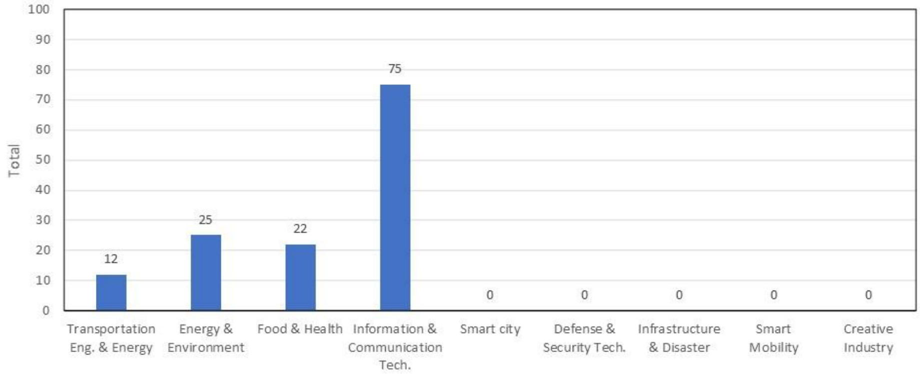

Figure: Number of Startup company developed through LPIK-ITB by industrial cluster
（as of November 2021）

Institute for Innovation and Entrepreneurship Development ITB organizes program to support business incubation and acceleration, entrepreneurship development as well as events to connect start-ups with investors and venture capitalists in order to access funding for their operations. The above figure shows the number of Startup company developed through Innovation and Entrepreneurship Development ITB by industrial cluster. The number of start-ups has been increasing every year, reaching 134 startups in November 2021. The Information & Communication Technology sector had the highest number of start-ups with 75, followed by Energy & Environment, Food & Health and Transportation Engineering & Energy.

(2) Status of Intellectual Property Rights through LPIK-ITB

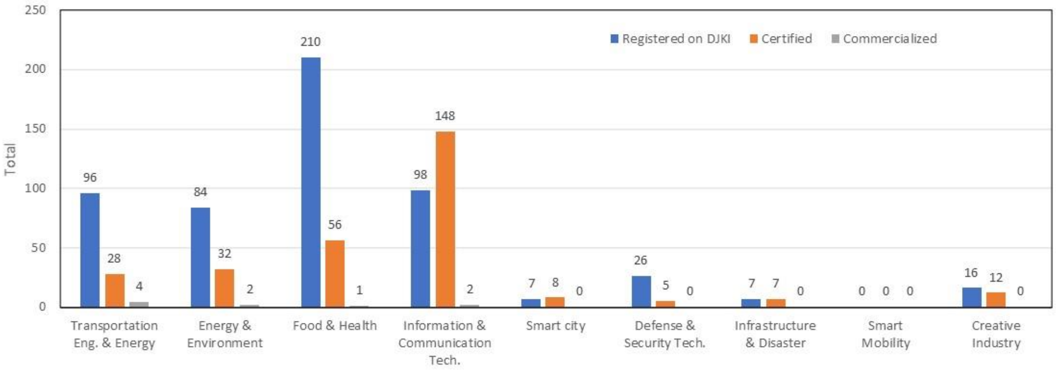

Figure: Number of Startup company developed through LPIK-ITB by industrial cluster

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[4] https://lpik.itb.ac.id/

(as of November 2021)

Innovation and Entrepreneurship Development ITB operates and manages the various intellectual property rights created by ITB's research results in accordance with Indonesian legal regulations on intellectual property rights. The support services include licensing and promotion of startups, negotiation of cooperation and contracts, and royalty collection.

Figure above indicates that the number of Intellectual Property Rights by industrial cluster. IPRs are categorized base on 3 kinds of status; "Registration", "Certified" and "Commercialized". It is confirmed from the figure that IPRs have been registered and certified in all sectors except Smart Mobility. However, the number of IPRs that have been commercialized are quite limited, 4 IPRs for Transportation Eng. & Energy, 2 IPRs for Energy & Environment, 1 IPR for Food & Health, and 2 IPRs for Information & Communication Technology, respectively.

(3) Number of Innovative research

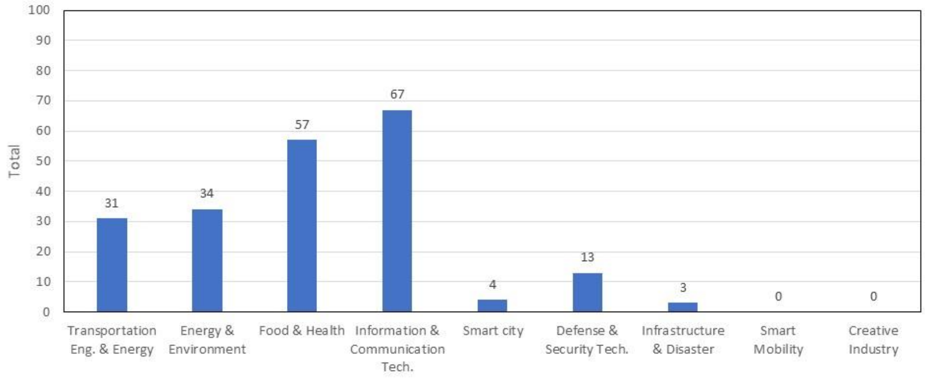

Figure: Status of innovation research for each cluster (as of November 2021)

Innovation and Entrepreneurship Development ITB supports Institute of Technology Bandung to promote the development of innovation through the research outcomes by introducing the research outputs to the stakeholders involved in the development of innovation such as academia, industry, and government. The status of innovation research implementation for each cluster registered with Innovation and Entrepreneurship Development ITB is shown in the figure above. The Figure show that research in Information & Communication Technology and Food & Health has been conducted more in compare with other research fields. In addition, the result indicates that there is a high need for research in Information & Communication Technology and Food & Health in Indonesian industry.

(List of Startup companies developed by LPIK-ITB)

LPiK ITB's Startups

No.	Year	Name	Field	Cluster
1	2005	PT. Cipta Tani Lestari	Bio Gas (Kotoran Sapi) - Sampah Organik	Energy and Environment
2	2004	PT. Lorco Menara Multimedia	Multimedia (Kesehatan & Keselamatan kerja)	Food & Health
3	2005	PT. Great	Pembangkit listrik mikro hidro	Transportation Engineering & Energy
4	2003	PT. Clarisen Digital Media	Elektronik (Perangkat telekomunikasi)	Information & Communication Technology
5	2009	CV. Grand Manufacturing Indonesia	Manufaktur	Transportation Engineering & Energy
6	2009	PT. T-Files Indonesia	Turbin Arus Laut	Energy and Environment
7	2011	CV. Artmadilaga	Seni Rupa, Desain dan Kriya	Information & Communication Technology
8	2011	Miko Pangan Utama	Pengolahan Jamur Tiram	Food & Health
9	2009	PT. Indismart Kreatif Media	E-learning	Information & Communication Technology
10	2009	CV. Motekar Fraktik	Fashion	Information & Communication Technology
11	2008	PT. Ganesha Astro Media	Pelatihan olimpiade Science	Information & Communication Technology
12	2013	PT. Labtek Ganesha Utama	Alat Pemantau Kualitas Udara	Information & Communication Technology
13	2013	CV. Lazuli Sarae	Batik Denim	Information & Communication Technology
14	2013	RaZha	Busana Muslim	Information & Communication Technology
15	2013	PT. Indihealth	Aplikasi Kesehatan "Mobile"	Information & Communication Technology
16	2013	Klungbot	Angklung Robot	Information & Communication Technology

No.	Year	Name	Field	Cluster
17	2013	Ruang Kreative Aksara	Web Design	Information & Communication Technology
18	2013	Batik Geek	Aksesoris Motif Batik	Information & Communication Technology
19	2013	CV. Far A Bit	Busana	Information & Communication Technology
20	2013	Noir Design	Interior Design	Information & Communication Technology
21	2013	Rcyl Project Chloting	Busana	Information & Communication Technology
22	2013	Roemah Sepatu	Busana	Information & Communication Technology
23	2013	Sakinah Gallery	Busana	Information & Communication Technology
24	2013	Violatama Adhiarsa	Busana	Information & Communication Technology
25	2013	Satya Abadi Utama (SAU)	Aksesoris	Information & Communication Technology
26	2013	Era Abadi Vision	Video Shooting	Information & Communication Technology
27	2013	Nuzul Mobile	Mobile Apps	Information & Communication Technology
28	2013	Nugget Putra	Makanan	Food & Health
29	2013	P&P Baby Toddler	Makanan Bayi	Food & Health
30	2013	Rumah Jamur Sariwangi	Budi daya jamur tiram	Food & Health
31	2013	Idea Production	Video Profile	Information & Communication Technology
32	2013	Virtuosity	Game Apps dan Creative Design	Information & Communication Technology
33	2014	Gerobak Juara	Booth Creative and Design	Information & Communication Technology

No.	Year	Name	Field	Cluster
34	2014	Matcha/Eduindo	Game Matematika untuk SD-SMA	Information & Communication Technology
35	2014	Adhmora	Audit Energy	Energy and Environment
36	2014	Garam Manis	Produksi Garam	Food & Health
37	2014	Zoey	Fashion Design	Information & Communication Technology
38	2015	Food Lab	Pengolahan Sampah	Energy and Environment
39	2015	Gelatik	Desain Interior	Information & Communication Technology
40	2015	Membleu	Desain Furniture	Information & Communication Technology
41	2015	Active Learning Club	Edukasi	Information & Communication Technology
42	2015	Vendorpedia	TIK	Information & Communication Technology
43	2015	KINETIK	Manufaktur	Food & Health
44	2015	LANCE	Smart Payment and Identity	Information & Communication Technology
45	2015	Smart Mobility	Smart transport and parking	Information & Communication Technology
46	2015	Smart energy & Building	Smart City	Information & Communication Technology
47	2015	INSITEK	Floating BTS dengan Ballon	Transportation Engineering & Energy
48	2015	SOROT	Smart Online Reporting and Observatory Tools	Information & Communication Technology
49	2016	PT. Tesla Daya Elektrika	Alat Proteksi Petir	Energy and Environment
50	2016	Winaafi	Platform Sembako	Information & Communication Technology
51	2016	BIOPS Agrotekno	Aplikasi Pertanian	Information & Communication Technology

No.	Year	Name	Field	Cluster
52	2016	Novo Svara	Aplikasi Radio	Information & Communication Technology
53	2016	Eragano	Aplikasi Pertanian	Information & Communication Technology
54	2016	Greenliving Indonesia	Briket	Energy and Environment
55	2016	Protek Solution	Tabung Gas Komposit	Energy and Environment
56	2016	Bos Pengering	Alat Konversi Listrik	Energy and Environment
57	2016	PT. Lakon (Lumen Helpdesk)	Apps Chatbot untuk Smart City	Information & Communication Technology
58	2016	Bilik Gaya	Aplikasi Virtual Fitting Room	Information & Communication Technology
59	2016	Argonavisia	Aplikasi Pariwisata	Information & Communication Technology
60	2016	Technozone	Alat Purefikasi Air dengan Ozone	Food & Health
61	2017	Agro Tech	Remote Sensing untuk Pertanian	Information & Communication Technology
62	2017	Clyck Backpack	Tas Ergonomis Anak	Food & Health
63	2017	Innotoma-Tech	Precision farming	Energy and Environment
64	2017	PT. Akselerasi Edukasi International (Learnee)	Aplikasi Financial Technology di bidang investasi dan pembelajaran	Information & Communication Technology
65	2017	Smart Suporting System (SSS)	Aplikasi bisnis untuk akuntansi sederhana	Information & Communication Technology
66	2017	My Clynical Pro	Aplikasi untuk e-health klinik	Information & Communication Technology
67	2017	Mycotech	Material bahan bangunan dari limbah pangan	Energy and Environment
68	2017	Sensor Teknologi Indonesia	Alat pemantau kualitas udara	Energy and Environment
69	2017	Dettacare	Aplikasi kesehatan	Information & Communication Technology

No.	Year	Name	Field	Cluster
70	2017	Intelligent Transportation System (ITS)	Aplikasi integrasi trasnportasi	Information & Communication Technology
71	2017	Rumanaga Indonesia	Pra-febrikasi bahan bangunan dari bambu	Energy and Environment
72	2017	Bio Promars Karya	Kosmetik dan obat dari propolis	Food & Health
73	2017	Alami Group	Rumah kayu modular	Energy and Environment
74	2017	Acritudo	IoT untuk rumah dan bangunan	Energy and Environment
75	2017	Freshnery	Pangan olahan dari jamur	Food & Health
76	2017	Avion	Pesawat Glider AVION GL-1	Transportation Engineering & Energy
77	2017	Airnetra	Kamera untuk drone	Information & Communication Technology
78	2018	ReadyDok	Sistem Manajemen Klinik dan Pasien	Food & Health
79	2018	Kargo In	Aplikasi kargo dan logistik	Transportation Engineering & Energy
80	2018	Conventory	Sistem Manajemen Inventori	Transportation Engineering & Energy
81	2018	CLOID	Bahan Kimia Elektroplating PCB	Energy and Environment
82	2018	Mayciz	Keju olahan dari susu jagung	Food & Health
83	2018	Lnpoint	Booking platform	Information & Communication Technology
84	2018	Lokapoin	Sustainable Tourism	Information & Communication Technology
85	2018	SyarQ	Cicilan Syariah	Information & Communication Technology
86	2018	FEROFFEE	Fermented Coffee	Food & Health
87	2018	Biorefinery Society (BIOS)	BSF untuk Pakan Ikan	Food & Health
88	2018	eHealth ID	Rekam Medis Digital	Food & Health
89	2018	iROS Tech	Robot	Information & Communication Technology

No.	Year	Name	Field	Cluster
90	2018	PT. Prosa Solusi Cerdas	Teknologi Artificial Intelligence untuk NLP, Chatbot dan Hoax Analyzer	Information & Communication Technology
91	2018	Neurafarm	Aplikasi Pendeteksi Penyakit Tanaman	Information & Communication Technology
92	2018	Ramdoo Electronics	Otomatisasi Charger Laptop dan HP	Information & Communication Technology
93	2019	Coating Republic	Innovative Coating	Transportation Engineering & Energy
94	2019	Bells Society	Lembaran selulosa mikroba	Energy and Environment
95	2019	Resikel Termal Teknindo	Pengelolaan sampah dan limbah	Energy and Environment
96	2019	Tech Prom Lab	Paving block berpori	Transportation Engineering & Energy
97	2019	Eduxa	Education platform untuk pelatihan perusahaan	Information & Communication Technology
98	2019	Imperia Dirgantara	Aerial survey dan pengolahan data informasi geospasial	Transportation Engineering & Energy
99	2019	Biomed Project	Alat Elektromiografi (EMG biofeedback)	Food & Health
100	2019	S-MART	POS untuk warung tradisional	Information & Communication Technology
101	2019	Learncy Education	Education platform dengan konsep gamifikasi	Information & Communication Technology
102	2019	Laboratorindo Global Scientific	Platform digital pengadaan peralatan lab dan bahan kimia serta jasa analisis lab	Information & Communication Technology
103	2019	Rekacipta Bioteknologi Indonesia	Vaksin Hepatitis B	Food & Health
104	2019	Hasta Karya Nusantara	Traditional Art Craft	Information & Communication Technology
105	2019	Khaira Power	Solar PV-Based Home Battery System	Energy and Environment
106	2019	Caterin	Aplikasi Pemesanan Makan Siang	Food & Health Information & Communication Technology

No.	Year	Name	Field	Cluster
107	2019	PT. Agrikultura Investama Sedaya	Bio-Organic Fertiliser	Energy and Environment
108	2019	JOINT	Prostetik 3D Printing	Food & Health
109	2019	Kidz Adventura	Platform Social Enterprise untuk Pendidikan Anak	Information & Communication Technology
110	2019	PT. Mounev Inovasi Bangsa	Learning Management System	Information & Communication Technology
111	2019	Chatbiz	Chatbot untuk UMKM	Information & Communication Technology
112	2019	PT. Berkah Inovasi Nusantara (Invest Properti.id)	Platform Investasi untuk Real Estate	Information & Communication Technology
113	2019	RedBeard	Pakan untuk Ternak Ikan	Energy and Environment
114	2019	PT. Teknika Media Okuler (Plepah)	Substitusi wadah makanan dari limbah pohon pinang	Energy and Environment
115	2019	Plastikinia	apliksi pengelolaan sampah yg fokus pada sampah plastik	Energy and Environment
116	2019	PastDean	Aplikasi untuk membantu proses desain dan analisis struktur perkerasan lentur dan kaku untuk umur rencana tertentu	Transportation Engineering & Energy
117	2019	Hardtmann-Mekatroniske	perusahaan konsultan untuk pembuatan prototype, MVP dan produksi massal produk	Transportation Engineering & Energy
118	2019	NASHO	cairan anti air dan embun untuk kaca helm menggunakan nanoteknologi untuk membuat cairan ini dapat menyerap pada permukaan kaca helm dan bertahan lebih lama	Food & Health
119	2019	PT Jasaloka Kreativa Mandiri (EOLA+)	platform online untuk integrasi EO dan individu yang akan mengadakan event	Information & Communication Technology
120	2019	Sekalawi	brand yang bergerak dibidang pengembangan kerajinan daerah Indonesia dengan berfokus pada pengembangan kerajinan batik tulis Kaganga	Information & Communication Technology

No.	Year	Name	Field	Cluster
121	2019	IDEALAB	start-up yang berfokus pada pengembangan produk yang memberdayakan masyarakat yang hidup dalam kondisi sumber daya terbatas dan disabilitas	Food & Health
122	2019	Auxulium Tannaga	jasa berbasis website yang menawarkan kemudahan di dalam proses pembuatan sebuah surat. Auxilium menyediakan berbagai template surat berdasarkan sektor bisnis yang ada di Indonesia.	Information & Communication Technology
123	2019	Risiko.ID	platform terbuka dan independen untuk model risiko bencana Indonesia	Energy and Environment
124	2019	Sportigo	Spotigo merupakan platform aplikasi mobile pada industri sepak bola. sportigo dapat digunakan untuk mencari lawan bermain futsal/ sepak bola.	Information & Communication Technology
125	2020	Locarvest	Marketplace hasil produk pertanian dan makanan segar	Information & Communication Technology
126	2020	Brodewijk	Startup fashion-tech pembuat pakaian formal pria secara online	Information & Communication Technology
127	2020	WiseWaste	Startup di bidang manajemen pengelolaan sampah	Energy and Environment
128	2020	GoriTeknik	Statup digital yang menyediakan jasa mebel berdasarkan desain dari konsumen	Information & Communication Technology
129	2020	PT Klik Trip Indonesia (KlikTrip)	Robo-travel technology untuk wisatawan	Information & Communication Technology
130	2020	Edulens	Learning Management System	Information & Communication Technology
131	2020	Hearo	platform untuk mendengarkan dan komunitas radio online	Information & Communication Technology

No.	Year	Name	Field	Cluster
132	2020	Studio Siku (Mora)	modul renovasi yang akan memandu agar budget, jadwal, dan kualitas renovasi rumah terjamin	Transportation Engineering & Energy
133	2020	Volvvd Design	perusahaan yang bergerak pada bidang jasa dan konsultan desain teknik, simulasi model dengan metode elemen hingga, dan pembuatan prototipe	Information & Communication Technology
134	2020	GP Starlight (Lokatara Filamen)	filamen 3D printing dari limbah plastik	Energy and Environment

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
(Kemristek/BRIN-JICA)
Indonesia

FEASIBILITY STUDY REPORT
(FIRST DRAFT)

Version January 8, 2021

Ministry of Research and Technology /
National Research and Innovation Agency (Kemristek/BRIN)

Japan International Cooperation Agency (JICA)

Non-Profit Organization Asia SEED/Oriental Consultants Global Co., Ltd.

Preface

The Feasibility Study for "Higher Education and Research Facility Development: Research and Innovation Capacity Development Project (Kemristek/BRIN-JICA), Indonesia" has been conducted since November 2020 by Japan International Cooperation Agency (JICA) to support of Kemristek/BRIN's project formation aiming for emergency corresponding to COVID-19 in Indonesia. The Study was implemented as a part of on-going "JICA Data Collection Survey on Higher Education and Vocational Education", prepared by the consultants of Asia SEED and Oriental Consultants Global assigned by JICA, with great collaboration and inputs of Indonesian project formation group members, Kemristek/BRIN, Eijkman Biomolecular Institute, Universitas Andalas and National Atomic Nuclear Institute (BATAN), and JICA

This report is a "First Draft" of the Feasibility Study. Still lots of data collection, clarifications and revisions are needed to complete through the series of discussion with the Indonesian project formation group members and JICA.

8 January 2021
Masahiro Hamano
Chairman
Non-Profit Organization Asia SEED

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Abbreviations and Acronyms

(Chapter 1) Background and Necessity of the Project

1.1 Background of the Project

At present, Indonesia's capacity for adoption of science and technology and innovation creation is still low. Indonesia is ranked 85th out of 129 countries with a Global Innovation Index (GII) score of 29.72

on a scale of 0-100 (2019). This is due to the low R&D spending on GDP, the number of patents, and scientific and technical publications at the global level. In addition, the R&D infrastructure is still limited. The number of science and technology human resources is still limited and only 14.08 percent of them qualify for S3.

The innovation ecosystem has not been fully created so that the downstream process and the commercialization of R&D results are hampered. The triple helix collaboration has not been supported by adequate capacity of R&D institutions and universities as a source of technological innovation (center of excellence).

In line with the 4.0 industrial revolution, Indonesia needs to accelerate the pace of innovation as a driver of sustainable economic growth. This situation became increasingly important when the Covid-19 Pandemic occurred. At that time, it was realized that Indonesia's research and innovation in the health sector was very inadequate. Indonesia's ability to handle the Covid-19 Pandemic is severely hampered due to various shortages and unavailability of various equipment, medicines, therapies, monitoring systems, etc. which is very necessary.

1.2 Research and Innovation Consortium for Covid-19

In March 2020, Kemenristek BRIN has made a breakthrough with the Research and Innovation Consortium for Covid-19 by evoking the spirit of research and innovation by various parties in an integrated manner. Within 3 months, consortium participants (Ministries, LPNK, PT, private sector, hospitals, local governments, etc.) have produced more than 58 innovations that are very useful in handling Covid-19, and were launched by the President of the Republic of Indonesia on 20 May 2020.

In an effort to deal with Covid-19, LBM Eijkman, Andalas University and BATAN have shown their leadership in conducting various research and innovations. LBM Eijkman plays a very important role, among others, in the detection process of Covid-19 through PCR swab results in his BSL 3 laboratory, vaccine research for Covid-19, plasma convalescence research, whole genome sequencing. Meanwhile, Andalas University became the center of public health for West Sumatra during the Covid-19 Pandemic by using the BSL 2 laboratory owned and a series of research and public health services provided. On the other hand, BATAN is carrying out various studies that support the creation of an innovation ecosystem for Covid-19 and food security, for example the use of gamma irradiation for the Sterilization of the Antiserum from the Covid-19 Inoculation in the context of developing Igy's antiserum

LBM Eijkman is a unit that is currently part of the Ministry of Research, Technology and Higher Education which has been planned to be developed into an independent STP in the Strategic Plan of the Ministry of Research, Technology, and Technology 2020-2024. Meanwhile, Andalas University and BATAN have planned to develop STP (in different maturity stages) from 2015-2019. When the three of them showed extraordinary performance in handling Covid-19, accelerating the realization of LBM Eijkman, Andalas University and BATAN to become independent STPs with a focus on the health sector became a high priority.

1.3 Present Condition of Leading Research Institutions

So far LBM Eijkman has been active in the biomolecular field in a spectacular manner and is very attractive to foreign researchers. However, the place where LBM Eijkman is currently still rides from buildings and land belonging to the Ministry of Health. The Eijkman Institute is located in the RSCM area, which belongs to the BHMN Ministry of Health. RSCM requested the return of the Eijkman Institute's historic building for use. In addition, there is limited space for expansion, cannot expand activities, cannot add human resources or new state-of-the-art facilities. With the construction of LBM Eijkman, it is hoped that LBM Eijkman will have an international standard research and innovation venue as an international standard STP in the biomolecular field that participates through research and innovation in maintaining world health.

Andalas University (Unand) has shown a strategic role in providing public health services during the Covid-19 Pandemic for the people of Sumatra Island. The availability of these services is mainly supported by research and innovation that has been carried out by Unand, in the fields of Food, Natural Medicine and Nutrition, and Health Equipment and Ingredients, with the third largest number of registered patents in Indonesia. It is hoped that later STP Andalas University in the field of public health can become the main service in the field of public health at the national and international levels.

For BATAN, the role of BATAN in research, innovation and dissemination of nuclear technology for the fields of health, agriculture and food, and industry is very important as the vanguard technology in people's lives. Currently, socialization in society is needed, in addition to research and innovation in nuclear technology. Therefore, the development of BATAN into STP in the field of nuclear technology for health, agriculture and food, as well as industry is very important in the framework of developing innovation and vanguard technology in the nuclear field in Indonesia.

1.4 Government Policies

Priority Programs (PP) / Priority Activities (KP) / Priority Projects (ProP) / Projects in the 2020-2024 RPJMN related to the proposed activities:

- In the 2020-2024 RPJMN, it is stated that strengthening the process of economic transformation in order to achieve development goals in 2045 is the main focus in order to achieve better infrastructure, quality of human resources, public services, and people's welfare.
- In the 2020-2024 RPJMN, it is stated that it will be a priority for the government to improve disease control, with special attention to emerging diseases, diseases that have the potential to cause extraordinary events. In particular, the Covid-19 Pandemic has intensified research and innovation in the health sector for handling Covid-19. The Eijkman Institute, Andalas University, and BATAN have shown a central role in the efforts to screen the infected population as well as basic research to vaccine development. Therefore, it is imperative to strengthen institutions, human resources, and basic infrastructure and research of LBM Eijkman, Andalas University, and BATAN to become a center for research, development, study and application of international standard scientific and technological innovation in the health sector based on the triple helix in national and international networks.
- Priority Programs (PP) / Priority Activities (KP) / Priority Projects (ProP) / Projects in the 2020-2024 RPJMN related to the proposed activities:

- The Ministry of Research and Technology / National Research and Innovation Agency was formed based on Presidential Decree No. 74/2019 with the main task of carrying out research, development, assessment and application, as well as integrated invention and innovation, as well as creating a research ecosystem, a good research culture for researchers and encouraging the birth of various innovations in the Indonesian nation that have a broad impact on society.
- In the 2020-2024 Kemristk/BRIN Strategic Plan, this program is included in the category of Increasing Research and Innovation Ecosystem Acceleration (strengthening collaboration), which is expected to be achieved in 2024 through Improving the Quality of Science and Technology Human Resources, Strengthening Economic Transformation, and Sustainable Development for Increasing Competitiveness, which is realized in:
    - Quality Improvement of Research and Development Institutions
    - Strengthening the Main Science Techno Park (STP)
    - Strengthening the Innovation Cluster as a Triple Helix Collaboration Vehicle (or Quadruple-Helix and so on)
    - Increased Percentage of Successful Technology Incubators
    - Increase in the number of publications and citations
    - Increased Number of Patents Granted
- The development of STP in the health sector is one of the Ministry of Research and Technology's portfolios as stated in one of the Ministry of Research, Technology and Technology's missions,

namely: Increasing Science and Technology Capability and Creating Innovation through Improving the Quality of Science and Technology Human Resources, Strengthening Economic Transformation, and Sustainable Development for Increasing Competitiveness with strategic targets (SS.1 .): Increasing the Productivity of Inventions and Innovations to Strengthen a Competitive and Sustainable Economic Transformation. The existence of the STP in the health sector is a vehicle that can play a role in realizing the mission and strategic objectives of the Ministry of Research, Technology and Technology.

- The development of STP in the health sector is an effort to support the achievement of capacity building for National Research which includes the quantity and quality of Science and Technology Resources, increasing the relevance and productivity of research and the role of stakeholders in research activities, and increasing research contributions to national economic growth, as targets listed in The National Research and Innovation Master Plan, and is based on Law Number 11 of 2019 concerning the National System of Science and Technology.
- At the stage of development and construction of STP in the health sector, as well as research and innovation, local governments who can be involved:
    - Jabodetabek regional government for LBM Eijkman
    - Local government of West Sumatra City of Padang for Andalas University
    - South Jakarta local government for BATAN.
    - Local Government involvement: licensing, research collaboration, hospital collaboration, AMDAL.

1.5 Necessity of the Project

Through the Higher Education Development Program and Research Facilities: Research Capacity and Innovation in collaboration between the Ministry of Research, Technology and JICA, it is hoped that Indonesia can:

1) Develop STP in the international health sector which can become a global innovation hub for research and innovation in the health sector
2) Developing Indonesia's ability to innovate in the health sector as one of the economic drivers (increasing added value, import substitution, increasing TKDN, and frontline innovation).
3) Developing dynamic, productive, skilled human resources, mastering science and technology supported by industrial cooperation and global talents, in the health sector.

Specifically, the expected services are:

a. LBM Eijkman has a function as a government agency that performs:

1) Conducting research, development and application of molecular biology science and technology in various sectors such as health / medicine, forestry, environment, and defense and security;
2) Study and formulation of policy recommendations (biopolicy) on national research, development and application of molecular biology science and technology in various sectors;
3) Guidance and facilitation of research, development and application of molecular biology science and technology for related research and educational institutions;
4) Development of molecular biology capabilities in Indonesia by becoming a reference center and main node for national and international cooperation networks.

b. Andalas University

1) Conducting research, development and application of science and technology in the field of public health;
2) Providing public health services in the Sumatra region
3) Become a reference for research and innovation in the field of public health in national and international network nodes

c. BATAN

1) Nuclear science and technology dissemination services by emphasizing the principles of utilization, safety and security in the fields of health, agriculture and food, as well as industry

2) Carry out the promotion of the results of nuclear science and technology R&D in the fields of health, agriculture and food, as well as industry with the support of effective and reliable media
3) Carry out strategic partnerships for the use of nuclear science and technology products in the fields of health, agriculture and food, as well as industry supported by technoeconomic studies

In particular, based on data from the Ministry of Research, Technology and Higher Education in 2018, the total population of researchers reached 8,734 and engineers 2,464 people, with a total of 1,430 having doctoral qualifications, while in accordance with the RPJMN 2020-2024 target, in 2024, Indonesia must have at least 2,240 researchers / S3 qualified engineer. This means that there is still a shortage of qualified science and technology human resources of at least 810 researchers / engineers (assuming zero growth) per million of the population. In order for Indonesia to develop an innovation-based economy, the existence of human resources for researchers is very much needed, equipped with intermediary technology personnel who are also needed. Thus, this program is not only the development of infrastructure and provision of infrastructure, but also the provision of human resources in their respective fields (bimolecular, public health, and nuclear for health, agriculture and food, and industry.

A long term framework for the development of each STP already exists, however, in general, health sector development is one of the national priorities through various strategies including national research. This became even more important when the Covid-19 Pandemic occurred.

In the Ministry of Research and Technology's Strategic Plan for National Agency for Research and Innovation 2020-2024, this program is included in the category of Increasing Research and Innovation Ecosystem Acceleration (strengthening collaboration), which is expected to be achieved in 2024 through Improving the Quality of Science and Technology Human Resources, Strengthening Economic Transformation, and Sustainable Development for Increasing Competitiveness, which is manifested in:

- Quality Improvement of Research and Development Institutions
- Strengthening the Main Science Techno Park (STP)
- Strengthening the Innovation Cluster as a Triple Helix Collaboration Vehicle (or Quadruple-Helix and beyond)
- Increased Percentage of Successful Technology Incubators
- Increase in the number of publications and citations
- Increased Number of Patents Granted

(Challenges faced in service fulfillment)
a. Lack of adequate facilities and infrastructure (state-of-the-art) to provide and deliver services to the Indonesian and international community
b. Lack of adequate human resources for researchers and intermediary technology personnel
c. Adequate financial support is required.

(Urgency of Service Availability)

- The design and development of STPs in the health sector (LBM Eijkman, Andalas University, and BATAN) are expected to start in the near future in 2021 to be able to function effectively and produce the expected output in the provision of health services for the Indonesian people by 2023.
- Design and Development of STP in the health sector (LBM Eijkman, Andalas University, and BATAN) as an international standard health sector research and innovation ecosystem is the main strategy for the creation of various innovations in Indonesia's health sector that will impact national economic development and be able to exclude Indonesia from middle income trap. If the vehicle is. not available, then one of Indonesia's economic defenders will decrease, and Indonesia's ability to become a global research and innovation hub in the health sector will also decrease. Indonesia will only always be a consumer of various foreign products, cannot be sovereign in research and investment in the health sector.

(Chapter 2) Project Plan

2.1 Objectives of the Project

"Higher Education and Research Facility Development: Research and Innovation Capacity Development Project (Kemristek/BRIN-JICA)" (hereinafter referred to as "the Project") is intended to contribute to improving the quality of Indonesian research and innovation, especially in the health sector.

The goal of the Project is to build an ecosystem and a vehicle for research and innovation in the health sector in Indonesia, which is sophisticated, modern (state-of-the-art) and productive, with international standards in the world chain of research and innovation.

In particular

1. Develop Eijkman LBM as an STP in the biomolecular field of international standard as a forum for the work of domestic and foreign researchers to collaborate with local governments and industry, as well as various other parties, to produce innovation products and vanguard technology in the biomolecular field.
2. Develop the STP of Andalas University as an STP in the health sector on the island of Sumatra to become a center for research, development, assessment and application of health innovation based on the triple helix, as well as a mainstay health service center in Indonesia.
3. Develop STP BATAN as STP in the nuclear sector for health, agriculture and food, as well as industry to become a center for research, development, study and application of nuclear science and technology-based scientific and technological innovation, based on the triple helix for technological services to the public.

2.2 Basic Approaches to Achieve the Objectives

In order to achieve the objectives above, the Project adopts the following approaches.

1) Improve **basic infrastructure** for research and innovation, such as construction of building and facilities of leading research institutions
2) Establish framework of **joint research** with Japanese universities/institutions and **collaboration with Industries** for the selected research topics
3) Procure necessary **research equipment** to implement the above joint researches and industrial collaboration
4) Develop necessary **human resources** for research and innovation using the above networks
5) Carry out the necessary **promotional activities** to promote the above, such as **researcher exchange**, domestic and international **seminars**, **workshop** and **meetings** etc.
6) Through the above activities, the Project builds an ecosystem and a vehicle for research and innovation in the health sector in Indonesia

This approach can be called as "Joint Research Centered Triple Helix Collaboration Approach" as illustrated in the Figure 2.1.

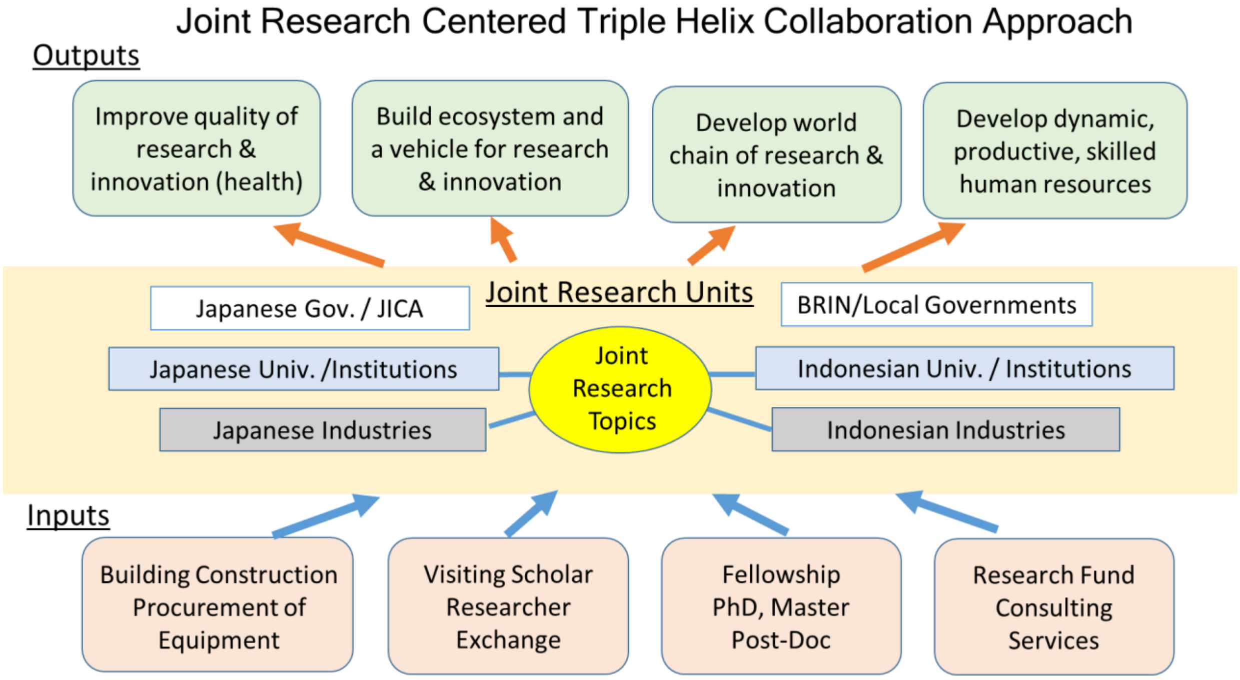


Figure 2.1 Joint Research Centered Triple Helix Collaboration Approach

2.3 Summary of the Project

Project title	Higher Education and Research Facility Development: Research and Innovation Capacity Development (Kemristek/BRIN–JICA)
Executing Agency	Ministry of Research and Technology/National Agency for Research and Innovation (Kemristek/BRIN)
Implementing Agencies	- LBM Eijkman (Jakarta) - Andalas University (Padan) - Research Center Batan (Jakarta)
Project Objectives	To build an ecosystem and a vehicle for research and innovation in the health sector in Indonesia, which is sophisticated, modern (state-of-the-art) and productive, with international standards in the world chain of research and innovation. In particular 1. Develop Eijkman LBM as an STP in the biomolecular field of international standard as a forum for the work of domestic and foreign researchers to collaborate with local governments and industry, as well as various other parties, to produce innovation products and vanguard technology in the biomolecular field. 2. Develop the STP of Andalas University as an STP in the health sector on the island of Sumatra to become a center for research, development, assessment and application of health innovation based on the triple helix, as well as a mainstay health service center in Indonesia. 3. Develop STP BATAN as STP in the nuclear sector for health, agriculture and food, as well as industry to become a center for research, development, study and application of nuclear science and technology-based scientific and technological innovation, based on the triple helix for technological services to the public.
Project Components	(Component 1) Development of Bio-molecular Research and Innovation Capacity of Eijkman LBM and Partner University/ Institute ● Construction of Building ● Procurement of Equipment ● Research and Innovation Program - Joint Research with Japanese Institutions and Industries Collaboration

	- Researcher Exchange - Research Fund ● Human Resource Development - Degree Program - Non-degree Program (Component 2) Development of Health Research and Innovation Capacity of Andalas University and Partner University/ Institute ● Procurement of Equipment ● Research and Innovation Program - Joint Research with Japanese Institutions and Industries Collaboration - Researcher Exchange - Research Fund ● Human Resource Development - Degree Program - Non-degree Program (Component 3) Development of Nuclear Medicine Research and Innovation Capacity of BATAN and Partner University/ Institute ● Procurement of Equipment ● Research and Innovation Program - Joint Research with Japanese Institutions and Industries Collaboration - Researcher Exchange - Research Fund ● Human Resource Development - Degree Program - Non-degree Program Consulting Services
Cost Estimation	Base Cost: JPY17,099,627,023 Total Cost: JPY19,664,571,076 (with PIU management and consulting cost) Grand Total: JPY21,646,154,925 (with contingencies)
Funding Plan	To be prepared
Project Period	7 years (2022-2029)

2.4 (Component 1) Bio-molecular Research and Innovation Capacity Development of Eijkman

2.4.1 Eijkman Institute

The Eijkman Institute for Molecular Biology (www.eijkman.go.id) is a renewed, non-profit, government funded research institute conducting basic research in medical molecular biology and biotechnology. The institute is currently located at the heart of Jakarta, the capital city of Indonesia. Our primary mission is advancing the progress of basic and applied research related to molecular biology in Indonesia, with focuses in biomedicine, biodiversity, biotechnology and biosecurity, as well as translating the findings of research for the benefits of Indonesian community. Eijkman Institute is under auspices of the Ministry of Research and Technology/National Agency for Research and Innovation (RISTEK-BRIN), Indonesia (https://ristekbrin.go.id).

(A Brief History of the Eijkman Institute)
The Eijkman Institute is one of the most prestigious and internationally acclaimed research institutions ever established in Indonesia. From its foundation as a Research Laboratory for Pathology and Bacteriology in 1888, the institute has had a long and proud scientific tradition. The institute's first director, Christiaan Eijkman, carried out most of his early work here, which resulted in the great discovery of vitamin B1 deficiency and beri-beri. Eijkman won a Nobel Prize in 1929 in recognition of his fundamental work upon which the modern concept of vitamins is based. The research laboratory was subsequently designated as the Central Medical Laboratory and later, at the commemoration of the 50th anniversary of its founding, the Eijkman Institute. At its peak in the first half of the 20th century, the Eijkman Institute was world famous as a centre for tropical medicine. However, the institution was eventually shut down in the 1960s amid economic hardships that followed the struggle for Indonesian independence.

The Eijkman Institute was then revived to address the country's urgent need of a biomolecular research institution to engage the rapid advances in medicine and biotechnology with all their associated industrial and commercial implications. Biotechnology is a high priority area in Indonesian science and technology development policy, and the foundation of basic research activities in molecular biology is an essential requirement for a successful national biotechnology development program. The initiative to revive the Eijkman Institute as a medium by which to establish a research institute of international standing in molecular cell biology was conceived in the office of the Indonesian Minister of Research and Technology. It was endorsed by the President of Indonesia at the centenary commemoration of Christiaan Eijkman's discovery of vitamin B1 deficiency as the cause of beri-beri in December 1990. The Eijkman Institute for Molecular Biology formally came into existence in July 1992, commenced operations in April 1993, and was officially inaugurated by President Soeharto on 19th September 1995.

The Eijkman Institute is transformed into an internationally acclaimed molecular biology research institute, which focuses on human and non-human genetics, infectious diseases of the tropics, and biomolecular engineering. The laboratories are located in Central Jakarta, occupying a 5,500 square meters historical building from the era of Christiaan Eijkman's pioneering research on vitamins, which has been completely renovated and refurbished to meet the standard of modern biotechnology laboratory work while retaining most of the original design.

Today, the institute is once again a vibrant research environment. It is a key node in the local and global scientific network, with increasing numbers of national and international research collaborations over the years. The Eijkman Institute strongly supports the capacity building of Indonesian scientists through various mentoring and training programs as well postgraduate study opportunities. The institute also encourages the nurturing of young researchers interested in biomedical research by hosting local and international students and interns.

As initially intended, the institute brings together the country's best intellectual minds who have a wide range of expertise, essential for the successful endeavour in modern biomedical and biotechnological research. The institute was formally inaugurated by the Minister for Research, Technology, and Higher Education as the Centre of Excellence in Molecular Biology and Genomics in December 2015.

(Current Research at the Eijkman Institute)
The Eijkman Institute carries out fundamental research in biomedical areas of strategic importance. The institute's research program has been developed following a strategy to ensure scientific performance at internationally competitive level. It follows a progressive recruitment and manpower development plan and capitalizes advanced scientific strategies and technologies.

Research activities at the Eijkman Institute are coordinated by Deputy for Fundamental Research and Deputy for Translational Research. Units within Eijkman Institute are currently grouped into the following categories:

Table 2-1: Eijkman Research Units

RESEARCH UNITS

1. Dengue Research
2. Hepatitis
3. Genome Diversity and Diseases
4. Malaria Pathogenesis
5. Malaria and Vector Resistance
6. Mitochondria and Infectious Diseases
7. Molecular Bacteriology
8. Red Blood Cell Disorders
9. Red Blood Cells Membrane and Enzyme Disorders

SUPPORT UNITS

1. Bioinformatics
2. Biosafety Level 3
3. DNA Sequencing
4. Histopathology & TEM
5. Library

SERVICE UNITS

1. Cytogenetics
2. DNA Forensics
3. Genetic Counselling
4. National Genome Center

INTERNATIONAL COLLABORATIVE RESEARCH UNITS

1. Eijkman Oxford Clinical Research Unit
2. Emerging Virus Research Unit

(Eijkman Institute Involvement in COVID-19 Pandemic Response in Indonesia)
The COVID-19 pandemic, caused by the novel coronavirus Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), has shaken the world since early 2020. On 2 March 2020 Indonesia reported its first two COVID-19 cases. On 13 March 2020, the Eijkman Institute was assigned by the President of Republic of Indonesia to be one of the official referral laboratories for COVID-19 testing. Long-term research on emerging viruses in Indonesia and past experiences in other infectious outbreaks (such as SARS in 2003 and Avian Influenza in 2005) have equipped the Eijkman Institute with necessary laboratory capacity and skillset to take up the responsibility. Ever since, the Eijkman Institute has been at the forefront of the pandemic response. The institute has been gradually stepping up its diagnostic capacity to meet the increasing COVID-19 testing requests from all over the country. As of 8 December 2020, the Eijkman Institute has tested 53,924 samples. The institute has also provided more than 140,000 viral transport medium and 40,000 sterile swabs free of charge to support local healthcare facilities in 34 provinces of Indonesia. The Eijkman Institute was the first laboratory

in the country to submit the complete SARS-CoV-2 genome sequences from Indonesian samples to the global open-access database GISAID in May 2020. Forty sequences have been submitted by the Eijkman Institute as of October 2020, an important contribution as part of the collaborative effort for characterizing the SARS-CoV-2 virus, monitoring the virus evolution, tracing the disease transmission, and ultimately identifying effective vaccines and therapies.

The Eijkman Institute is heavily involved in various projects for the development of COVID-19 vaccine and treatment. The institute is part of the national team responsible for developing the "Merah-Putih" COVID-19 Vaccine in collaboration with Indonesia's Ministry of Health and State Intelligence Agency. The vaccine candidates are developed using a recombinant protein platform and based on the Indonesian strains of the virus. This is an important step to ensure Indonesia's self-reliance to fight the pandemic, especially considering the country's large population size and the global demand of effective COVID-19 prevention. Additionally, the Eijkman Institute is collaborating with Indonesia's leading pharmaceutical company PT BioFarma to develop convalescent plasma as an alternative COVID-19 therapy. The project focuses on (1) developing tests to evaluate the properties of plasma and measure antibodies from donated blood of recovering COVID-19 patients, and (2) validating several alternative immunology-based COVID-19 tests. The Eijkman Institute is also planning to conduct a COVID-19 seroprevalence study to understand how the immune system plays a role in SARS-COV-2 infection, in collaboration with University of Indonesia School of Public Health (FKM).

(Future Direction: Expanding Eijkman Institute's Research Capacity in the New Era of Genomics and Advance Biomedical Science)

As a leading molecular biology institution in Indonesia, research by the Eijkman Institute has been influential in the field of medicine and public health. The institute also champions the use of genetic technology for wider application such as wildlife conservation, law enforcement, and national security. The Eijkman Institute looks forward to an exciting era of molecular biology and biomedical research. The recent technological advances in the area of genomics, proteomics, transcriptomics, and bioinformatics will significantly improve the studies of communicable and non-communicable diseases, aid the development of vaccines and treatments, and enable the move towards precision medicine. To achieve this, the Eijkman Institute plans to develop four centres of research excellence: molecular research in infectious disease, molecular research in immunology, molecular research of precision medicine, leading to center of excellence and national referral institute in molecular biology and biomedical research (Figure 1).

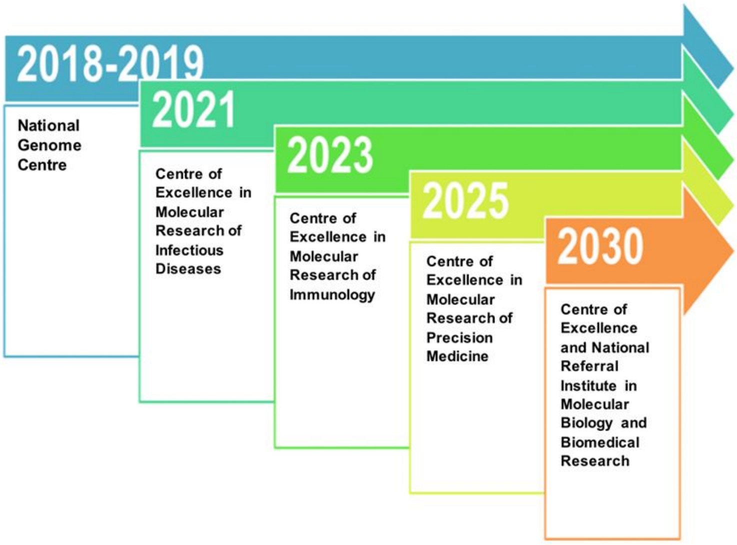


Figure 2.2: Milestones of the Eijkman Institute.

The Indonesian National Master Plan for Research (Rencana Induk Riset Nasional/RIRN) 2017-2045 has already set the path for research activities across all government research institutions, including the Eijkman Institute. The current research at the Eijkman Institute are aligned with research focuses outlined in RIRN, for instance (A) Health and Medicine Research Focus: lifestyle diseases (eg. diabetes and nutrition) and infectious diseases (dengue, malaria, hepatitis, emerging viruses); and (B) Medical Devices and Diagnostic Technologies Focus: development of dengue vaccine (with Sanofi Pasteur) and malaria and G6PD diagnostics (with FIND and PATH). The Eijkman Institute plans to broaden and coordinate its research activities upon the four centers mentioned above to further develop molecular diagnostics for human genetics diseases, strengthen surveillance systems especially at cross border areas to prevent and mitigate possible infectious disease outbreaks by collaborating across disciplines, as well as in depth study of the genetics of host immune responses to infections. A total of 21 research units at the Eijkman Institute will be streamlined into three major research themes: (1) Infectious Diseases, (2) Human Genetics, and (3) Genetic Diversity, complemented with cutting-edge Support Facility, which lead to the ultimate goal toward Precision Medicine (Figure 2).

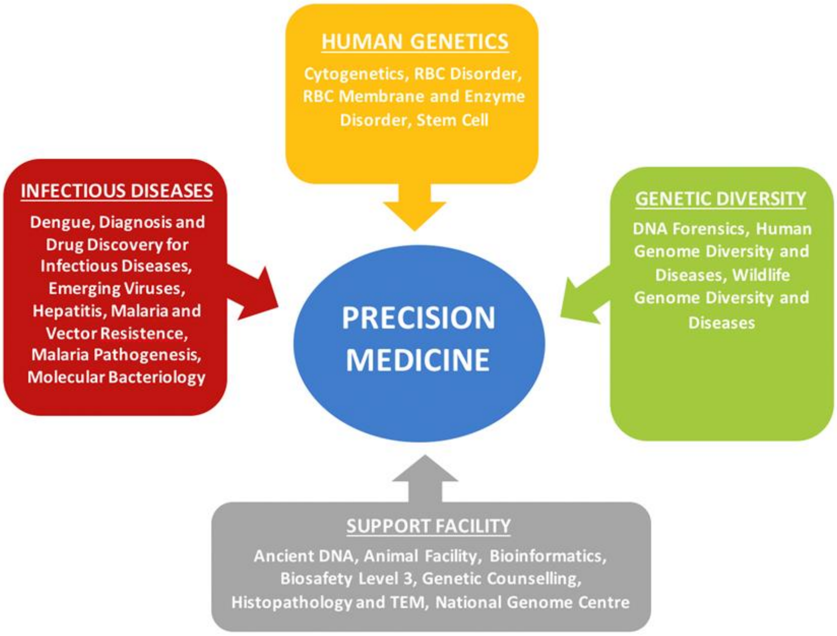


Figure 2.3 Research Themes at the Eijkman Institute

2.4.2 Construction of Building: Establishing a New Eijkman Institute Research Complex

The Outline Design (OD) is tentative, and the final decision shall be made after further analysis, conduct site survey (if possible) and discussion with concerned parties.

1) Location, Building Type, Scale and Target Size of Facility

The location, the building type, scale and target size of XXX in Eijkman Institute will be as indicated below. The Building shall be expanding the facility. Due to the limited space of the current building for achieving long-term milestones.

Items	Description
Location	An area at the TBIC Complex has been allocated for the new buildings of the Eijkman Institute. TBIC Complex is a part of the Puspitek Serpong Science and Tchnology research Center, located in Bogor Regency, West Java. The site is accessible via Jakarta-BSD toll road.
Building Type	Reinforced cast-in-situ concrete structure

Scale	Five levels : 1 basement and 4 floors above the ground
Target Size	Total floor area : 24,400m^2

2) Outline Design (OD) Condition

a. Codes, Standards, Guidelines and Manuals

The following codes, standards, guidelines and manuals are principally used in establishing design conditions of structure:

- Indonesian Codes
  SNI 2847:2019 Persyaratan Beton Structural untuk Bangnan Gedung
  SNI 1726:2019 Tata-cara Perencanaan Ketahanan Gempa uutuk Structur bangunan Gedung dan Non-gedung
  SNI 1727:2013 Beban Minimum untuk Perancangan Bangunan Gedung dan Struktur lain
  SNI 8460:2017 Persyaratan Perancangan Geoteknik
  The international reference is also considered as follows:
  ACI 318-14 Building Code Requirements for Structural Concrete
  ASCE 7-10 minimum Design Loads for Buildings and Other Buildings
- Soil Investigation
  The soil condition where the building will be built shall be investigated in order to understand the proper soil characteristics, such as soil strength, hard layer, etc. The soil test results will be applied to design the foundation of the buildings.
- Structural Materials
- Super-structure: The structural materials is reinforced cast-in-situ concrete. Concrete grade shall be FC30 (fc' 30 MPa) and steel reinforcement of BJTS 42 (fy 420 MPa).
- Sub-structure / Foundation: Proper foundation is usually based on soil test results. However, in this case propose to use deep foundation which consist of precast concrete (PC) piles with proper capacity. Bore piles also available. It might be considered soil test results and cost factor.
- Loading Criteria
  The building will be designed based on Loading Criteria as described by the SNI 1727:2013 for gravity loads and SNI 1726:2019 for seismic/earthquake load.
- Risk category
  SNI 1726:2019 Clause 4.1.2, table 3, laboratory Building is in Risk Category IV
- Design Seismic category (SDC)
  Based on SNI 1726:2019 Clause 6.5, SDC of the building must be indicated by using Table 8 & 9. SDC-D should be used for this building.
- Importance Factor (le)
- Based on SNI 1726:2019 table 4 – Importance Factor (le) = 1.50

b. Design Concept
   Create stress-free and health environment for research workers in terms of affluent and comfortable space.

c. Structure System
   It shall be designed disaster resistance building against earthquake and flood.

d. Building Design Nature
   The design of the building will replicate the historical Eijkman Institute building facade from the Jl. Diponegoro 69 in Central Jakarta.
   A 4-storey building at the back which rooms the laboratories and designated as limited access or area for authorized personnel only.
   High containment laboratory and additional support facilities in Zone 5.
   Achieve maximum green area, the building is interspaced with open spaces, allowing each part to have ample daylight and an indoor-outdoor environment.

e. Mechanical, Electrical and Ventilation System (MEV)

- Mechanical
  Mechanical system will include following system.
- Plumbing system

- Sewerage treatment system
- Fire-fighting system
- Air conditioning and ventilation system

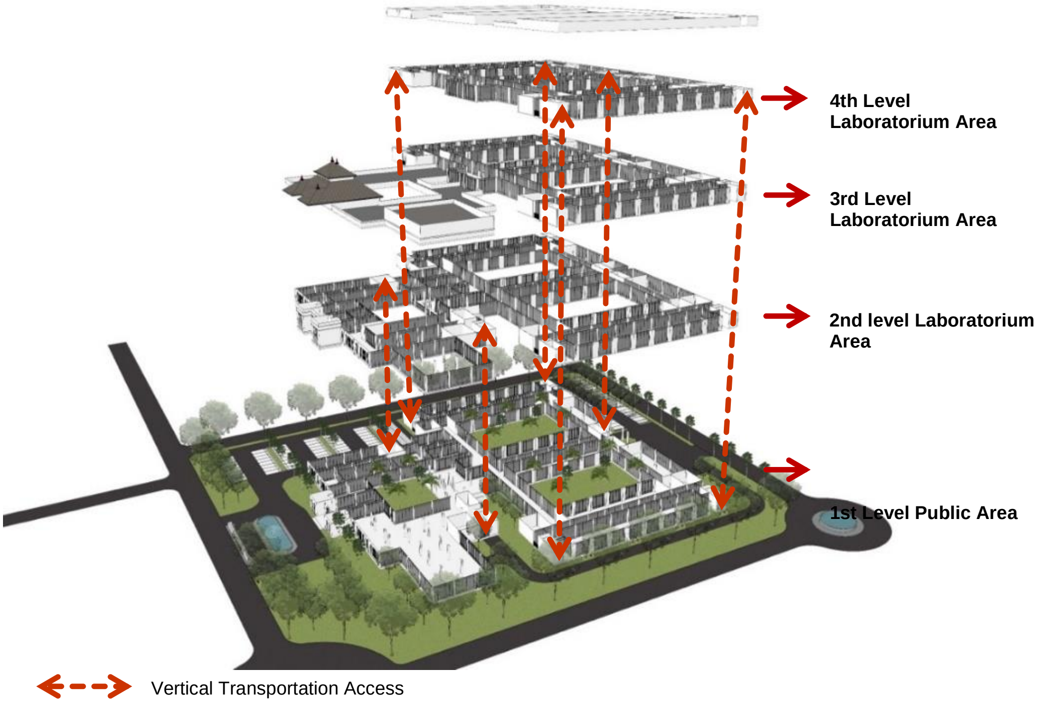


Figure 2.4: Elevator System

Special attention will be given to the design of the laboratories, e.g. the air conditioning and waste disposal system with specific considerations.

- Electrical

Electrical system of the building will include following system.

- Lighting system
- Telecommunication and internet system
- Fire alarm system
- Sound system
- CCTV and security system
- Lightning protection system

3) Plans for Outline Design

a. Location of the Construction Site

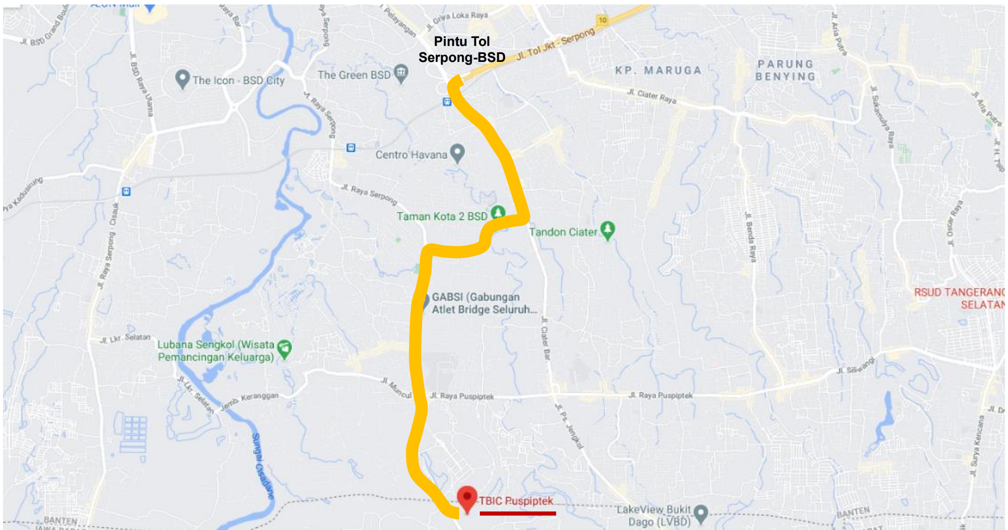


Figure 2.5: Location of the Construction Site

b. Site Plan

Construction site in TBIC Complex: Zone ③

Site **Figure 2.6: Layout**

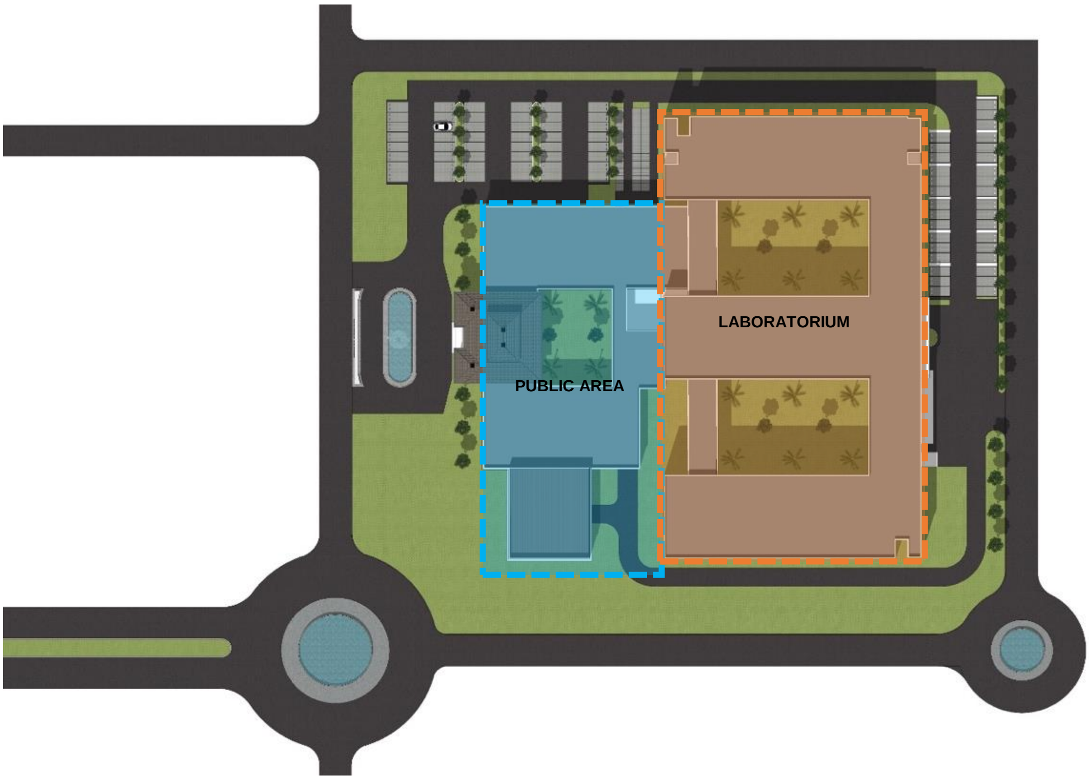


Figure 2.7: Building Plan

c. Building Plan

Basement Floor (2,850 m^2)

Basement floor area will be used as a service unit consisting of following functions.

- Cleaning service facilities with lockers
- Toilets, dining and rest room for cleaning service and security staff
- General and special storage for laboratory needs
- Mechanical and electrical rooms

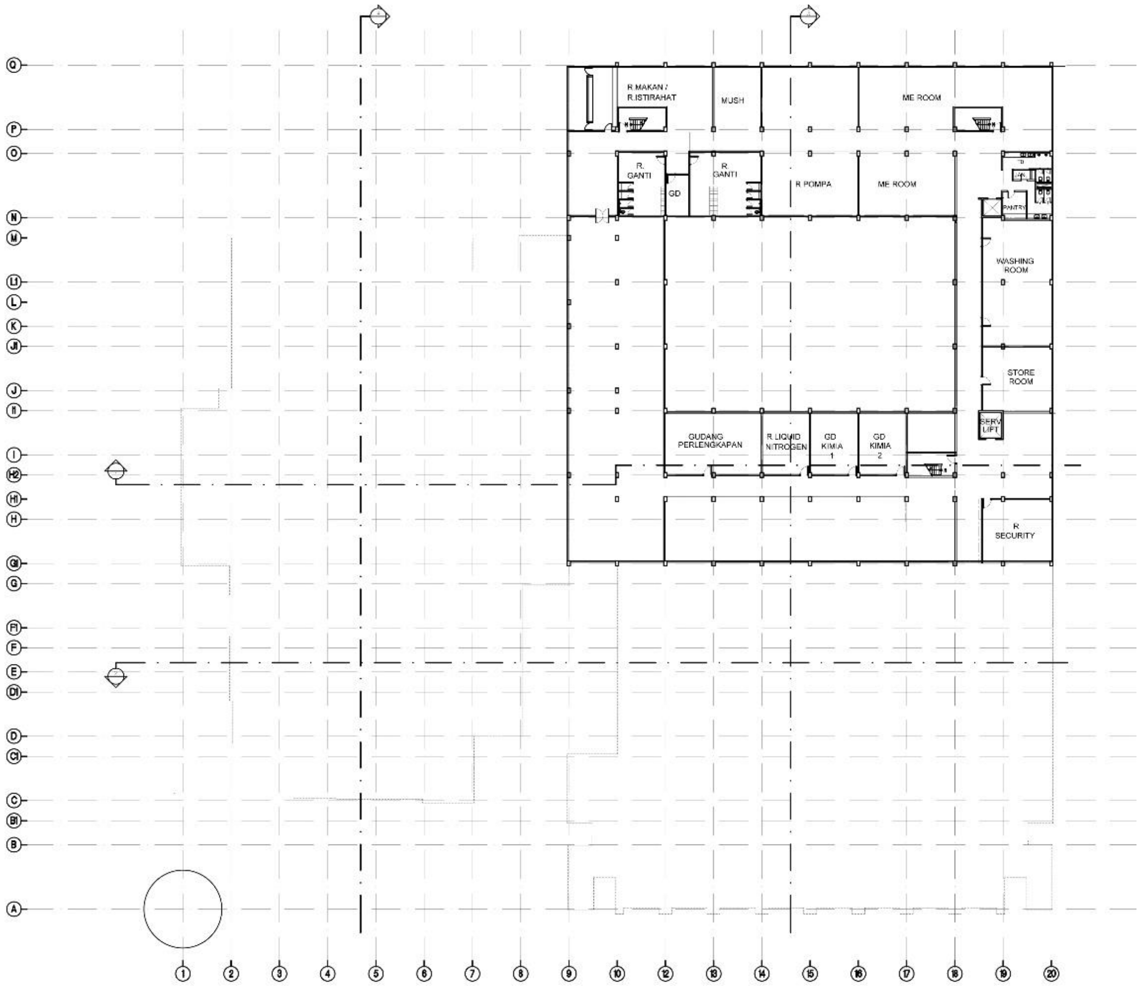


Figure 2.8: Basement Floor Plan

First Floor (6,860 m^2)

First floor will be a designated universal access area. This floor will used inhouse laboratories and research unit service for the public.

- Lobby area
- Administration office
- Conference rooms
- Auditorium (400 seats) and a holding room for VIP guests
- Library
- Display hallway
- Clinic and genetic counselling unit
- Transmission Electron Microscope (TEM) laboratory

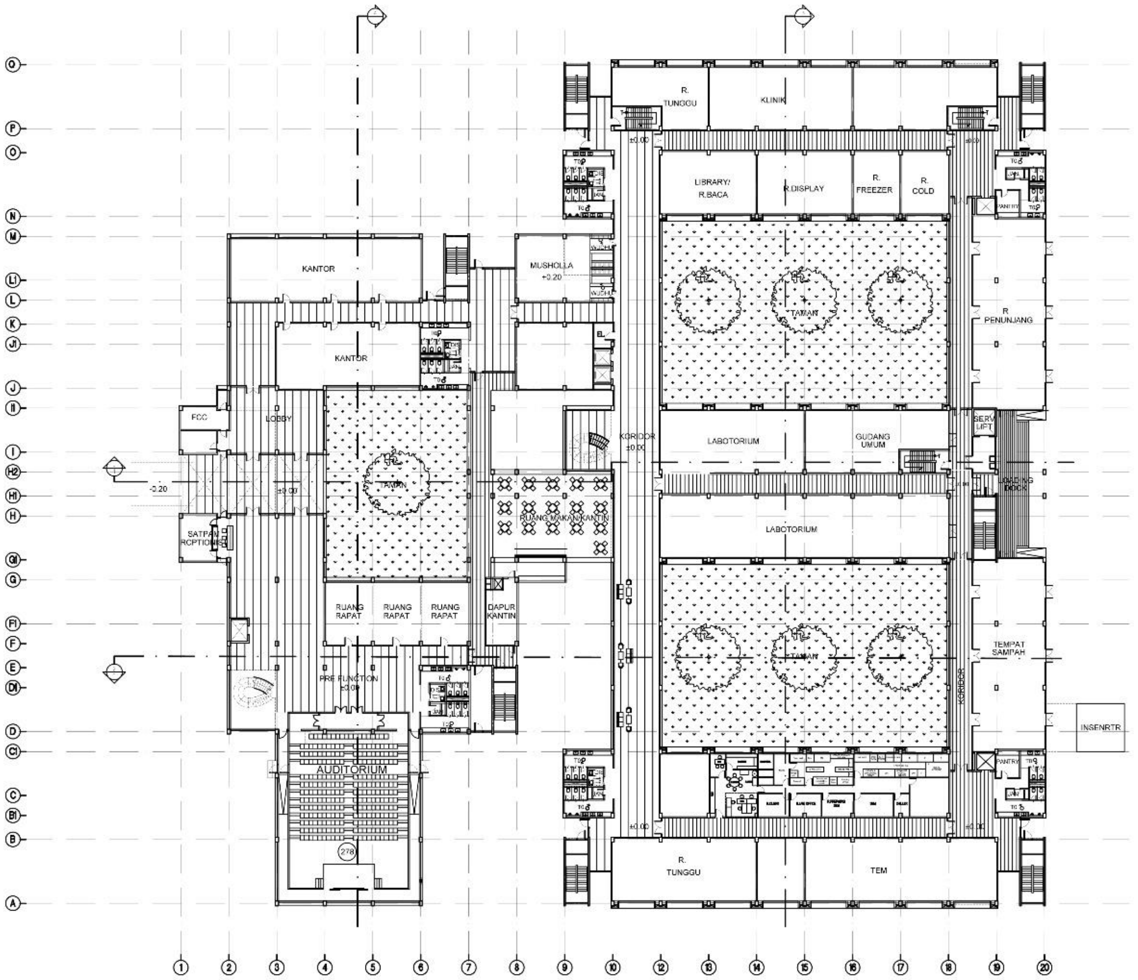


Figure 2.9: First Floor Plan

Second Floor (6,233m^2)

Second floor will used inhouse laboratories and support facilities. The second floor will consist of;

- Imaging center laboratory
- Immunology center
- National genome center
- Stem cell laboratory
- Bioinformatics unit
- Medical record or archive room

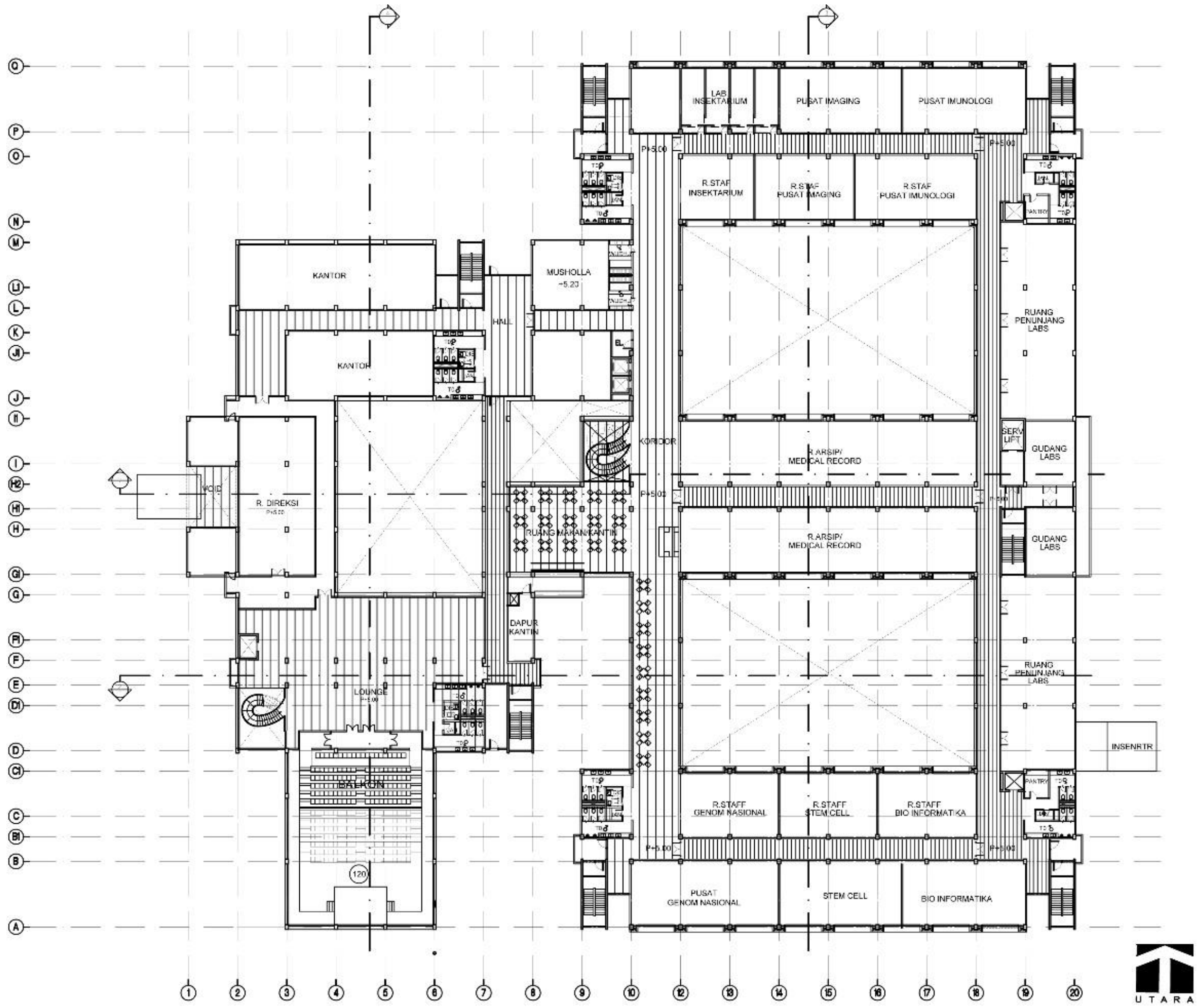


Figure 2.10: Second Floor Plan

Third Floor (4,231m^2)

Third floor will be designated as a Center for Infectious Diseases i.e., laboratories working on communicable diseases.

- Dengue research unit
- Emerging virus research unit
- Malaria and vector resistance laboratory
- Hepatitis laboratory
- Molecular bacteriology laboratory

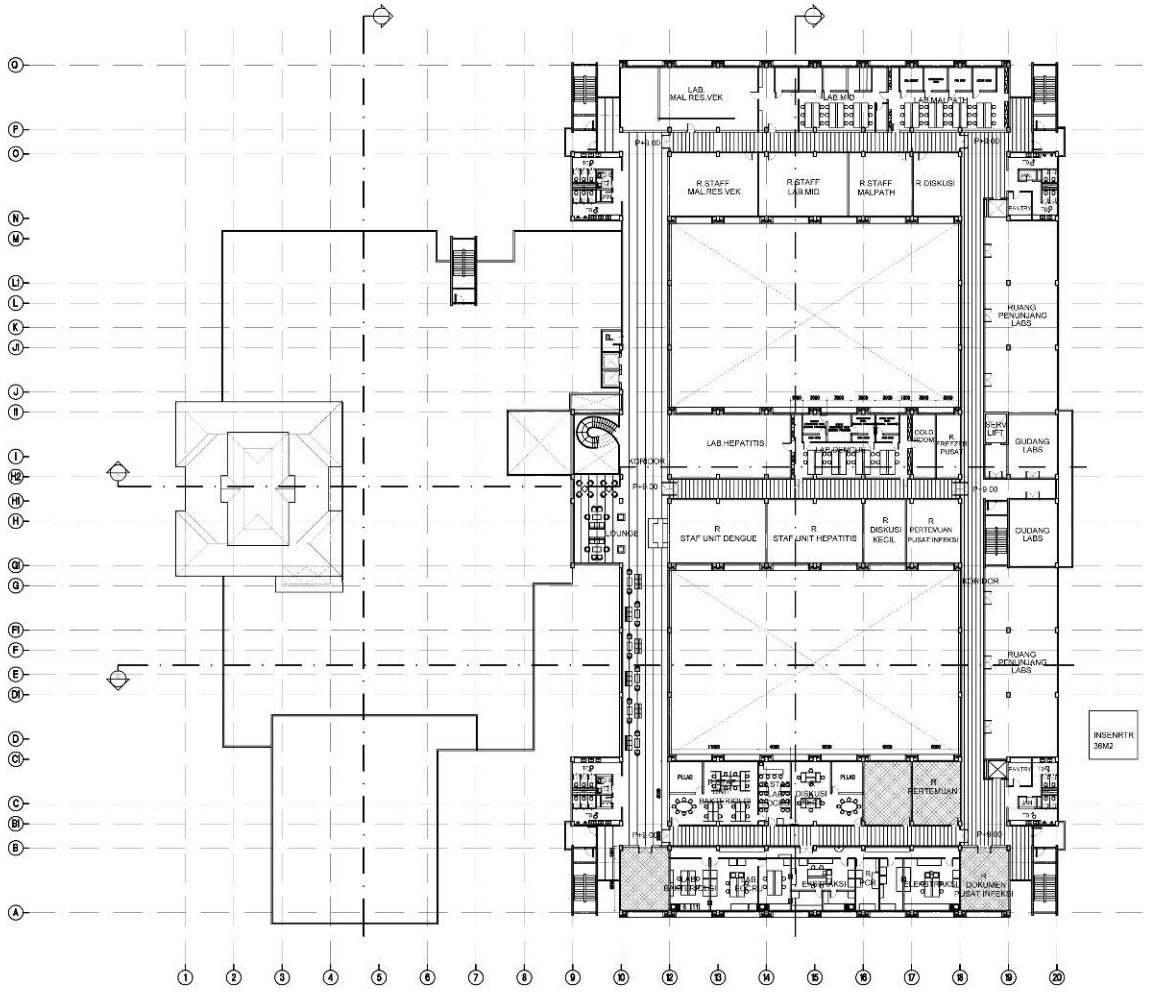


Figure 2.11: Third Floor Plan

Fourth Floor (4,231m^2)

Fourth floor will be designated for laboratories working with non-communicable diseases.

- Cytogenetics laboratory
- Forensic DNA identification unit
- Genome diversity and diseases laboratory
- RBC disorders laboratory
- RBC membrane and enzyme disorder laboratory

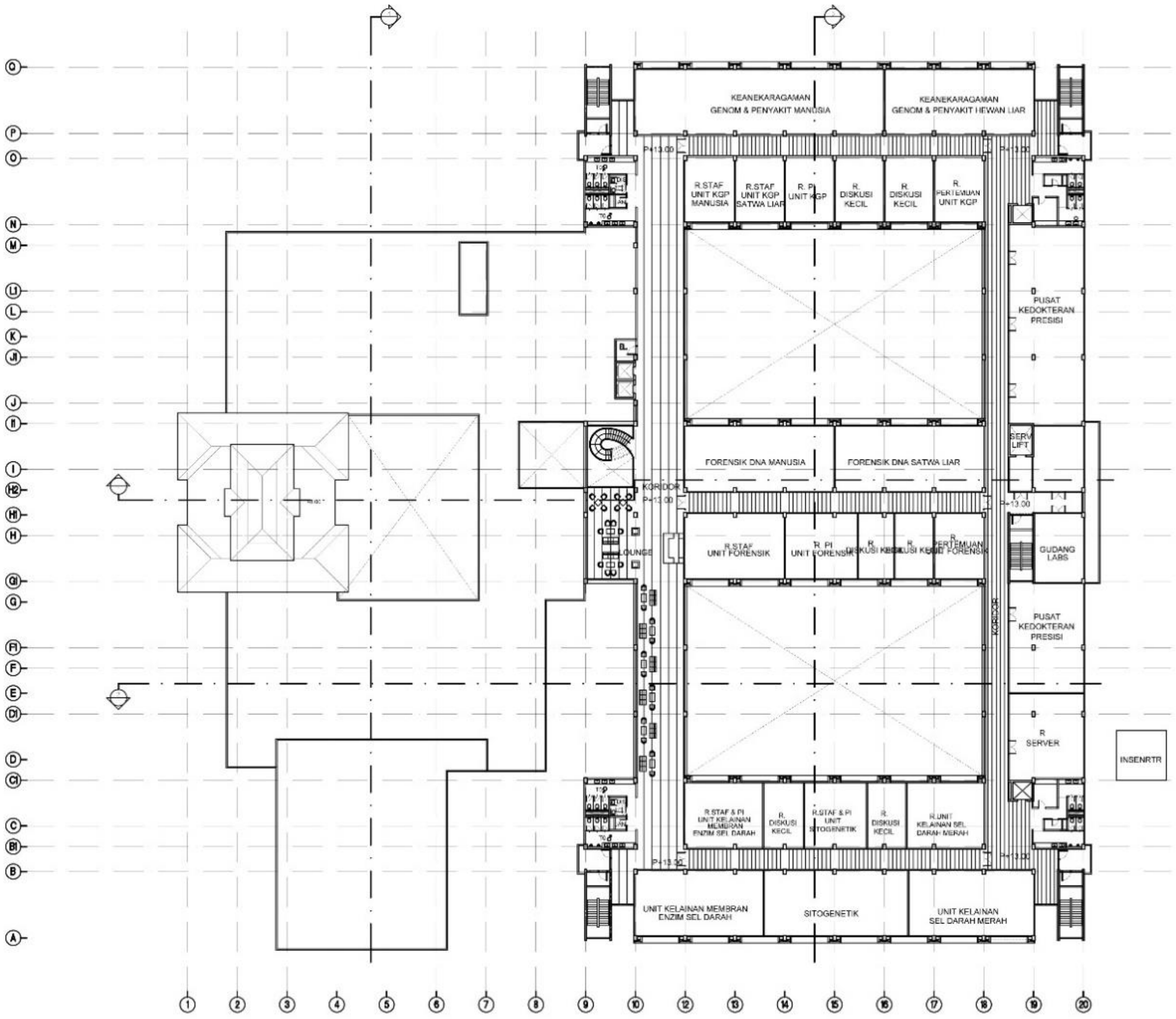


Figure 2.12: Fourth Floor Plan

Every floor in the building will be equipped with restroom, a praying room (musholla), a storage, elevators and stairs for vertical transportation, and wide corridor. Each laboratory will face to outdoor space to ensure sufficient natural lighting and green scenery.

d. Building Elevation

<u>Front Elevation</u>

Figure 2.13: Front Elevation

Side Perspective

Figure 2.14: Side Perspective

Internal Courtyard

Figure 2.15: Internal Courtyard

Bird-eyes View

Figure 2.16: Bird-eyes View

- Important Remarks

  Other necessary drawings for the outline design including Building Sections, Structure System, Utility Plans will be providing later.

- Floor Area

(m^2)

Basement Floor	2,850
First Floor	6,860
Second Floor	6,233

Third Floor	4,231
Fourth Floor	4,231
Roof Floor / Penthouse	0
Total	24,405

- Preliminary Cost Estimation (Provisional memorandum)

  More accurate cost analysis will be conducting later. However, following preliminary const information will be considered.

i) According to "Rekapit Ulasi Pendanaan Phln"

LBM Eijkman Building Construction Cost mentioned: USD70,638,888 (JPY+-72.8 billion = Rp99,681,200 million)

*It is required clarification of cost items included in the amount which proposed by the concerning agency.

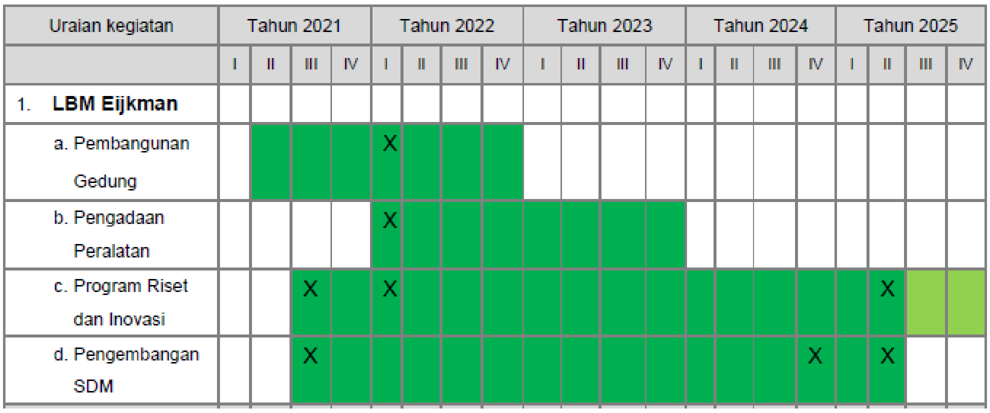
ii) Tentative target cost

Total floor area 24,400m^2 x current ordinal unit cost Rp9,000,000/m^2 = Rp219,600 million (JPY16 billion)

4) Construction Schedule

Construction schedule will be developing together with another component such as Procurement of Equipment and Human Resources Development.

(*Tentative Chart)



Uraian kegiatan	Tahun 2021				Tahun 2022				Tahun 2023				Tahun 2024				Tahun 2025			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1. **LBM Eijkman**																				
a. Pembangunan Gedung		🟩	🟩	🟩	🟩 X	🟩	🟩	🟩												
b. Pengadaan Peralatan					🟩 X	🟩	🟩	🟩	🟩	🟩	🟩	🟩								
c. Program Riset dan Inovasi			🟩 X	🟩	🟩 X	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩 X	🟩	🟩
d. Pengembangan SDM			🟩 X	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩	🟩 X	🟩	🟩 X		

2.4.3 Research Profiles

From the 21 laboratories of Eijkman, 17 laboratories submitted Research Profiles to be supported by the Project are as below:

Table 2-2: List of Research Profiles of Eijkman

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator
A. INFECTIOUS DISEASE				
1-1	Advancing the Dengue Research in Indonesia	Dengue	RP-EIJKMAN 01	Dr. R. Tedjo Sasmono, Ph.D.
1-2	Diagnosis and Drug Discovery for Infectious Diseases	Diagnosis and Drug Discovery for Infectious Diseases	RP-EIJKMAN 02	Josephine E. Siregar, SSi, MSc, PhD

1-3	Endemic and Emerging Viruses in the Indonesian Archipelago	Emerging Virus Research Unit (EVRU)	RP-EIJKMAN 03	Frilasita Aisyah Yudhaputri, M.BiomedSc Khin Saw Myint, MD., PhD. (Foreign Researchers)
1-4	Hepatitis	Hepatitis	RP-EIJKMAN 04	Prof. David H. Muljono, MD, PhD
1-5	Malaria and Vector Resistance Unit	Malaria and Vector Resistance	RP-EIJKMAN05	Dr. Puji Budi Setia Asih
1-6	Malaria Pathogenesis: Genomics and Immunological Studies in Search for Diagnotics and Vaccine	Malaria Pathogenesis	RP-EIJKMAN 06	Dra Rintis Noviyanti, PhD
1-7	Molecular Epidemiology and Antimicrobial resistance of *Streptococcus pneumoniae* in Indonesian population	Molecular Bacteriology	RP-EIJKMAN07	Dodi Safari, PhD
B.	**HUMAN GENETICS**			
1-8	Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders	Cytogenetics	RP-EIJKMAN 08	Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.
1-9	Red Blood Cells (RBCs) Disorders	RBC Disorders	RP-EIJKMAN 09	Dr. Ita Margaretha Nainggolan
1-10	Red Blood Cells Membrane and Enzyme Disorders	RBC Membrane and Enzyme Disorders	RP-EIJKMAN 10	Dr. sc.hum Ari Winasti Satyagraha, B.Sc (Hons)
1-11	Stem Cell	Stem Cell	RP-EIJKMAN11	Dr. Ita Margaretha Nainggolan
C.	**GENETIC DIVESITY**			
	Forensic DNA Identification Unit	DNA Forensics	N/A	
1-12	Human Genome Diversity and Diseases	Human Genome Diversity and Diseases	RP-EIJKMAN 13	Prof. Herawati Sudoyo, MD, PhD Safarina G. Malik, DVM, MS, PhD (Lifestyle disease) Pradiptajati Kusuma, PhD
1-13	Wildlife Genetic Diversity and Disease	Wildlife Genome Diversity and Diseases	RP-EIJKMAN14	Dr. Wuryantari Setiadi, M.Biomed
D.	**SUPPORT FACILITY**			
1-14	The Establishment of Ancient DNA Facility to Support Indonesian Genetic Diversity Studies	Ancient DNA	RP-EIJKMAN15	Prof. Dr Herawati Sudoyo
	Animal Research Facility	Animal Research Facility	N/A	
1-15	Bioinformatics Unit	Bioinformatics	RP-EIJKMAN 17	Ismail Ekoprayitno Rozi
1-16	Biosafety Level 3	Biosafety Level 3	RP-EIJKMAN 18	Ismail Ekoprayitno Rozi

	Genetic Counselling	Genetic Counselling	N/A	
	Proposed budget for imaging center (Histopathology and TEM Laboratory)	Histopathology and TEM	N/A	
1-17	National Genome Centre	National Genome Centre	RP-EIJKMAN 21	Safarina G Malik, DVM, MS, PhD

The detail of the Research Profiles of Eijkman are attached in the Appendix 1.

2.4.4 Procurement of Equipment

In order to implement the research plan illustrated in the Research Profiles for infectious disease and human genetics, and improve the support facility, the variety of research equipment is requested to procure in the Project. The details of the requested equipment list are shown in the Appendix 4.

(Procurement Method)
In general, Japanese ODA Guideline acknowledges three (3) types of procurement methods, which are 1) Competitive Bidding, 2) Direct Contracting and 3) International Shopping. Competitive Bidding is commonly generally used method for procurement of equipment. The Supplier is selected through the evaluation of their bid proposal. Direct Contracting could be conducted in specific procurement conditions such as additional equipment or peripherals, spare parts or consumables to the existing system by the original manufacturer, or only a single manufacturer is available in the world to satisfy the target specification and performance. International Shopping will be conducted not for the package deal of procurement but for procurement of a single items with a limited number of similar type of equipment suppliers. As the procurement contract package consists of various types of equipment in it, Competitive Bidding System may be the most popular, general and preferable method for the Loan project.

(LCB (Local Competitive Bidding) and ICB (International Competitive Bidding))
Two (2) types of the Competitive Bidding is available in Indonesia, which is LCB and ICB. Taking available number of the construction related engineers from local into account, LCB could be a popular and recommendable method for the Building Construction package in Indonesia. However, due to submission conditions of the evaluation report (use of five typical language such as Japanese, English, French, Spanish and Chinese) and the degree of transparency and accountability as required JICA, ICB could be a recommendable procurement method for equipment work.

(Single Envelope Bidding System and Two Envelope Bidding System)
A Single and Two Envelope Bidding System is recommended by Japanese ODA Guideline. A Single Envelope Bidding System (JICA Standard Bidding Documents, May 2013) is preferable procurement system for a procurement of the goods with bulky or non-sophisticated stand-alone equipment, like a price oriented package. This is a simple procurement method to identify the lowest bid upon bid opening. Two Envelope Bidding System (JICA Standard Bidding Documents, April 2012) is recommended for the procurement of the goods with sophisticated equipment, which evaluates the bids through 4 steps of bid evaluation process. Due to variety of characteristics of the goods, the procurement work has to be considered combination of a Single and Two Envelope Bidding System.

(Procurement Packaging)
Procurement of the goods are considered in a package deal. The contract has to be signed not on an item based but by a package level based on the bid submitted by the Bidders. Therefore, planning of an attractive packaging is a basic concept. Mix up of the goods with different characteristics, timeframe, and locations has to be avoided and it must be an appropriate item number and contract size to handle. The package planed based on such policy may lead successful project results. Due to

above discussion, the package has to be planed based on the;

1) Characteristics of the goods
2) Can be shared the similar frame work for delivery, installation and hand-over timing, and
3) JPY 300 – 500 million of the contract amount.

Specific packaging will be explained after completion of the equipment list with equipment location.

Following is a typical time frame and work items for procurement of equipment.

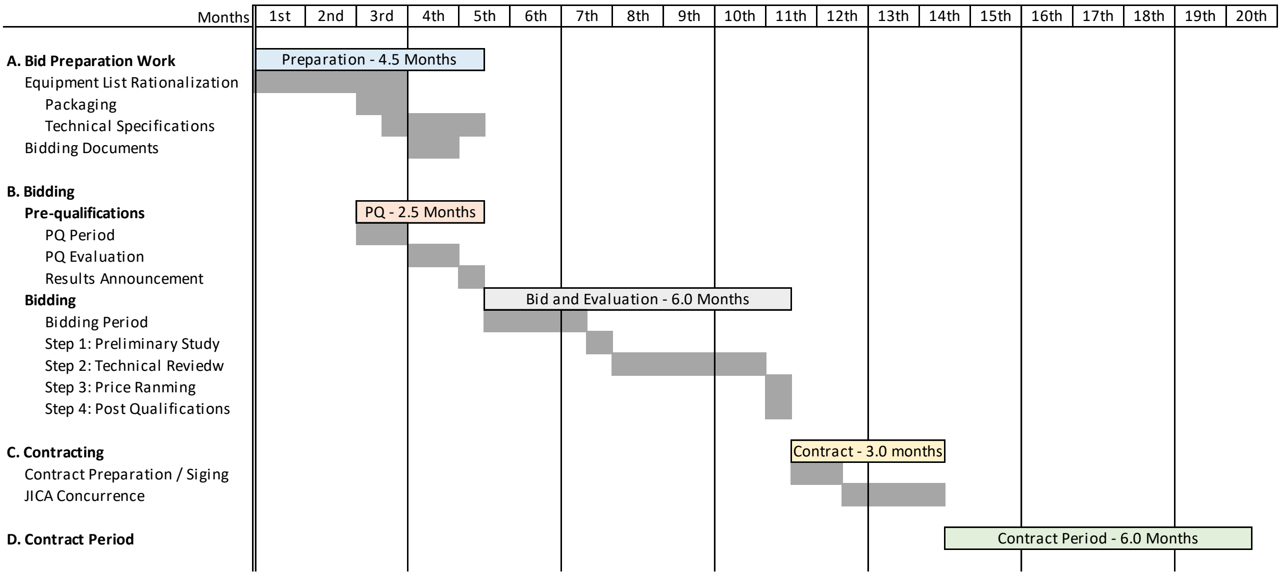


Figure 2- Procurement Schematic Implementation Schedule

(Data: The Consultants, *December 2020*)

2.4.5 Human Resource Development

(Improving Human Resources Qualifications)

Following the establishment of a new research facility, the Eijkman Institute also aims to increase research capacity by upgrading the quality and quantity of its human resources. Academic and professional developments are integral for researchers to stay up to date with the latest scientific discoveries, improve technical skills and expertise, and exchange knowledge, especially in this era of rapid technological advancement in the field of molecular biology and biomedical science. The Eijkman Institute acknowledges the importance of investing in its people, especially the junior researchers. Research staff will be endorsed to pursue postgraduate opportunities (Master's and PhD programs) and also be facilitated to carry out their academic research abroad in collaboration with the Eijkman Institute. They are also encouraged to consistently improve their research competence and expand networks by attending trainings, workshops, scientific meetings, and fellowships both nationally and internationally. In parallel with the growing research activities (4 centres of excellences), the Eijkman Institute will recruit top quality Master and PhDs researchers to help with the research activities. The Eijkman Institute also wishes to facilitate and attract Indonesian scientific diasporas to bring their research network and expertise back to the country and join the exciting research environment. State of the art technologies and research facilities may also attract the diasporas to come back to Indonesia and thus contribute to the Indonesian scientific communities through Eijkman Institute. The new research complex will also enable the Eijkman Institute to host more local and international students, as part of the continuing tradition of mentoring the next generations of scientists

(Summary of the Human Resource Development needs)

Human Resource Development Program needs in Eijkman Institute are surveyed through their individual Research Profiles and it is summarized in the (Table 2-3) Soft Input Programs for Eijkman below:

Table 2-3: Soft Input Programs for Eijkman

App. No	Project Title	Degree Program		Non-Degree Program			Visiting Scholar Program
		Doctor degree (4 years)	Master's degree (2 years)	1 year	3 months	Indonesia to Japan 2 weeks (persons/year)	Japan to Indonesia 2 weeks (persons/year)
1-1	Advancing the Dengue Research in Indonesia	3	3	1	2	3	3
1-2	Diagnosis and Drug Discovery for Infectious Diseases	2	1	1	3	2	1
1-3	Endemic and Emerging Viruses in the Indonesian Archipelago	2	2	2	5	2	1
1-4	Hepatitis	1	1	1	4	3	2
1-5	Malaria and Vector Resistance Unit	3	2	2	5	4	1
1-6	Malaria Pathogenesis: Genomics and Immunological Studies in Search for Diagnotics and Vaccine	2	4	1	4	5	3
1-7	Molecular Epidemiology and Antimicrobial resistance of *Streptococcus pneumoniae* in Indonesian population	4	3	1	2	2	2
1-8	Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders	1	1	1	3	2	2
1-9	Red Blood Cells (RBCs) Disorders	0	1	1	3	3	1
1-10	Red Blood Cells Membrane and Enzyme Disorders	1	1	1	4	3	1
1-11	Stem Cell	0	1	1	1	2	1
1-12	Human Genome Diversity and Diseases	4	1	3	9	3	1
1-13	Wildlife Genetic Diversity and Disease	1	2	1	3	2	1
1-14	The Establishment of Ancient DNA Facility to Support Indonesian Genetic Diversity Studies	2	1	1	4	2	2
1-15	Bioinformatics Unit	2	3	1	1	2	1
1-16	Biosafety Level 3	2	3	1	1	2	1
1-17	National Genome Centre	0	2	1	4	2	2
TOTAL		30	32	21	58	44	26

Note: red color figures with underline are entered by consultants where the column remained blank in the Research Profiles which are to be discussed.

The Degree Program consists of "Doctor degree program in Japan (4 years)" and "Master's degree in Japan (2 years)". Minimum length of doctor program in Japan is 3 years but normally it takes 4 to 5 years. In this project 4 years is suitable for the budget purpose.

As for the Non Degree Program, variety of length of program, 1 year, 3 months and 2 weeks are

prepared just for the budget purpose.
The host institutions for non-degree program (Training/Postdoc) in Japan are tentatively identified as follows:

- University of Nagasaki, Institute of Tropical Medicine (BSL 3)
- RIKEN Center for Integrative Medical Science, Lab. For Advanced Genomic Circuit (NGS, amplicon sequencing)
- Kyushu University, The Ultra Microscopy Research Center (TEM)
- National Institute if Infectious Disease
- Osaka Kokusai, Bioinformatics Training Center
- Tokyo University, Institute of Bioscience Institute (metabolomics)
- Tokyo University, Osaka Bioscience Institute (
- Tokyo University, School of Science/Dep. Bioinformatics and System Biology
- Kanazawa University, Advance Science Research Center (Covid Research)
- Kanazawa University, Cancer Research Institute (Stem Cell)
- Sokendai University, Research Organization of Informatics and Systems (National Institute of Genetics
- Kyoto University, Graduate School & Faculty of Pharmaceutical Science
- Jichi Medical University, Data Science Center (data mining)
- Jichi Medical University, Center for Molecular Medicine
- Jichi Medical University, Center for Community Medicine (epidemiology)

2.4.6 Research and Innovation Program

In order to achieve the objectives of the Project, it important to carry out the following soft Research and Innovation Program, together with the above mentioned activities.

1) Establish framework of Joint Research with Japanese universities/institutions
2) Promote collaboration with Industries for the selected research topics
3) Carry out the necessary promotional activities to promote the above, such as researcher exchange, domestic and international seminars, workshop and meetings etc.

Without such activities, it is hard to reach the goal of building an ecosystem and a vehicle for research and innovation in the health sector in Indonesia.

In case of Eijkman, the target of the Research and Innovation Program is as follows:

- Establishment of Joint Research framework with Japanese universities/institutions)
  - Many of laboratories of Eijkman already has collaborations with Japanese universities and institutions, such as Nagasaki University, Kanazawa University, National Institute of Genetics (Mishima, Japan), and Okinawa Institute of Science and Technology.
  - Consultants will support to promote Joint Research framework with Japanese universities and institutions
- Promotion of collaboration with Industries
  - Many of laboratories of Eijkman already has collaborations with Indonesian industries such as PT Bio Farma, PT. Industri Jamu Borobudu, PT. Aretha Medika Utama, Biomolecular and Biomedical Research Center.
  - Consultants will support to promote collaboration with Indonesian and Japanese industries
- Implement Researcher Exchange programs
  - In order to implement the above activities, researcher exchange programs are executed as stated in the table 2-3 Soft Input Programs for Eijkman.
- Carry out other necessary promotional activities to promote the above, such as domestic and international seminars, workshop and meetings etc.

Through the above activities, Eijkman will be further developed as an STP in the biomolecular field of international standard as a forum for the work of domestic and foreign researchers to collaborate with local governments and industry, as well as various other parties, to produce innovation products and vanguard technology in the biomolecular field.

2.5 (Component 2) Development of Health Research and Innovation Capacity of Andalas University

2.5.1 Andalas University

Almost entire World and Indonesia have been facing a huge problem in the public health since last year of 2019 due to a very rapidly spreading pandemic. COVID-19 pandemic nowadays is a very big, serious problem ever in our life. The corona virus causing the pandemic has been infecting more than 50 million people and caused more than 1.2 million deaths in the world. This pandemic even has been affecting social life and economic of all countries very much. This situation could happen in a long time if there is no adequate, effective problem solution.

Universitas Andalas (Unand) has capacity and experience in the research and innovation of food, drugs, and health. Unand has been developing drugs particularly for natural and herbal medicines as well as health science and technology especially for medical technology and devices. Regarding to the pandemic, Universitas Andalas has been carrying out the testing and tracing of COVID-19 in West Sumatra Province at its diagnostic laboratory as well as the curing and handling of its patients at its university hospital. The testing performance is the second largest in Indonesia and this could map and slow down the spread of COVID-19 especially in West Sumatra Province. Unand has been asked for assistance by several provinces for the improvement of the their COVID-19 massive rapid testing ability. Some medical devices (rapid test kits, service robots, and stethoscopes) have been developed for services to COVID-19 patients in a hospital. At Universitas Andalas, the development research of the medical products is under coordination of the Institute for Research and Community Service, while their development and commercialization are managed by the Science Techno Park (STP). To increase the business of innovation of products and the services related to the curing and handling of COVID-19, it is required to strengthen the capacity, human resources, facility, as well as the research and innovation of COVID-19 products at Universitas Andalas.

(Research and Innovation Consortium for COVID-19)

Universitas Andalas is right now conducting the research and innovation for COVID-19 related products with cooperation with the researchers of Universitas Gajah Mada (UGM) in Jogjakarta and LIPI (Indonesian Institute for Science) as well as with a medical company, PT. Dian Maharani Medika, Jakarta. The hospital of Unand is the member of Indonesian University Hospital Association which supports for the requirement of medical product tests and applications in hospitals.

Moreover, Universitas Andalas conducts the research and innovation of public health products with University of North Sumatra in Medan, and University of Riau in Pekanbaru that is funded by Ministry of Research and Technology/BRIN through the scheme of Konsorsium Riset Unggulan Perguruan Tinggi. Some of the products are rapid test kits of rota-virus, TB (tuberculosis) virus, human papilloma virus, HIV, and dengue virus as well) with the cooperation of PT. Kimia Farma in Jakarta and Bali.

Universitas Andalas has cooperation for the development of public health products with PT Biofarma, Jakarta and PT. Biosains Medika (BioSM) Indonesia, Jakarta. Universitas Andalas is also conducting stem-cell research now as one of the National Research Priority (Prioritas Riset Nasional, PRN) researches that is collaborated with University of Indonesia, Maranatha University, Padjajaran University, ITB, and IPB, as well as Institute for Health Research of Health Ministry. The companies involved within the PRN program are PT. Aretha Medika in Bandung and Ina-Lab Foundation in Padang. Another research collaboration of stem-cells is also now conducted with PT. Dermama Bioteknologi Laboratorium, Jakarta and Dr. M. Djamil Regional Hospital of West Sumatra.

(Necessity of the Project)

This project is to develop the medical products used to support the public health for curing and handling COVID-19 disease and its possible derivatives/mutations with strengthening the institutional capacity, human resources, facility, and innovation implementation at Universitas Andalas especially for supporting the innovation and commercialization of the COVID-19 related medical products.

The benefits of this strengthening project are:

- Universitas Andalas will be able to produce and test medical products related to COVID-19 diseases and its derivatives/mutations as national products,

- Universitas Andalas will be able to carry out commercialization, business and services of the COVID-19 products especially for national needs with the partners of several medical companies and the Ministry of Health,
- Universitas Andalas could deliver a much higher contribution to the fighting of COVID-19 diseases in Indonesia as well as in the World,
- The capacity improved and facility provided by this project could be used for the research and innovation of medical products for handling other viruses (related to the projects of the five virus types with PT Kimia Farma).
- Universitas Andalas could be a research university with excellent collaborations with national medical companies and the Ministry of Health to develop and to produce public health products and services.

(Present Condition and Future Plan)
Based on the performance in the last three years before, in 2019, Universitas Andalas is awarded by the former Ministry of Research, Technology and Higher Education (Kemenristekdikti) as a university with a national rank of No. 4 for the performance of research as well as a national rank of No. 7 for the performance of innovation among more than 2,000 higher education institutions in Indonesia. The university was also awarded by Ministry of Law and Human Rights as the 3rd and 4th national most productive university for registered patents in 2017 and 2018, respectively. In 2019, Universitas Andalas was awarded for 2nd place with 126 registered patents. For the commercialization of research products and technology, Universitas Andalas has several units called Science Techno Park, Technology Business Incubator, Technology Transfer Office, and Teaching Industries in campus. Furthermore, The major research topics of Universitas Andalas are food, natural drugs, and health. The university has applied for registration of more than 100 food, natural drugs, and medical products and technologies to the site of www.kedaireka.id which is a platform of the Ministry Education and Culture to facilitate mutual cooperation between universities and industries in Indonesia.
Internally, Universitas Andalas is now driving the major university researches of food, natural drugs, and medical science and technology to support the development of public health products, especially that are against COVID-19. Externally, Universitas Andalas has been conducting the research and innovation activities for developing public health products and services including COVID-19 related products under the collaboration with several national medical companies, prominent research universities and the Ministry of Health as well as the Ministry of Research and Technology. As mention above, Universitas Andalas has been a university conducting the research, innovation and service for public health products in Sumatra Region (which is the second most populated island in Indonesia), particularly now for COVID-19 related products and services as current national needs. Therefore, Universitas Andalas has a strategic plan to be a national prominent and leading university in Sumatra Island and even outside of Java Island that has a center of excellence in a integrated, comprehensive and sustainable research and innovation of public health products, especially for fighting against COVID-19 that is a huge issue currently.

PROJECT LOCATION

Science Techno Park for
Business of Innovation
of Research Products at
Andalas University

Hospital for medical service
for COVID-19 patients at
Andalas University

COVID-19 Lab. at
Andalas University

2.5.2 Research Profiles

Research Profile of Andalas University is attached in Appendix 2.
The Research Profile of Andalas University is one fold, but it includes 21 research topics as follows, relating to development of medical products for curing and handling COVID-19 diseases (including its derivatives and mutations)

1). Development of Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
2). Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
3). Non-COVID ILI Rapid Test Product Development;
4). COVID 19 Vaccine Product Development;
5). Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
6). Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;
7). Product Development of Five COVID-19 Nanoparticle Technology Immunomodulators;
8). Development of Therapeutic Technology for COVID-19 based on Herbal Products;
9). Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
10). Development of Catechin-based Antibody and Stress Reduction Supplement Products;
11). Open-Source Ventilator Product Development;
12). CPAP (Continuous Positive Airway Pressure) Ventilator Product Development;
13). Digital Statoscope Product Development for COVID-19 Patients;
14). PPE (Personal Protective Equipment) Product Development for Infectious COVID-19;
15). Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services;

16). COVID-19 patient room disinfectant robot;
17). Patrol robots suspecting COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients;
18). Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients;
19). Product Development for Powered Air Purifying Respirator;
20). Development of Infectious Waste Incinerator Products with Plasma Pyrolysis;
21). Development of Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom with Nanotechnology in the New Norm;

The schedule of the research plan is illustrated in the chart below:

Table 2-4: Research Schedule of Andalas university

<table>
<tr><th>Research Area</th><th colspan="2">Research Topics</th><th>2022</th><th>2023</th><th>2024</th><th>2025</th><th>2026</th><th>2027</th><th>2028</th></tr>
<tr><td rowspan="4">I. Development of medical products</td><td colspan="2">Making models and validation in a laboratory environment</td><td colspan="3">■</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Making product models and demonstration and test in relevant environment in labs</td><td></td><td></td><td colspan="2">■</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Making prototipes and feasibility tests in operational environment</td><td></td><td></td><td></td><td colspan="2">■</td><td></td><td></td></tr>
<tr><td colspan="2">Making completed products and feasibility test for production</td><td></td><td></td><td></td><td></td><td colspan="2">■</td><td></td></tr>
<tr><td rowspan="7">II. Strengthening of institutional capacity of Science Techno Park</td><td colspan="2">Facilities</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Human resources</td><td rowspan="2">Master degree
(50 perosons)</td><td colspan="2">10</td><td colspan="2">10</td><td colspan="2">10</td><td></td></tr>
<tr><td></td><td colspan="2">10</td><td colspan="2">10</td><td></td><td></td></tr>
<tr><td rowspan="3">PhD.
(30 persons)</td><td></td><td></td><td colspan="3">10</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="3">10</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="3">10</td></tr>
<tr><td>Non-degree fellowship
(120 persons)</td><td colspan="7">120</td></tr>
<tr><td>III. Commercialization of the COVID-19 related medical products</td><td colspan="2">Production and business plan to the market</td><td></td><td></td><td></td><td></td><td></td><td colspan="2">■</td></tr>
</table>

2.5.3 Procurement of Equipment

In order to implement the research plan illustrated in the research profiles and improve the support facility, the variety of research equipment is requested to be procured in the Project. The details of the requested equipment list are shown in the Appendix.
As for the procurement method, refer to the explanation in 2.4.4.

2.5.4 Human Resource Development

(Contributions through the Degree Program in the Project)
Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: 30 persons
  Training Duration: 3 years
- Master degree
  Number of candidates: 20 persons
  Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

(Contributions through the Non-Degree Program in the Project)
Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 7 persons

- Position: administration staff, laboratory analyst
- Program: Non-degree (Post-doc research, technical training or internship)

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

2.5.5 Research and Innovation Program

In order to achieve the objectives of the Project, it important to carry out the following soft Research and Innovation Program, together with the above mentioned activities.

1) Establish framework of Joint Research with Japanese universities/institutions
2) Promote collaboration with Industries for the selected research topics
3) Carry out the necessary promotional activities to promote the above, such as researcher exchange, domestic and international seminars, workshop and meetings etc.

Without such activities, it is hard to reach the goal of building an ecosystem and a vehicle for research and innovation in the health sector in Indonesia.

In case of Andalas University, the target of the Research and Innovation Program is as follows:

- Establishment of Joint Research framework with Japanese universities/institutions)
  - Potential collaborations with Japanese laboratories/researchers are:
    - Jichi University
    - Kobe University
    - Prof. Kohei NAKANO (Gifu University)
    - Prof. Shinichiro Kuroki (Kobe University)
    - Shin Kaneko, M.D, Ph.D contacting in progress (CiRA, Kyoto University)
    - Prof. Jun Ota (The University of Tokyo)
- Promotion of collaboration with Industries
  - Potential collaborations with Industries are:
    - Kimia Farma
    - Shimadzu Corporation, Japan < Developing machine/parts for biomarker detection >
    - Aichikikai Techno System
    - Shintec Hozumi Co.,Ltd.
    - INFINITIGROUP Indonesia
- Carry out the necessary promotional activities to promote the above, such as researcher exchange, domestic and international seminars, workshop and meetings etc.
  - Visiting Scholar Program in the Project

    The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.
    - The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: 5 persons/year
    - The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: 5 persons/year
    - During the visit, the research ideas and investigated results will be exchanged and discussed.

Through the above activities, Andalas University will be further developed as STP of Andalas University as an STP in the health sector on the island of Sumatra to become a center for research, development, assessment and application of health innovation based on the triple helix, as well as a mainstay health service center in Indonesia.

2.6 (Component 3) Development of Nuclear Medicine Research and Innovation Capacity of BATAN

2.6.1 BATAN

BATAN

In accordance to Law No. 10/1997 regarding Nuclear Energy and Decision of the President RI No. 64/2005, National Nuclear Energy Agency of Indonesia (BATAN) has conducted governmental duties in the field of research, development and utilization of nuclear Science and Technology in accordance to the provisions of the valid laws and regulations related to peaceful use of Nuclear technology. BATAN has 5 missions as shown below:

1. Formulate national policy and strategy for nuclear science and technology
2. Develop a nuclear science and technology which is reliable, sustainable and beneficial to the people
3. Strengthen the role of BATAN as a leader in the regional level, and an active role in the international level
4. Conduct prime services in utilization of nuclear science and technology for the satisfaction of the stakeholders
5. Conduct dissemination of nuclear science and technology stressing on the utilization, safety and security

The objective in development of nuclear science and technology is to give real support in the national development with the role of

- Increasing the results of R&D of nuclear Technology, isotope and radiation, and the utilization/empowerment by the people in supporting the national development program
- Increasing the management performance of institutions and strengthening the innovation system in the frame of supporting research, development and application of nuclear energy, isotope and radiation

The target of the nuclear science and technology (NS&T) development which desires to be achieved are:

- Increase in the results of R&D ensure in the form of superior food plant seeds, availability of the basic infrastructure in the development of NPP, understanding of the people towards nuclear technology, utilization in application of isotope and radiation technology for health; and
- Increase in management performance of institution and strengthening of the innovation system covering NS&T institution, NS&T resources and strengthening the NS&T network in the frame of supporting the utilization of the results of research, development and application of nuclear energy, isotope and radiation in the community

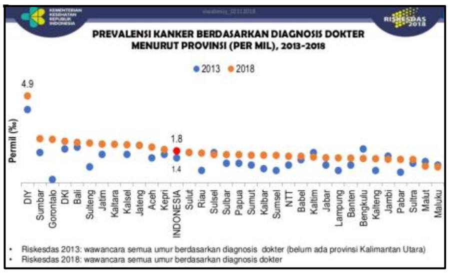
(Brief history of BATAN)

Activities in development and application of nuclear technology in Indonesia were initiated with the formation of a State Committee to Investigate Radioactivity in the year 1954. The State Committee had the duty to conduct investigation towards the possibility of a radioactive fall-out from nuclear weapons testing in the Pacific Ocean. By giving attention to the development in empowerment and utilization of the atomic energy for the welfare of the people, therefore through Government Regulation No. 65 year 1958, on the date 5 December 1958 the formation of the Atomic Energy Council and the Atomic Energy Institution (LTA) was established, which then was improved to become the National Atomic Energy Agency (BATAN) based on Law No. 31 year 1964 regarding the Main Provisions of Atomic Energy.

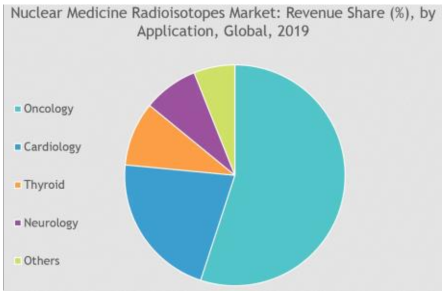
In the following developments, in order to increase mastery in the field of nuclear science and technology, in the year 1965 the operation of the first atomic reactor (Triga Mark II) in Bandung was inaugurated. Then gradually, several facilities for R&D&E were developed in various research centers, among others the Pasar Jumat, Jakarta Center for Atomic Energy Research (1966), the GAMA Center for Atomic Energy Research in Yogyakarta (1967), and the 30 MW Multi-Purpose Reactor (1987) including its supporting laboratories, like: Fabrication and fuel research, reactor safety testing, radioactive waste management and other nuclear facilities.

(Background of Research)

Recently the number of degenerative diseases, especially cancer in Indonesia increases drastically. The prevalence of cancer increases from 1.4 (2013) to 1.8 (2018) in 1000 population. According to data from the Ministry of Health of Indonesia (MoH) as of 2019, breast cancer is 42.1 per 100,000 population with 17/100,000 of average mortality rate. Cervical cancer is 23.4 per 100,000 capita with 13.9/100,000 of average mortality rate. The number of cancer patients in Indonesia is the 8th in Southeast Asia countries and the 23rd in Asia countries.



Prevalence of cancer in 2013 and 2018



Nuclear Medicine Radioisotopes Market

Nuclear technology plays an important role in cancer management. Nuclear technologies such as Radioisotopes, radiopharmaceuticals and nuclear medicine are indispensable in managing cancer decease and construction of tissue bank to growth inhibition measures. It is predicted that national demand of radioisotope, radiopharmaceutical and nuclear medicine services will increase significantly in the near future. In order to coordinate domestic activities for cancer control, Indonesian government established the National Cancer Control Committee and formulated the National Cancer Control Plan. In particular, the treatment of breast cancer and cervical cancer are regulated by "Prevention of Breast and Cervical cancer" promulgated by MoH in 2015.

Although there are 22 nuclear medicine centers in Indonesia, the capacity of medical treatment would not be sufficient to the number of cancer patients. In the present, 58 radiation therapy centers are established, the number of radiation therapy centers is expected to increase to cover the entire region of Indonesia in the future. Indonesia government supports to develop manufacturing technology of radioisotopes and radiopharmaceuticals to endorse cancer control program. Some of the radiopharmaceuticals to treat cancer are produced in Indonesia. However, at present more than 90% of radioisotope and radiopharmaceuticals is imported from abroad. Under these situations, BATAN is developing the manufacturing technology of radioisotopes and radiopharmaceuticals (Fig XX), but the progress of development has been delayed further than plan. Because the research reactor, which is main facility for developing radioisotope and radiopharmaceutical has been operated for more than 33 years, thus some systems in research reactor must be revitalized.

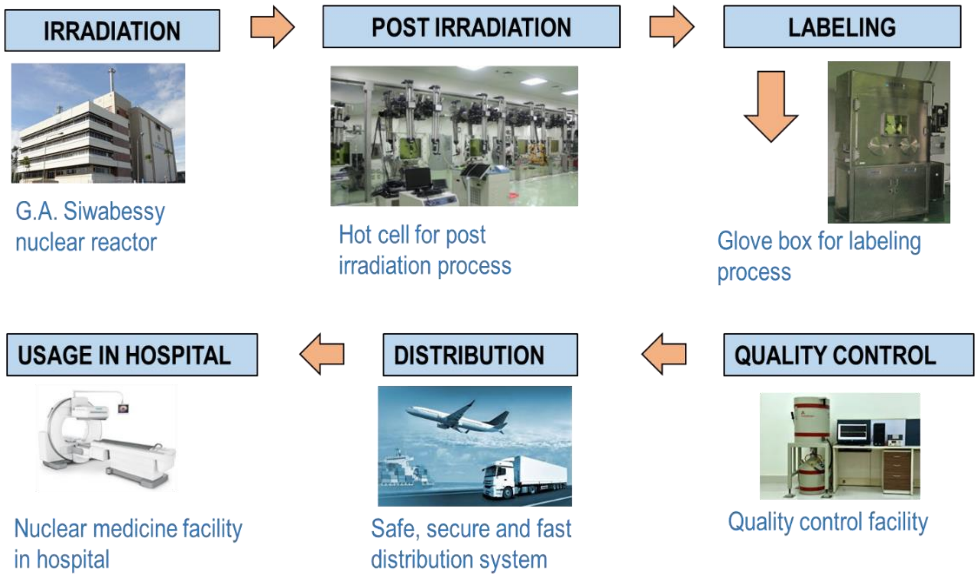


Figure 2.17: Radioisotope and Radiopharmaceutical production for Nuclear medicine

(Necessity of project)
As mentioned in the background, the number of degenerative diseases, especially cancer in Indonesia rapidly increase. Indonesia government has announced to introduce the nuclear technologies to cancer control. BATAN is a core institution to develop and innovate technologies on radioisotopes radiopharmaceuticals and nuclear medicine in Indonesia. This project is mainly to strengthen research and innovation capabilities on developing radioisotopes radiopharmaceuticals and nuclear medicine by consolidating research equipment, facilities and human resources at BATAN.
The objectives of this strengthening project are:

- increasing national capacity in research and innovation of radioisotopes radiopharmaceuticals and nuclear medicine
- increasing market share of domestic production of radioisotope for nuclear medicine services,
- increasing technological capacity related to radioisotope radiopharmaceutical and nuclear medicine
- improving reliability and safety performance of the G.A. Siwabessy nuclear research reactor as the main facility for radioisotope radiopharmaceutical research and innovation.

(Research Area and research topics)
To carrying out the objectives in the project, BATAN plans to conduct research as shown following.

(A) Development of radioisotope production technology using research reactor
- Development of Technetium-99m (Tc-99m) production technology using neutron-irradiated molybdenum.
- Development of Lutetium-177 (Lu-177) production technology
- Development of Iodine-131 (I-131) production technology
- Development of Gadolinium153 (Gd-153) production technology

(B) Development of radiopharmaceutical production technology
- Development of PSMA-based radiopharmaceuticals
- Development of Nano HSA radiopharmaceutical kit production technology
- Development of EDTMP radiopharmaceutical kit production technology
- Development of radiopharmaceutical for radiosynovectomy

(C) Preclinical studies of radioisotope and radiopharmaceutical
- Development of animal model for cancer

- Preclinical studies of Lu-177-InhPSMA for prostate cancer

(D) Clinical studies of radiopharmaceutical in nuclear medicine

- Clinical studies for Nano HSA radiopharmaceutical for lymphoscintigraphy
- Clinical studies for Lu-177-InhPSMA for prostate cancer

(Implementing department on radioisotopes radiopharmaceuticals and nuclear medicine in BATAN)
The program of revitalization of radioisotope radiopharmaceutical and nuclear medicine innovation ecosystem will be carried out in 4 centers in BATAN. The brief profile of the centers are the followings.

(a) Center of Multipurpose Reactor (CMPR)

Center of Multipurpose Reactor (CMPR) is the institution operator of G.A. Siwabessy Multipurpose Reactor (GAS-MPR). The reactor is located in Serpong Nuclear Area, Serpong, South Tangerang, is one of the research reactors owned by Indonesia. The reactor was built by Interatom International from West Germany in 1983. This reactor reaches critical condition in March 27th, 1987 and being authorized by Indonesia's second President in August 20th, 1987.

G.A. Siwabessy nuclear reactor is a multipurpose reactor which is also used for radioisotope research and production.

GA Siwabessy Multipurpose Reactor has the following facilities:

1. Silicone Doping Facility

This is a facility which is used for conducting neutron irradiation to a silicone sample. With this irradiation, a part of the silicone atoms will change to become phosphor, therefore the irradiated sample changes to become semi-conductor material. The processing of a semi-conductor fuel with this method, has many features compared to conventional methods therefore this is a new way which many industrial countries are attracted.

2. Rabbit System Facility

This irradiation facility is used for conducting neutron activation and production of radioisotope in a short irradiation period. There are two types of Rabbit Systems, which are the Hydraulic Rabbit type and the Pneumatic Rabbit type.

3. Radioisotope Production Facility

This irradiation facility which is in the reactor core (IP) could be used for producing radioisotopes that is useful for medical needs, industry as well as for agriculture. With the use of the multipurpose reactor which has a high neutron flux, the radioisotopes obtained are more efficient and quicker. Various types of radioisotopes been achieved with the GAS-MPR reactor, for medical purposes, (Tc-99m, I-125, I-131, etc.), for industrial needs (Ir-192, Br-82), as well as for research (P-32).

4. Power Ramp Test Facility (PRTF)

This facility is used for testing power reactor fuel specifically in the case of fuel resilience during repeated power level changes. Through this testing facility interaction characteristics could be known between the fuel pellets and tubes. The results of testing which are obtained will be inputs for development of reliable fuel types.

5. Neutron beam tube

Beside the irradiation facility which is in the reactor core, there is also an irradiation facility outside the core through an S1 to S6 radiation beam tube. Regarding the use of S1 to S6, this could be explained as follows: The S1 beam tube is used as an Iodine Loop Facility, the S2 beam tube is used for neutron radiography, the S3 beam tube has not been used or empty, The S4 beam tube is used for a three axis neutron spectrometer. The S5 beam tube is complemented with a neutron beam tube to channel the neutron beam to the Neutron Guide Hall building, as well as a part of the neutron beam is used for the four circle neutron diffractometer. And finally, the S6 beam tube is used as a neutron diffractometer for measurement of the remaining voltage.

(b) Center for Radioisotope and Radiopharmaceutical Technology (CRRT)

Main activities of Center for Radioisotope and Radiopharmaceutical Technology are development and utilization of radioisotope and radiopharmaceutical technology. At present mostly radioisotope for medical application is developed in the center. The radioisotopes are produced by neutron irradiation in the multipurpose reactor described above.

Center for Radioisotope and Radiopharmaceutical Technology has the following facilities:

1. <u>Facilities of target preparation for neutron irradiation</u>

The facilities is used for preparation of target before irradiation of the target in the GA Siwabessy multipurpose reactor. The target is put in a aluminum capsules and sealed by welding. Leak test is performed to make sure that there is no leak in the capsules.

2. <u>Hot Cell for post irradiation process</u>

Several radioisotopes have been processed using the hot cell after irradiation process in the GA Siwabessy Reactor. For examples: I-131, Sm-153, Br-82, P-32, Mo-99 and Lu-177.

3. <u>Mini cell for labelling process</u>

Several labeled compounds are developed using the mini cell. For examples: Sm-153-EDTMP, I-131-MIBG, I-131-hippuran

4. <u>Clean Room for aseptic process</u>

Several radiopharmaceutical kits are developed using the cleanroom. For examples are MDP radiopharmaceutical kit, MIBI radiopharmaceutical kit, DTPA radiopharmaceutical kit and ethambutol radiopharmaceutical kit.

5. <u>Glove Box</u>

The glove box is used for handling radioisotopes with low radioactivity. Small scale of experiments can be carried out in the glove box.

6. <u>Facilities for radioisotope and radiopharmaceutical characterization</u>

The facilities are used for characterization of radioisotope and radiopharmaceutical developed in CRRT. Some equipment has been operated for a long time, some equipment more than 20 years. It is necessary to revitalize the equipment to increase the quality of the results of the characterization.

The CRRT has collaboration research with several national institutions and international institutions. National collaborations are carried out with national universities, research centers and hospitals. International collaboration is carried out with International Atomic Energy Agency (IAEA), Japan Atomic Energy Agency (JAEA) and some universities in Japan. Several researchers were graduated from Japanese university such as Kanazawa University, Toyama University, Tsukuba University and Osaka prefecture university.

(c) Center for Applied Nuclear Science and Technology (PSTNT)

Center for Applied Nuclear Science and Technology (PSTNT), also commonly known under the name of BATAN Bandung, is one of BATAN's research centers coordinated by Deputy for Application of Nuclear Science and Technology of BATAN. PSTNT consists of several divisions such as Administration, Labelled Compounds & Radiometric, Techno-physics, Reactors, Work Safety and Engineering, Quality Assurance, and Nuclear Security. With duties and functionalities in conducting research, development, and utilization of applied nuclear science and technology, PSTNT aiming of increasing the contribution of nuclear science and technology in society, as well as increasing the availability of qualified nuclear science and technology resources, in terms of human resources, facilities and infrastructure. PSTNT also focuses on other research fields such as energy, health, radiation safety, and industry.

The main facility in PSTNT is TRIGA 2000 Research Reactor, which is widely applied for research, training, radioisotope production, and services. Since it was first built in 1962, the TRIGA 2000 Research Reactor has undergone several modifications. The latest modification in 2015 is the replacement of two out of five FFCRs due to the overburn up of more than 50% at its fuel follower. The TRIGA 2000 reactor consists of several parts such as reactor tank which contained aluminum liner, reactor core which has hexagonally core lattice and water as moderator, solid form of Uranium and Zirconium hydride alloy as a fuel element, five control rods, digital Control System Console (CSC) that regulates the movement of the rod, control unit and digital data acquisition (DAC) as well as other power monitoring channel, and the use of water as coolant in reactor cooling system. The TRIGA 2000 Reactor must be operated by certified personnel coordinated with BAPETEN as the regulatory body.

The utilization of the TRIGA reactor has become the backbone for research and development (R&D) activities at PSTNT. The major utilization of TRIGA 2000 is radioisotope production and Neutron Activation Analysis (NAA) research activities. Apart from R&D activities, the TRIGA 2000 Reactor is also used for service activities in nuclear science and technology that may be directly felt by society through irradiation services and radioisotope products for nuclear medicine. Numerous training activities can also be utilized from the TRIGA Reactor, including neutronic and thermohydraulic training for students/reactor operators.

In the development of science and technology, PSTNT collaborates with several educational institutions and governments in Bandung until 2025. PSTNT has produced radioisotopes that can be used in the fields of health and medicine, environment, hydrology, and industry by other parties as to its contribution to the field of nuclear science and technology. PSTNT also supports national priority research in the health sector, particularly in efforts to eradicate stunting/malnutrition through the identification of micronutrient content in food of children under two years and in improving the quality of public health through the contribution of nuclear analysis techniques to air pollutant research in collaboration with the Ministry of Environment and Forestry (KLHK) and the Regional Environmental Service (city/province). To enhance the quality of human resources, PSTNT also serves the demand for education and training of human resources within BATAN and from external/other institutions.

The center is developing animal laboratory for pre-clinical study. Several animal models are developed in this lab, including animal model for cancer. The animal lab can be used for pre-clinical study using radioactive materials.

(d) Center for Empowerment of Informatics and Nuclear Strategic Area

Center for Empowerment of Informatics and Nuclear Strategic Area is one of center in BATAN that has the duty to manage the Serpong nuclear area. The center has the following duties:

- Implementation in management of the Serpong Nuclear Area
- Implementation in monitoring of personnel dose in the Serpong nuclear area environment
- Implementation in monitoring of environment in the Serpong nuclear area
- Implementation of management of the computer network system
- Implementation in management of nuclear management information system
- Implementation of Quality Assurance
- Implementation of nuclear security

One of its duties is to manage the medical clinic for the Serpong Nuclear Area. The clinic is planned to be developed into a nuclear medicine clinic. It is expected that it has a wider scope of activities and has greater benefits for supporting research and development in the Serpong Nuclear Area.

(Present condition and further plan)

Status of research activities

Presently, about 60% of radioisotope and radiopharmaceutical needs is iodine-131. Therefore, Iodine-131 production technology has been successfully developed in lab scale. It is necessary to prepare production facilities for I-131. The demand of Sm-153 EDTMP for palliative therapy (bone-metastatic cancer) increases significantly. It is necessary to increase the production capacity of Sm-153 EDTMP.

- Some radioisotope production technology using research reactor has been developed. Samarium-153, molybdenum-99 with small radioactivity, Lutetium-177 with low specific radioactivity and Iodine-131 with low radioactivity are obtained.

- Some radiopharmaceutical production technology, which includes MIBI radiopharmaceutical kit, DTPA radiopharmaceutical kit, MDP radiopharmaceutical kit, 153Sm-EDTMP and 131I-MIBG have been established.
- Some radiopharmaceutical quality control methods such as QA methods of MIBI radiopharmaceutical kit, DTPA radiopharmaceutical kit, MDP radiopharmaceutical kit, Sm-153-EDTMP and I-131-MIBG have been established:

Status of research infrastructure

- G.A. Siwabessy nuclear research reactor has been operated since 1987. The reactor is used for radionuclide production, material testing and colorization of gemstone. Since the reactor protection system has been used for more than 33 years, it is necessary to revitalize the system to increase the reliability and safety of the reactor.
- BATAN has facility for radioisotope and radiopharmaceutical development. Since some radioisotopes and radiopharmaceuticals production technology has been successfully developed, it is necessary to produce the radioisotope and radiopharmaceuticals routinely for user. The facility should be developed for routine production for some radioisotopes dan radiopharmaceuticals.
- At present, BATAN must cooperate with hospitals for radiopharmaceutical clinical trials since BATAN doesn’t have nuclear medicine facilities. However nuclear medicine facility in hospitals have a very high load for public services. Hence, clinical trial of radiopharmaceuticals will be better if BATAN can carry out clinical trial in BATAN, integrated with radiopharmaceutical development and production facility.

Further plan

Further plan for strengthening research and innovation capabilities on developing radioisotopes radiopharmaceuticals and nuclear medicine under the project shows in Figure 2-18 and 19.

- Operation of G.A. Siwabessy reactor with higher safety and reliability for radioisotope production and technology development.
- Development of neutron irradiation technology for radioisotope production and other applications
- Development and routine production methods of radioisotope and radiopharmaceutical.
- Development of radiopharmaceuticals for molecular imaging and targeted therapy
- Development of animal model and preclinical studies for radiopharmaceutical using animal model
- Clinical studies of radiopharmaceutical for diagnosis and therapy
- International research collaboration in research reactor utilizations

Research Area		Y-1				Y-2				Y-3				Y-4				Y-5			
	Research topics	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
(A) Development of radioisotope production technology using research reactor																					
A-1	Development of Technetium-99m (Tc-99m) production technology using neuton-irradiated molybdenum.	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
A-2	Development of Lutetium-177 (Lu-177) production technology	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
A-3	Development of Iodine-131 (I-131) production technology	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨								
A-4	Development of Gadolinium153 (Gd-153) production technology	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
(B) Develompent of radiopharmaceutical production technology																					
B-1	Development of PSMA-based radiopharmaceuticals	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
B-2	Development of Nano HSA radiopharmaceutical kit production technology	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
B-3	Development of EDTMP radiopharmaceutical kit production technology	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
B-4	Develompent of radiopharmaceutical for radiosynovectomy									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
(C) Preclinical studies of radioisotope and radiopharmaceutical																					
C-1	Development of animal model for cancer	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
C-2	Pre-clinical studies of Lu-177-InhPSMA for prostate cancer					▨	▨	▨	▨	▨	▨	▨	▨								
(D) Clinical studies of radiopharmaceutical in nuclear medicine																					
D-1	Clinical studies for Nano HSA radiopharmaceutical for lymphoscintigraphy													▨	▨	▨	▨	▨	▨	▨	▨
D-2	Clinical studies for Lu-177-InhPSMA for prostate cancer													▨	▨	▨	▨	▨	▨	▨	▨

Figure 2.18: Tentative plan for research activity under the project

Output		Y-1				Y-2				Y-3				Y-4				Y-5			
	Task	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 1: Reactor protection systems and replacing beam tube in GA Siwabessy Reactor																					
1	Preparation and tender process	▨	▨	▨	▨																
2	Phase 1: Feasibility study, System requirement and specifications					▨	▨	▨	▨												
3	Phase 2: System design					▨	▨	▨	▨												
4	Phase 3: Detail design Manufacturing of cabinets									▨	▨	▨	▨								
5	Phase 4: Test bay									▨	▨	▨	▨								
6	Phase 5: Installation and commisioning													▨	▨	▨	▨				
7	Normal operation																	▨	▨	▨	▨
Output 2: Radioisotope and radiopharmaceutical facility																					
1	Preparation and feasibility study	▨	▨	▨	▨																
2	Design for revitalization of old laboratory building	▨	▨	▨	▨																
3	Licensing					▨	▨	▨	▨												
4	Facility renovation									▨	▨	▨	▨	▨	▨	▨	▨				
5	Equipment procurement and installation					▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				
6	Commisioning																	▨	▨	▨	▨
Output 3: Nuclear medicine facility																					
1	Preparation and feasibility study	▨	▨	▨	▨																
2	Basic design	▨	▨	▨	▨																
3	detail design					▨	▨	▨	▨												
4	Licensing					▨	▨	▨	▨												
5	Building construction									▨	▨	▨	▨	▨	▨	▨	▨				
6	Installation of facilities and equipment									▨	▨	▨	▨	▨	▨	▨	▨				
7	Commisioning																	▨	▨	▨	▨
Output 4: Supporting activities																					
1	Human resource development	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
2	Regulation evaluation	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨								
3	Stakeholder intermediation									▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
4	Radiopharmaceutical market survey and analysis	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

Figure 2.19: Tentative plan for infrastructure Development and supporting activities

Basic Information of BATAN

- **Organization of BATAN**

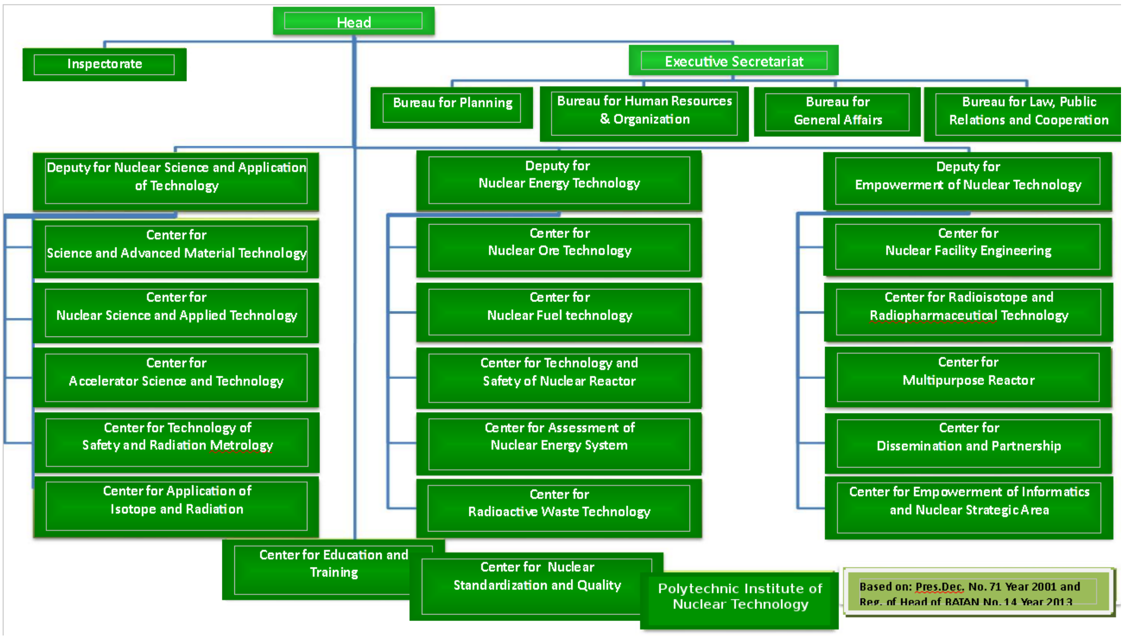


Figure 2.20: Organization of BATAN

- **International cooperation**

Indonesia government acceded to membership of International Atomic Energy Agency (IAEA) on 7 August, 1957. BATAN joins the technical cooperation project conducted by IAEA.[1]

- Bilateral Cooperation

Country Name	Agreement	(Effective) Date
Argentina	Agreement on Peaceful Uses of Nuclear Energy	9 March 1993
Australia	Agreement on Peaceful Uses of Nuclear Energy	11 November 1997 (signed)
Canada	Agreement on Peaceful Uses of Nuclear Energy	14 July 1983
Republic of Korea	Agreement on Peaceful Uses of Nuclear Energy	24 October 2011
Germany	Agreement on Peaceful Uses of Nuclear Energy	24 February 1977
Japan	Cooperation in Nuclear Field	22 November, 2007 (signed between METI, Japan and MEMR, Indonesia)
The United States of America	Agreement on Peaceful Uses of Nuclear Energy	30 December, 1981, 20 February 2004 (revised, extended)
	Agreement of exchange information and cooperation on Nuclear safety	23 September, 1998, 1 October, 2008 (reissuance)
Russian Federation	Agreement on Peaceful Uses of Nuclear Energy	2 June 2015, (signed between BATAN and Rosatom)

- Multilateral cooperation

Name	Organized by
Forum for Nuclear Cooperation in Asia (FNCA)	MEXT, Japan

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[1] List of IAEA collaboration project See Appendix 11

Regional Cooperative Agreement for Research, Development and Training to Nuclear Science and Technology (RCA)	IAEA
Asian Nuclear Safety Network (ANSN)	IAEA

Academic and Scientific cooperation with Japanese institutes

	Partner or network	Activities
1	Japan Atomic Energy Agency (JAEA)	Arrangement between the National Nuclear Energy Agency, Indonesia and the Japan Atomic Energy Agency, in the Field of Peaceful Uses of Nuclear Energy[2]

2.6.2 Construction of Building

Nuclear medicine is a medical specialty that involves the application of radioactive substances in the diagnosis and treatment of diseases. Nuclear medicine scans are usually performed by nuclear medicine technologists. Examination in the field of nuclear medicine helps a lot in supporting the diagnosis of various diseases. Its use is wide ranging from examining diseases of the brain, thyroid gland, parathyroid, lung, heart, stomach, liver, bile ducts, impaired kidney function, detecting and determining the location of bleeding in the digestive tract, to detecting cancer and determining the spread and stage of cancer. There is much more information that can be obtained to support the diagnosis by applying nuclear medical technology which is currently developing rapidly. The advantage of examination in nuclear medicine is that the examination is not invasive, can be repeated immediately without giving additional radiation to the patient, and the most important thing is that the imaging results obtained are functional images.

Nuclear medicine also plays a role in the therapy of certain diseases, for example, thyroid gland cancer and thyroid gland hyperfunction, palliative therapy for bone pain due to cancer spread, inflammatory therapy (inflammation) of the knee joint that is difficult to treat with oral or injection medications, keloid therapy, neuroendocrine tumor therapy, therapy for malignancy in the liver, and which is currently being developed rapidly, is a teranostic (therapy and diagnostic) which aims at targeted therapy. Unlike conventional therapy, radioisotope which is given in nuclear medicine therapy is more selective towards target tissue so as to minimize the side effects of treatment. The example of therapy most frequently used today is thyroid cancer therapy which should be performed after total thyroidectomy to reduce recurrence and metastases.

Planning for the construction of a nuclear medical installation is a large-scale project that requires careful planning. Planning and implementation of installation construction is required to take into account applicable regulations. The legal foundations governing the construction of nuclear medical installations include:

1. Law Number 10 of 1997 concerning Nuclear Energy,
2. Government Regulation Number 33 of 2007 concerning Safety of Ionizing Radiation and Security of Radioactive Sources,
3. Government Regulation Number 29 of 2008 concerning Licensing for Utilization of Ionizing Radiation Sources and Nuclear Materials,
4. Perka Bapeten No. 17 of 2012 concerning Radiation Safety in Nuclear Medicine, and
5. Perka Bapeten No. 4 of 2013 concerning Radiation Protection and Safety in the Utilization of Nuclear Energy

(Nuclear Medicine Clinic Building)

The construction of a nuclear medicine facility in the Serpong Nuclear Zone is planned to be a Nuclear Medicine Clinic. This clinic is planned to provide nuclear emergency services, medical services and research. This nuclear medicine clinic will be accessible to residents and employees around the KNS.

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[2] The Arrangement was commenced on May 2007, and agreed to extend the arrangement on April 2018. See APPENDIX 11.

Services are provided in accordance with clinical standards while prioritizing research aspects.
The construction of a nuclear medicine clinic is planned in the residential area of PUSPIPTEK Serpong. The clinic area is planned to be built on an area of 5,200 m2, while the clinic building itself has a building area of 1,600 m2. The clinic building will be built on one floor by referring to the standard of nuclear medicine clinic, KMK No. 08 of 2008.
The construction of the clinic building includes the main room for nuclear medical instruments, namely PET / CT, SPECT CT, diagnostic probe, laboratory and iodine therapy room. The other main room is a hot lab room, injection room, isolation room, waste room and other rooms adapted to Kmk No. 08 2008.
The nuclear medicine clinic building is planned to be in the PUSPIPTEK housing area with latitude 6021'18.97 "S and longitude 106040'37.25" E. Land area is 80 x 65 m2. The plan of the nuclear medicine clinic area is in the Figure below:

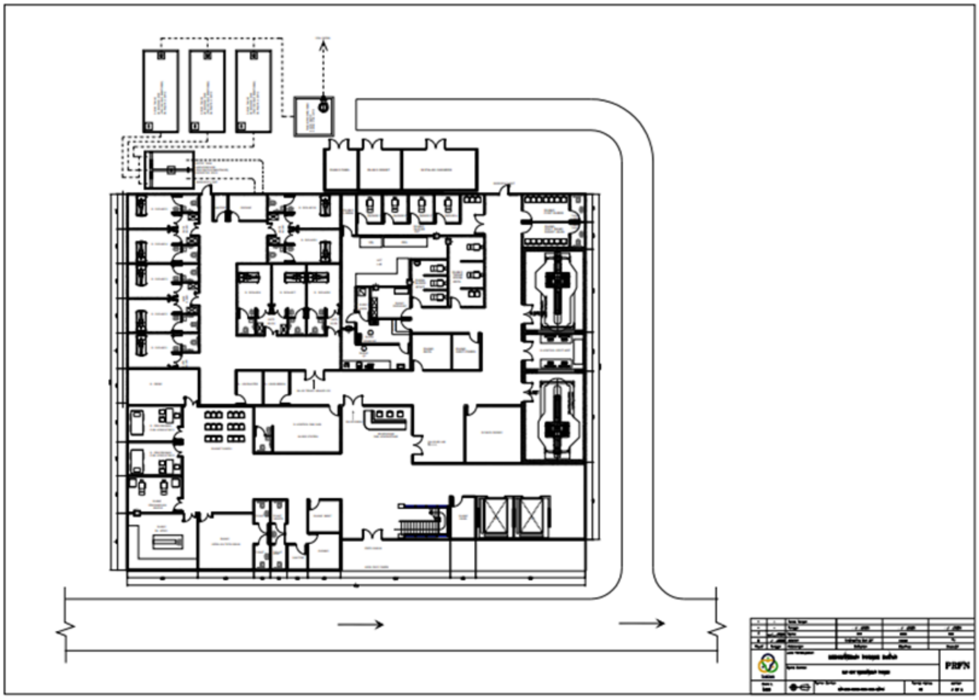


Figure 2-21: Image of Nuclear Medicine Clinic Layout

The Building Construction and Renovation related Costs of BATAN are estimated as follows:

Table 2-5: BATAN Building Construction and Renovation related Costs

Exchange Rate US
to JPY: 103.81

BATAN Buiding Construction and Rennovation related Costs					
No	Items	unit		in USD	in JPY
A	**Renovation of old lab building system**			**827,585**	**85,911,599**
	Installation of fire protection system			32,263	32.263
	Rennovation of floor, walls and roof			217,825	217.825
	Installation of water system			19,619	19.619
	monitoring and control system for VAC and AHU			229,034	229.034
	renovation of clean room (aseptic) and cell line room			328,844	328.844

B	**NUCLEAR MEDICINE FACILITY**			**3,700,000**	**3,700,000**
1	**Building**			**1,260,000**	**1,260,000**
	Main building	750	M2	1,135,000	1,135,000
	Utility building	200	M2	125,000	125,000
2	**Building supporting system**			**882,000**	**882,000**
	Air conditioning system	7%		88,200	88,200
	building sound system	2%		25,200	25,200
	communication system	1%		12,600	12,600
	Information technology	6%		75,600	75,600
	Electrical system	12%		151,200	151,200
	fire protection system	7%		88,200	88,200
	lightning protection system	1%		12,600	12,600
	waste water treatment	2%		25,200	25,200
	Interior furniture	10%		126,000	126,000
	combustion gas system	1%		12,600	12,600
	medical gas system	2%		25,200	25,200
	termite prevention	1%		12,600	12,600
	Facility for disabilities	3%		37,800	37,800
	environment infrastructure	3%		37,800	37,800
	licensing	1%		12,600	12,600
	green building requirements	9%		113,400	113,400
	Utility connection	2%		25,200	25,200
3	**Building construction management**			**277,200**	**277,200**
	Construction management	10%		126,000	126,000
	Planning consultant	12%		151,200	151,200
4	**Medical equipment**			**1,280,800**	**1,280,800**
	PECT/CT and the supporting system			1,280,800	1,280,800

2.6.3 Procurement of Equipment

In order to implement the research plan illustrated in the research profile and improve the support facility, the variety of research equipment is requested to procure in the Project. The details of the requested equipment list are shown in the Appendix 2.

As for the procurement method, refer the explanation in 2.4.4.

2.6.4 Human Resource Development

(Contributions through the Non-Degree Program in the Project)

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 100 persons
- Position: researchers and operators
- Program: Non-degree (technical training or internship)

2.6.5 Research and Innovation Program

In order to achieve the objectives of the Project, it important to carry out the following soft Research and Innovation Program, together with the above mentioned activities.

1) Establish framework of Joint Research with Japanese universities/institutions
2) Promote collaboration with Industries for the selected research topics
3) Carry out the necessary promotional activities to promote the above, such as researcher exchange, domestic and international seminars, workshop and meetings etc.

Without such activities, it is hard to reach the goal of building an ecosystem and a vehicle for research and innovation in the health sector in Indonesia.

In case of BTAN, the target of the Research and Innovation Program is as follows:

- Establishment of Joint Research framework with Japanese universities/institutions)
  - Potential collaborations with Japanese laboratories/researchers are:
    - Dr. Kunihiko Tsuchiya
      <Japan Atomic Energy Agency >
- Promotion of collaboration with Industries
  - Potential collaborations with Industries are:
    - Name: PT Kimia Farma (state-own pharmaceutical company)
    - State of collaboration
    - < Collaboration in radiopharmaceutical development and production>
- Carry out the necessary promotional activities to promote the above, such as researcher exchange, domestic and international seminars, workshop and meetings etc.
  - Visiting Scholar Program in the Project

    The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.
    - The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: 5 persons/year
    - The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: 5 persons/year
    - During the visit, the research ideas and investigated results will be exchanged and discussed.

Through the above activities, BATAN will be further developed as STP in the nuclear sector for health, agriculture and food, as well as industry to become a center for research, development, study and application of nuclear science and technology-based scientific and technological innovation, based on the triple helix for technological services to the public.

2.7 Consulting Services

The Project plans employment of Consulting Services to assist the Executing Agency and Implementing Agencies for their effective, efficient and compliant implementation of the Project.

The contents of the Consulting Services will be the followings including others:

1) Assistance for promotion and implementation of the Research and Innovation Programs
    - Promotion of Joint Research and Industrial Collaboration
    - Implementation of Researcher Exchange Programs
    - Assistance for promotional activities including Seminars, Workshop and Meetings etc.
2) Assistance for implementation of Human Resources Development Programs
    - Placement and Mobility Arrangement
    - Monitoring and Support
    - Fellowship Management
3) Assistance for implementation of Building Construction
    - Detailed Design
    - Tender Assistance
    - Construction Supervision
4) Assistance for Equipment Procurement
    - Equipment List Rationalization
    - Tender Assistance (including Bid Documentation)
    - Contract Monitoring (including Liquidated Damages)
    - Equipment Acceptance (including Disbursement Management) etc.
5) Assistance for Financial Management of Yen loan fund
    - Establishment of Fund Flow Mechanism
    - Periodical Financial Management Assistance

The proper Terms of Reference for Consulting Services is to be prepared.

2.8 Project Implementation Schedule

Overall project implementation schedule is illustrated as below:

Table 2-6: Overall Project Implementation Schedule

Overall Project Implementation Schdule								
Program		**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
1. Eijkman: Bio-molecular Research and Innovation Capacity Development								
1-1	Construction of Building	▬	▬	▬	▬	▬		
1-2	Procurement of Equipment	▬	▬	▬	▬	▬	▬	▬
1-3	Human Resource Development							
	1) Doctor degree program	▬	▬	▬	▬	▬	▬	▬
	2) Master's degree program	▬	▬	▬	▬	▬	▬	▬
	3) Non-Degree Program)	▬	▬	▬	▬	▬	▬	▬
1-4	Research and Innovation Program							
	1) Visiting Scholar Program	▬	▬	▬	▬	▬	▬	▬
	2) Promotion and Research	▬	▬	▬	▬	▬	▬	▬
2. Andalas University: Development of Health Research and Innovation Capacity								
2-1	Procurement of Equipment	▬	▬	▬	▬	▬	▬	▬
2-2	Human Resource Development							
	1) Doctor degree program	▬	▬	▬	▬	▬	▬	▬
	2) Master's degree program	▬	▬	▬	▬	▬	▬	▬
	3) Non-Degree Program)	▬	▬	▬	▬	▬	▬	▬
2-3	Research and Innovation Program							
	1) Visiting Scholar Program	▬	▬	▬	▬	▬	▬	▬
	2) Promotion and Research	▬	▬	▬	▬	▬	▬	▬
3	**BATAN: Development of Nuclear Medicine Research and Innovation Capacity**							
3-1	Construction of Building		▬	▬	▬	▬	▬	
3-2	Procurement of Equipment	▬	▬	▬	▬	▬	▬	
3-3	Human Resource Development							
	1) Doctor degree program	▬	▬	▬	▬	▬	▬	▬
	2) Non-Degree Program)	▬	▬	▬	▬	▬	▬	▬
3-4	Research and Innovation Program							
	1) Visiting Scholar Program	▬	▬	▬	▬	▬	▬	▬
	2) Promotion and Research	▬	▬	▬	▬	▬	▬	▬
Management								
4	Consulting Services	▬	▬	▬	▬	▬	▬	▬
5	PIU Management	▬	▬	▬	▬	▬	▬	▬

(Chapter 3) Project Cost Estimation

2.4 Assumptions of Cost Estimation

Project cost estimation was made based on the following assumptions for the common terms:

1) Exchange rate
    - Yen/$: US$ 1 = 103.81 Yen
    - Yen/IDR: IDR 1 = 0.00728 Yen
2) Price Escalation
    - Foreign Currency (FC): 1.3%
    - Local Currency (LC): 6.0%
3) Physical Contingency
    - Construction: 5.0%
    - Consultant: 5.0%
4) Consultant cost: Tentatively 10% of Base Cost
5) Tax
    - VAT: 10.0%
    - Import Tax: 5.0%
6) Rate of Administration Cost: 5.0%
7) Rate of Interest During Construction
    - Construction: 0.30%
    - Consultant: 0.01%
8) Rate of Front end Fee: 0.2%
9) Payment Method for Interest during construction and Commitment charge: loan-covered
10) Fiscal Year: Jan - Dec

2.5 Cost Estimation of Building Construction

1) Breakdown of cost estimation of building construction of Eijkman

To be prepared

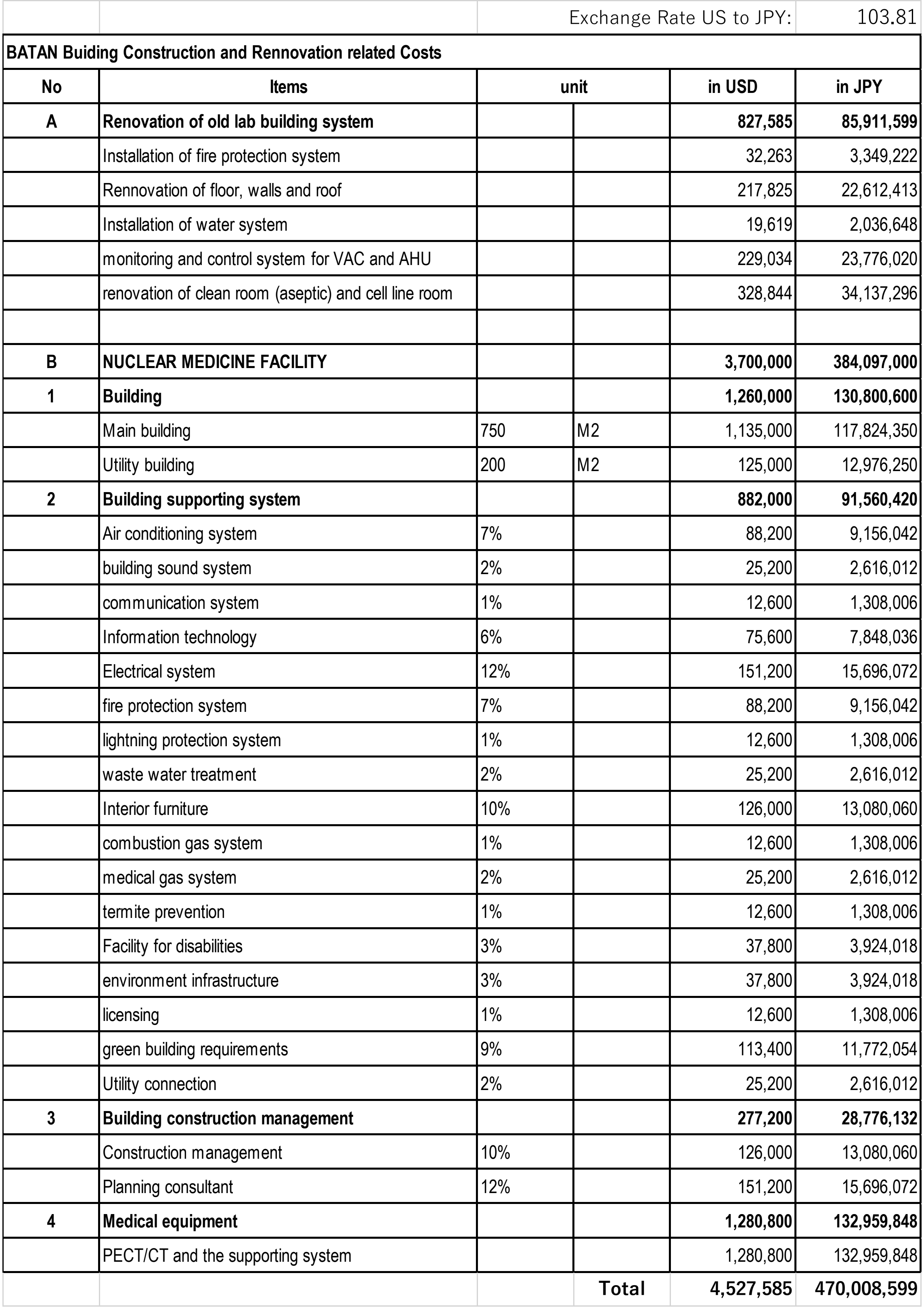
Tentatively, the cost amount of building construction of Eijkman is taken from the project cost table in blue book document for total project cost estimation purpose as below:

BUILDING USD 70,638,888.89 (JPY 7,333,023,056) took from Blue Book

Breakdown information and clarification is required.

2) Cost estimation of building construction of BATAN

Table 3-1: Owner's cost estimation of building construction of BATAN



		Exchange Rate US to JPY:			103.81
BATAN Buiding Construction and Rennovation related Costs					
No	**Items**	**unit**		**in USD**	**in JPY**
A	**Renovation of old lab building system**			**827,585**	**85,911,599**
	Installation of fire protection system			32,263	3,349,222
	Rennovation of floor, walls and roof			217,825	22,612,413
	Installation of water system			19,619	2,036,648
	monitoring and control system for VAC and AHU			229,034	23,776,020
	renovation of clean room (aseptic) and cell line room			328,844	34,137,296
B	**NUCLEAR MEDICINE FACILITY**			**3,700,000**	**384,097,000**
1	**Building**			**1,260,000**	**130,800,600**
	Main building	750	M2	1,135,000	117,824,350
	Utility building	200	M2	125,000	12,976,250
2	**Building supporting system**			**882,000**	**91,560,420**
	Air conditioning system	7%		88,200	9,156,042
	building sound system	2%		25,200	2,616,012
	communication system	1%		12,600	1,308,006
	Information technology	6%		75,600	7,848,036
	Electrical system	12%		151,200	15,696,072
	fire protection system	7%		88,200	9,156,042
	lightning protection system	1%		12,600	1,308,006
	waste water treatment	2%		25,200	2,616,012
	Interior furniture	10%		126,000	13,080,060
	combustion gas system	1%		12,600	1,308,006
	medical gas system	2%		25,200	2,616,012
	termite prevention	1%		12,600	1,308,006
	Facility for disabilities	3%		37,800	3,924,018
	environment infrastructure	3%		37,800	3,924,018
	licensing	1%		12,600	1,308,006
	green building requirements	9%		113,400	11,772,054
	Utility connection	2%		25,200	2,616,012
3	**Building construction management**			**277,200**	**28,776,132**
	Construction management	10%		126,000	13,080,060
	Planning consultant	12%		151,200	15,696,072
4	**Medical equipment**			**1,280,800**	**132,959,848**
	PECT/CT and the supporting system			1,280,800	132,959,848
			Total	4,527,585	470,008,599

The above cost estimation is based on the document submitted by BATAN. Clarification by consultants is not done yet.

2.6 Cost of Equipment

The Equipment list requested by Eijkman is in Appendix 7, by Andalas University is in Appendix 8 and by BATAN is in Appendix 9 respectively. The total costs of the equipment in the lists are estimated by owner institutions as follows:

Table 3-2: Owner's Estimation Cost of Equipment

Institution	Total cost in Rp	Total cost in JPY
Eijkman	870,579,818,192	6,322,051,745
Andalas University	74,924,958,043	545,453,695
BATAN	57,998,341,900	422,227,929

The above costs estimation is based on the document submitted by individual institutions. Clarification by consultants is not finished yet.

2.7 Human Resource Development

1) Unit Costs

Unit costs of applied for cost estimation of Human Resource Development Programs are as follows:

Table 3-3: Unit Cost of Human Resource Development Programs (incl. Visiting Scholar Program)

Ph.D. Degree Program (4 years)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	Year 1	Year 2	Year 3	Year 4	Year 5	Total
				3 months	12 months	12 months	12 months	3 months	42 months
Travel Fee	Round	100,000	4	100,000	100,000	100,000	100,000		400,000
Entrance Fee	Once	420,000	1	420,000					420,000
Tuition Fee	Year	600,000	3		600,000	600,000	600,000		1,800,000
Arriving Allownce	Once	321,000	1	321,000					321,000
Living Allowance	Year	160,000	42	480,000	1,920,000	1,920,000	1,920,000	480,000	6,720,000
Book, Thesis Allowance	Once	160,000	1	160,000					160,000
Health Insurane	Year	53,500	3.5	13,375	53,500	53,500	53,500	13,375	187,250
				1,494,375	2,673,500	2,673,500	2,673,500	493,375	10,008,250

Master Degree Program (2 years)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	Year 1	Year 2	Year 4	Total
				3 months	12 months	9 months	30 months
Travel Fee	Round	100,000	2	100,000		100,000	200,000
Entrance Fee	Once	420,000	1	420,000			420,000
Tuition Fee	Year	600,000	3	600,000			600,000
Arriving Allownce	Once	321,000	1	321,000			321,000
Living Allowance	Year	160,000	24	480,000	1,920,000	1,440,000	3,840,000
Book, Thesis Allowance	Once	107,000	1	107,000			107,000
Health Insurane	Year	53,500	2	53,500	53,500		107,000
				2,081,500	1,973,500	1,540,000	5,595,000

Non-Degree Program (Post Doc: 1 year)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	Year 1	Total
				12 months	12 months
Travel Fee	Round	100,000	1	100,000	100,000
Entrance Fee	Once	160,500	1	160,500	160,500
Tuition Fee	Year	600,000	1	600,000	600,000
Arriving Allownce	Once	321,000	1	321,000	321,000
Living Allowance	Year	160,000	12	1,920,000	1,920,000
Book, Thesis Allowance	Once	160,000	1	160,000	160,000
Health Insurane	Year	53,500	1	53,500	53,500
				3,315,000	3,315,000

Non-Degree Program (Short Term: 3 months)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	3 months
				FC
Travel Fee	Round	100,000	1	100,000
Accommodation*1	dayly	10,000	34	340,000
Living Allowance	Monthly	160,000	3	480,000
Health Insurane	Monthly	15,000	3	45,000
				965,000

Non-Degree Program (Short Term, Seminor, Workshop: 3 week)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	3 week
				FC
Travel Fee	Round	100,000	1	100,000
Accommodation*1	dayly	10,000	34	340,000
Living Allowance	dayly	5,000	36	180,000
Health Insurane	Monthly	15,000	1	15,000
				635,000

Visiting Schelar Program: 2 week)

Unit: FC: JPY

Item	Unit	Unit Cost	Quantity	2 week
				FC
Travel Fee	Round	100,000	1	100,000
Accommodation*1	dayly	10,000	12	120,000
Living Allowance	dayly	5,000	14	70,000
Health Insurane	Monthly	15,000	0.5	7,500
				297,500

2) Number of Participants and Schedule of Human Resource Development Programs

Table 3-4: (Eijkman) Number of HRD Program Participants and Schedule

Number of HRD Program Participants and Schedule									Unit: Persons
Program		No. person	Number of Person						
			2022	2023	2024	2025	2026	2027	2028
1	**Eijkman: Bio-molecular Research and Innovation Capacity Development**								
	(Doctor degree program)								
	4 years PhD								
	Batch 1	7	7	7	7	7			
	Batch 2	8		8	8	8	8		
	Batch 3	7			7	7	7	7	
	Batch 4	8				8	8	8	8
	Sub-Total	30	7	15	22	30	23	15	8
	(Master's degree program)								
	2 years								
	Batch 1	6	6	6	6				
	Batch 2	7		7	7	7			
	Batch 3	6			6	6	6		
	Batch 4	7				7	7	7	
	Batch 5	6					6	6	6
	Sub-Total	32	6	13	19	20	19	13	6
	(Non-Degree Program)								
	1 years								
	Batch 1	3	3						
	Batch 2	3		3					
	Batch 3	3			3				
	Batch 4	3				3			
	Batch 5	3					3		
	Batch 6	3						3	
	Batch 7	3							3
	Sub-Total	21	3	3	3	3	3	3	3
	3 months								
	Sub-Total	58	8	8	8	9	9	8	8
	3 weeks								
	Sub-Total	308	44	44	44	44	44	44	44
Total		**449**	**68**	**83**	**96**	**106**	**98**	**83**	**69**
	(Visiting Scholar Program)								
	2 weeks	182	26	26	26	26	26	26	26
Total		**182**	**26**	**26**	**26**	**26**	**26**	**26**	**26**

Table 3-5: (Andalas University) Number of HRD Program Participants and Schedule

Number of HRD Program Participants and Schedule									Unit: Persons
Program		No. person	Number of Person						
			2022	2023	2024	2025	2026	2027	2028
2	**Andalas University: Development of Health Research and Innovation Capacity**								
	(PhD degree program)								
	4 years								
	Batch 1	10	10	10	10	10			
	Batch 2	10		10	10	10	10		
	Batch 3	10			10	10	10	10	
	Sub-Total	30	10	20	30	30	20	10	0
	(Master's degree program)								
	2 years								
	Batch 1	10	10	10	10				
	Batch 2	10		10	10	10			
	Batch 3	10			10	10	10		
	Batch 4	10				10	10	10	
	Batch 5	10					10	10	10
	Sub-Total	50	10	20	30	30	30	20	10
	(Non-Degree Program)								
	1 years								
	Batch 1	1	1						
	Batch 2	1		1					
	Batch 3	1			1				
	Batch 4	1				1			
	Batch 5	1					1		
	Batch 6	1						1	
	Batch 7	1							1
	Sub-Total	7	1	1	1	1	1	1	1
	3 months								
	Sub-Total	113	16	16	17	17	16	16	15
	3 weeks								
	Sub-Total	40	5	6	6	6	6	6	5
Total		**240**	**42**	**63**	**84**	**84**	**73**	**53**	**31**
	(Visiting Scholar Program)								
	2 weeks	40	5	6	6	6	6	6	5
Total		**40**	**5**	**6**	**6**	**6**	**6**	**6**	**5**

Table 3-6: (BATAN) Number of HRD Program Participants and Schedule

Number of HRD Program Participants and Schedule									Unit: Persons
Program		No. person	Number of Person						
			2022	2023	2024	2025	2026	2027	2028
3	**BATAN: Development of Nuclear Medicine Research and Innovation Capacity**								
	(PhD degree program)								
	4 years								
	Batch 1	3	3	3	3	3			
	Batch 2	4		4	4	4	4		
	Batch 3	3			3	3	3	3	
	Sub-Total	10	3	7	10	10	7	3	0
	(Non-Degree Program)								
	1 years								
	Batch 1	1	1						
	Batch 2	1		1					
	Batch 3	2			2				
	Batch 4	2				2			
	Batch 5	2					2		
	Batch 6	1						1	
	Batch 7	1							1
	Sub-Total	10	1	1	2	2	2	1	1
	3 months								
	Sub-Total	90	12	13	13	13	13	13	13
	3 weeks								
	Sub-Total	56	8	8	8	8	8	8	8
	Total	**269**	**37**	**38**	**40**	**40**	**39**	**38**	**37**
	(Visiting Scholar Program)								
	2 weeks	70	10	10	10	10	10	10	10
	Total	**70**	**10**	**10**	**10**	**10**	**10**	**10**	**10**

3) Cost estimation of Human Resource Development Programs (incl. Visiting Scholar Program)

Table 3-7: Cost estimation of Human Resource Development Programs of Eijkman

Cost Estimation of Human Resource Development Programs of Eijkman									Unit: JPY
Program	Number person	Total	2022	2023	2024	2025	2026	2027	2028
1 Eijkman: Bio-molecular Research and Innovation Capacity Development									
(Doctor degree program)									
4 years PhD									
Batch 1	10	100,082,500	14,943,750	26,735,000	26,735,000	26,735,000	4,933,750		
Batch 2	10	100,082,500		14,943,750	26,735,000	26,735,000	26,735,000	4,933,750	
Batch 3	10	100,082,500			14,943,750	26,735,000	26,735,000	26,735,000	4,933,750
Sub-Total	30	300,247,500	14,943,750	41,678,750	68,413,750	80,205,000	58,403,750	31,668,750	4,933,750
(Master's degree program)									
2 years MA									
Batch 1	6	33,570,000	12,489,000	11,841,000	9,240,000				
Batch 2	6	33,570,000		12,489,000	11,841,000	9,240,000			
Batch 3	7	39,165,000			14,570,500	13,814,500	10,780,000		
Batch 4	7	39,165,000				14,570,500	13,814,500	10,780,000	
Batch 5	6	33,570,000					12,489,000	11,841,000	9,240,000
Sub-Total	32	179,040,000	12,489,000	24,330,000	35,651,500	37,625,000	37,083,500	22,621,000	9,240,000
(Non-Degree Program)									
1 years									
Batch 1	3	9,945,000	9,945,000						
Batch 2	3	9,945,000		9,945,000					
Batch 3	3	9,945,000			9,945,000				
Batch 4	3	9,945,000				9,945,000			
Batch 5	3	9,945,000					9,945,000		
Batch 6	3	9,945,000						9,945,000	
Batch 7	3	9,945,000							9,945,000
Sub-Total	21	69,615,000	9,945,000	9,945,000	9,945,000	9,945,000	9,945,000	9,945,000	9,945,000
3 months									
Batch 1	8	5,080,000	5,080,000						
Batch 2	8	5,080,000		5,080,000					
Batch 3	8	5,080,000			5,080,000				
Batch 4	9	5,715,000				5,715,000			
Batch 5	9	5,715,000					5,715,000		
Batch 6	8	5,080,000						5,080,000	
Batch 7	8	5,080,000							5,080,000
Sub-Total	58	36,830,000	5,080,000	5,080,000	5,080,000	5,715,000	5,715,000	5,080,000	5,080,000
3 weeks									
Batch 1	44	27,940,000	27,940,000						
Batch 2	44	27,940,000		27,940,000					
Batch 3	44	27,940,000			27,940,000				
Batch 4	44	27,940,000				27,940,000			
Batch 5	44	27,940,000					27,940,000		
Batch 6	44	27,940,000						27,940,000	
Batch 7	44	27,940,000							27,940,000
Sub-Total	308	195,580,000	27,940,000	27,940,000	27,940,000	27,940,000	27,940,000	27,940,000	27,940,000
Sub-Total	**387**	302,025,000	42,965,000	42,965,000	42,965,000	43,600,000	43,600,000	42,965,000	42,965,000
Research and Innovation Program									
(Visiting Scholar Program)									
2 weeks									
Batch 1	26	7,735,000	7,735,000						
Batch 2	26	7,735,000		7,735,000					
Batch 3	26	7,735,000			7,735,000				
Batch 4	26	7,735,000				7,735,000			
Batch 5	26	7,735,000					7,735,000		
Batch 6	26	7,735,000						7,735,000	
Batch 7	26	7,735,000							7,735,000
Sub-Total	182	54,145,000	7,735,000	7,735,000	7,735,000	7,735,000	7,735,000	7,735,000	7,735,000
Total	**364**	**54,145,000**	**7,735,000**	**7,735,000**	**7,735,000**	**7,735,000**	**7,735,000**	**7,735,000**	**7,735,000**

Table 3-8: (Andalas University) Cost estimation of Human Resource Development Programs

Cost Estimation of Human Resource Development Programs of Andalas University Unit: JPY

Program	Number person	Total	2022	2023	2024	2025	2026	2027	2028
2 Andalas University: Development of Health Research and Innovation Capacity									
(PhD degree program)									
4 years									
Batch 1	10	100,082,500	14,943,750	26,735,000	26,735,000	26,735,000	4,933,750		
Batch 2	10	100,082,500		14,943,750	26,735,000	26,735,000	26,735,000	4,933,750	
Batch 3	10	100,082,500			14,943,750	26,735,000	26,735,000	26,735,000	4,933,750
Sub-Total	30	300,247,500	14,943,750	41,678,750	68,413,750	80,205,000	58,403,750	31,668,750	4,933,750
(Master's degree program)									
2 years									
Batch 1	10	55,950,000	20,815,000	19,735,000	15,400,000				
Batch 2	10	55,950,000		20,815,000	19,735,000	15,400,000			
Batch 3	10	55,950,000			20,815,000	19,735,000	15,400,000		
Batch 4	10	55,950,000				20,815,000	19,735,000	15,400,000	
Batch 5	10	55,950,000					20,815,000	19,735,000	15,400,000
Sub-Total	50	279,750,000	20,815,000	40,550,000	55,950,000	55,950,000	55,950,000	35,135,000	15,400,000
(Non-Degree Program)									
1 years									
Batch 1	1	3,315,000	3,315,000						
Batch 2	1	3,315,000		3,315,000					
Batch 3	1	3,315,000			3,315,000				
Batch 4	1	3,315,000				3,315,000			
Batch 5	1	3,315,000					3,315,000		
Batch 6	1	3,315,000						3,315,000	
Batch 7	1	3,315,000							3,315,000
Sub-Total	7	6,630,000	3,315,000	3,315,000	3,315,000	3,315,000	3,315,000	3,315,000	3,315,000
3 months									
Batch 1	16	15,440,000	15,440,000						
Batch 2	16	15,440,000		15,440,000					
Batch 3	17	16,405,000			16,405,000				
Batch 4	17	16,405,000				16,405,000			
Batch 5	16	15,440,000					15,440,000		
Batch 6	16	15,440,000						15,440,000	
Batch 7	15	14,475,000							14,475,000
Sub-Total	113	109,045,000	15,440,000	15,440,000	16,405,000	16,405,000	15,440,000	15,440,000	14,475,000
3 weeks									
Batch 1	5	3,175,000	3,175,000						
Batch 2	6	3,810,000		3,810,000					
Batch 3	6	3,810,000			3,810,000				
Batch 4	6	3,810,000				3,810,000			
Batch 5	6	3,810,000					3,810,000		
Batch 6	6	3,810,000						3,810,000	
Batch 7	5	3,175,000							3,175,000
Sub-Total	40	25,400,000	3,175,000	3,810,000	3,810,000	3,810,000	3,810,000	3,810,000	3,175,000
Total	**240**	**721,072,500**	**57,688,750**	**104,793,750**	**147,893,750**	**159,685,000**	**136,918,750**	**89,368,750**	**41,298,750**
Research and Innovation Program									
(Visiting Scholar Program)									
2 weeks									
Batch 1	5	1,487,500	1,487,500						
Batch 2	6	1,785,000		1,785,000					
Batch 3	6	1,785,000			1,785,000				
Batch 4	6	1,785,000				1,785,000			
Batch 5	6	1,785,000					1,785,000		
Batch 6	6	1,785,000						1,785,000	
Batch 7	5	1,487,500							1,487,500
Total	**40**	**11,900,000**	**1,487,500**	**1,785,000**	**1,785,000**	**1,785,000**	**1,785,000**	**1,785,000**	**1,487,500**

Table 3-9: (BATAN) Cost estimation of Human Resource Development Programs

Cost Estimation of Human Resource Development Programs of BATAN Unit: JPY

Program	Number person	Total	2022	2023	2024	2025	2026	2027	2028
3 BATAN: Development of Nuclear Medicine Research and Innovation Capacity									
(PhD degree program)									
4 years									
Batch 1	3	30,024,750	4,483,125	8,020,500	8,020,500	8,020,500	1,480,125		
Batch 2	4	40,033,000		5,977,500	10,694,000	10,694,000	10,694,000	1,973,500	
Batch 3	3	30,024,750			4,483,125	8,020,500	8,020,500	8,020,500	1,480,125
Sub-Total	10	100,082,500	4,483,125	13,998,000	23,197,625	26,735,000	20,194,625	9,994,000	1,480,125
(Non-Degree Program)									
1 years									
Batch 1	1	3,315,000	3,315,000						
Batch 2	1	3,315,000		3,315,000					
Batch 3	2	6,630,000			6,630,000				
Batch 4	2	6,630,000				6,630,000			
Batch 5	2	6,630,000					6,630,000		
Batch 6	1	3,315,000						3,315,000	
Batch 7	1	3,315,000							3,315,000
Sub-Total	10	33,150,000	3,315,000	3,315,000	6,630,000	6,630,000	6,630,000	3,315,000	3,315,000
3 months									
Batch 1	13	12,545,000	12,545,000						
Batch 2	13	12,545,000		12,545,000					
Batch 3	13	12,545,000			12,545,000				
Batch 4	13	12,545,000				12,545,000			
Batch 5	13	12,545,000					12,545,000		
Batch 6	13	12,545,000						12,545,000	
Batch 7	12	11,580,000							11,580,000
Sub-Total	90	86,850,000	12,545,000	12,545,000	12,545,000	12,545,000	12,545,000	12,545,000	11,580,000
3 weeks									
Batch 1	5	3,175,000	3,175,000						
Batch 2	5	4,825,000		4,825,000					
Batch 3	5	4,825,000			4,825,000				
Batch 4	5	4,825,000				4,825,000			
Batch 5	5	4,825,000					4,825,000		
Batch 6	5	4,825,000						4,825,000	
Batch 7	5	4,825,000							4,825,000
Sub-Total	35	32,125,000	3,175,000	4,825,000	4,825,000	4,825,000	4,825,000	4,825,000	4,825,000
Total	**248**	**261,170,000**	**34,475,000**	**36,125,000**	**40,405,000**	**40,405,000**	**39,440,000**	**36,125,000**	**34,195,000**
Research and Innovation Program									
(Visiting Scholar Program)									
2 weeks									
Batch 1	5	1,487,500	1,487,500						
Batch 2	5	1,487,500		1,487,500					
Batch 3	5	1,487,500			1,487,500				
Batch 4	5	1,487,500				1,487,500			
Batch 5	5	1,487,500					1,487,500		
Batch 6	5	1,487,500						1,487,500	
Batch 7	5	1,487,500							1,487,500
Total	**35**	**10,412,500**	**1,487,500**	**1,487,500**	**1,487,500**	**1,487,500**	**1,487,500**	**1,487,500**	**1,487,500**

2.8 Research and Innovation Program

Research and Innovation Program consists of following activities:

1). Promotion of Joint Research with Japanese universities/institutions

2). Promotion of collaboration with Industries

3). Researcher exchange

4). Provision of research consumables, books and information

5). Domestic and international seminars, workshop and meetings etc.

Relationship between cost items and above activities are illustrated as below:

Table3-10: Relationship between Cost Items and Research and Innovation Program

Cost Items Activities	HRD and Visiting scholar programs	Research & Promotion Expense	Consulting Services
1).Promotion of Joint Research	yes	yes	yes
2).Promotion of Industrial collaboration		yes	yes
3).Researcher exchange	yes	yes	yes
4).Provision of research consumables		yes	
5). Domestic and international seminars, workshop and meeting etc.		yes	
Cost estimation	HRD and Visiting scholar program cost	Tentatively 10% of HRD and Research & Promotion cost	Consulting service cost

Note: "yes" means this cost item covers a part of this activity cost.

2.9 Project Cost Estimation

Based on the above cost estimation, total cost of the Project is calculated in Table 3-11. Project Cost by Year is in Table 3-12

Also as a reference data, Total Cost estimation in the Blue Book document is shown in Table 3-13.

Table3-11: Total Cost of the Project

Program		Total		
		FC	LC	Total
1. Eijkman: Bio-molecular Research and Innovation Capacity Development				
1-1	Construction of Building		7,333,023,056	7,333,023,056
1-2	Procurement of Equipment	6,322,051,745		6,322,051,745
1-3	Human Resource Development			
	1) Doctor degree program	300,247,500		300,247,500
	2) Master's degree program	179,040,000		179,040,000
	3) Non-Degree Program)	302,025,000		302,025,000
1-4	Research and Innovation Program			
	1) Visiting Scholar Program	54,145,000		54,145,000
	2) Promotion and Research Expense		83,545,750	83,545,750
Eijkman Total		7,157,509,245	7,416,568,806	14,574,078,050
2. Andalas University: Development of Health Research and Innovation Capacity				
2-1	Procurement of Equipment	545,453,695		545,453,695
2-2	Human Resource Development			
	1) Doctor degree program	300,247,500		300,247,500
	2) Master's degree program	279,750,000		279,750,000
	3) Non-Degree Program)	25,400,000		25,400,000
2-3	Research and Innovation Program			
	1) Visiting Scholar Program	11,900,000		11,900,000
	2) Promotion and Research Expense		61,729,750	61,729,750
Andalas University Total		1,162,751,195	61,729,750	1,224,480,945
3	**BATAN: Development of Nuclear Medicine Research and Innovation Capacity**			
3-1	Construction of Building		470,008,599	470,008,599
3-2	Procurement of Equipment	422,227,929		422,227,929
3-3	Human Resource Development			
	1) Doctor degree program	100,082,500		100,082,500
	2) Non-Degree Program)	261,170,000		261,170,000
3-4	Research and Innovation Program			
	1) Visiting Scholar Program	10,412,500		10,412,500
	2) Promotion and Research Expense		37,166,500	37,166,500
BATAN Total		793,892,929	507,175,099	1,301,068,028
BASE COST		**9,114,153,368**	**7,985,473,655**	**17,099,627,023**
4	Consulting Services (10%)	911,415,337	798,547,365	1,709,962,702
5	Management Cost (5%)	455,707,668	399,273,683	854,981,351
TOTAL		**10,481,276,373**	**9,183,294,703**	**19,664,571,076**
	Physical Contingency (5%)	524,063,819	459,164,735	983,228,554
	Price Escalation (FC:1.3%)	414,620,400		414,620,400
	Price Escalation (LC:6%)		583,734,896	583,734,896
GRAND TOTAL		**11,419,960,592**	**10,226,194,333**	**21,646,154,925**

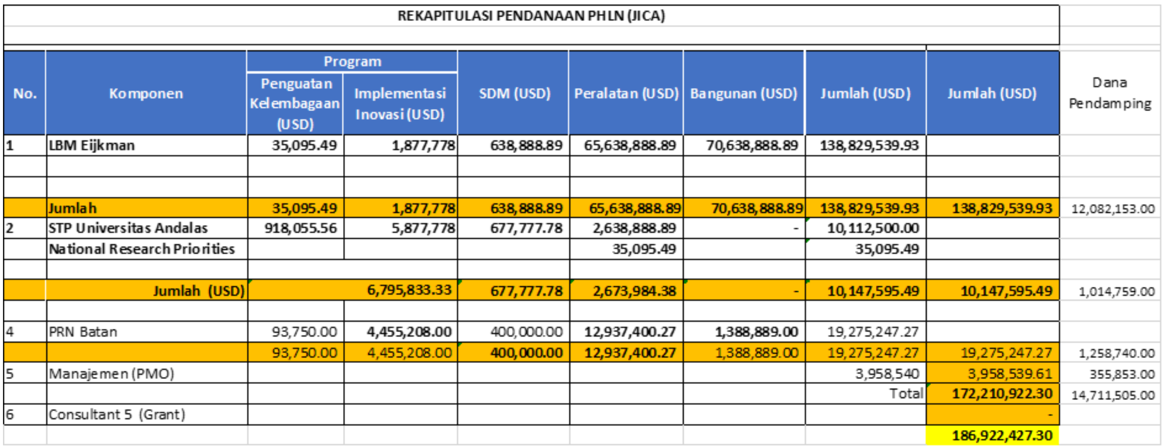
Table 3-12: Project Cost by Year

Cost Estimation of the Project

Unit: JPY

Program		Total			2022		2023		2024		2025		2026		2027		2028	
		FC	LC	Total	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
1. Eijkman: Bio-molecular Research and Innovation Capacity Development																		
1-1	Construction of Building		7,333,023,056	7,333,023,056		2,444,341,019		2,444,341,019		2,444,341,019								
1-2	Procurement of Equipment	6,322,051,745		6,322,051,745			2,500,000,000				2,500,000,000				1,322,051,745			
1-3	Human Resource Development																	
	1) Doctor degree program	300,247,500		300,247,500	14,943,750		41,678,750		68,413,750		80,205,000		58,403,750		31,668,750		4,933,750	
	2) Master's degree program	179,040,000		179,040,000	12,489,000		24,330,000		35,651,500		37,625,000		37,083,500		22,621,000		9,240,000	
	3) Non-Degree Program)	302,025,000		302,025,000	42,965,000		42,965,000		42,965,000		43,600,000		43,600,000		42,965,000		42,965,000	
1-4	Research and Innovation Program																	
	1) Visiting Scholar Program	54,145,000		54,145,000	7,735,000		7,735,000		7,735,000		7,735,000		7,735,000		7,735,000		7,735,000	
	2) Promotion and Research Expense		83,545,750	83,545,750		7,813,275		11,670,875		15,476,525		16,916,500		14,682,225		10,498,975		6,487,375
	Eijkman Total	7,157,509,245	7,416,568,806	14,574,078,050	78,132,750	2,452,154,294	2,616,708,750	2,456,011,894	154,765,250	2,459,817,544	2,669,165,000	16,916,500	146,822,250	14,682,225	1,427,041,495	10,498,975	64,873,750	6,487,375
2. Andalas University: Development of Health Research and Innovation Capacity																		
2-1	Procurement of Equipment	545,453,695		545,453,695			200,000,000				200,000,000				145,453,695			
2-2	Human Resource Development																	
	1) Doctor degree program	300,247,500		300,247,500	14,943,750		41,678,750		68,413,750		80,205,000		58,403,750		31,668,750		4,933,750	
	2) Master's degree program	279,750,000		279,750,000	20,815,000		40,550,000		55,950,000		55,950,000		55,950,000		35,135,000		15,400,000	
	3) Non-Degree Program)	25,400,000		25,400,000	3,175,000		3,810,000		3,810,000		3,810,000		3,810,000		3,810,000		3,175,000	
2-3	Research and Innovation Program																	
	1) Visiting Scholar Program	11,900,000		11,900,000	1,487,500		1,785,000		1,785,000		1,785,000		1,785,000		1,785,000		1,487,500	
	2) Promotion and Research Expense		61,729,750	61,729,750		4,042,125		8,782,375		12,995,875		14,175,000		11,994,875		7,239,875		2,499,625
	Andalas University Total	1,162,751,195	61,729,750	1,224,480,945	40,421,250	4,042,125	287,823,750	8,782,375	129,958,750	12,995,875	341,750,000	14,175,000	119,948,750	11,994,875	217,852,445	7,239,875	24,996,250	2,499,625
3	**BATAN: Development of Nuclear Medicine Research and Innovation Capacity**																	
3-1	Construction of Building		470,008,599	470,008,599	156,669,533		156,669,533		156,669,533		200,000,000				113,339,066			
3-2	Procurement of Equipment	422,227,929		422,227,929			200,000,000				200,000,000				22,227,929			
3-3	Human Resource Development																	
	1) Doctor degree program	100,082,500		100,082,500	4,483,125		13,998,000		23,197,625		26,735,000		20,194,625		9,994,000		1,480,125	
	2) Non-Degree Program)	261,170,000		261,170,000	34,475,000		36,125,000		40,405,000		40,405,000		39,440,000		36,125,000		34,195,000	
3-4	Research and Innovation Program																	
	1) Visiting Scholar Program	10,412,500		10,412,500	1,487,500		1,487,500		1,487,500		1,487,500		1,487,500		1,487,500		1,487,500	
	2) Promotion and Research Expense		37,166,500	37,166,500		4,044,563		5,161,050		6,509,013		6,862,750		6,112,213		4,760,650		3,716,263
	BATAN Total	793,892,929	507,175,099	1,301,068,028	197,115,158	4,044,563	408,280,033	5,161,050	221,759,658	6,509,013	468,627,500	6,862,750	61,122,125	6,112,213	183,173,495	4,760,650	37,162,625	3,716,263
	BASE COST	**9,114,153,368**	**7,985,473,655**	**17,099,627,023**	**315,669,158**	**2,460,240,981**	**3,312,812,533**	**2,469,955,319**	**506,483,658**	**2,479,322,431**	**3,479,542,500**	**37,954,250**	**327,893,125**	**32,789,313**	**1,828,067,434**	**22,499,500**	**127,032,625**	**12,703,263**
4	Consulting Services (10%)	911,415,337	798,547,365	1,709,962,702	31,566,916	246,024,098	331,281,253	246,995,532	50,648,366	247,932,243	347,954,250	3,795,425	32,789,313	3,278,931	182,806,743	2,249,950	12,703,263	1,270,326
5	Management Cost (5%)	455,707,668	399,273,683	854,981,351	15,783,458	123,012,049	165,640,627	123,497,766	25,324,183	123,966,122	173,977,125	1,897,713	16,394,656	1,639,466	91,403,372	1,124,975	6,351,631	635,163
	TOTAL	**10,481,276,373**	**9,183,294,703**	**19,664,571,076**	**363,019,532**	**2,829,277,128**	**3,809,734,413**	**2,840,448,616**	**582,456,207**	**2,851,220,796**	**4,001,473,875**	**43,647,388**	**377,077,094**	**37,707,709**	**2,102,277,549**	**25,874,425**	**146,087,519**	**14,608,752**
	Physical Contingency (5%)	524,063,819	459,164,735	983,228,554	18,150,977	141,463,856	190,486,721	142,022,431	29,122,810	142,561,040	200,073,694	2,182,369	18,853,855	1,885,385	105,113,877	1,293,721	7,304,376	730,438
	Price Escalation (FC:1.3%)	414,620,400		414,620,400	0		52,002,875		16,004,411		165,999,771		20,993,374		147,259,747		12,360,222	
	Price Escalation (LC:6%)		583,734,896	583,734,896		0		178,948,263		370,031,435		8,754,217		10,392,275		9,188,962		6,419,744
	GRAND TOTAL	**11,419,960,592**	**10,226,194,333**	**21,646,154,925**	**381,170,508**	**2,970,740,985**	**4,052,224,008**	**3,161,419,310**	**627,583,428**	**3,363,813,270**	**4,367,547,339**	**54,583,974**	**416,924,322**	**49,985,370**	**2,354,651,173**	**36,357,108**	**165,752,117**	**21,758,933**

Table 3-13: (Reference data) Total cost estimation in Blue Book document and its translation English with total in JPY



REKAPITULASI PENDANAAN PHLN (JICA)

No.	Komponen	Program		SDM (USD)	Peralatan (USD)	Bangunan (USD)	Jumlah (USD)	Jumlah (USD)	Dana Pendamping
		Penguatan Kelembagaan (USD)	Implementasi Inovasi (USD)						
1	LBM Eijkman	35,095.49	1,877,778	638,888.89	65,638,888.89	70,638,888.89	138,829,539.93		
	Jumlah	35,095.49	1,877,778	638,888.89	65,638,888.89	70,638,888.89	138,829,539.93	138,829,539.93	12,082,153.00
2	STP Universitas Andalas	918,055.56	5,877,778	677,777.78	2,638,888.89	-	10,112,500.00		
	National Research Priorities				35,095.49		35,095.49		
	Jumlah (USD)	6,795,833.33		677,777.78	2,673,984.38	-	10,147,595.49	10,147,595.49	1,014,759.00
4	PRN Batan	93,750.00	4,455,208.00	400,000.00	12,937,400.27	1,388,889.00	19,275,247.27		
		93,750.00	4,455,208.00	400,000.00	12,937,400.27	1,388,889.00	19,275,247.27	19,275,247.27	1,258,740.00
5	Manajemen (PMO)						3,958,540	3,958,539.61	355,853.00
							Total	172,210,922.30	14,711,505.00
6	Consultant 5 (Grant)							-	
								186,922,427.30	

No.	Component	Program		HR (USD)	Equipment (USD)	Building (USD)	Total (USD)	Total (JPY)
		Institutional Strengthening (USD)	Innovation Implementation (USD)					
1	LBM Eijkman	35,095.49	1,877,778.00	638,888.89	65,638,888.89	70,638,888.89	138,829,540.16	14,411,894,564
	Total	**35,095.49**	**1,877,778.00**	**638,888.89**	**65,638,888.89**	**70,638,888.89**	**138,829,540.16**	**14,411,894,564**
2	STP Andalas University	918,055.56	5,877,778.00	677,777.78	2,638,888.89		10,112,500.23	1,049,778,649
	National Research Priorities				35,095.49		35,095.49	3,643,263
	Total	**918,055.56**	**5,877,778.00**	**677,777.78**	**2,673,984.38**	**0.00**	**10,147,595.72**	**1,053,421,912**
3	PRN BATAN	93,750.00	4,455,208.00	400,000.00	12,937,400.27	1,388,889.00	19,275,247.27	2,000,963,419
	Total	**93,750.00**	**4,455,208.00**	**400,000.00**	**12,937,400.27**	**1,388,889.00**	**19,275,247.27**	**2,000,963,419**
4	Management (PMO)					**3,958,540.00**	**3,958,540.00**	**410,936,037**
5	Consultant 5 (Grant)						-	
	Grand Total						**172,210,923.15**	**17,877,215,932**

2.10 Funding Plan

To be prepared

(Chapter 4) Project Implementation Structure

2.11 Executing Agency

To be prepared

2.12 Implementing Agencies

To be prepared

2.13 Project Steering Committee

To be prepared

2.14 Project Management Unit

To be prepared

2.15 Fund Flow

To be prepared

(Chapter 5) Other Considerations

2.16 Economic and Financial Feasibility

- Benefits: Indonesian sovereignty in research and innovation in the health sector, the production of domestic health products which will greatly assist Indonesia in import substitution and increase the added value of domestic products.
- Beneficiaries: government, society (Indonesian people), and also the world community when Indonesian health products can be exported.

No.	Benefits	Prediction Method	User	Prediction Method
1.	Indonesia as a country that will have an STP in the health sector with international standard that can function as a global research and innovation hub	1. Increase the quantity and quality of health innovation products 2. Increasing collaborative research between Indonesia and abroad 3. Increasing the number of innovations at the frontline of the health sector 4. Increasing the quantity and quality of human resources for health researchers in Indonesia. 5. To increase Indonesian and foreign researchers who carry out research and innovation in international standard STPs in health	Government, Industry, Society	1. To increase domestic innovative health products (import substitution) to meet the needs of the Indonesian people 2. Increasing research collaboration and collaborative innovation in the field of domestic and foreign health in the form of a triple helix. 3. To increase innovation at the forefront of the health sector from Indonesia

2.17 Verifiable Indicators

(Indication of Financial Feasibility)

- Designing and developing STP in the health sector is one of the strategic objectives of the Ministry of Research, Technology and Higher Education.
- The existence of companion funds has not been seen until 2020, because the Ministry of Research and Technology is a new ministry, a fraction of Research and Technology and Higher Education. However, for 2021, a maximum of 10% of PHLN matching funds will be provided.
- STP in the health sector is expected to be an income generating center through a variety of

services, including services for collaboration with overseas researchers.

(Indication of Other Sources of Financing)

- Although the development and construction of STP in the health sector is one of KemristekBRIN's strategic goals, it is realized that the available funding allocation from the APBN is limited, therefore additional funding is needed, one of which is the Foreign Grant Loan.
- With this funding from PHLN, the target achievement of the National Main Priority program can be realized, so that the outcomes and benefits of the STP development program can be realized, provide a multiplier effect for other economic activities, and have a positive impact on regional and national economic growth. This proposed Foreign Loan is a continuation and complements activities previously carried out through APBN funding and other domestic funding, this PHLN funding is very much needed to accelerate the fulfillment of the target achievement of national priority programs listed in the 2020-2024 RPJMN.

Table 5-1: Draft of Verifiable Indicator

	Component / Program	Verifiable Indicator	Means of Verification
1. (Component 1) Bio-molecular Research and Innovation Capacity Development of Eijkman			
1-1	Research and Innovation Program	・Number of international joint research ・Number of collaboration with industry ・Number of academic paper ・Number of citation ・Number of patent ・Number of Innovative Product ・Number of fully operated STP	・Monitoring Report ・Completion Report ・Follow-up/Evaluation survey Report
1-2	Human Resource Development Program	・Number of S3 developed ・Graduation rate of degree program ・Number of participant of international researcher exchange ・Return rate to University/Institution	・Completion Report ・Monitoring Report ・Follow-up/Evaluation survey Report
1-3	Construction of Building	・User satisfaction rate of the building	・Completion Report ・Monitoring Report ・Follow-up/Evaluation survey Report
2. (Component 2) Development of Health Research and Innovation Capacity of Andalas University			
2-1	Research and Innovation Program	・Number of international joint research ・Number of collaboration with industry ・Number of academic	・Monitoring Report ・Completion Report ・Follow-up/Evaluation survey Report

		paper ・Number of citation ・Number of patent ・Number of Innovative Product ・Number of fully operated STP	
2-2	Human Resource Development Program	・Number of S3 developed ・Graduation rate of degree program ・Number of participant of international researcher exchange ・Return rate to University/Institution	・Completion Report ・Monitoring Report ・Follow-up/Evaluation survey Report
3. (Component 3) Development of Nuclear Medicine Research and Innovation Capacity of BATAN			
3-1	Research and Innovation Program	・Number of international joint research ・Number of collaboration with industry ・Number of academic paper ・Number of citation ・Number of patent ・Number of Innovative Product ・Number of fully operated STP	・Monitoring Report ・Completion Report ・Follow-up/Evaluation survey Report
3-2	Human Resource Development Program	・Number of S3 developed ・Graduation rate of degree program ・Number of participant of international researcher exchange ・Return rate to University/Institution	・Completion Report ・Monitoring Report ・Follow-up/Evaluation survey Report

2.18 Risks, Considerations and Countermeasures in Implementing the Project

To be prepared

2.19 Environmental and Social Considerations

- AMDAL[3] needs to be done for 2 STPs, namely LBM Eijkman and STP BATAN. Meanwhile for STP Andalas Univ AMDAL has been done.
- Before the implementation of this project, sufficient consideration must be given to the harmony of the planned construction/renovation works and the surrounding

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[3] AMDAL (Analisis Manajemen Dampak Lingkungan – Indonesia) is a study of the significant impacts of project on the environment. During project planning that is expected to have a big impact on the surrounding environment, an AMDAL is needed for matters related to: Abiotic aspects (relating to or characterized by the absence of living organisms), Biotics (living things) and Cultural (culture)

environment, including the existing facilities, in compliance with the AMDAL-Indonesia.

To be prepared

APPENDICIES

Appendix 1: Research Profile of Eijkman
1-1: Advancing the Dengue Research in Indonesia

RP-EIJKMAN01

Research Profile

Project Title
Advancing the Dengue Research in Indonesia

Project Coordinator
Dr. R. Tedjo Sasmono

Department and Institution
Dengue Research Unit, Eijkman Institute, Indonesia

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1.1. Research Area

Dengue and other Arboviruses

1.2. Research Topics

1. Dengue and other Arboviruses Molecular Surveillance in Indonesia
2. Dengue Antiviral Activity Screening from Natural Products
3. Dengue Vaccine Study, Clinical Trial and Development
4. Dengue serological-prevalence study in Indonesia
5. Evaluation of dengue diagnostics in Indonesia
6. Genetics and biological characteristics of dengue viruses
7. Host's immune response against dengue infection

1.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Dengue fever is one of the most common mosquito-borne viral diseases in the world. The disease is caused by infection of dengue virus and transmitted to humans by the bites of *Aedes* mosquito vectors. Each year, about 50 million infections occur in approximately 100 countries in the tropics and sub-tropics in the world with the potential for further spread. This disease affects about 2.5 billion people living in South East Asia, the Pacific, and the Americas. Dengue causes variable clinical manifestations, ranging from undifferentiated fever (Dengue fever, DF) to a more severe form of the disease, dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).

Indonesia is a vast archipelago country that regularly affected by the disease. Dengue occurred in all 34 provinces in the country annually and periodic major outbreaks occurred regularly. Despite the endemicity of the disease, currently there is only limited data on the epidemiology of the disease available. Our laboratory investigates the dynamic of the dengue disease in Indonesia, looking at the many aspects of the disease such as the epidemiology, clinical, virology, and immunology. We also have interest on genetics of dengue mosquito vectors, the dengue diagnostics, and vaccine developments. In the vaccine development, we involved in dengue vaccine clinical trial in Indonesia.

Our overall objective is to advance dengue research in Indonesia, by conducting collaborative research projects in several topics mentioned above. We have been performing the research in the last 14 years, and we have the required skill, knowledge, infrastructure, and manpower to conduct the research.

By conducting comprehensive research on dengue, we will be able to provide data on dengue virus distribution, the demography data of patients, the population immunity against dengue, the characteristics of viruses, the vector data, and diagnostics performance. Overall, this will be useful for disease management and epidemic prediction. Also, data on the population immunity will be useful for vaccine introduction. The data on diagnostic performance will be useful to avoid low quality diagnostic tools. In the end, all of this information will benefit the Indonesian people economically and socially.

1.4. Research Plan, Themes, Activities, Schedule

1. Dengue and other Arboviruses Molecular Surveillance in Indonesia
2. We will conduct molecular surveillance of dengue and other arboviruses throughout Indonesian archipelago. Based on our past experience, we can set up up to 3 study sites per year and conducting sample collection in hospitals in collaboration with local scientist/clinicians. The activity will be done throughout the year, covering one monsoon/dengue season in each study site.
3. Dengue serological prevalence study.
4. Serological prevalence can be conducted in parallel with molecular surveillance. This study will assess the population immunity against dengue virus.
5. Evaluation of dengue diagnostics in Indonesia
6. Using clinical samples collected during the survey, we will use the sera to evaluate the performance of various dengue diagnostics available in the market.
7. Host's immune response against dengue infection
8. Serum collected during the survey can be assessed for the expression of immune proteins such as cytokines and chemokines. We will compare the cytokine profile between mild and severe dengue patients. This will be done during the second year.
9. Genetic and biological characteristics of dengue virus
10. We will use the clinical virus isolates collected during the surveillance to assess the genetic characteristics through whole genome sequencing and compare the virus characteristics such as the replication kinetics in vitro. This will be done on the second-third year.
11. Dengue antiviral discovery
12. Virus collected from clinical samples as well as the prototype strains can be used as a tool to

screen the potential antiviral activity of natural compounds. Besides that, we have been actively using host defense peptide as potential antivirus. The activity will be done in the third year.

1.5. Present research status at your Laboratory/ Department / University/ Institution

The Dengue Research Unit has been actively collaborating with national and international research partners from academics, research institutions, and pharmaceutical companies. We conducted various studies on dengue, including the molecular epidemiology of dengue in Indonesia, whole genome sequencing of dengue virus, development of dengue vaccine and diagnostics, the antiviral screening of natural compounds and other antiviral drugs, and host's response against dengue virus infection. We have published more than 45 articles as the output of the studies.

To support our research activities, our lab complies with and is certified for Good Clinical Laboratory Practice (GCLP). GCLP is an international quality system for laboratories which undertake the analysis of samples from clinical trials. In addition, we also participated in international external quality assurance (EQA) program for dengue molecular diagnostics, administered by QCMD, UK.

1.6. Future Research Plan

Our future research plan is to conduct advance research on dengue and other arboviruses in Indonesia. This can be achieved by providing state of the art facility, excellence human resources/scientists, and sufficient research fund.

2. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students.

2.1. Indonesian Researchers

Research Coordinator
Dr. R. Tedjo Sasmono, Ph.D.
Eijkman Institute for Molecular Biology

Team Members
1. Dr. Amalina G. Komarudin, Ph.D.
   Eijkman Institute for Molecular Biology
2. Benediktus Yohan, M.Biomed.
   Eijkman Institute for Molecular Biology
3. Rahma F. Hayati, M.Sc.
   Eijkman Institute for Molecular Biology
4. Mercy Egrina Adiniko, M.Sc.
   Eijkman Institute for Molecular Biology

5. Farhan Azwin Maulana, M.Sc.
   Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

<u>Research Coordinator</u>
Kouichi Morita MD & PhD
Professor and Head Department of Virology, Institute of Tropical Medicine
Nagasaki University

<u>Team Members</u>
Sherry Moi ML,PhD
Institute of Tropical Medicine, Nagasaki University

2.3. ***Collaboration with Industries***

<u>Collaborating industries or expected collaboration industries</u>
PT Bio Farma
State of collaboration
Research and Development of Dengue Vaccine

<u>Key personnel</u>
Dr. Neni Nuraini
PT Bio Farma

2.4. ***Other Research Collaborators***

Dengue Vaccine Consortium (Indonesia)
COVID-19 Vaccine Development Consortium (Indonesia)
Universitas Indonesia (Indonesia)
Universitas Gadjah Mada (Indonesia)
University of Cambridge (UK)
University of Edinburgh – Napier (UK)

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

A) Doctor degree
   Number of candidates: 3 persons
   Training Duration: 4 years
B) Master’s degree
   Number of candidates: 3 persons
   Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 3 persons
- Position: research assistant
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be around 3 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 3 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	**Equipment/facilities to be procured for the Research**	**Quantity, Price, Amount**
1	-80C freezer (2 units)	USD 80,000
2	Gel Imaging	USD 30,000
3	Tissue Culture Microscope	USD 50,000
4	Tissue Culture Incubators	USD 50,000
5	Fluorescence Microscope	USD 100,000
6	Nucleic Acid Extraction Machine	USD 50,000
7	-20C freezers (2 units)	USD 10,000
8	Real-time RT-PCR	USD 100,000

Note: Catalogues and product details are attached in a separate document

4. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are scientific articles, patent, and human resources

5. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

By conducting comprehensive research on dengue, we will be able to provide data on dengue virus distribution, the demography data of patients, the population immunity against dengue, the characteristics of viruses, the vector data, and diagnostics performance. Overall, this will be useful for disease management and epidemic prediction. Also, data on the population immunity will be useful for vaccine introduction. The data on diagnostic performance will be useful to avoid low quality diagnostic tools. In the end, all of this information will benefit the Indonesian people economically and socially.

Appendix 1: Research Profile of Eijkman
1-2: Diagnostic and Drug Discovery for Infectious Diseases

RP-EIJKMAN02

Research Profile

Project Title

Diagnostic and Drug Discovery for Infectious Diseases

Project Coordinator
Josephine E. Siregar, SSi, MSc, PhD

Department and Institution

Diagnostic and Drug Discovery for Infectious Diseases Laboratory

Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1-1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1.1. Research Area

Infectious diseases

1.2. Research Topics

- Malaria identification in non-human primate dan their distribution in Indonesia
- Screening compounds which has potential as antimalaria candidate *ex vivo* and *in vivo*
- Epidemiology study of Toxoplasmosis in Indonesia as the preliminary development for simple and fast diagnosis method of Toxoplasma.

1.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

The objectives of this project:

- To identify the case of zoonosis malaria in Indonesia
- To investigate the potential of Indonesian biodiversity as an antimalaria
- To study the epidemiology of Toxoplasma in Indonesia

Infectious diseases are still a major contributor to the morbidity and mortality, not only in the developing country but also in developed country. In the journey of this diseases, mitochondria therapy could be a challenge in the biomedical treatment. The used of mitochondria theraphy would be very crucial in regulating some disorders of tropical diseases.

Mitochondria as the powerhouse of cell, and the energy metabolism is play an important role in the living cell organism. This organel has a specific composition in between host and parasite. The role function of this organel in the study of infectious diseases still be a major interest into some researcher. For the tropical country as Indonesia, where the infectious diseases still be a major caused of mortality, the knowledge of mitochondria function and infectious diseases is very important because their potential benefit for development strategy in handling diseases (in clinical, epidemiology and public health), as well as a new drug target.

The first initiation of Laboratory of Mitochondria and Infectious Diseases at the Eijkman Institute has aim to be a centre of mitochondria and infectious diseases research with their contribution in handling infectious diseases. The exploration research of different level evolution of human and parasite mitochondria had been the first interest of Mitochondria and Infectious Diseases Unit in attempt to identify and study the evolution of parasite, treatment and development of drug to these diseases. This project is an ongoing research at the Eijkman Institute for Molecular Biology, to uncover the role and contribution of different variation function of energy metabolism, as in the host organism and the infection-agent through the pathofisiology and epidemiology of the infectious diseases.

The deep insight on the cytoplasmic genetic of malaria parasite against an antimalaria drug Atovaquone (inhibitor of mitochondria respiration) has been studied and become a valuable invention allowing analysis of other similar antimalarial drugs in the future (published in Science journal on 2016). This result was the first evidence of study the relationship between mutations in the mitochondrial cytochrome *b* gene and the resistance of respiratory complex III to Atovaquone. The new breakthrough of this study determine the basic of molecular genetic through other antimalaria with mitochondria as a target. This topic is still our focus interest in the research activities and still on going.

Zoonosis evidence in malaria diseases has increased our awareness on the emergence of new malaria strain in human. The knowledge of parasite mitochondria can be used in the study of epidemiology and their distribution pattern of malaria disease. The identification of malaria not only in human, but also in non-human primate will help us to predict the evidence of zoonosis cases in local area. The closed contact of human and non-human primate population has become reservoir of malaria transmission. Interestingly on our previous study, the indigenous people living nomadic in the forest of Jambi Provence (named “suku anak dalam”) is very sensitive to the transmission of this malaria disease, where later could become the reservoir of malaria zoonosis. In order to support the malaria elimination in Indonesia which will be targeted in 2030, our activities in the next 5 years is still combining the laboratory and fields activities. We are continuing surveying the evidence number of malaria in non-human primate in Indonesia. Parasites identification in non-human primate are essential in handling malaria zoonosis case.

The rapid spread of parasite resistance to the currently available antimalarial drug has hampered large-scale efforts at malaria control. There is an urgent need for discovery of new antimalarial agents. Indonesia which has rich in biodiversity make us possible to investigate compound with their malaria activities. We are working together with other institutions in the collection of natural compounds with their background used as traditional herbal medicine in Indonesia.

With the used of research outcome from Mitochondria and Infectious Diseases Unit, we have developed a mitochondria marker to identify the malaria parasite, rodent animal model system to study the basic mechanism of parasite resistant to some antimalaria drugs, and screening compounds from natural product with their antimalaria activities. Our laboratory has some collaboration research with some researcher from many institution in Indonesia to provide our research activities.

In line with the mision of our institute to advance fundamental knowledge in the field of molecular cell biology, and to apply such knowledge to the understanding and the prevention of and treatment of human diseases, the Mitochondria and Infectious Diseases Unit expand the research not only in malaria diseases, but also continuing with other infectious diseases caused by protozoan parasites with the used of other marker not only in mitochondria.

In the development planning of this unit, accelerate us to perform strategic medical research and the result can be applied directly to the welfare. The research activities must be supported by good laboratory practice with international standard and human resources with their expertise in molecular biology. Our planning is to develop the "Mitochondria and Infectious Diseases Unit" into "Diagnosis and Drug Discovery for Infectious Diseases Unit". This development research has to be supported by government to facilitate tools and infrastructure, and adequate human resources.

1.4. Research Plan, Themes, Activities, Schedule

Research Plan

- Collaboration study with some institution in dealing with non-human primate
- Collaboration study with some researcher who has been extracting natural product for the screening compound with their antimalaria activities (ex vivo and in vivo)
- Collaboration study with some clinician for the Toxoplasma diagnosis study

The research setting will be done at the laboratory of Eijkman Institute for Molecular Biology. The collection of samples will be done in some area in Indonesia (collaboration study with research institution dan academic institution dealing with study of parasite and natural product.

Activities:

<u>Sample collection:</u>

1. Faecal sample of non-human primate from some area in Indonesia
2. Collection sample from Indonesian biodiversity (plant and marine biology) from some institution who work in collaboration.
3. Patient samples from clinician to study Toxoplasma.

<u>Molecular Biology Analysis:</u>

Molecular Biology analysis of malaria parasite DNA sample will be done at the Eijkman Institute

(parasite genotyping with nuclear and mitochondrial marker)

Rodent malaria model:

The research will be done at the animal facilities and laboratory at the Eijkman Institute. The rodent animal will be infected with malaria parasite P. *berghei* and used for screening compound ex vivo and in vivo.

Schedule :

Field sample collection

ACTIVITY/PURPOSE	**STEP/ MONTH- IN A YEAR**											
	1	2	3	4	5	6	7	8	9	10	11	12
Research preparation	X											
Research material preparation		X	X									
Sample collection in study field				X	X		X	X				
Laboratory work				X	X	X	X	X	X			
Result analysis					X	X		X	X			
Abstract for conferences										X		
Writing result										X	X	
Final report												X

Experiment in animal model

ACTIVITY/PURPOSE	**STEP/MONTH- IN A YEAR**											
	1	2	3	4	5	6	7	8	9	10	11	12
Research preparation	X											
Research material preparation		X	X									
Parasite injection to animal model				X	X	X	X					

ACTIVITY/PURPOSE	**STEP/MONTH- IN A YEAR**											
	1	2	3	4	5	6	7	8	9	10	11	12
Natural compound screening					X	X	X	X	X			
Enzyme assay							X	X	X			
Result analysis							X	X	X	X		
Writing result										X	X	
Final report												X

1.5. Present research status at your Laboratory/ Department / University/ Institution

Initially our group has studied the relationship between mitochondria function and infectious disease, in particular the potential of mitochondria of the malaria parasite as drug target. The malaria parasite has a complex life cycle involving sudden changes of environment during transmission between different hosts and transition from extra- to intracellular existences, requiring specific adaptive differentiation. Despite the obvious importance of the energy transducing machinery in such adaptive process – which involves aerobic, semi aerobic and relatively anaerobic environment – remarkably little is known about the biogenesis of the mitochondrial energy transducing membrane in the malaria parasite. By acquiring detail knowledge of the biogenesis and function of the parasite's energy transducing membrane, and particularly the role of the parasite's two extrachromosomal DNAs in this process, it is hoped that new therapeutic targets for malaria treatment and prophylaxis could be identified.

We have produced most significant results in the understanding of the mechanism of action of Atovaquone and in the cytoplasmic genetic of the malaria parasite. The development an animal model system, allowing analysis of other similar antimalarial drugs in the future. This work provides the first direct demonstration of the relationship between mutations in the mitochondrial cytochrome *b* gene and the resistance of respiratory complex III to Atovaquone.

Beside those outcome, our expertise in the study of mitochondria parasite, has also allowed us to develop a PCR-based diagnostic of human malaria parasite based on mitochondrial DNA and published a protocol for the collection of non-invasive samples and isolation of malaria parasites from the wild macaque. Within the last decade, there was an evidence of zoonosis malaria. A macaque malaria, *Plasmodium knowlesi*, has caused disease in hundreds of human in Southeast Asia.

We have also now continuing to examine in more detail the pathobiology of the parasite in respond to resistance phenomena observed for some antimalarial drugs. And recently, we have developing a method of an *ex vivo* fluorescence-based antimalarial drug screening for the exploration on the Indonesian biodiversity.

1.6. Future Research Plan

- Study antimalarial drug in rodent animal model
- Epidemiology study of Toxoplasmosis in Indonesia

1-2. Research Personnel

Experienced professors, senior researchers and graduate students

2.1. Indonesian Researchers

Research Coordinator

Josephine E. Siregar, SSi, MSc, PhD
Eijkman Institute for Molecular Biology

Team Members

1. Normalita E. Pravitasari, SSi
   Eijkman Institute for Molecular Biology
2. Andita F. M. Rizki, SSi
   Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. *Collaboration with Industries*

N/A

2.4. *Other Research Collaborators*

Fakultas Sains dan Teknologi, Universitas Jambi (Indonesia)
PT Jamu Borobudur Semarang (Indonesia)
Balai Penelitian dan Pengembangan Teknologi Hasil Hutan Bukan Kayu Badan Penelitian, Indonesia Pengembangan dan Inovasi Kementrian Lingkungan Hidup dan Kehutanan (Indonesia)

1-3. Supporting Activities in the Project

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

C) Doctor degree
   Number of candidates: 2 persons
   Training Duration: 4 years
D) Master’s degree

Number of candidates: 1 person
Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 4 persons
- Position: Research Assistant
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the research project
These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Refrigerator and Freezer (Combo)	1	86,300,000	86,300,000
2	Ultra Low Temperature Freezer, Upright, 682 liter	1	574,750,000	574,750,000
3	Lab Refrigerator	1	178,632,300	178,632,300
4	Temperature Freezer -40	1	242,000,000	242,000,000
5	Biological Safety Cabinet Class II A2	1	391,500,000	391,500,000
6	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.1 - 2.5 µL	5	6,993,000	34,965,000
7	Research® plus, Adj., Single Channel	5	6,993,000	34,965,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Brand : Eppendorf - Germany Volume : 0.5 - 10 µL			
8	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	5	6,993,000	34,965,000
9	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	5	6,993,000	34,965,000
10	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	5	6,993,000	34,965,000
11	Pipette Carousel 2	5	4,680,500	23,402,500
12	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 5-10 µL	1	27,438,000	27,438,000
13	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 2-20 µL	1	27,438,000	27,438,000
14	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 5-10 µL	1	27,438,000	27,438,000
15	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 5-50 µL	1	27,438,000	27,438,000
16	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 200-200 µL	1	27,438,000	27,438,000
17	Rainin E4 XLS+ Elect. LTS12-channel pipette, volume 100-1200 µL	1	27,438,000	27,438,000
18	CO2 Incubator	1	385,600,000	385,600,000
19	pH/ion meter	1	32,475,000	32,475,000
	Accesories for pH/ion meter:			
20	Bottle rainbow kit 1, 6x 230 mL	1	3,565,000	3,565,000
21	IQ/OQ cost for S220-K	1	2,000,000	2,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
22	Mettler Toledo Semi Micro Balance	1	126,825,000	126,825,000
23	PCR Cabinet	2	65,125,000	130,250,000
24	Thermo Scientific mySPIN Mini Centrifuge Series	2	14,000,000	28,000,000
25	Nikon Trinocular microscope	3	65,000,000	195,000,000
26	Refrigerated Table Top Centrifuge	1	288,460,000	288,460,000
27	Centrifuge 5430 R incl. Rotor FA-45-30-11	1	266,104,000	266,104,000
28	S1 Pipette filler	3	9,000,000	27,000,000
29	High Speed Mixer Mix Mate	1	60,875,000	60,875,000
	Accesories for Mix Mate			
30	Tube Holder PCR 96	1	3,535,000	3,535,000
31	Tube Holder 24 x 0.5 mL conical tubes	1	3,535,000	3,535,000
32	Tube Holder 24 x 1.5/2.0 mL conical tubes	1	3,535,000	3,535,000
33	Tube Holder 8 x 5/15 mL conical tubes	1	3,535,000	3,535,000
34	Tube Holder 4 x 25/50 mL conical tubes	1	3,535,000	3,535,000
35	Pico 21 Ventilated Microcentrifuge	1	50,993,000	50,993,000
36	Scie-Plas Mini Plus Horizontal Gel Unit System HU10, Include : EV1450 Power Supply Unit Consort - Belgium (distributed through Scie-Plas - UK), cat# EV1450	2	46,810,000	93,620,000
37	Cordless Multi-purpose Centrifuge	2	12,810,000	25,620,000
38	TOMY High Speed Refrigerated Centrifuge SUPREMA 25, include Fixed Angle Rotor NA-610 1000MlX6/8,000 rpm; 1,000 mL	1	671,134,050	671,134,050

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	bottles (set of 6)			
39	Waterbath	1	45,182,500	45,182,500
40	Multi Vortex V-1 Plus	1	6,300,000	6,300,000
41	Multi Vortex V-32	1	10,800,000	10,800,000
42	Laptop/Notebook	1	17,900,000	17,900,000
43	Printer	1	4,659,000	4,659,000
44	Microwave	1	2,000,000	2,000,000
45	Thermal Cycler with Six Separate Peltier Blocks	1	242,000,000	242,000,000
46	Orbital Shaker-incubator, BIOSAN ES-20/80	1	167,508,000	167,508,000
	Accessories for Orbital Shaker-incubator			
47	Platform with 6 tight fit clamps for 1000 ml flasks (360x400 mm)	1	17,325,000	17,325,000
48	Platform with 9 tight fit clamps for 500 ml flasks (360x400 mm)	1	15,444,000	15,444,000
49	Platform with 16 tight fit clamps for 250-300 ml flasks (360x400 mm)	1	21,186,000	21,186,000
50	Platform with 30 tight fit clamps for 100-150 ml flasks (360x400 mm)	1	26,967,600	26,967,600
51	Universal platform with clamps can accommodate flasks or bottles of different volume sizes.	1	6,355,800	6,355,800
52	Adjustable angle test tube rack for up to 21 tubes 50 ml (for UP-168)	1	5,306,400	5,306,400
53	Adjustable angle test tube rack for up to 44 tubes 15 ml (for UP-168)	1	4,653,000	4,653,000
54	Multiplate reader Tecan Infinite	1	2,167,000,000	2,167,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	200PRO			
55	Tri-gas incubator	1	325,000,000	325,000,000
56	UHPLC with autosampler and UV-Vis detector	1	1,225,000,000	1,225,000,000
57	Flash chromatography	1	130,000,000	130,000,000
58	Column chromatography	1	125,000,000	125,000,000
59	Econogradient/ fraksinator Biorad	1	235,000,000	235,000,000
60	Chromatochamber 4 degree celcius	1	375,000,000	375,000,000
61	Liquid Nitrogen Tank	1	172,000,000	172,000,000
62	Heater-stirrer thermoscientific	1	16,000,000	16,000,000
63	Candle Jar	2	3,500,000	7,000,000
64	Thermomixer	1	112,629,000	112,629,000
	Accessories for Thermomixer			
65	SmartBlock 1.5 mL	1	22,056,000	22,056,000
66	SmartBlock 15 mL	1	22,056,000	22,056,000
67	SmartBlock PCR 96	1	27,443,000	27,443,000
68	SmartBlock plates	1	27,443,000	27,443,000
69	Lid, for Eppendorf ThermoMixer® F0.5/F1.5/F2.0 and FP for Eppendorf SmartBlocks™ 0.5–2.0 mL plates, PCR 96 and 384	1	18,746,000	18,746,000

6. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are international publication, thesis from Master Student and Disertation from PhD Student, seminar national and international.

7. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

- Control of human transmission of primates malaria, which is very important for malaria elimination program.

- Invention of new antimalaria product from Indonesian biodiversity.
- Development of simple and fast diagnosis for Toxoplasma.

Appendix 1: Research Profile of Eijkman
1-3: Endemic and Emerging Viruses in the Indonesian Archipelago

RP-EIJKMAN03

Research Profile

Project Title
Endemic and Emerging Viruses in the Indonesian Archipelago

Project Coordinator
Khin Saw Myint, MD, PhD

Department and Institution
Emerging Virus Research Unit, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1-1. Research Area

Virology, molecular biology, immunology

1.2. Research Topics

1. Characterization of endemic and emerging viruses circulating in the Indonesian archipelago
2. Identification of zoonotic pathogen outbreak especially those with pandemic risk in Indonesia
3. Implementation of rapid high-throughput molecular diagnostic tools and next generation sequencing for studies on the ecology of emerging viruses

1.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

In the last decade, emerging diseases have become a new threat for human health with significant public health consequences. With the advance in transportation technology, emerging diseases tend to rapidly spread to many geographical distributions. Zoonotic diseases account for at least 75% of emerging diseases in humans, and growing evidence demonstrate that zoonotic infections are crossing into humans in natural settings more frequently and in a more widespread manner than previously understood.[1] The potential that zoonotic infections may introduce new infectious agents emphasizes the need for rapid characterization of these pathogens to infect and/or cause disease in humans.

World Health Organization (WHO) in 2015 have released the list of priority diseases for the research and development blueprint. The list was reviewed in 2017 and has become the guidance to focus the research and development effort on severe emerging diseases with potential to generate a public health emergency for which insufficient or no preventive and curative solutions exist.[2,3] Diseases on the list, are mostly caused by viral pathogens including Arenaviral haemorrhagic fevers (including Lassa Fever), Crimean Congo Haemorrhagic Fever (CCHF), Filoviral diseases (including Ebola and Marburg), highly pathogenic coronaviral diseases such as Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Severe Acute Respiratory Syndrome (SARS-CoV), Rift Valley Fever (RVF), Severe Fever with Thrombocytopenia Syndrome (SFTS), Zika.

Most emerging infectious diseases are still neglected agents often not considered by physicians in diagnostic algorithms since the laboratory resources and epidemiology data are limited. Laboratories with capacity to diagnose these pathogens play an important role since the diseases are not always associated with specific clinical presentations and transmitted by various routes making diagnosis difficult; the emergence of novel microbes presents an even greater challenge.

Indonesia has been identified as a high-risk area for emerging pathogens. Currently diagnosis of emerging pathogens is still limited and it is likely that many more pathogens are endemic in the Indonesian Archipelago than currently known. Testing prospective and archived diagnostic samples for emerging pathogens will also build local capacity to work safely with biological agents and strengthen biosecurity within Southeast Asia. The findings from the study are expected to identify circulating emerging pathogens in Indonesia with potential threat for public health in the region.

Our study will use clinical specimens from undifferentiated fever, central nervous system infection and respiratory infection. Specimens can be various types submitted from hospitals/universities located in different geographical location of Indonesia collected within the past 10 years. The study will employ scientifically sound methods/platforms (serology, culture, molecular assays) to address the sensitivity and specificity of each based on different archival conditions. Testing will follow a designated laboratory testing algorithm for efficiency with screening for common pathogens causing the disease in Indonesia i.e. dengue, typhoid, chikungunya, and malaria and the potential viral pathogens. Our data could contribute to the development of preventive strategies to address disease threats both locally and regionally.

1.4. Research Plan, Themes, Activities, Schedule

3. To lay the foundation for a network of trained laboratory personnel, provide baseline information on the vector-borne pathogen likely to emerge and cause human disease in the fourth most populated country in the world.
3. To detect and characterize pathogens of potential human significance from clinical samples and to examine archival and prospective samples for the presence of human pathogens using a range of virological and molecular methodologies

Activities:

1. Collaborate with local partners and providing training to Indonesian scientists, veterinarians, and clinicians in conducting field, laboratory and clinical research of pathogens.
2. Identification of emerging viruses in human acute febrile specimens, including archival specimens which have been tested for typical pathogens.
3. Introduce new technologies capable of supporting the program activities in-country: Subsequent to augmented laboratory capacity and training of Indonesian researchers, a more advanced approach will be used to identify endemic and emerging viruses

Schedule

Activity	YEAR				
	1	2	3	4	5
Development of study proposal, protocol, grant	🟥				
Administrative paperwork and ethcal clearance	🟥				
Investigation of methodology	🟥		🟥		
Site exploration and lab capacity evaluation	🟥	🟥	🟥		
Capacity building at Eijkman Institute	🟥		🟥		
Capacity building at study site		🟥		🟥	
Study enrolment		🟥	🟥	🟥	
Data entry and analysis			🟥		🟥
Progress report and study evaluation		🟥	🟥	🟥	🟥
Development of Manucript and report			🟥	🟥	🟥

1.5. *Present research status at your Laboratory/ Department / University/ Institution*

Acute Febrile Illness Studies (Undifferentiated Fever and Central Nervous System Infection) are in place (North/South Sulawesi, Bali, West Java) to characterize vector-borne and zoonotic pathogens and investigate the transmission dynamics of vector-borne and zoonotic disease agents

1.6. *Future Research Plan*

We anticipate to significantly increase and broaden our capacity for molecular diagnosis of emerging vector-borne diseases. Specifically, we plan to have the ability to routinely carry out deep sequencing of selected AFI specimens, and institute metagenomic testing. We are also planning for expanded testing of AFI and outbreak specimens in the event that an arboviral agent is not identified. These additional agents to be tested include leptospirosis, rickettsia and hantavirus infections which clinically resemble arboviral infections.

1-2. RESEARCH PERSONNEL

Experienced professors, senior researchers, laboratory consultants, technology specialist and graduate students

2.2. *Indonesian Researchers*

Research Coordinator

Frilasita Aisyah Yudhaputri, M.BiomedSc

Eijkman Institute for Molecular Biology

Team Members

1. Edison Johar
   Eijkman Institute for Molecular Biology
2. Yora Permata Dewi, M.Biomed
   Eijkman Institute for Molecular Biology

1-3. Ageng Wiyatno, S.Si
Eijkman Institute for Molecular Biology
1-4. Chairin Nisa Ma'Roef
Eijkman Institute for Molecular Biology
1-5. Aghnianditya Kresno Dewantari
Eijkman Institute for Molecular Biology
1-6. Ungke Anton Jaya
Eijkman Institute for Molecular Biology
1-7. Rama Dhenni
Eijkman Institute for Molecular Biology

2.2. Foreign Researchers

Research Coordinator
Khin Saw Myint, MD., PhD.
Eijkman Institute for Molecular Biology

2.3. Collaboration with Industries

N/A

2.4. Other Research Collaborators

FKIK, Universitas Warmadewa (Indonesia)
FK, Universitas Sam Ratulangi (Indonesia)
FK, Universitas Padjajaran (Indonesia)
US-CDC Fort Collins (USA)
Department of Medical Research (DMR), Yangon (Myanmar)
National University of Singapore (Singapore)
Cambridge University (UK)
University of Melbourne (Australia)

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

E) Doctor degree
   Number of candidates: 2 persons
   Training Duration: 4 years
F) Master's degree
   Number of candidates: 2 persons
   Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 7 persons
- Position: technical training, internship and post doc research
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the research project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be around persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price	Total
1	Biological Safety Cabinet Class II A2 Herasafe 2030i (Thermo Scientific)	2	Rp391,500,000	Rp783,000,000
2	Fridge 40C TSX Series (Thermo Scientific)	3	Rp196,495,530	Rp589,486,590
3	Freezer -400C REFCO FDE (Thermo Scientific)	3	Rp266,200,000	Rp798,600,000
4	Fridge/Freezer BDF--40V288A (Biobase)	2	Rp94,930,000	Rp189,860,000
5	ThermoMixer® C (Eppendorf)	1	Rp120,175,000	Rp120,175,000
6	Freezer -80 Forma 89000 (Thermo Scientific)	6	Rp632,225,000	Rp632,225,000
7	Vortex Mixer Maxi Mix (Thermo Scientific)	4	Rp7,260,000	Rp29,040,000
8	mySPIN Mini Centrifuge Series (Thermo Scientific)	3	Rp15,400,000	Rp46,200,000
9	Research plus pipette set (Eppendorf)	6	Rp51,302,350	Rp307,814,100
10	Start Kit PL-LTS Single Pipette (Rainin)	2	Rp26,193,310	Rp52,386,620
11	Multichannel pipette set F1 Finnpipettes (Thermo Scientific)	1	Rp74,681,640	Rp74,681,640

No	Equipment/facilities to be procured for the Research	Quantity	Price	Total
12	PCR cabinet PCR-800 (Biobase)	2	Rp71,637,500	Rp143,275,000
13	QIAExcel Advance System, Priority	1	Rp1,600,000,000	Rp1,600,000,000
14	EVOS™ XL Core Imaging System	1	Rp3,500,000,000	Rp3,500,000,000
15	Hydroflex Microplate Washer Tecan	1	Rp1,300,000,000	Rp1,300,000,000
16	CO2 Incubator	2	Rp385,600,000	Rp143,275,000
17	Microplate Reader Varioskan LUX ThermoFisher	1	Rp1,600,000,000	Rp1,600,000,000
18	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	Rp25,300,000	Rp25,300,000
19	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	Rp25,300,000	Rp50,600,000

Note: Catalogues and product details are attached in a separate document

8. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are capacity building for staff and International research papers

9. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Our data could contribute to the development of preventive strategies to address disease threats both locally and regionally

Appendix 1: Research Profile of Eijkman
1-4: Hepatitis

RP-EIJKMAN04

Research Profile

Project Title
Hepatitis

Project Coordinator
Prof. David H. Muljono, MD, PhD

Department and Institution
Hepatitis Unit, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

7.1. Research Area

Molecular biology, Virology, Immunology, Bioinformatics, Oncology, Cell Biology

7.2. Research Topics

1. Genetic characteristics of viral hepatitis in Indonesia and its implication in epidemiology and clinical manifestations
2. Host genetics background and disease pathomechanisms in viral hepatitis liver diseases

7.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Viral hepatitis caused more deaths each year in the Asia Pacific region, compared to the other infectious diseases caused by HIV, tuberculosis, and malaria. The two-main viral hepatitis in Asia Pacific and in the world, are hepatitis B and C. Hepatitis B, caused by Hepatitis B virus (HBV), affected more than 257 million people worldwide, and those who are chronically infected have a higher risk of developing severe liver diseases including liver cirrhosis and liver cancer. Hepatitis C, caused by Hepatitis C virus (HCV), affected around 71 million people worldwide, and can also cause chronic infection that can develop into severe liver diseases. Preventable vaccine is available for hepatitis B, and hepatitis B vaccination is now mandatory in most countries for newborns. For hepatitis C, no vaccines are available, but current generation antiviral drugs can cure up to 95% of HCV patients.

Indonesia have significant cases of both hepatitis B and C. Hepatitis B prevalence is estimated at 7.1% (2013 data), with both vertical (mother-to-child) and horizontal transmission routes. Meanwhile, hepatitis C prevalence is around 1% (2013 data), with estimated increased cases due to injecting drug use. The main issues in viral hepatitis management in Indonesia are lack of complete and reliable epidemiology data, either nationally or regionally, low testing rate for viral hepatitis diagnostics, and low treatment rate for hepatitis patients. Indonesia is an archipelago country with varying social, education, and economic levels, thus access to healthcare facilities and services may be limited in some areas, which may exacerbate the viral hepatitis disease burden. Furthermore, Indonesian population have high genetic variability, this combined with the easily mutated nature of HBV and HCV, resulted in high variability of HBV and HCV circulating in Indonesia which may have significant impact on viral hepatitis epidemiology and clinical manifestations in Indonesia.

Therefore, studying the characteristics of viral hepatitis in Indonesia, from different approaches, epidemiology, molecular biology, virology, immunology, host genetics, and disease pathomechanisms may significantly improve the current national strategies and regulations on hepatitis diagnostics, prevention, and treatment. Improving the national hepatitis management in Indonesia would also result in reduced health and economic costs of hepatitis-related disease burden and increased society productivity and improved health and life standard.

7.4. Research Plan, Themes, Activities, Schedule

Research Plan and Theme:

1. Genetic characteristics of viral hepatitis in Indonesia and its implication in epidemiology and clinical manifestations
    - Genetic characteristics of viral hepatitis in Indonesia and its implication with epidemiology and clinical manifestations
    - Development of viral hepatitis diagnostics
    - Development of viral hepatitis vaccine and evaluation of vaccination effectivity
    - Evaluation of antiviral treatment and monitoring to improve patients' access

2. Host genetics background and disease pathomechanisms in viral hepatitis liver diseases
    - Host genetics factor that can influence viral hepatitis progression
    - Identification of biomarker for detection of viral hepatitis-related liver cancer
    - Pathological mechanisms of viral hepatitis-related severe liver diseases
    - Immune cells specific population and expression in viral hepatitis patients

Activities:

1. Field sampling in hepatitis endemic areas
2. Hospital and/or healthcare-based sampling for viral hepatitis patients
3. Serological and molecular analyses
4. Bioinformatics analyses for viral and host mutations
5. Analyses of viral and host factors in viral hepatitis

Schedule (in one year):

Activities	**Month**											
	1	2	3	4	5	6	7	8	9	10	11	12

Preparation and literature review	▨	▨	▨									
Organization and selection of field sampling site			▨	▨	▨	▨	▨	▨	▨	▨		
Serological and molecular analyses				▨	▨	▨	▨	▨	▨	▨		
Data analyses					▨	▨	▨	▨	▨	▨	▨	▨
Reporting and publication							▨	▨	▨	▨	▨	▨

7.5. Present research status at your Laboratory/ Department / University/ Institution

Routine field sampling was not done this year due to pandemic restrictions. Most molecular analyses were performed on archived samples. We have identified HBV prevalence, serotype, and genotype in specific ethnic populations and clinical patients in Indonesia. We have also identified HBV mutations that may cause diagnostics and vaccination failure, and severe disease progression. For HCV, we have data on major HCV genotypes in Indonesia and viral mutations that may affect antiviral treatment.

7.6. Future Research Plan

- Identification of biomarker for detection of viral hepatitis-related liver cancer
- Pathological mechanisms of viral hepatitis-related severe liver diseases
- Immune cells specific population and expression in viral hepatitis patients

1-8. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

8.1. Indonesian Researchers

Research Coordinator
Prof. David H. Muljono, MD, PhD
Eijkman Institute for Molecular Biology

Team Members
1. Meta D. Thedja, MD, PhD
   Eijkman Institute for Molecular Biology
2. Turyadi, M.Biomed.
   Eijkman Institute for Molecular Biology
3. Korri El Khobar, PhD
   Eijkman Institute for Molecular Biology
4. Dhita P. Wibowo, BSc.
   Eijkman Institute for Molecular Biology

5. M. Rezki Rasyak, BSc.
   Eijkman Institute for Molecular Biology
6. Billy Witanto, BSc.
   Eijkman Institute for Molecular Biology

8.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

N/A

2.4. Other Research Collaborators

PT. Biofarma, Bandung (Indonesia)
Institut Teknologi Bandung, Bandung (Indonesia)
Badan Pengkajian dan Penerapan Teknologi (Indonesia)
PT. Medquest Jaya Global (Indonesia)
Poltekkes Kemenkes Kupang, Nusa Tenggara Timur (Indonesia)
Universitas Hasanuddin, Makassar, Sulawesi Selatan (Indonesia)
University of Nottingham, Nottingham (UK)

1-9. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

G) Doctor degree
   Number of candidates:1 person
   Training Duration: 4 years
H) Master's degree
   Number of candidates: 1 person
   Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 5 persons
- Position: Technical training and post-doc research for Research Fellows and Research Assistants
- Program: Non-degree (Post-doc research, technical training or internship)

Contributions to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 1-2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 3 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Biological Safety Cabinet Class II A2	2	391,500,000	783,000,000
2	CO2 Incubator	1	385,600,000	385,600,000
3	Refrigerator and Freezer (Combo)	7	86,300,000	604,100,000
4	Refrigerated Table Top Centrifuge	2	288,460,000	576,920,000
5	Research Inverted Microscope, Phase Contrast	1	287,000,000	287,000,000
6	Camera For Inverted Color Photomicrography Digital Camera System, 5.9m	1	105,504,000	105,504,000
7	Basic Research Software	1	74,438,000	74,438,000
8	Personal computer (to be combined with DS-Fi3 digital camera)	1	44,831,769	44,831,769
9	Small Capacity Thermostatic Shaking Incubator	1	78,500,000	78,500,000
10	Oven, Advanced Protocol, Gravity Convection	1	77,550,000	77,550,000
11	Ultra Low Temperature Freezer, Upright, 682 liter	3	574,750,000	1,724,250,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
12	Temperature Freezer -40	3	242,000,000	726,000,000
13	Lab Refrigerator	5	178,632,300	893,161,500
14	Digital PCR	1	4,037,920,000	4,037,920,000
15	Real Time PCR 7500Fast Real-time PCR System	1	1,505,680,000	1,505,680,000
16	Centrifuge 5430 R incl. Rotor FA-45-30-11	4	266,104,000	1,064,416,000
17	Innova 2100	1	150,027,500	150,027,500
18	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	5	6,993,000	34,965,000
19	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	5	6,993,000	34,965,000
20	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	5	6,993,000	34,965,000
21	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	5	6,993,000	34,965,000
22	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany ￼Volume : 0.5 - 10 µL	1	30,229,000	30,229,000
23	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany ￼Volume : 5 - 100 µL	5	30,229,000	151,145,000
24	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany ￼Volume : 15 - 300 µL	5	30,229,000	151,145,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
25	Research® plus, Adj., 8 - channel Volume : 10 - 100 µL	5	17,797,000	88,985,000
26	Pipette Carousel 2	5	4,680,500	23,402,500
27	ELISA Reader	1	1,070,300,000	1,070,300,000
28	Airstream® Vertical Laminar Flow Cabinet, Gen 3, Stainless Steel Sides, Sliding Sash	1	227,600,000	227,600,000
29	Magnetic Stirrer	2	10,450,000	20,900,000
30	Microwave	1	10,000,000	10,000,000
31	Dry Bath Incubator	1	45,358,500	45,358,500
32	Analytical Balance Quintix®	1	76,034,000	76,034,000
33	Precision Balance BSA Series	1	45,789,000	45,789,000
34	PCR Cabinet	2	61,690,446	123,380,892
35	pH meter	1	15,011,000	15,011,000
36	Plate Washer for ELISA	1	231,000,000	231,000,000
37	Qubit™ 4 Fluorometer	1	83,676,582	83,676,582
38	Qubit™ 1X dsDNA BR Assay Kit - Thermo Fisher Scientific	1	10,231,000	10,231,000
39	Qubit™ 1X dsDNA HS Assay Kit - Thermo Fisher Scientific	1	10,192,000	10,192,000
40	Qubit™ Assay Tubes Thermo Fisher Scientific	1	2,952,000	2,952,000
41	Complete Mini Vertical Gel Electrophoresis Apparatus Mini 10x10cm Dual, 2 sets of Glass plates with 1 mm thick bonded spacers, 2 x 12 sample, 1mm thick combs, cooling pack, dummy plate and casting base include power supply	1	51,031,448	51,031,448
42	OrbiCult Ambient Shaker, Non-CO2 Resistant, 25mm Triple	1	68,720,000	68,720,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Eccentric Drive; 100-240VAC 50-60Hz			
43	Small Capacity Thermostatic Shaking Incubator	1	78,500,000	78,500,000
44	SmartBlock™ plates	1	26,619,000	26,619,000
45	Thermo Scientific mySPIN Mini Centrifuge Series	4	14,000,000	56,000,000
46	Vortex Mixer	4	20,350,000	81,400,000
47	Water Bath	2	37,164,600	74,329,200
48	Automated extractor	1	629,656,500	629,656,500
49	Gel doc	1	452,381,600	452,381,600
50	Mini Sub-Cell/PP Basic System	1	49,577,000	49,577,000
51	Midi plus-2, 15 x 7,10 & 15cm UV Tray, 2 x 20 sample, 1mm thick combs, loading guides and dams, Include power supply	1	16,930,320	16,930,320
52	Mini-PROTEAN® Tetra Vertical Electrophoresis Cell, 4-gel	1	13,943,600	13,943,600
53	Trans-Blot® SD Semi-Dry Electrophoretic Transfer Cell	1	220,000,000	220,000,000
54	Power supply for electrophoresis	2	9,900,000	19,800,000
55	T100 Thermal Cycler	2	130,106,900	260,213,800

Note: Catalogues and product details are attached in a separate document

10. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are Research papers and capacity building for human resources

11. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

- Improved health policies and improved society health
- Reduced of disease burden and loss of productivity

Appendix 1: Research Profile of Eijkman
1-5: Malaria and Vector Resistance

RP-EIJKMAN05

Research Profile

Project Title
Malaria and Vector Resistance Unit

Project Coordinator
Dr. Puji Budi Setia Asih

Department and Institution
Malaria and Vector Resistance Unit, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

9.1. Research Area

Genetics, Molecular Biology, Cell Biology, Bioinformatics, Infectious Diseases, Entomology

9.2. Research Topics

1. Molecular analysis underlying *Plasmodium* resistance to antimalarial drugs.
2. Antimalarial drug discovery through medicinal plants
3. New approach in malaria control
4. Molecular taxonomy of *Anopheles* mosquitoes
5. Molecular mechanisms underlying mosquitoes' resistance to insecticides

9.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Malaria is currently still a major public health problem around the globe. World health Organization (WHO, 2019) reported an estimated 228 million cases of malaria occurred worldwide in 2018, compared with 251 million cases in 2010 and 231 million cases in 2017. Of the total Indonesian population in 2017, 5% reside in hyperendemic areas with annual parasite incidence (API) are > 5, 29% in mesoendemic areas (API between 1-5 per 1000), 56.1% in hypoendemic areas (API <1 per 1000) and 52% in malaria-free areas [Ministry of Indonesia 2020].

Malaria, a disease caused by a protozoan parasite of the genus *Plasmodium* possesses a wide spectrum of clinical manifestation, from asymptomatic at the one pole to a to fatal cerebral complication in the other extreme. The underlying mechanism (s) that dictate this phenomenon is multifactorial, involving parasite, human host and environmental factors. Although this disease is both preventable and treatable, the constant evolution of malaria parasites and their mosquito vector poses an ever-present challenge in our battle against this devastating disease.

Insecticide, vaccine and drug development are in a constant tight race against the rise of insecticide and drug resistance. An all-rounded strategy is crucial in order to achieve effective malaria control and elimination. Ever since when malaria was elected as one of the major topics of research at Eijkman Institute for Molecular Biology, numerous strategical attempts have been done by the institute in order to solve malaria from both fundamental and applied research standpoints.

The activities done at Eijkman Institute, specifically the Malaria and Vector Resistance Laboratory aims to evaluate the spread of malaria parasite resistance to current antimalarial drugs used in

Indonesia, study the molecular mechanism of parasite resistance to antimalarial medications, search for new antimalarial drug candidates, and to obtain malaria vector prevalence data from Anopheles sp. mosquitoes.

Economic and Social Benefit of this research:

1. Manpower development for local community
2. Temporary and permanent employment
3. Community participation in diseases control and management

9.4. Research Plan, Themes, Activities, Schedule¥

Research Plan and theme:

I. Malaria Parasite:
    1. Antimalarial drug resistance parasite mapping in Indonesia
    2. Molecular analysis underlying *Plasmodium* resistance to antimalarial drugs.
    3. Antimalarial drug discovery through medicinal plants

II. Mosquitoes malaria vector:
    1. Insecticides resistance mosquitoes mapping in Indonesia
    2. Molecular taxonomy of *Anopheles* mosquitoes
    3. Molecular mechanisms underlying mosquitoes' resistance to insecticides

Activities:

6. Field sampling in malaria endemic areas
7. Primary health and hospital based sampling for malaria patients
8. Molecular analyses
9. Bioinformatics analyses for mutations (SNPs)
10. In vitro using Plasmodium falciparum 3D7
11. Insecticides of susceptibility test for mosquito vector

Schedule in one year:

ACTIVITIES	**MONTH**											
	1	2	3	4	5	6	7	8	9	10	11	12
1.Developement of in vitro culture for malaria parasite and insectary facilities	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

2.Development of insecticides resistance test in insectary facility	▨	▨	▨	▨	▨	▨	▨	▨				
3.Evaluation of insecticides resistance test in insectary facility				▨	▨	▨	▨	▨	▨	▨	▨	▨
4.Development of susceptibility test for mosquitoes collected from malaria endemic areas				▨	▨	▨	▨	▨	▨	▨	▨	▨
5. Development of center of excellent for vector control tools					▨	▨	▨	▨	▨	▨	▨	▨

9.5. Present research status at your Laboratory/ Department / University/ Institution

Research status in Malaria and Vector Resistance Unit is still on going though hampered with Covid-19 pandemic.

We have collected isolate of malaria parasite and mosquitoes vectors from different malaria endemic areas in Indonesia. We are compiling and being analyzed all data collected.

9.6. Future Research Plan

1. Molecular analysis for isolate of malaria parasite and mosquitoe vectors collected from different malaria endemic areas in Indonesia.
2. Testing of antimalarial drug using in vitro test
3. Molecular analysis for taxonomy of *Anopheles* mosquitoes
4. Analysis for mechanisms underlying mosquitoes' resistance to insecticide

1-10. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

10.1. Indonesian Researchers

Research Coordinator

Dr. Puji Budi Setia Asih
Eijkman Institute for Molecular Biology

Team Members

1. Prof. Din Syafruddin, MD, Ph.D
   Eijkman Institute for Molecular Biology
2. Ismail Ekoprayitno Rozi, M.Eng
   Eijkman Institute for Molecular Biology
3. Dendi Hadi Permana, M.Sc
   Eijkman Institute for Molecular Biology

4. Sully Kosasih, M.Sc
   Eijkman Institute for Molecular Biology
5. Lepa Syahrani, M.Si
   Eijkman Institute for Molecular Biology
6. Farahana Kresnop Dewayanti, S.Si
   Eijkman Institute for Molecular Biology
7. Rifqi Risandi, B.Sc
   Eijkman Institute for Molecular Biology
8. Suradi
   Eijkman Institute for Molecular Biology
9. Siti Zubaidah, B.Sc
   Eijkman Institute for Molecular Biology
10. Tubagus Banirizqi, S.Kom
    Eijkman Institute for Molecular Biology
11. Anto Satrio Nugroho, Dr.Eng
    Badan Pengkajian dan Penerapan Teknologi (BPPT)
12. Dr. Jamilah Abbas, M.Si
    Lembaga Ilmu Pengetahuan Indonesia (LIPI)

10.2. Japanese Researchers

Research Coordinator (on going collaboration)
Masaharu Tokoro
Kanazawa University

Team Members (on going collaboration)
1. Hisao Yoshikawa
   NARA University
2. Shiro Iwanaga
   Osaka University
3. Hisao Yoshikawa
   NARA University

2.3. *Collaboration with Industries*

N/A

2.4. *Other Research Collaborators*

Lembaga Ilmu Pengetahuan Indonesia (Indonesia)
Universitas Hasanuddin (Indonesia)
Notre Dame University (USA)
Notre Dame University (USA)
UNICEF

1-11. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

I) Doctor degree

Number of candidates: 3 persons
Training Duration: 4 years

J) Master degree
Number of candidates: 2 persons
Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 7 persons
- Position: technical training and post doc research
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 1 person/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 4 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

Room	Equipments (new)	PRICE/ITEMM (IDR)	QTY	Total Price (IDR)
Laboratory Central table	Lab Refrigerator	178.632.300	3	535.896.900
	Laboratory Freezer (-40°C) 2 Doors	242.000.000	3	726.000.000
	Centrifuge 5424 R	174.214.500	1	174.214.500
	Multi Channel Pipette 0.5 - 10 µl	17.797.000	4	71.188.000
	Multi Channel Pipette 10 - 100 µl	17.797.000	4	71.188.000
	Pippette Volume : 10 - 100 µL	6.993.000	4	27.972.000
	Pippette Volume : 20 - 200 µL	6.993.000	4	27.972.000
	Pippette Volume : 100 - 1000 µL	6.993.000	4	27.972.000
	Dry Shipper	100.000.000	4	400.000.000
	Stereo Zoom Microscopes	60.000.000	4	240.000.000
	Pippette Stand	4.680.500	4	18.722.000
	Microscope Binocular	60.000.000	6	360.000.000
Parasite Culture Room	Biological Safety Cabinet Class II A2	391.500.000	1	391.500.000
	CO2 Incubator	385.600.000	1	385.600.000
	Refrigerator and Freezer (Combo)	86.300.000	1	86.300.000
	Refrigerated Table Top Centrifuge	288.460.000	1	288.460.000
	RESEARCH INVERTED MICROSCOPE, PHASE CONTRAST	287.000.000	1	287.000.000
	Camera For Inverted COLOR PHOTOMICROGRAPHY DIGITAL CAMERA SYSTEM, 5.9M	105.504.000	1	105.504.000
	Basic Research Sofware	74.438.000	1	74.438.000
	Personal computer (to be combined with DS-Fi3 digital camera)	44.831.769	1	44.831.769
	Small Capacity Thermostatic Shaking Incubator	78.500.000	1	78.500.000
	Oven, Advanced Protocol, Gravity Convection	77.550.000	1	77.550.000
	Ultra Low Temperature Freezer, Upright, 682 liter	574.750.000	1	574.750.000
	Lab Refrigerator	178.632.300	1	178.632.300
	Centrifuge 5430 R incl. Rotor FA-45-30-11	266.104.000	1	266.104.000
	Centrifuge 5424 R	174.214.500	1	174.214.500
	Multi Channel Pipette 0.5 - 10 µl	17.797.000	1	17.797.000
	Multi Channel Pipette 10 - 100 µl	17.797.000	1	17.797.000
	Pippette Volume : 10 - 100 µL	6.993.000	1	6.993.000
	Pippette Volume : 20 - 200 µL	6.993.000	1	6.993.000
	Pippette Volume : 100 - 1000 µL	6.993.000	1	6.993.000
	Dry Shipper	100.000.000	1	100.000.000
	Stereo Zoom Microscopes	60.000.000	1	60.000.000
	Pippette Stand	4.680.500	1	4.680.500
DNA Isolation room	Pippette Volume : 10 - 100 µL	6.993.000	1	6.993.000
	Pippette Volume : 20 - 200 µL	6.993.000	1	6.993.000
	Pippette Volume : 100 - 1000 µL	6.993.000	1	6.993.000
	Pippette Stand	4.680.500	1	4.680.500
	Laboratory Freezer (-80°C)	574.750.000	1	574.750.000
	Laboratory Freezer (-40°C) 2 Doors	242.000.000	1	242.000.000
	Laboratory Refrigerator (4°C) 2 Slide Doors	178.632.300	1	178.632.300
	PCR Cabinet	65.125.000	3	195.375.000
	Spectofotometer/ Nanodrop	50.000.000	1	50.000.000
	Vortex	20.350.000	2	40.700.000
	Magnetic Stirer	10.000.000	4	40.000.000
	pH meter	10.000.000	4	40.000.000
	Laboratory Scale	10.000.000	4	40.000.000
	Speedvac	250.000.000	1	250.000.000
	Hot Plate	10.000.000	1	10.000.000
	Heat Block	109.250.000	1	109.250.000
	Nanopure (water purification)	225.449.400	1	225.449.400
	Small Capacity Thermostatic Shaking Incubator	78.500.000	1	78.500.000
	Biological Safety Cabinet Class II A2	391.500.000	1	391.500.000
	Bench top centrifuge	310.400.090	1	310.400.090
	Centrifuge 5430 R incl. Rotor FA-45-30-11	266.104.000	1	266.104.000
	Automatic DBS Puncher	266.104.000	1	266.104.000
	Refrigerator and Freezer (Combo)	86.300.000	1	86.300.000
	Refrigerated Table Top Centrifuge	288.460.000	1	288.460.000
Electrophoresis Room	Laboratory Freezer (-40°C) 2 Doors	242.000.000	1	242.000.000
	Laboratory Refrigerator (4°C) 2 Slide Doors	178.632.300	1	178.632.300
	Electrophoresis apparatus	24.255.660	1	24.255.660
	GelDoc	240.669.000	1	240.669.000
	Computer	20.000.000	2	40.000.000
	Thermal Printer	50.000.000	2	100.000.000
	Microwave	5.000.000	2	10.000.000
	Pippette Volume : 10 - 100 µL	6.993.000	2	13.986.000
	Pippette Volume : 20 - 200 µL	6.993.000	2	13.986.000
	Pippette Volume : 100 - 1000 µL	6.993.000	2	13.986.000
	Pippette Stand	4.680.500	2	9.361.000
	Laboratory Scale	10.000.000	2	20.000.000
	Bench top centrifuge	310.400.090	1	310.400.090
	Vortex	20.350.000	2	40.700.000
PCR Room	Qubit™ 1X dsDNA HS Assay Kit - Thermo Fisher Scientific	10.192.000	2	20.384.000
	Biological Safety Cabinet Class II A2	391.500.000	1	391.500.000
	Qubit™ Assay Tubes Thermo Fisher Scientific	2.952.000	2	5.904.000
	Magnetic Stand-96	14.655.000	2	29.310.000
	Lab Refrigerator	178.632.300	2	357.264.600
	Temperature Freezer -40	242.000.000	2	484.000.000
	Refrigerator and Freezer (Combo)	86.300.000	2	172.600.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	6.993.000	2	13.986.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	6.993.000	2	13.986.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	6.993.000	2	13.986.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	6.993.000	1	6.993.000
	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	30.229.000	1	30.229.000
	Research® plus, Adj., 8 - channel Volume : 10 - 100 µL	17.797.000	1	17.797.000
	Pipette Carousel 2	4.680.500	1	4.680.500
	Charger Carousel 2	14.763.000	1	14.763.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.1 - 2.5 µL	6.993.000	1	6.993.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	6.993.000	1	6.993.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	6.993.000	1	6.993.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	6.993.000	1	6.993.000
	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	6.993.000	1	6.993.000
	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	30.229.000	1	30.229.000
	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany Volume : 5 - 100 µL	30.229.000	1	30.229.000
	Xplorer®, 8-channel Xplorer®, 8-channel Brand : Eppendorf - Germany Volume : 15 - 300 µL	30.229.000	1	30.229.000
	Research® plus, Adj., 8 - channel Volume : 10 - 100 µL	17.797.000	1	17.797.000
	Pipette Carousel 2	4.680.500	1	4.680.500
	Charger Carousel 2	14.763.000	1	14.763.000
	Thermal Cycler (PCR Machine)	342.850.000	2	685.700.000
	Real Time PCR 7500Fast Real-time PCR System	1.505.680.000	1	1.505.680.000
	Thermal Cycler with Six Separate Peltier Blocks	242.000.000	1	242.000.000
	Ultra Low Temperature Freezer, Upright, 682 liter	574.750.000	1	574.750.000
	PCR Cabinet	65.125.000	1	65.125.000
	Thermo Scientific mySPIN Mini Centrifuge Series	14.000.000	1	14.000.000
	Centrifuge 5430 R incl. Rotor FA-45-30-11	266.104.000	1	266.104.000
	Centrifuge 5424 R	174.214.500	1	174.214.500
	Innova 2100	150.027.500	1	150.027.500

Mosquitor Breeding Room	Micro Vials and Neoprene Stoppers	**10.000.000**	20	200.000.000
	Specimen Handling Cage	**100.000.000**	1	100.000.000
	BugDorm-2 and BugDorm-3 Rearing Cages	**100.000.000**	5	500.000.000
	Weather Station	**25.000.000**	5	125.000.000
	MVP Flex Video Camera System	**10.000.000**	2	20.000.000
	Dipper	**5.000.000**	100	500.000.000
	Mosquito Breeder	**5.000.000**	100	500.000.000
	Collapsible Cages	**5.000.000**	10	50.000.000
	Series Collecting Jars	**5.000.000**	100	500.000.000
	Aspirator	**100.000**	500	50.000.000
	BugDorm-1, Rearing and Observation Cage	**100.000.000**	2	200.000.000
	Insect Vacs	**100.000.000**	2	200.000.000
Dissecting Room	Aspirator Syringe Bulb	**100.000**	100	10.000.000
	Insect Vac Nozzle/Extension Set	**100.000.000**	1	100.000.000
	Laboratory Chill Table	**100.000.000**	2	200.000.000
	Glass Capsule Vials	**100.000**	100	10.000.000
	Stereo Zoom Microscopes	**60.000.000**	1	60.000.000
	MVP Flex Video Camera System	**60.000.000**	1	60.000.000
	Basic Research Sofware	**60.000.000**	3	180.000.000
	Heavy Duty EVS CO2 Mosquito Trap	**100.000.000**	1	100.000.000
	CDC Light Traps	**60.000.000**	10	600.000.000
	Universal Black Light Traps	**60.000.000**	10	600.000.000
	Malaise Traps	**60.000.000**	10	600.000.000
	Personal computer (to be combined with DS-Fi3 digital camera)	**44.831.769**	2	89.663.538
	Vial Cabinets	**60.000.000**	6	360.000.000
Insectarium Room	Advanced Collecting & Mounting kit	**50.000**	100	5.000.000
	Night Collecting Sheet	**50.000**	1	50.000
	Ambidextrous Pinning Forceps	**25.000**	1000	25.000.000
	Cornell University System Unit Pinning Tray	**500.000**	100	50.000.000
	Cornell Open-Faced Cabinets for 6 or 12 Drawer	**50.000.000**	4	200.000.000
	California Academy Cabinets for 24 Drawers	**50.000.000**	4	200.000.000
	Dehumidifier	**50.000.000**	4	200.000.000
	Insect Slide Mounting Kit	**50.000**	1000	50.000.000
	Steel Insectarium Cabinets	**50.000.000**	4	200.000.000
	Series Insect Pins	**50.000**	2000	100.000.000
Insecticide Testing Room	BG-Sentinel Trap	**50.000.000**	1	50.000.000
	High Intensity UV Flashlight	**100.000**	100	10.000.000
	Aquatic Pipettes	**50.000.000**	1	50.000.000
	Heavy-Duty Sweep Net with Three-Foot Handle	**50.000.000**	1	50.000.000
	Black Light EVS Trap	**50.000.000**	20	1.000.000.000
	Mosquito Attractant, "Octanol" Cage	**50.000.000**	1	50.000.000
	Cordless LED Microscopes	**50.000.000**	1	50.000.000
PIs - RAs Room	Computer	**20.000.000**	20	400.000.000
	Cubicle/Workstation	**10.000.000**	20	200.000.000
		14.986.562.278		25.105.513.947

Note: Catalogues and product details are attached in a separate document

12. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are Research papers and human resources (from bachelor to master, and from master to PhD)

13. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Health Policies and thus may affect indirectly local economy

Appendix 1: Research Profile of Eijkman

1-6: Malaria Pathogenesis: Genomics and Immunological Studies in search for Diagnotics and Vaccine

RP-EIJKMAN06

Research Profile

Project Title

Malaria Pathogenesis: Genomics and Immunological Studies in search for Diagnotics and Vaccine

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Project Coordinator

Dra Rintis Noviyanti, PhD

Department and Institutions

Malaria Pathogeneis Unit, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

11.1. Research Area

Genomics, Genetics, Molecular Biology, Bioinformatics, Immunology, Diagnostics, Vaccine, Public Health, Epidemiology

11.2. Research Topics

1. *Plasmodium* genotyping study in Indonesia
2. Finding biomarkers of *P. vivax* relapse
3. Identifying the geographical and clinical spectrum of zoonotic malaria
4. Molecular diagnostic and malaria vaccine development
5. Studying immunological correlates of protection against malaria
6. Understanding pathogenesis of malaria infection in the human host

11.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Background

Malaria continues to be an important public health drawback despite efforts to eliminate this disease has been carried out intensively worldwide. Similar to other countries where malaria is endemic, Indonesia has set out a goal to eliminate this disease by 2030. This requires concerted efforts and effective strategy to reduce the burden of this disease in affected areas.

Five *Plasmodium* sp. causing malaria are found in Indonesia, having their highest prevalence in Eastern part of this country. Most of the cases are due to *Plasmodium. falciparum* and *P. vivax* infections, followed by the two relatively rare species *P. malariae* and *P. ovale.* The recently found zoonotic malaria parasite, *P. knowlesi* adding complication to the malaria elimination efforts.

There are many factors that could hamper malaria elimination plans, including the emergence of drug-resistant parasites, the presence of asymptomatic individuals as reservoirs for parasite transmission, ineffective diagnostic tools for the sub-microscopic level of parasites, the sub-optimal dose of anti-malaria drug treatment leading to the relapse of *Plasmodium vivax*, the absence of effective vaccine, as well as the spread of mosquitoes carrying malaria parasites across many endemic areas.

Although many researches have been conducted to understand why malaria is still present up to now, there are gaps remain unanswered. The diversity of parasites contributed to the various host response against malaria ranging from mild to severe disease manifestation. Immune response to parasite infections varies, yet the protection against malaria has never been sterile. Better understanding on the host response will pave a way to the discovery of better diagnostics and vaccines.

Our group has set out agendas to improve knowledge in understanding the complexity of malaria infection in a population as well as at individual levels. In the past 5 years, we have been able to characterize different parasite populations in malaria endemic areas in Indonesia (Noviyanti *et al.* 2015), finding the tools to study parasite genetic diversity (Trimarsanto *et al*. 2017), identifying antigenic motifs associated with parasite virulence (Tonkin-Hill, Trianty, Noviyanti *et al.* 2018), and finding the best diagnostic methods to detect zoonotic malaria (Coutrier *et al.* 2018). More importantly, working together with the Indonesian National Malaria Control Program (NMCP) we aim to provide the evidence-based research which can later be used to accelerate malaria elimination endeavors. We plan to conduct molecular surveillance research across Indonesia to address essential use cases in parasite genotyping (Noviyanti *et al.* 2020).

With the above background, we are aiming to create a critical mass of scientists who will become leaders in malaria research in Asia-Pacific. Knowledge development needed to generate malaria diagnostic tools and vaccine candidates are among the highest focus of our research activities. Working together with scientist worldwide will also help us accelerating our goal to achieve malaria elimination status across the nation.

Brief Economic and Social Benefits from Research Outcomes

Having enough capacity to manage our own health problems will give us great advantage. It would obviously reduce the costs associated with the disease burden, but also in community, our research results will be applied in efforts toward malaria elimination.

11.4. Research Plan, Themes, Activities, Schedule

In 2021 – we will perform a series of activities in our Unit

1. ***Plasmodium* genotyping study (2021-2023)**
   a. Continue to perform genetic diversity study of malaria parasites form the remaining target of endemic areas in Papua: molecular surveillance, genetic analysis employing next generation sequencing (NGS), data analysis including bioinformatics and epidemiology
   b. Identification of geographical markers of *Plasmodium* sp.: studies will be conducted through cross-sectional surveillance to collect Plasmodium isolates in many endemic malaria regions

2. **Finding biomarkers of *P. vivax* relapse (2021-2023)**
   a. Performing longitudinal serological study on relapsing individuals to find relapse signatures employing multiple-beads array technology (Luminex)
   b. Dissecting the DNA markers for relapsing *P. vivax* employing NGS

3. **Identifying the best methods to detect zoonotic malaria – optimizing molecular detection of *P. knowlesi* (2021-2023)**
   a. Performing cross-sectional study at health centers to collect *P. knowlesi* to find better diagnosis for this zoonotic parasite
   b. Performing community survey to identify the hotspot of *P. knowlesi* transmission

4. **Molecular diagnostic and malaria vaccine development (2022 - onwards)**
   a. Identifying conserved epitopes of *Plasmodium* antigens related to clinical characteristics utilizing bioinformatics and immunological techniques
   b. Production of *Plasmodium* antigens encompassing extracellular epitopes for development of serological tools identifying malaria transmission, detection of recent exposures, as well as distinguishing particular phenotypic correlates

5. **Studying immunological correlates of protection against malaria (2022- onwards)**
   a. Understanding immunological aspects of asymptomatic vs severe malaria employing PBMC typing and serological conversion against various parasite proteins – various immunological techniques will be applied including ELISA, FACS, and multiple-beads array.
6. **Understanding pathogenesis of malaria infection in the human host (2021- onwards**
   a. Molecular analysis of *Plasmodium* infection in the blood and spleen tissue
   b. Molecular analysis of *Plasmodium* infection in the blood and placenta

11.5. Present research status at your Laboratory/ Department / University/ Institution

List of Researches currently performed in our Unit:

1. *Plasmodium* genotyping to inform parasite structure and diversity, to distinguish between relapse vs non-relapsing parasites, to assess drug efficacy – the techniques being used are Next Generation Sequencing and microsatellite genotyping

2. Development of the most effective molecular detection to diagnose *P. knowlesi* infection
3. To assess genetic variation among malaria parasites in response to RDT
4. Serological survey to find the recent infection of *P. vivax* associated with relapse episodes
5. Cross-checking the microscopy slide for better diagnosis of zoonotif malaria

11.6. Future Research Plan

1. Genotyping of all malaria parasites that infect human including the newly identified zoonotic malaria
2. Zoonosis identification of malaria infection: parasite species identification using normal and RT-PCR system and visualization.
3. Epidemiology of malaria transmission: increased capacity of computational ability and/in combination with EI's server capacity.
4. Approaches for malaria vaccine development: malaria culture abilities, protein experimental equipments, etc.
5. Microscopical identification and storages of specimens: slide storage shelves, microscopy with high resolutions, digital cameras, microscopical picture/data storages (external drives)

1-12. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

12.1. Indonesian Researchers

Research Coordinator
Dra Rintis Noviyanti, PhD
Eijkman Institute for Molecular Biology

Team Members

1. Farah Novita Coutrier, SSi. PhD
   Eijkman Institute for Molecular Biology
2. DR. Leily Trianty, SSi. MSi
   Eijkman Institute for Molecular Biology
3. Retno Ayu Setya Utami, SSi. MPhil.
   Eijkman Institute for Molecular Biology
4. Agatha Mia Puspitasari, SSi
   Eijkman Institute for Molecular Biology
5. Nadia Fadila, SSi
   Eijkman Institute for Molecular Biology
6. Pinkan Kariodimedjo, SSi
   Eijkman Institute for Molecular Biology
7. Ristya Amalia, SSi
   Eijkman Institute for Molecular Biology

8. Hidar
   Eijkman Institute for Molecular Biology
9. Fahira Ainun Nisa
   Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. *Collaboration with Industries*

N/A

2.4. *Other Research Collaborators*

Menzies School of Health Research Darwin (Australia)
Walter and Eliza Hall Institute of Medical Research, Melbourne (Australia)
Nanyang Technology University (Singapore)
FIND Diagnostics, Geneva (Switzerland)
Centers for Disease Control and Prevention, Atlanta (USA)

3. Supporting Activities in the Project

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

K) Doctor degree
   Number of candidates: 2 persons
   Training Duration: 4 years
L) Master's degree
   Number of candidates: 4 persons
   Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 5 persons (3 PhDs, 4 Masters)
- Position: Senior Scientist, Research Assistant/Junior Scientist
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 3 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 5 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Unit Price	Quantity	Total
1	UVC/T-AR DNA/RNA UV-cleaner box PCR Workstation	67,320,000	4	269,280,000
2	CO2 Incubator	265,986,500	1	265,986,500
3	Biological Safety Cabinet Class II A2	346,350,000	2	692,700,000
4	Refrigerator and Freezer (Combo)	86,300,000	1	86,300,000
5	Refrigerated Table Top Centrifuge	288,460,000	1	288,460,000
6	Oven, Advanced Protocol, Gravity Convection	77,550,000	1	77,550,000
7	Ultra Low Temperature Freezer, Upright, 682 liter	574,750,000	3	1,724,250,000
8	Temperature Freezer -20	242,000,000	4	968,000,000
9	Lab Refrigerator	178,632,300	5	893,161,500
10	QIAcuity Four Platform	4,037,920,000	1	4,037,920,000
11	Real Time PCR 7500Fast Real-time PCR System	1,505,680,000	1	1,505,680,000
12	Thermal Cycler with Six Separate Peltier Blocks	242,000,000	2	484,000,000

No	Equipment/facilities to be procured for the Research	Unit Price	Quantity	Total
13	High Throughput PCR (Thermal Cycler) with Interchangeable Blocks, 2x96 well	614,818,600	2	1,229,637,200
14	DBS Puncher	463,196,088	1	463,196,088
15	Centrifuge 5430 R incl. Rotor FA-45-30-11	266,104,000	1	266,104,000
16	Centrifuge 5424 R	174,214,500	1	174,214,500
17	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	6,993,000	4	27,972,000
18	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	6,993,000	4	27,972,000
19	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	6,993,000	4	27,972,000
20	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	6,993,000	8	55,944,000
21	Pipette Carousel 2	4,680,500	4	18,722,000
22	Easypet® 3	17,043,000	2	34,086,000
23	GelDoc Go Imaging System	513,180,360	1	513,180,360
24	PCR plate spinner centrifuge	12,000,000	2	24,000,000
25	LSETM Digital Microplate Shaker	29,898,000	2	59,796,000
26	ThermoMixer® C	112,629,000	3	337,887,000

No	Equipment/facilities to be procured for the Research	Unit Price	Quantity	Total
27	SmartBlockTM plates	27,443,000	3	82,329,000
28	SmartBlockTM 1.5 mL	21,394,000	3	64,182,000
29	SmartBlockTM 15 mL	21,394,000	1	21,394,000
30	Eppendorf ThermoTop	18,746,000	2	37,492,000
31	Palm Micro Centrifuges D1008, Mini Centrifuge	5,500,000	3	16,500,000
32	Axygen® PlateMax® Semi Automated Plate Sealer, includes adapters for standard and deep well Microplates, 230V	165,000,000	1	165,000,000
33	Axygen® Sealing Film Roller	2,800,000	2	5,600,000
34	Orbital shaker labquake tube shaker	9,950,000	1	9,950,000
35	Qubit™ Flex Fluorometer	159,500,000	1	159,500,000
36	Finnpipette F1 Multichannel Pipettes, 8-channel, volume range: 1 - 10 uL	18,589,000	1	18,589,000
37	Finnpipette F1 Multichannel Pipettes, 8-channel, volume range: 10 - 100 uL	18,589,000	1	18,589,000
38	Finnpipette F1 Multichannel Pipettes, 8-channel, volume range: 30 - 300 uL	18,589,000	1	18,589,000
39	Finnpipette F1 Multichannel Pipettes, 12-channel, volume range: 1 - 10 uL	20,942,000	1	20,942,000
40	Finnpipette F1 Multichannel Pipettes, 12-channel, volume range: 10 - 100 uL	20,942,000	1	20,942,000
41	Finnpipette F1 Multichannel Pipettes, 12-channel, volume range: 30 - 300 uL	20,942,000	1	20,942,000

No	Equipment/facilities to be procured for the Research	Unit Price	Quantity	Total
42	Finnpipette F-stand	2,236,000	2	4,472,000
43	E1-ClipTip Equalizer 384 8-ch 1-30µl	75,883,000	2	151,766,000
44	E1-ClipTip Equalizer 384 8-ch 0.5-12.5µl	75,883,000	2	151,766,000
45	PCR-Cooler (Blue)	2,368,000	5	11,840,000
46	IsoPack and IsoRack for 0.5ml tubes	5,476,000	2	10,952,000
47	IsoPack and IsoRack for 1.5ml/2ml tubes	5,476,000	2	10,952,000
48	Axygen™ PCR Tube Storage Racks,	1,800,000	5	9,000,000
49	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply	43,353,200	1	43,353,200
50	Mini-Sub Cell GT Mini Handcasting Kit	7,364,500	1	7,364,500
51	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm	3,042,600	2	6,085,200
52	Mini Sub-Cell GT Gel Caster	5,359,200	2	10,718,400
53	15-Well Comb	3,111,900	3	9,335,700
54	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm tray, with PowerPac Basic Power Supply	49,921,300	1	49,921,300
55	Wide Mini-Sub Cell GT Mini Handcasting Kit	8,574,500	1	8,574,500
56	Wide Mini-Sub Cell GT UV-Transparent Gel Tray, 15 x 7 cm	4,356,000	2	8,712,000
57	Multichannel Pipet–Compatible Comb, 26-well	3,111,900	8	24,895,200
58	Multichannel Pipet–Compatible Comb, 14-well	3,111,900	4	12,447,600
59	Sub-Cell GT Gel Caster	5,981,800	2	11,963,600

No	Equipment/facilities to be procured for the Research	Unit Price	Quantity	Total
60	Sub-Cell GT UV-Transparent Gel Tray, 15 x 15 cm	5,531,900	2	11,063,800
61	Sub-Cell GT Horizontal Electrophoresis System, 15 x 15 cm tray, with casting gates	34,883,200	1	34,883,200
62	20-Well Comb	3,111,900	5	15,559,500
63	15-well Comb	3,111,900	5	15,559,500
64	VX-200 Vortex Mixer	8,250,000	3	24,750,000
65	Small Capacity Thermostatic Shaking Incubator	86,350,000	1	86,350,000
66	Shaking Waterbath	76,800,000	1	76,800,000
67	Trinocular Microscope with High Luminescent LED Illuminator	151,465,000	1	151,465,000
68	Color Photomicrography Digital Camera System, 5,9M	148,500,000	1	148,500,000
69	pH meter	29,150,000	1	29,150,000
70	Precision scale	31,147,930	1	31147930

Note: Catalogues and product details are attached in a separate document

14. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are:

1. At least 2 scientific publications each year in a peer-reviewed Journal

2. Training modules on molecular detection of P*lasmodium*, genotyping, and serological testing of antibody response to *Plasmodium* infection.
3. More experienced staff in molecular and immunological research will be produced during the course of the activities.

15. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

1. Application of methodologies in the lab to help accelerating detection of Plasmodium in malaria endemic areas
2. Application of detecting mutant Plasmodium in the field such as those having deletions in the gene that affect the parasite survival
3. Capability to self-generate tools to perform mass-screening of both antigen and antibody response to inform malaria elimination status

Appendix 1: Research Profile of Eijkman

1-7: Molecular Epidemiology and Antimicrobial resistance of *Streptococcus pneumoniae* in Indonesian population

RP-EIJKMAN07

Research Profile

Project Title

Molecular Epidemiology and Antimicrobial resistance of *Streptococcus pneumoniae* in Indonesian population

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Project Coordinator

Dodi Safari, PhD

Department and Institution

Molecular Bacteriology Laboratory, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

12.2. Research Area

Molecular bacteriology and antimicrobial resistance

12.3. Research Topics

1. Molecular epidemiology of *Streptococcus pneumoniae* serotypes in Indonesian population;
2. Antibiotic resistant of *S pneumoniae* isolated from the community or hospitals;
3. Genomic Analysis of Multidrug Resistant *S. pneumoniae*
4. Exploration of new antimicrobial drugs from traditional plant medicine

12.4. Objectives (include Background of research, Brief economic and social benefits from Research Outcomes)

Streptococcus pneumoniae is one of majors worldwide causing of morbidity and mortality in human especially in low-income countries. Currently, pneumococcal vaccination is not included in routine immunization within the National Immunization Program in Indonesia. The epidemiology data of nasopharyngeal carriage of S. pneumoniae in Indonesia is important to measure the impact of PCV vaccinaton. Therefore, in this study we investigate the nasopharyngeal carriage of S. pneumoniae in healthy children in different regions in Indonesia.

This study aims to describe the serotype distribution of *S. pneumoniae* colonizing in nasopharyngeal of healthy Indonesian children less than 5 years of age and to describe the antimicrobial susceptibility pattern of *S. pneumoniae* colonizing in nasopharyngeal of healthy Indonesian children less than 5 years of age. The study will be supporting epidemiology data of *S. pneumoniae* in Indonesia by providing serotype and antimicrobial profile of S. pneumoniae in Indonesia. Nasopharyngeal swab specimens will be collected among healthy children less than 5 years of age.

The serotype distribution obtained from carriage study *of S. pneumoniae* in Banjarmasin will contribute to epidemiological surveillance data of *S. pneumoniae* that can be used for future pneumococcal vaccination programs in Indonesia. By implementing pneumococcal vaccination, we expect the incidence of pneumococcal diseases will be reduced in Indonesia. Moreover, the antimicrobial susceptibility profile will gain an understanding on resistance pattern of *S. pneumoniae,* one of the WHO AMR priority pathogen. The antimicrobial susceptibility profile also will help clinician to determine appropriate antibiotics to treat patient with pneumococcal disease.

12.5. Research Plan, Themes, Activities, Schedule

This study is cross-sectional study. We use sample size calculation described by Lemeshow et al. (1990) to estimate the population proportion with the one sample problem. Based on previous studies, it is estimated that the proportion *S. pneumoniae* carried by childen <5 years or age is somewhere between 30% - 50% (P = 0.3 – 0.5). With 95%, Confidence, we can calculate the sample size is 386 children that need to be collected.

Survey participants will be identified through monthly community health extension clinics (*posyandu*) held at the village or community level. The posyandu will provide data regarding eligible children aged 0 < 60 months old attending the health clinic (posyandu). The parents or guardians will be informed about the content of the study. After informed parental permission is obtained, the parent or guardian will be asked to complete a questionare. The questionare and inform consent will be sent to the Eijkman Institute for Molecular Biology.

The specimen collection will be conducted by collaborating with puskesmas or district public health in Banjarmasin. This collaboration includes training for administration of parental permission form, appropriate interviewing techniques, adherence to procedures and protocol, appropriate documentation, and the collection of nasopharyngeal swab. After informed consent and questionare forms were obtained from the parents, the collection of nasopharnyngeal swab can be conducted. The child will be held securely on the parent’s lap. After measuring the distance from the nares to just anterior to the earlobe, the trained medical assistant or nurse will insert a fine flexible wire flocked swab straight back (not upwards), along the floor of the nasal passage until reaching the posterior pharynx. The swab will be gently rotated twice and left in place for 5 seconds before slowly and rotatory removal movement. Swabs will be immediately placed into cryotubes containing 1.0 ml skim milk, tryptone, glucose, glycerol (STGG) storage medium and placed on an icepack (4°C for 6 hours maximum). Upon reaching the selected laboratory, inoculated STGG will be vortexed for 10-20 sec to disperse organisms from the swab before freezing at -70°C to secure survival of the pneumococcus bacteria. Specimens must be shipped using dry-shipper (liquid nitrogen tank) or in dry ice until it reach laboratory in Jakarta.)

Schedule in one year:

Activity	**Timeline (month)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Literatur and methodology review	▨											

Proposal development and ethical application	▨	▨										
Specimen and data collection			▨	▨	▨	▨	▨	▨	▨			
Laboratory testing			▨	▨	▨	▨	▨	▨	▨	▨		
Data analysis									▨	▨		
Reporting and drafting the manuscript											▨	▨

12.6. Present research status at your Laboratory/ Department / University/ Institution

Our current research was still focus on the molecular epidemiology of Streptococcus pneumoniae in Indonesian population and exploration of new antimicrobial drugs from plant medicine in Indonesia

12.7. Future Research Plan

1. Whole genome sequencing of multidrug resistant of *Streptococcus pneumoniae* isolates from Indonesia
2. Characterization of new antimicrobial drugs from plant medicine in Indonesia

1-13. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

13.1. Indonesian Researchers

Research Coordinator

Dodi Safari, PhD
Eijkman Institute for Molecular Biology, Jakarta, Indonesia

Team Members

1. Wisnu Tafroji, BSc
   Eijkman Institute for Molecular Biology,
2. Miftahuddin Majid Khoeri, MSc
   Eijkman Institute for Molecular Biology

1-14. Wa Ode Dwi Daningrat, MSc
Eijkman Institute for Molecular Biology
1-15. Korrie Salsabila, BSc
Eijkman Institute for Molecular Biology
1-16. Wisiva Tofriska, BSc
Eijkman Institute for Molecular Biology
1-17. Yayah Winarti
Eijkman Institute for Molecular Biology
1-18. Hanifah
Eijkman Institute for Molecular Biology
1-19. Sarah Fitria
Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

Collaborating industries or expected collaboration industries

N/A

2.4. Other Research Collaborators

Universitas Jenderal Soedirman, Purwokerto (Indonesia)
Fakultas Kedokteran, Universitas Indonesia/RSCM (Indonesia)
Fakultas Kedokteran, Universitas Andalas (Indonesia)
Fakultas Kedokteran, Universitas Sam Ratulangi (Indonesia)
Centers for Disease Control and Prevention, Atlanta (USA)
University of Greifswald (Germany)

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

M) Doctor degree
   Number of candidates: 3 persons
   Training Duration: 4 years
N) Master's degree
   Number of candidates: 3 persons
   Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 3 persons
- Position: Post-doc research and technical training
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	CO2 Incubator (Thermo Fisher Heracell 160i)	2	385,600,000	771,200,000
2	Biological Safety Cabinet Class II A2 Herasafe 2030i (Thermo Scientific)	4	391,500,000	391,500,000
3	Refrigerated Table Top Centrifuge (Thermo Scientific)	1	28,846,000	288,460,000
4	Research Inverted Microscope, Phase Contrast, Nikon	1	287,000,000	28,846,000
5	Camera For Inverted Color Photomicrography Digital Camera System, 5.9m (Nikon)	1	105,400,000	105,400,000
6	Basic Research Sofware (Nikon)	1	74,438,000	74,438,000
7	Personal computer (to be combined with DS-Fi3 digital camera)	1	44,831,769	44,831,769
8	Magnifier lamp	1	2,000,000	2,000,000
9	QUANTOM Tx™ Microbial Cell Counter (Logos biosystem)	1	450,000,000	450,000,000
10	Densitometer (DEN-1B, Biosan)	2	15,000,000	30,000,000
11	Vortex (General Lab)	1	20,350,000	20,350,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
12	Research® plus, Adj., Single Channel Brand: Eppendorf - Germany Volume: 100 - 1000 µL (Eppendorf)	10	6,993,000	60,993,000
13	Research® plus, Adj., Single Channel Brand: Eppendorf - Germany Volume: 20 - 200 µL (Eppendorf)	10	6,993,000	60,993,000
14	Research® plus, Adj., Single Channel Brand: Eppendorf - Germany Volume : 10 - 100 µL (Eppendorf)	10	6,993,000	60,993,000
15	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 2 - 20 µL (Eppendorf)	10	6,993,000	60,993,000
16	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL (Eppendorf)	10	6,993,000	60,993,000
17	Autoclave (Hirayama)	2	100,000,000	200,000,000
18	Rocker shaker	1	20,000,000	20,000,000
19	Orbital shaker inkubator (Biosan)	1	75,000,000	75,000,000
20	Spindown (Eppendorf)	3	15,000,000	45,000,000
21	Repetitive micropipette (Eppendorf)	2	10,000,000	20,000,000
22	Thermoshaker (Biosan)	1	35,000,000	35,000,000
23	Light microscope (Nikon)	2	105,504,000	211,008,000
24	Automatic Gram Staining	1	25,000,000	25,000,000
25	Fume hood	1	120,000,000	120,000,000
26	Autoinoculator sensititer (Thermo)	1	300,000,000	300,000,000
27	Multichannel micropippette 200 ul, 12 (Eppendorf)	2	20,000,000	40,000,000
28	Multichannel micropippette 200 ul, 8 (Eppendorf)	2	20,000,000	40,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
29	Thermo Vizion Automated MIC Reader (Thermo Scientific)	1	250,000,000	250,000,000
30	High speed vortex (Daiger)	1	65,000,000	65,000,000
31	Disk dispenser (Oxoid)	1	15,000,000	15,000,000
32	BactAlert (Biomerieux)	1	520,000,000	520,000,000
33	SmartBlockTM 1.5 mL (Eppendorf)	1	21,394,000	21,394,000
34	Centrifuge 5430 R incl. Rotor FA-45-30-11 (Eppendorf)	1	266,104,000	266,104,000
35	Magnetic stand (Invitrogen AM10027)	2	20,000,000	40,000,000
36	Qubit (Thermo Fisher)	2	75,000,000	150,000,000
37	Refrigerator and Freezer - Combo (Biobase)	5	86,300,000	431,500,000
38	SimpliAmp PCR (Applied Biosystem)	3	120,000,000	360,000,000
39	Real Time PCR 7500Fast Real-time PCR System (Applied Biosystem)	1	1,505,680,000	1,505,680,000
40	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster (BioRad)	2	36,000,000	72,000,000
41	Mitsubishi Thermal Printer (Biorad)	1	60,000,000	60,000,000
42	Microwave	1	10,000,000	10,000,000
43	Rotary evaporator	1	15,000,000	15,000,000
44	Automatic media preparation with autodispenser	1	1,100,000,000	1,100,000,000
45	Magnetic stirer	1	15,000,000	15,000,000
46	4200 TapeStation system (Agilent)	1	1,000,000,000	1,000,000,000
47	Ultra Low Temperature Freezer, Upright, 682 liter (Thermo Scientific)	5	574,750,000	2,873,750,000
48	ThermoMixer® C	1	109,250,000	109,250,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Heraeus™ Pico™ 17 Microcentrifuge (Thermo Scientific)			
49	MALDI-TOF (Bruker Germany)	1	4,196,495,530	4,196,495,530

Note: Catalogues and product details are attached in a separate document

16. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Paper (publication), Human Resources

17. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

The serotype distribution obtained from carriage study *of S. pneumoniae* in Banjarmasin will contribute to epidemiological surveillance data of *S. pneumoniae* that can be used for future pneumococcal vaccination programs in Indonesia. By implementing pneumococcal vaccination, we expect the incidence of pneumococcal diseases will be reduced in Indonesia. Moreover, the antimicrobial susceptibility profile will gain an understanding on resistance pattern of *S. pneumoniae,* one of the WHO AMR priority pathogen. The antimicrobial susceptibility profile also will help clinician to determine appropriate antibiotics to treat patient with pneumococcal disease.

Appendix 1: Research Profile of Eijkman
1-8: Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders

RP-EIJKMAN08

Research Profile

Project Title

Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders

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Project Coordinator

Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.

Department and Institution

Cytogenetics Laboratory, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

19.1. Research Area

Cytogenetics: Disorder of Sex Development (DSD), Down syndrome, Multiple Congenital Anomaly Cases, and other rare or difficult cases of chromosomal abnormalities.

19.2. Research Topics

1. Copy Number Variations in Multiple Congenital Anomaly Cases in Indonesia: A Chromosomal Microarray Study.
2. Chromosomal microarray: Detection of genetic abnormalities in Down syndrome cases with normal karyotyping
3. Mutation detection in Indonesian 46,XY DSD patients
4. The effect of divalent cation and scaffold protein on human chromosomal structure

19.3. Objectives (include background of research, brief economic, and social benefits from research outcomes)

The diagnostic techniques that are currently available in our country has been inadequate to reveal the etiology of 46,XY DSD, multiple congenital anomaly dan Down syndrome cases. Most of the cases showed normal results following karyotyping, which indicates more advanced and accurate diagnostic techniques are required for such cases.

Our data review showed that only 22% of 46,XY DSD cases referred to our lab, could be detected by conventional cytogenetics techniques and the rest are still etiologically unknown. In our country, Next Generations Sequencing (NGS) and Whole Exome Sequencing (WES) techniques are not commonly used for diagnosis of DSD. These techniques must be developed to increase diagnostic yield of 46,XY DSD by detection of known and/or novel genes mutations responsible for the abnormal development of reproductive organs .

Based on our 3-year data review (2017-2019), diagnosis using conventional cytogenetics in cases of multiple congenital anomaly (MCA) and Down syndrome (DS) revealed normal karyotyping in 60% (26/43) and 9% (43/477), respectively. This indicates that higher resolution technique is required to get better diagnosis. Chromosomal microarray (CMA) has been used in some countries to detect copy number variations (CNVs) in DS and MCA cases that cannot be detected by conventional techniques. Using this technique, the detected genes involve in the abnormal CNV’s could explain the genotype-phenotype correlations.

Economic and Social Benefits: The genetic data of Indonesian patients with DSD, MCA and DS has been lacking. By doing these researches, besides the obtained genetic data, genotype-phenotype correlations can be verified at molecular level. The developed molecular cytogenetics techniques will produce more accurate, effective and efficient diagnosis hence genetic counseling and more targeted patients' management can be given as early as possible based on etiology.

19.4. Research Plan, Themes, Activities, Schedule

Research plan and activities

1. Preparation: Literature study and research planning (type of sample, sample collection and transportation, number of samples needed, methods and techniques, and the analytical method that will be used)
2. Sample Collection: fresh blood, amnion and chorionic villus samples from patients referred to our clinic for chromosome (karyotyping) analysis.
3. Sample Processing: Based on karyotyping analysis. Those with normal karyotyping will be further analyzed using FISH (Fluorescence In Situ Hybridization) technique (DSD and DS cases), and/or PCR technique (DSD). NGS and/or WES will be applied on certain DSD samples. Microarray will be applied on MCA and non-mosaic DS cases.
4. Data analysis: Descriptive data analysis will be applied. The data will include summaries about the sample, clinical data and diagnosis of the patients. Conclusions will be made after all data, including the results, have been collected and completed.
5. Reports Submission and Manuscript Preparation: Reports will be written after completion of data analysis and the manuscript will be published in International scientific journals

Research Schedules in One Year:

ACTIVITIES	MONTH											
	1	2	3	4	5	6	7	8	9	10	11	12
Preparation (Literature study and research planning)	■	■	■									
Sample collection			■	■	■	■	■	■	■	■		
Sample processing				■	■	■	■	■	■	■	■	
Data analysis					■	■	■	■	■	■	■	

Reports submission & manuscript preparation										▨	▨	▨

19.5. *Present research status at your Laboratory/ Department / University/ Institution*

Ethical clearance has just been submitted to the Eijkman Institute Research Ethics Commission. Validation of chromosomal microarray technique has been going on since the beginning of 2020 using evaluated blood samples (abnormal controls) that represent various abnormalities (duplications and deletions) of both autosomal and sex chromosome abnormalities.

19.6. *Future Research Plan*

1. Study on cases of unspecific mental retardation and other rare chromosomal abnormalities at molecular level.
2. Study on the effect of divalent cation and scaffold protein on human chromosomal structure

1-20. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

20.1. *Indonesian Researchers*

Research Coordinator

Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.
Eijkman Institute for Molecular Biology

Team Members

1. Dr. dr. Andi Nanis Sacharina Marzuki, SpA (K)
   Eijkman Institute for Molecular Biology
2. Chrysantine Paramayuda, BSc, MSc
   Eijkman Institute for Molecular Biology
3. Dipl.-Ing. Firman Prathama Idris, S.T., MMolBiol
   Eijkman Institute for Molecular Biology
4. Faiza Az Zahra, S.Si., MSc
   Eijkman Institute for Molecular Biology
5. Debby Dwi Ambarwati, S.Si.
   Eijkman Institute for Molecular Biology
6. Mualifah, S.Si.
   Eijkman Institute for Molecular Biology
7. Astari Dwiranti, M.Eng., Ph.D
   Biology Department, Faculty of Mathematics and Natural Sciences, Universitas Indonesia

20.2. *Japanese Researchers*

N/A

2.3. *Collaboration with Industries*

N/A

1-21. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: 1 person
  Training Duration: 4 years
- Master's degree
  Number of candidates: 1 person
  Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 4 people
- Position: Senior researchers and junior researchers
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
1	Biological Safety Cabinet Class II A2 (Thermo Scientific-Heraeus)	2	Rp783,000,000	Rp391,500,000
2	Lab Refrigerator (Thermo Scientific)	1	Rp178,632,300	Rp178,632,300
3	Temperature Freezer -40 (Thermo Scientific)	1	Rp242,000,000	Rp242,000,000
4	Ultra Low Temperature Freezer, Upright, 682 liter (Thermo Scientific)	1	Rp574,750,000	Rp574750000
5	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.1 - 2.5 µL	4	Rp6,993,000	Rp27,972,000
6	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.5 - 10 µL	4	Rp6,993,000	Rp27,972,000
7	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	4	Rp6,993,000	Rp27,972,000
8	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	4	Rp6,993,000	Rp27,972,000
9	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	4	Rp6,993,000	Rp27,972,000
10	Pipette Carousel 2 (Eppendorf)	4	Rp4,680,500	Rp18,722,000
11	Stereo zoom microscope, with LED Stand for Diascopic and episcopic observation (dissecting microscope) (Nikon)	1	Rp62,400,000	Rp62,400.000
12	Vortex mixer (General Lab)	4	Rp20,350,000	Rp81,400,000
13	Research inverted microscope, phase contrast (Nikon)	1	Rp287,000,000	Rp287,000,000
14	Incubator (Non CO2) (Thermo Scientific Heratherm)	1	Rp66,000,000	Rp66,000,000
15	CO2 Incubator (Thermo Scientific Heraeus)	2	Rp385,600,000	Rp771,200,000
16	Centrifuge 5424 R (Eppendorf)	1	Rp174,214,500	Rp174,214,500
17	Hot Plate Magnetic Stirrer (Thermo Scientific)	1	Rp17,611,000	Rp17,611,000
18	Reciprocating Thermostatic Shaking Water Bath (Biobase)	1	Rp120,000,000	Rp120,000,000
19	Thermo Scientific mySPIN Mini Centrifuge Series (Thermo Scientific)	3	Rp14,000,000	Rp42,000,000
20	Binocular microscope for chromosome analysis (Nikon, Eclipse Ci-L (Ci-L BF-T-P))	3	Rp157,000,000	Rp471,000,000

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
21	Research fluorescence microscope system+ Karyotyping + FISH imaging system (Nikon Ex. Japan)	1	Rp1,080,600,000	Rp1,080,600,000
22	Metafer Scanning and Imaging Platform (automated slide scanner) including Motorized Microscope and Ikaros Software (Metasystems)	1	Rp4,115,475,000	Rp4,115,475,000
23	Biobase Denaturation and Hybridization System (Biobase)	1	Rp240,000,000	Rp240,000,000
24	Biobase Slide Cabinet BKC-S400 (Biobase)	4	Rp53,000,000	Rp212,000,000
25	Easypet® 3 pipette controller	2	Rp17,043,000	Rp34,086,000
26	ThermoMixer® C (Eppendorf-Germany)	1	Rp109,250,000	Rp109,250,000
27	SmartBlockTM plates (Eppendorf-Germany)	3	Rp26,619,000	Rp79,857,000
28	SmartBlockTM 1.5 mL (Eppendorf-Germany)	3	Rp21,394,000	Rp64,182,000
29	Thermal Cycler with Six Separate Peltier Blocks (Applied Biosytems)	1	Rp242,000,000	Rp242,000,000
30	Compact pH Ion Meter (Mettler Toledo)	1	Rp48,000,000	Rp48,000,000
31	Refrigerator and Freezer (Combo) (Biobase)	3	Rp86,300,000	Rp258,900,000
32	Memmert Oven UN110 Lab 108L/ Memmert UN110 Universal Oven Drying	2	Rp40,800,000	Rp81,600,000
33	Fisher Scientific 77 Slide Warmer	1	Rp8,011,250	Rp8,011,250
34	Fisher Scientific Precision GPD 10 Water Bath	1	Rp13,137,000	Rp13,137,000
35	Thermo Sorvall ST 8 Benchtop Centrifuge Thermo Scientific	1	Rp43,885,386	Rp43,885,386
36	Set Owl™ EasyCast™ B2 Mini Gel Electrophoresis Systems (Thermo Fisher)	1	Rp8,399,502	Rp8,399,502
37	Set Owl™ A1 Large Gel System, complete system (Thermo Fisher)	1	Rp11,484,000	Rp11,484,000
38	Liquid/supernatan Aspiration Pump (Vacuubrand)	2	Rp27,147,828	Rp54,295,656

Note: Catalogues and product details are attached in a separate document

18. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers and human resources (staff development)

19. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Health policies that refers to better and more targeted patient's management, specifically for those with multiple congenital anomalies, Down syndrome and mental retardation. This can lead to early detection thus early treatment can be given. More children with mental retardation and Down syndrome will have better quality of life. Better generations may lead to better country's economy.

Appendix 1: Research Profile of Eijkman
1-9: Red Blood Cells (RBCs) Disorders

RP-EIJKMAN09

Research Profile

Project Title
Red Blood Cells (RBCs) Disorders

Project Coordinator
Dr. Ita Margaretha Nainggolan

Department and Institution
Red Blood Cells (RBCs) Disorders Laboratory
Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

21.1. Research Area

Carrier Screening, Hematology, Mutation Detection, Proteomic, Bioinformatics

21.2. Research Topics

- Spectrum mutation of hemoglobinopathes and RBCs disorders in Indonesia
- Genotype Phenotype of Hemoglobinopaties
- Patomechanism of Hemoglobinopathy's mutation

21.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Background

The thalassemias are a group of inherited hematologic disorders caused by defects in the synthesis of one or more of the hemoglobin chains. Two common type of thalassemia according to the abnormal production of sub-unit hemoglobin are alpha (α) and beta (β) thalassemia. The α thalassemia major with hemoglobin Bart's usually results in fatal hydrops fetalis. The β thalassemia major causes hemolytic anemia, poor growth, and skeletal abnormalities during infancy. Affected children will require regular lifelong blood transfusion. (REF). Thalassemia ranks the fourth most consuming disease in the BPJS, national health insurance budget. (REF) Therefore this disease is a huge financial burden and causes poor quality human resources. However, the medication to handle major thalassemia not yet widely available. The effort to control the number of patient up until now is to prevent the birth of new patient, which require a complex approach, start from educating the community, premarital check, and prenatal diagnosis. The effectiveness of thalassemia disease control is very dependent on recorded data of molecular defects on a certain population and its relation to variation of clinical expression from the disease. Indonesia has a very high genetic diversity, so that determining the type of mutation underlying thalassemia and hemoglobinopathy in various Indonesian populations extremely important. The knowledge of molecular defects that underlying on thalassemia has been used to develop a quick and reliable diagnosis procedure with PCR based technique (Pramoonjago et al., 1999). The frequency of β thalassemia carriers in Indonesia varies around 5-10% (Sofro, 1995) while the α thalassemia trait carriers range from 2.6-11% (Setianingsih et al, 2003). The mutation spectrum underlying thalassemia and it's pathomechanism can be used to develop programs for the prevention and management of thalassemia especially in Indonesia as well as the development of fast and reliable diagnostic procedures based on PCR-based techniques (Pramoonjago et.al, 1999). Severe types of mutations which are common in this population such as Hb Adana (Nainggolan et al., 2010) need to be further studied to determine the pathomechanism so that it can be used as a basis for treatment.

Economic and Social Benefit of this research:

The challenges of red blood cell disorders diseases in the future are very important to especially in thalassemia prevention. The future efforts for this problem are carrier screening, mutation detection and prenatal diagnosis that should faster, more advance, and more reliable. Therefore, laboratory with GLP certification will be Practice (GMP) standards will be in demand. The Red Blood Cell Disorders needs to be developed starting from the quantity and quality of the human resources.

Red Blood Cell Disorders currently consisted of five human resources, 2 Doctoral degree as principal investigator and 3 undergraduate equivalent research assistants. Thus, for a capable unit development, the additional two research assistants undergraduate equivalent and one research assistant in master's degree were needed in minimum bare. The equipment those need to be added for functional Red Blood Cell Disorders with GLP certification are the mostly related to mutation detection tools and also proteomic tools for basic research. The Red Blood Cell Disorders Laboratory Unit currently has an area of 6.3 x 14 m. Therefore, to become a GLP certified reference laboratory that can serve to detect mutations and perform basic research, it requires an increase in the area to 15 x 20 m.

21.4. Research Plan, Themes, Activities, Schedule

Research Plan and theme:

In the framework of future development of research and services, the Red Blood Cell Disorders Unit schemed to do the pre-existing activities to complete data on the spectrum of alpha and beta thalassemia mutations for Indonesia and obtain knowledge about the phenotype and genotype relationships of thalassemia patients as well as knowledge of the patho-mechanism of thalassemia mutations related to clinical manifestations. Additional implementation: advance diagnosis and further pathomechanism of the severe mutations with GLP certification.

Activities:

The Red Blood Cell Disorders Unit pre-existing activities are:

12. Field sampling in population or thalassemia and other red blood cell carrier screening
13. Hospital based sampling for thalassemia patients
14. Molecular analyses
15. Genotype- phenotype research
16. Bioinformatics analyses for mutations
17. Pathomechanism using proteomic tools
18. Research in collaboration with several academic institutions

Schedule in one year:

The stages of implementing Stem Cell Unit development can be structured as follows:

1. Planning for laboratory layout (Jan – June 2021)

2. Compilation of laboratory equipment list (Jan – June 2021)

3. Planning the recruitment of research assistant (Sep – Dec 2021)

4. Strategic plan framing in five years for Red Blood Cell Disorders Unit (July – Oct 2021)

5. Construction and development of the new Eijkman Building (January-December 2022)

7. Order of requested research tools and materials (June -December 2022)

8. Recruitment of human resources (June-December 2022)

ACTIVITIES/GOALS	**PHASE/MONTH IN A YEAR**											
	1	2	3	4	5	6	7	8	9	10	11	12
Planning for laboratory layout	▨	▨	▨	▨	▨	▨						
Compilation of laboratory equipment list	▨	▨	▨	▨	▨	▨						
Planning the recruitment of research assistant									▨	▨	▨	▨
Strategic plan framing in five years for Stem Cell Unit							▨	▨	▨	▨		

21.5. Present research status at your Laboratory/ Department / University/ Institution

Existing research status covers carrier screening, mutation detection, genotype phenotype research and pathomechanism research.

21.6. Future Research Plan

Advance diagnosis and mutation detection, further research for pathomechanism research to be able provide excellent service and reference laboratory for thalassemia with GLP standard.

1-22. RESEARCH PERSONNEL

22.1. Indonesian Researchers

Research Coordinator
Dr. Ita Margaretha Nainggolan
Eijkman Institute for Molecular Biology

Team Members
1. Sintia Puspitasari, S.Si
   Eijkman Institute for Molecular Biology

2. Evira Putricahya, S.Si
Eijkman Institute for Molecular Biology
1-23. Marchella, S.Si
Eijkman Institute for Molecular Biology
1-24. Iswari Setianingsih, MD, PhD
Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

N/A

2.4. Other Research Collaborators

Fakultas Kedokteran Ilmu Kesehatan (FKIK), Universitas Jambi (Indonesia)
Fakultas Sains dan Teknologi (FST), Universitas Jambi (Indonesia)
Fakultas Biologi, Universitas Gadjah Mada (Indonesia)
Fakultas Kedokteran, Universitas Padjadjaran (Indonesia)

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

B) Master degree
Number of candidates: 1 person
Training Duration: 2 years

This candidate will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 4 persons
- Position: PI and research assistants
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 3 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Fridge 40C TSX Series (Thermo Scientific)	2	196,495,530	392,991,106
2	Freezer -400C REFCO FDE (Thermo Scientific)	2	266,200,000	532,400,000
3	Fridge/Freezer BDF--40V288A (Biobase)	1	94,930,000	94,930,000
4	Biological Safety Cabinet Class II A2 Herasafe 2030i (Thermo Scientific)	1	380,985,000.00	380,985,000
5	Waterbath Precision CIR 19 (Thermo Scientific)	1	69,492,940	69,492,940
6	ThermoMixer® C (Eppendorf)	1	120,175,000	120,175,000
7	Vortex Mixer Maxi Mix (Thermo Scientific)	2	7,260,000	14,520,000
8	mySPIN Mini Centrifuge Series (Thermo Scientific)	1	15,400,000	15,400,000
9	Research plus pipette set (Eppendorf)	6	51,302,350	307,814,100
10	Multichannel pipette set F1 Finnpipettes (Thermo Scientific)	1	74,681,640	74,681,640
11	PCR cabinet PCR-800 (Biobase)	2	71,637,500	143,275,000
12	Spectrophotometer UV-1900i set include UPS, CPS Controller, and Computer (Shimadzu)	1	550,000,000	550,000,000
13	Laser Printer Neverstop Laser 1000w (HP)	2	4,024,900	8,049,800
14	Scanner/Printer/Photocopy LaserJet Pro MFP M227fdw (HP)	1	5,694,700.00	5,694,700
15	Microcentrifuge Sorvall 21R	1	160,927,666.90	160,927,666.90

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	(Thermo Scientific)			
16	Refrigerated Centrifuge with Rotor S-4xUniversal (Eppendorf)	1	191,635,950	191,635,950
17	Refrigerated Centrifuge with rotor FA-45-24-11 for 24 x 1.5/2.0 mL (Thermo Scientific)	1	191,635,950	191,635,950
18	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	33,165,000	33,165,000
19	Specimix for 8 tube (Thermo Scientific)	1	10,759,430.00	10,759,430
20	pH meter Lab 875 (S1 Analytics)	1	29,150,000	29,150,000
21	Analytical scale max 200g EX224 (Ohaus)	1	124,867,490	124,867,490
22	Precision scale max 2.2kg ME 2002 (Mettler Toledo)	1	31,147,930	31,147,930
23	Hotplate Stirrer Cimarec+ (Thermo Scientific)	2	11,666,160	23,332,320
24	Mini-PROTEAN® Tetra Vertical Electrophoresis Cell, 4-gel (Bio-Rad)	1	13,943,600	13,943,600
25	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster (Biorad)	1	19,800,000	19,800,000
26	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply (Biorad)	1	14,465,000	14,465,000
27	Geldoc Go System (Biorad)	1	110,000,000	110,000,000
28	Thermocycler Veriti (Applied Biosystem)	1	266,200,000	266,200,000
29	Thermocycler ProFlex (Applied Biosystem)	1	385,000,000	385,000,000
30	MINIPULS 3 Pump (Drive Unit) with Two Channel, High Flow Head (R2/HF) (Gilson)	1	68,200,000	68,200,000
31	Akta pure protein purification system (Cytiva Life Sciences)	1	330,000,000	330,000,000
32	Trans-Blot® SD Semi-Dry Electrophoretic Transfer Cell (Bio-Rad)	1	220,000,000	220,000,000
33	Power supply for electrophoresis (Bio-Rad)	2	9,900,000	19,800,000
34	Light microscope + camera, Upright Microscope Eclipse Ci-S/Ci-L	1	116,054,400	116,054,400

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	(Nikon)			
35	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	41,798,900	41,798,900
36	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	25,300,000	25,300,000
37	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	25,300,000	50,600,000
38	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	5	693,220,000	3,466,100,000
39	Cuvette semi quarts 2 ml (Starna)	8	1,831,500	14,652,000
43	Cuvette quarts 1 ml (Helma)	8	4,664,000	373,120,000
44	Cuvette quarts 2 ml (Shimadzu)	4	15,158,000	60,632,000
45	Acid and Corrosive Safety cabinet (Justrite)	1	18,721,010	18,721,010
46	NanoDrop™ 2000 Microvolume Spectrophotometer with Laptop (Thermo Scientific)	1	251,143,750	251,143,750
47	BD Accuri C6 Plus (BD)	1	220,000,000	220,000,000
48	UPS 1000A (Prolink)	1	5,299,800	5,299,800
49	Freezer -80 Forma 89000 (Thermo Scientific)	1	632,225,000	632,225,000
50	Temp controlled shaker Innova 2100 (New Brunswick Scientific)	1	165,030,250	165,030,250
51	Applied Biosystems® 7500 fast Real-Time PCR System	1	795,000,000	695,000,000
52	Automation hybrimax	1	1,100,000,000	1,100,000,000

Note: Catalogues and product details are attached in a separate document

20. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

- Producing research output in publications and/ or patents linked to thalassemia prevalence and spectrum of mutation disease and pathomechanism
- Generating publications and/or patents in diagnosis methods.
- Provide thalassemia service and reference laboratory for students/researchers

21. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

- Spectrum of mutation according to population and patients.
- Genotype – phenotype research that the result give contribution to thalassemia prevention and patient management.

- Thalassemia reference laboratory for academic/research institution and public.

Appendix 1: Research Profile of Eijkman
1-10: Red Blood Cells Membrane and Enzyme Disorders

RP-EIJKMAN10

Research Profile

Project Title
Red Blood Cells Membrane and Enzyme Disorders

Project Coordinator
Dr. Ari Winasti Satyagraha, B.Sc (Hons.)

Department and Institution
Red Blood Cells Membrane and Enzyme Disorders Laboratory
Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

24.1. Research Area

Genetics, Biochemistry, Bioinformatics, Cell Biology

24.2. Research Topics

- G6PD deficiency in relations to malaria, neonatal jaundice and diabetes

- Role of UGT1A1 in neonatal jaundice

24.3. Objectives (include background of research, brief economic and social benefits from Research Outcomes)

Background

Malaria is a parasite infection caused by *Plasmodium* species transmitted by *Anopheles* mosquitos. In 2018, WHO reported 228 million malaria cases in which there were 405,000 deaths. Children below 5 years of age are the most vulnerable group to be infected by malaria. Malaria can be treated but however rapid emergence of drug resistance often hinders its therapy strategy.

The Ministry of Health of the Republic of Indonesia announced that in 2019 there were 250,644 malaria case in Indonesia where around 86% came from the provinces of Papua, East Nusa Tenggara and West Papua. However, there are still many areas in western part of Indonesia that are malaria endemic such as Hanura in Lampung. WHO plans to eliminate malaria globally by 2030 using radical cure in which the drug to be used is primaquine, an 8-aminoquinoline, that can kill the parasite both in the liver and blood stages. This drug can be especially for P. vivax by killing the parasites to stop transmission and to prevent relapse. Unfortunately, this drug is lethal to a group of individuals who have deficiency in G6PD (Glucose-6-Phosphate Dehydrogenase).

Red blood cell membrane and enzyme disorders at the Eijkman Institute for Molecular Biology plans to map the G6PD prevalence as well as characterizing the G6PD variants across the Indonesia archipelago because there were not many researches on G6PD in Indonesia. From 400 biochemical variants known so far only approximately half of that were genotyped. With so many ethnic groups in Indonesia, the possibility of find one variant that is specific to one of the ethnic groups in Indonesia is highly likely, because there is a positive correlation between malaria high endemicity and G6PD prevalence. G6PD deficiency is thought to give protection towards malaria infection as do other red blood cell membrane disorders such as Southeast Asian Ovalocytosis (SAO), Hereditary Spherocytosis (HS) and Hereditary Elliptocytosis (HE). G6PD screening diagnosis is also one of the major concerns in malaria therapy. Thus, an affordable, accurate test is needed.

One form of clinical manifestations from RBC membrane and enzyme disorders is hemolytic anemia. Chronic anemia is debilitating to the patient and affects their productivity and hence will affect local economy if not handled properly. In newborns, this can lead to neonatal jaundice that can cause kernicterus, hearing disorder and cerebral palsy, if not properly diagnosed and treated. The genetic causes of hemolytic anemia and neonatal jaundice will also be further studied in this unit. UDP Glucuronosyl Transferase Family 1 member A1 (UGT 1A1) has been shown to play a role in neonatal jaundice aside from the RBC membrane and enzyme disorders.

Economic and Social Benefit of this research:

As pointed out in the background, billions of rupiahs are spent in malaria treatment and prevention. The sooner malaria is eliminated the better it is for our economic health and the fund can be allocated for something else. However, to achieve safe and successful therapeutic strategy for malaria, knowledge on G6PD deficiency prevalence and diagnostic test are vital. G6PD has also been shown to worsen the prognosis of diabetes and thus may be burdensome to our economy as we see a rising trend in people having diabetes type II in the population. The government will have to fork out more money for diabetes treatment and management in Indonesia.

Anemia will affect productivity of an individual having it and if in a population there are high percentage of anemia, thus will affect the economic status of that region. This is often found in eastern Indonesia where the burden of malaria causes the population that is already poor even more so because of their lack of productivity. If anemia is present in childhood, this will have a prolonged effect on that particular individual because they don’t have enough nutrition of their developmental growth. Eventually this will affect social behavior of this individual.

24.4. Research Plan, Themes, Activities, Schedule

Research Plan and theme:

III. Anemia and Neonatal Jaundice:

  4. Map G6PD deficiency prevalence and variants across Indonesia
  5. Map RBC membrane disorders across Indonesia
  6. UGT 1A1 prevalence and allele mapping
  7. Anemia prevalence: malnutrition vs genetics

IV. Malaria dan Diabetes:

4. G6PD deficiency diagnostics
5. What is the association of G6PD and diabetes?

Activities:

19. Field sampling in malaria endemic areas
20. Hospital based sampling for diabetes
21. Molecular analyses
22. Bioinformatics analyses for mutations (SNPs)
23. Protein interactions/regulation in G6PD gene expression

Schedule in one year:

ACTIVITIES	**MONTH (IN A YEAR)**											
	1	2	3	4	5	6	7	8	9	10	11	12
Location and subject identification	■	■										
Contrive research budget		■	■									
Site survey and Socialization			■	■	■							
Research permit and reagents/consumables purchasing				■	■	■						
Field sampling							■	■				
Sample processing							■	■	■	■		
Data analyses								■	■	■	■	
Manuscript preparation										■	■	■
Progress report submission												■

24.5. Present research status at your Laboratory/ Department / University/ Institution

Research status is still ongoing though hampered due to the Covid-19 pandemic. So far, we have compiled G6PD data from mostly eastern part of Indonesia and data from RBC membrane disorder

(SAO) and UGT1A1 is on-going. We have data on dominant variants for G6PD deficiency and dominant alleles for UGT1A1 in Indonesia.

24.6. Future Research Plan

- Protein interactions/regulation in G6PD gene expression – looking into epigenetics and post translational mechanism of G6PD
- Association between G6PD deficiency and diabetes mellitus

1-25. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

25.1. Indonesian Researchers

Research Coordinator

Dr. sc.hum Ari Winasti Satyagraha, B.Sc (Hons)
Eijkman Institute for Molecular Biology

Team Members

1. Arkasha Sadhewa, M.Biomed.Sci
Eijkman Institute for Molecular Biology
2. Lydia Visita Panggalo, B.Sc
Eijkman Institute for Molecular Biology
1-26. Rahmadania Marita Jusuf, B.Sc
Eijkman Institute for Molecular Biology
1-27. Alida R. Harahap, MD, PhD
Eijkman Institute for Molecular Biology

a. Japanese Researchers

N/A

2.3. Collaboration with Industries

Collaborating industries or expected collaboration industries

N/A

2.4. Other Research Collaborators

Menzies School of Health Research Darwin (Australia)

6. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

A) Doctor degree
Number of candidates: 1 person
Training Duration: 4 years

B) Master’s degree
Number of candidates: 1person
Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 5 persons
- Position: technical training and post doc research
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be around persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 3 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Fridge 40C TSX Series (Thermo Scientific)	3	196,495,530	589,486,590
2	Freezer -400C REFCO FDE (Thermo Scientific)	3	266,200,000	798,600,000
3	Fridge/Freezer BDF--40V288A (Biobase)	2	94,930,000	189,860,000
4	Biological Safety Cabinet Class II A2 Herasafe 2030i (Thermo Scientific)	2	380,985,000	761,970,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
5	Waterbath Precision CIR 19 (Thermo Scientific)	1	69,492,940	69,492,940
6	ThermoMixer® C (Eppendorf)	1	120,175,000	120,175,000
7	Vortex Mixer Maxi Mix (Thermo Scientific)	4	7,260,000	29,040,000
8	mySPIN Mini Centrifuge Series (Thermo Scientific)	3	15,400,000	46,200,000
9	Research plus pipette set (Eppendorf)	6	51,302,350	307,814,100
10	Start Kit PL-LTS Single Pipette (Rainin)	2	26,193,310	52,386,620
11	Multichannel pipette set F1 Finnpipettes (Thermo Scientific)	1	74,681,640	74,681,640
12	PCR cabinet PCR-800 (Biobase)	2	71,637,500	143,275,000
13	Spectrophotometer UV-1900i set include UPS, CPS Controller, and Computer (Shimadzu)	1	550,000,000	550,000,000
14	Laser Printer Neverstop Laser 1000w (HP)	2	4,024,900	8,049,800
15	Scanner/Printer/Photocopy LaserJet Pro MFP M227fdw (HP)	1	5,694,700	5,694,700
16	Microcentrifuge Sorvall 21R (Thermo Scientific)	1	160,927,666.90	160,927,666.90
17	Refrigerated Centrifuge with Rotor S-4xUniversal (Eppendorf)	1	191,635,950	191,635,950
18	Refrigerated Centrifuge with rotor FA-45-24-11 for 24 x 1.5/2.0 mL (Thermo Scientific)	1	191,635,950	191,635,950
19	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	33,165,000	33,165,000
20	Specimix for 8 tube (Thermo Scientific)	2	10,759,430	21,518,860
21	pH meter Lab 875 (S1 Analytics)	1	29,150,000	29,150,000
22	Analytical scale max 200g EX224 (Ohaus)	1	124,867,490	124,867,490
23	Precision scale max 2.2kg ME 2002 (Mettler Toledo)	1	31,147,930	31,147,930
24	Protean i12 IEF System (Biorad)	1	201,487,000	201,487,000
25	Hotplate Stirrer Cimarec+ (Thermo Scientific)	2	11,666,160	23,332,320
26	Mini-PROTEAN® Tetra Vertical Electrophoresis Cell, 4-gel (Bio-Rad)	1	13,943,600	13,943,600

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
27	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster (Biorad)	1	19,800,000	19,800,000
28	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply (Biorad)	1	14,465,000	14,465,000
29	Geldoc Go System (Biorad)	1	110,000,000	110,000,000
30	Thermocycler Veriti (Applied Biosystem)	1	266,200,000	266,200,000
31	Thermocycler ProFlex (Applied Biosystem)	1	385,000,000	385,000,000
32	Hemocue 301 (Hemocue)	2	15,125,000	30,250,000
33	MINIPULS 3 Pump (Drive Unit) with Two Channel, High Flow Head (R2/HF) (Gilson)	1	68,200,000	68,200,000
34	Akta pure protein purification system (Cytiva Life Sciences)	1	330,000,000	330,000,000
35	Trans-Blot® SD Semi-Dry Electrophoretic Transfer Cell (Bio-Rad)	1	220,000,000	220,000,000
36	Power supply for electrophoresis (Bio-Rad)	3	9,900,000	29,700,000
37	Light microscope + camera, Upright Microscope Eclipse Ci-S/Ci-L (Nikon)	2	116,054,400	232,108,800
38	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	41,798,900	41,798,900
39	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	25,300,000	25,300,000
40	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	25,300,000	50,600,000
41	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	8	693,220	5,545,760
42	Cuvette semi quarts 2 ml (Starna)	12	1,831,500	21,978,000
43	Cuvette quarts 1 ml (Helma)	12	4,664,000	55,968,000
44	Cuvette quarts 2 ml (Shimadzu)	6	15,158,000	90,948,000
45	Acid and Corrosive Safety cabinet (Justrite)	1	18,721,010	18,721,010
46	NanoDrop™ 2000 Microvolume	1	251,143,750	251,143,750

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Spectrophotometer with Laptop (Thermo Scientific)			
47	BD Accuri C6 Plus (BD)	1	220,000,000	220,000,000
48	UPS 1000A (Prolink)	1	5,299,800	5,299,800
49	Freezer -80 Forma 89000 (Thermo Scientific)	1	632,225,000	632,225,000
50	Temp controlled shaker Innova 2100 (New Brunswick Scientific)	1	165,030,250	165,030,250
51	Bilistick System (Bilimetrix)	1	24,086,700	24,086,700
52	Link 10 Voice Activated Speaker Portable (JBL)	1	3,628,900	3,628,900
53	Mirrorless Camera Z6 (Nikon)	1	44,000,000	44,000,000

Note: Catalogues and product details are attached in a separate document

22. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers and human resources (from bachelor to master, and from master to PhD)

23. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Health Policies and thus may affect indirectly local economy

Appendix 1: Research Profile of Eijkman
1-11: Stem Cell

RP-EIJKMAN11

Research Profile

Project Title
Stem Cell

Project Coordinator
Dr. Ita Margaretha Nainggolan

Department and Institution
Stem Cell Laboratory, Eijkman Institute for Molecular Biology

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For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

27.1. Research Area

Genetics, Stem Cell, Cell Biology, Drug Screening, Regenerative Medicine

27.2. Research Topics

- Various disease model using stem cell
- Drug screening and regenerative medicine using stem cell
- GMP level production of stem cell and conditioned medium for therapy

27.3. Objectives (include background of research, brief eonomic and social benefits from Research Outcomes)

Degenerative disease is caused by cell or tissue degeneration which is generally affected by age factor and lifestyle. World Health Organization (WHO) categorized the degenerative disease into four main groups, there are cardiovascular disease (such as heart disease and stroke), diabetes, cancer, and chronic respiratory disease (such as lung disease and asthma). Degenerative disease become one of the biggest causes of death in the world, while 80% of death cases by this disease was happened in developing countries. Degenerative disease like heart disease, cancer, respiratory disease, and diabetes were thought to be the cause of 73% death cases in Indonesia. Currently, research on regenerative medicine by stem cell transplantation become main focus because it is believed to be the one of the potential alternatives to treat diseases, including degenerative diseases. Stem cell is undifferentiated cell and it has pluripotency to differentiate into various type of cells in a specific environment condition. Based on the above matters, Stem Cell Unit in Eijkman Institute for Molecular Biology newly formed at the end of 2018 needs development to become a capable and qualified laboratory to face the challenges of degenerative diseases in the future.

Stem Cell Unit at the Eijkman Institute plans to carry out various diseases using stem cell as a model. We also have started doing drug screening in various Indonesian natural products. For the next future this unit will initiated research in regenerative medicine using stem cell. As one of stem cell reference laboratories, this unit will provide GMP level production of stem cell and conditioned medium for therapy.

Economic and Social Benefit of this research:

The challenges of various diseases especially degenerative diseases in the future are predicted to be more tough and varied, so that the prospect of research using stem cell as disease model, drug treatment using stem cells and conditioned medium with Good Manufacturing Practice (GMP) standards will be in demand. Therefore, Stem Cell Unit needs to be developed starting from the quantity and quality of the human resources.

Stem Cell Unit currently consisted of just two human resources, Doctoral degree equivalent principal investigator and main researcher all at one, also an undergraduate equivalent research assistant. Thus, for a capable unit development, the additional three research assistants undergraduate equivalent and one research assistant in master degree were needed in minimum bare. The equipment those need to be added for functional Stem Cell Unit in optimum capability with GMP certification are the number of Class II Biosafety cabinets, CO_2 incubator, whilst the addition of tools needed are -20°C and -80°C freezers, phase-contrast microscope, transfection system, fluorescent and imaging system, low-speed centrifuge, and vacuum flask/aspiration device. The existing Stem Cell Unit Laboratory is 6,3 m x 5,93 m in size, hence for the expansion to GMP certified laboratory needs additional space up to 22 m x 25 m.

27.4. Research Plan, Themes, Activities, Schedule

Research Plan and theme:

In the framework of future development of research and services, Stem Cell Unit schemed to do the pre-existing activities for daily research as mentioned in the next section with additional implementation: gene editing, iPSC differentiation, and stem cell manufacturing with GMP certification for tissue regeneration.

Activities:

The Stem Cell Unit pre-existing activities are culture and conservation of mesenchymal and hematopoietic stem cell (MSC dan HSC) from adult's tissue and blood/ umbilical cord of neonates, nature ingredients screening for drug candidates, and also induced- pluripotent stem cell (iPSC) culture in collaboration with WIMM MRC Oxford University in disease modelling studies.

Schedule in one year:

The stages of implementing Stem Cell Unit development can be structured as follows:

1. Planning for GMP standard laboratory layout (Jan – June 2021)
2. Compilation of laboratory equipment list (Jan – June 2021)
3. Planning the recruitment of research assistant (Sep – Dec 2021)

4. Strategic plan framing in five years for Stem Cell Unit (July – Oct 2021)

5. Construction and development of the new Eijkman Building (January-December 2022)

7. Order of requested research tools and materials (June -December 2022)

8. Recruitment of human resources (June-December 2022)

ACTIVITIES/GOALS	**PHASE/MONTH IN A YEAR**											
	1	2	3	4	5	6	7	8	9	10	11	12
Planning for GMP standard laboratory layout	■	■	■	■	■	■						
Compilation of laboratory equipment list	■	■	■	■	■	■						
Planning the recruitment of research assistant									■	■	■	■
Strategic plan framing in five years for Stem Cell Unit							■	■	■	■		

27.5. Present research status at your Laboratory/ Department / University/ Institution

Existing research status covers nature ingredients screening for potential drugs, isolation, culture, and conservation of mesenchymal and hematopoietic stem cell (MSC dan HSC) from tissue and blood, or umbilical cord from newborn babies, also induced- pluripotent stem cell (iPSC) culture.

27.6. Future Research Plan

Gene editing, iPSC differentiation and stem cell/and conditioned medium manufacturing with GMP standard for regenerative medicine.

1-28. RESEARCH PERSONNEL

28.1. Indonesian Researchers

Research Coordinator
Dr. Ita Margaretha Nainggolan
Eijkman Institute for Molecular Biology

Team Members
1. Hanna Natalia
   Eijkman Institute for Molecular Biology

28.2. Japanese Researchers

N/A

2.3. *Collaboration with Industries*

Collaborating industries or expected collaboration industries
Rachmat Sarwono
PT. Industri Jamu Borobudur (Indonesia)

Dr. Wahyu Widowati, M.Si

PT. Aretha Medika Utama, Biomolecular and Biomedical Research Center (Indonesia)

1-29. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Master's degree
  - ✧ Number of candidates: 1 person
  - ✧ Training duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 2 persons
- Position: PI and research assistant
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: ______________
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: 2

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price	Amount
1	Fridge 40C TSX Series (Thermo Scientific)	2	196,495,530	392,991,106
2	Freezer -400C REFCO FDE (Thermo Scientific)	2	266,200,000	532,400,000
3	Fridge/Freezer BDF--40V288A (Biobase)	1	94,930,000	94,930,000
4	Biological Safety Cabinet Class II A2 Herasafe 2030i (Thermo Scientific)	4	380,985,000	1,523,940,000
5	Waterbath Precision CIR 19 (Thermo Scientific)	1	69,492,940	69,492,940
6	ThermoMixer® C (Eppendorf)	1	120,175,000	120,175,000
7	Vortex Mixer Maxi Mix (Thermo Scientific)	2	7,260,000	14,520,000
8	mySPIN Mini Centrifuge Series (Thermo Scientific)	1	15,400,000	15,400,000
9	Research plus pipette set (Eppendorf)	6	51,302,350	307,814,100
10	Multichannel pipette set F1 Finnpipettes (Thermo Scientific)	1	74,681,640	74,681,640
11	PCR cabinet PCR-800 (Biobase)	2	71,637,500	143,275,000
12	Spectrophotometer UV-1900i set include UPS, CPS Controller, and Computer (Shimadzu)	1	550,000,000	550,000,000
13	Laser Printer Neverstop Laser 1000w (HP)	1	4,024,900	4,024,900
14	Scanner/Printer/Photocopy LaserJet Pro MFP M227fdw (HP)	1	4,024,900	4,024,900
15	Microcentrifuge Sorvall 21R (Thermo Scientific)	1	160,927,666.90	160,927,666.90
16	Refrigerated Centrifuge with Rotor S-4xUniversal (Eppendorf)	1	191,635,950	191,635,950
17	Refrigerated Centrifuge with rotor FA-45-24-11 for 24 x 1.5/2.0 mL (Thermo Scientific)	1	191,635,950	191,635,950
18	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	33,165,000	33,165,000
19	Specimix for 8 tube (Thermo Scientific)	1	10,759,430.00	10,759,430
20	pH meter Lab 875 (S1 Analytics)	1	29,150,000	29,150,000
21	Analytical scale max 200g EX224 (Ohaus)	1	124,867,490	124,867,490
22	Precision scale max 2.2kg ME 2002 (Mettler Toledo)	1	31,147,930	31,147,930
23	Hotplate Stirrer Cimarec+ (Thermo Scientific)	2	11,666,160	23,332,320
24	Thermocycler Veriti (Applied Biosystem)	1	266,200,000	266,200,000
25	Thermocycler ProFlex (Applied Biosystem)	1	385,000,000	385,000,000
30	MINIPULS 3 Pump (Drive Unit) with Two Channel, High Flow Head (R2/HF) (Gilson)	1	68,200,000	68,200,000

No	Equipment/facilities to be procured for the Research	Quantity	Price	Amount
31	Power supply for electrophoresis (Bio-Rad)	2	9,900,000	19,800,000
32	Light microscope + camera, Upright Microscope Eclipse Ci-S/Ci-L (Nikon)	1	116,054,400	116,054,400
33	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	41,798,900	41,798,900
34	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	25,300,000	25,300,000
35	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	25,300,000	50,600,000
36	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	5	693,220	3,466,100,000
37	Acid and Corrosive Safety cabinet (Justrite)	1	18,721,010	18,721,010
38	NanoDrop™ 2000 Microvolume Spectrophotometer with Laptop (Thermo Scientific)	1	251,143,750	251,143,750
39	BD Accuri C6 Plus (BD)	1	220,000,000	220,000,000
40	UPS 1000A (Prolink)	1	5,299,800	5,299,800
41	Freezer -80 Forma 89000 (Thermo Scientific)	1	632,225,000	632,225,000
42	Temp controlled shaker Innova 2100 (New Brunswick Scientific)	1	165,030,250	165,030,250
43	Applied Biosystems® 7500 fast Real-Time PCR System	1	795,000,000	695,000,000
44	Locator Liquid Nitrogen (2)	1	1,100,000,000	1,100,000,000
45	Freezer -80 (Thermo Scientific	1	375,000,000	375,000,000
46	Inverted Microscope (Olympus)	1	502,000,000	502,000,000
47	AmScope Forward Microscope	1	476,000,000	476,000,000
48	Neon Transfection System for Electroporation (Thermo Fisher)	1	532,000,000	532,000,000
49	Olympus IXplore SpinSR Microscope	1	865,000,000	865,000,000
50	BD FACSMelody™ Cell Sorter	1	2,332,000,000	2,332,000,000

Note: Catalogues and product details are attached in a separate document

1-30. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers and human resources (from bachelor to master)

1-31. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Directly or indirectly contribution to the cell/conditioned medium therapy for patient, health policies, and scientific community.

Appendix 1: Research Profile of Eijkman
1-12: Human Genome Diversity and Diseases

RP-EIJKMAN13

Research Profile

Project Title
Human Genome Diversity and Diseases

Project Coordinator
Prof. Herawati Sudoyo, MD, PhD

Department and Institution
Human Genome Diversity and Diseases Laboratory
Eijkman Institute For Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

31.1. Research Area

Genetics, bioinformatics, population genetics, evolutionary biology, biological anthropology, lifestyle diseases, microbiome, nutrigenomics

31.2. Research Topics

1. Genetic origin and adaptation of the diverse Indonesian populations
2. Genetic predisposing factors associated with the risk of non-communicable diseases

31.3. Objectives (include background of research, brief economic, and social benefits from research outcomes)

Background

Indonesian archipelago is a melting pot of human diversity. Indonesia has been a busy intersection for human migrations since the early arrival of modern humans from 'Out-of-Africa' into Papua and Australia about 60,000 – 50,000 years ago. The country also was impacted by the dispersal of Austronesian language speakers from south China and Taiwan into the Pacific and Madagascar that started around 4,000 – 3,000 years ago. It created the important cultural and biological population diversity that can be seen today in Indonesia; 700 languages are spoken by ~500 ethnic groups, each with its unique culture and phenotypic characteristics, illustrating the complex genetic background. Being a crossroad of ancient human migrations, Indonesia harbors an invaluable human genome diversity.

Study of the human genome in the diverse Indonesian populations and its lifestyle lays an important foundation in medical science and disease prevention/management in Indonesia. The focus of our projects is to study the genomic-epigenomics-functional variants associated with demographic processes, resistance and susceptibility to both infectious and non-communicable diseases. We also extend our study specifically to observe the impact of lifestyle transition, and different lifestyle choices in populations to their health status, diseases (e.g. obesity, diabetes mellitus, cardiovascular diseases, etc.), and gut microbiomes, also to decipher how genomics, epigenomics, and functional variants play roles in the disease progression.

A deep understanding of population-specific genetic diversity is crucial to the success of genomic medicine. But so far, modern human genetics is built upon cohorts of primarily European ancestry, and thus not representative of humanity. Indonesia, the world's fourth most populous country, is a striking example of this disparity. Our research thus will contribute to a growing body of genomic health research in under-represented populations. It is important that this study be undertaken in indigenous communities across the Indonesian archipelago, thus laying a new foundation for longer term benefits to the indigenous peoples in Indonesia.

Objectives

1. To build a baseline for this study, we will characterize DNA diversity, particularly focusing on whether putative advantageous functional polymorphisms (e.g., nonsynonymous changes, or positions) are lost less frequently in populations than other polymorphisms.
2. We will explore associations between two molecular phenotypes – expression levels and methylation patterns – as well as their associations with DNA diversity.
3. We will determine the correlation between DNA variants with resistance and/or susceptibility to certain diseases.

We will determine the interplay between genetics, gut microbiomes, and environmental factors in shaping the risk for the development of lifestyle-related chronic diseases.

31.4. Research Plan, Themes, Activities, Schedule

Research plan and theme:

Genetic origin

1. Genome-wide studies have proved crucial for linking genomic regions with biomedical traits, especially disease risk. All samples will be genotyped using whole genome sequencing, including long-read sequencing for accurate haplotype phasing and whole-genome imputation. Genomic annotations of both coding and non-coding regions in all populations will first be made by comparison to public datasets. Special attention will be paid to regions that show genomic signals of positive natural selection.
2. Linking genotypes to intermediate phenotypes, such as gene expression or regulation levels, using molecular quantitative trait locus (QTL) mapping has proven successful at addressing this gap. These approaches have proven instrumental in elucidating genetic contributions to common disease phenotypes in European populations, and the methodological tools and approaches are well established in the field and familiar to our team. Thus, while establishing the Genomic Indonesia cohort, we will perform whole RNA-sequencing and methylation arrays. Leveraging the genotype data, we will identify QTLs that impact expression and DNA methylation levels in whole blood based on the RNA sequencing result. This work will explicitly examine how genetically defined population structure within Indonesia impacts the genetic architecture of gene regulation. These results will once again be enriched by thorough comparisons with information

from existing global cohorts – again, largely of European or African ancestry – allowing us to better understand the portability of QTLs between populations. While many QTLs will doubtlessly be shared, the actual fractions remain unclear, as do the impact of environmental differences (including lifestyle and nutrition) across groups, and the potential for complex interactions between loci.

Lifestyle diseases

1. Variation on mitochondrial DNA (mtDNA) has been reported to play a role as a risk factor for obesity and type 2 diabetes mellitus (T2DM). The mtDNA variation will be determined using quantitative Real-Time PCR and sequencing.
2. Genetic association studies with lifestyle-related diseases will provide a knowledge base for the development of prevention, treatment, and management strategies for non-communicable disease. All samples will be genotyped using SNPs genotype, whole genome sequencing, methylation
3. Changes in diet and lifestyle would also lead to the diversity in the microbiome. This study will examine human microbiome genomes that might be associated with susceptibility to the complex noncommunicable polygenic diseases.

Activities:

1. Literature study
2. Proposal writing
3. Method optimization
4. Field sampling
5. Samples selection
6. Samples processing: molecular analyses
7. Data analyses: high-throughput computing analyses
8. Progress report
9. Manuscript writing

Schedule in one year:

Activities	**Months**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Literature study	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Proposal writing	▨	▨	▨									
Method optimization		▨	▨	▨	▨							
Field sampling				▨	▨	▨	▨	▨				

Samples selection						▨	▨	▨				
Samples processing						▨	▨	▨	▨			
Data analyses							▨	▨	▨	▨	▨	
Progress report								▨	▨	▨	▨	▨
Manuscript writing								▨	▨	▨	▨	▨

31.5. Present research status at your Laboratory/ Department / University/ Institution

Our laboratory pioneered the study of human whole genome sequencing in various populations across the archipelago, from Sumatra to Papua. That study was designed to sample an overall genome diversity in different ancestries, and to observe the pattern of archaic introgression, also its adaptation behavior. The published genome data showed that Indonesian populations are understudied, there are many demographic patterns, ancestries, and adaptation in different environmental pressures that were still uncovered. Furthermore, there was none-to-limited phenotypic data incorporated in the study. In the future, we will fill the aforementioned gap in our previous studies, with a focus on the development of functional and genotype-to-phenotype axis.

Studies on genetic association with lifestyle-related diseases have been conducted since 2008. We have screened 17 common single nucleotide polymorphisms (SNPs) associated with metabolic disorders in selected Indonesian populations. In 2020, we conducted a large-scale genome sequencing targeting the functional exomes in obese and non-obese subjects, as well as methylation and gut microbiomes profilings in the hunter-gatherer ethnic group of Punans.

Future Research Plan

- Systematically clarifying the trajectory from genotype, to phenotype, to biological function, within macro-geographic networks of human communities in Indonesia.
- Determine genetic risk factors associated with lifestyle-related diseases for Indonesian population.
- Investigate the interplay between genetic and environmental factors in influencing the risk for the development of lifestyle-related diseases.
- Precision medicine

1-32. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

32.1. Indonesian Researchers

Research Coordinator

Prof. Herawati Sudoyo, MD, PhD
Eijkman Institute for Molecular Biology

Safarina G. Malik, DVM, MS, PhD (Lifestyle disease)
Eijkman Institute for Molecular Biology

Pradiptajati Kusuma, PhD
Eijkman Institute for Molecular Biology

Team Members

1. Sukma Oktavianthi, M.Biomed
   Eijkman Institute for Molecular Biology
2. Clarissa Asha Febinia, M.Phil
   Eijkman Institute for Molecular Biology
3. Lidwina Priliani, M.Si
   Eijkman Institute for Molecular Biology
4. Isabella Apriyana, M.Sc
   Eijkman Institute for Molecular Biology
5. Chelzie Crenna Darusallam, S.Si
   Eijkman Institute for Molecular Biology
6. Leonard, S.Si
   Eijkman Institute for Molecular Biology
7. Others (to be employed)

32.2. *Japanese Researchers*

National Institute of Genetics (Mishima, Japan)

2.3. *Collaboration with Industries*

N/A

2.4. *Other Research Collaborators*

Indonesian Danone Institute Foundation (Indonesia)
Harvard School of Public Health (USA)
School of Life and Environmental Science, University of Sydney (Australia)
Complexity Institute, Nanyang Technological University (Singapore)
Australian Center for Ancient DNA, University of Adelaide (Australia)

Cambridge University (UK)

1-33. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: 4 people
  Training Duration: 4 years
- Master's degree
  Number of candidates: 1person
  Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 12 people
- Position: Senior researchers and junior researchers
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be___ ___ persons/year
- The number visiting scholar for Indonesian researchers to Japan estimated be around 3 persons/year

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price	Amount
FREEZER, REFRIGERATOR, AND ACCESSORIES				

1	Thermo Scientific™ TSX Series ultra-low freezers, Upright (Thermo Scientific)	2	Rp525,000,000.00	Rp1,050,000,000.00
2	Fridge/Freezer BDF--40V288A (Biobase)	4	Rp52,000,000.00	Rp208,000,000.00
3	Thermo ScientificTM TSX Series high-performance lab (Thermo Scientific)	2	Rp178,632,300.00	Rp357,264,600.00
4	Thermo Scientific™ TSX Series High-Performance Lab Refrigerators (Thermo Scientific)	3	Rp230,000,000.00	Rp690,000,000.00
5	Temperature Freezer -40 (fits 400 boxes) (Thermo Scientific)	6	Rp242,000,000.00	Rp1,452,000,000.00
6	Smart-Vue™ Sensors (Thermo Scientific)	25	Rp10,000,000.00	Rp250,000,000.00
7	Freezer rack (Thermo Scientific)	60	Rp4,000,000.00	Rp240,000,000.00
8	Tempshield™ Cryo-Gloves™ (Tempshield)	4	Rp3,500,000.00	Rp14,000,000.00
CABINETS				
9	Bel-Art™ SP Scienceware™ Dry-Keeper™ Desiccator Cabinets (Bel-Art)	3	Rp54,000,000.00	Rp162,000,000.00
10	Sure-Grip® EX Flammable Safety Cabinet, 2 self-close doors (Justrite)	1	Rp14,000,000.00	Rp14,000,000.00
11	Sure-Grip® EX Undercounter Corrosives/Acid Safety Cabinet (Justrite)	1	Rp25,000,000.00	Rp25,000,000.00
12	Fire-proof filing cabinet	1	Rp30,000,000.00	Rp30,000,000.00
BSC Cabinets, PCR Hood				
13	Biological Safety Cabinet Class II A2 (Thermo Scientific)	4	Rp346,350,000.00	Rp1,385,400,000.00
14	Polymerase Chain Reaction Cabinet PCR-3A1 (ESCO)	4	Rp150,000,000.00	Rp600,000,000.00
15	Polymerase Chain Reaction Cabinet PCR-4A-1 (ESCO)	4	Rp200,000,000.00	Rp800,000,000.00
PIPPETTES				
16	Research® plus, Adj., Single Channel, Volume: 0.1 - 2.5 µL (Eppendorf)	15	Rp6,993,000.00	Rp104,895,000.00
17	Research® plus, Adj., Single Channel, Volume: 0.5 - 10 µL (Eppendorf)	25	Rp6,993,000.00	Rp174,825,000.00
18	Research® plus, Adj., Single Channel, Volume: 10 - 100 µL (Eppendorf)	25	Rp6,993,000.00	Rp174,825,000.00

19	Research® plus, Adj., Single Channel, Volume: 20 - 200 µL (Eppendorf)	25	Rp6,993,000.00	Rp174,825,000.00
20	Research® plus, Adj., Single Channel, Volume: 30- 300 µL (Eppendorf)	2	Rp6,993,000.00	Rp13,986,000.00
21	Research® plus, Adj., Single Channel, Volume: 100 - 1000 µL (Eppendorf)	25	Rp6,993,000.00	Rp174,825,000.00
22	Research® plus, Adj., 8 - channel, Volume: 0,5 - 10 µL (Eppendorf)	2	Rp17,797,000.00	Rp35,594,000.00
23	Research® plus, Adj., 8 - channel, Volume: 10 - 100 µL (Eppendorf)	2	Rp17,797,000.00	Rp35,594,000.00
24	Research® plus, Adj., 8 - channel Volume: 30 - 300 µL (Eppendorf)	2	Rp17,797,000.00	Rp35,594,000.00
25	Xplorer®, 8-channel Xplorer®, 8-channel, Volum: 0.5 - 10 µL (Eppendorf)	2	Rp30,229,000.00	Rp60,458,000.00
26	Xplorer®, 8-channel Xplorer®, 8-channel, Volume: 5 - 100 µL (Eppendorf)	2	Rp30,229,000.00	Rp60,458,000.00
27	Xplorer®, 8-channel Xplorer®, 8-channel, Volume: 15 - 300 µL (Eppendorf)	2	Rp30,229,000.00	Rp60,458,000.00
28	Charger Carousel 2 (Eppendorf)	25	Rp4,680,500.00	Rp117,012,500.00
29	Pipette Carousel 2 (Eppendorf)	2	Rp14,763,000.00	Rp29,526,000.00
30	Easypet® 3 (Eppendorf)	2	Rp17,043,000.00	Rp34,086,000.00
31	F1-ClipTip™ Multichannel Pipettes, 8-channel, 10 to 100 µL (Thermo Scientific)	2	Rp11,000,000.00	Rp22,000,000.00
32	F1-ClipTip™ Multichannel Pipettes, 8-channel, 5 to 50 µL (Thermo Scientific)	2	Rp11,000,000.00	Rp22,000,000.00
33	F1-ClipTip™ Multichannel Pipettes, 8-channel, 30 to 300 µL (Thermo Scientific)	2	Rp11,000,000.00	Rp22,000,000.00
34	F1-ClipTip™ Multichannel Pipettes, 12-channel, 10 to 100 µL (Thermo Scientific)	2	Rp12,000,000.00	Rp24,000,000.00
35	F1-ClipTip™ Multichannel Pipettes, 12-channel, 5 to 50 µL (Thermo Scientific)	2	Rp12,000,000.00	Rp24,000,000.00
36	F1-ClipTip™ Multichannel Pipettes, 12-channel, 30 to 300 µL (Thermo Scientific)	2	Rp12,000,000.00	Rp24,000,000.00
37	Matrix™ Hybrid Pipetter Carousel Stand (Thermo Scientific)	4	Rp3,000,000.00	Rp12,000,000.00

CENTRIFUGES				
38	Thermo Scientific™ Megafuge 16R (Thermo Scientific)	2	Rp288,460,000.00	Rp576,920,000.00
39	Large Centrifuge 5910 R + S-4x Universal + Adapter for 25 mL/50 mL/Plates/250 mL (Eppendorf)	2	Rp472,074,000.00	Rp944,148,000.00
40	Centrifuge 5430 R incl. Rotor FA-45-30-11+Rotor A-2-MTP + Adapter for PCR plate 96 wells (Eppendorf)	4	Rp266,104,000.00	Rp1,064,416,000.00
41	Thermo Scientific mySPIN Mini Centrifuge Series (Thermo Scientific)	2	Rp14,000,000.00	Rp28,000,000.00
42	Mini personal centrifuge Tomy (Tomy)	8	Rp5,500,000.00	Rp44,000,000.00
43	Heraeus™ Pico™ 17 Microcentrifuge (Thermo Scientific)	3	Rp150,000,000.00	Rp450,000,000.00
PCR MACHINES				
44	Thermal Cycler validated for Human Identification (Applied Biosystems)	3	Rp342,850,000.00	Rp1,028,550,000.00
45	Veriti^{TM} 96-Well Thermal Cycler (0.2 mL) (Applied Biosystems)	3	Rp242,000,000.00	Rp726,000,000.00
46	QuantStudio™ 12K Flex Real-Time PCR System (Applied Biosystems)	1	Rp6,027,560,000.00	Rp6,027,560,000.00
47	QuantStudio™ 3D Digital PCR System (Applied Biosystems)	1	Rp2,550,000,000.00	Rp2,550,000,000.00
DNA QUANTIFICATION				
48	4200 TapeStation System + Laptop (Agilent)	1	Rp2,500,000,000.00	Rp2,500,000,000.00
49	Qubit 4 Quantification Starter Kit (Thermo Scientific)	2	Rp60,000,000.00	Rp120,000,000.00
50	NanoDrop™ 8000 Microvolume UV-Vis Spectrophotometer with Laptop (Thermo Scientific)	1	Rp420,000,000.00	Rp420,000,000.00
ELECTROPHORESIS APPARATUS				
51	GelDoc Go System (Bio-Rad)	1	Rp400,000,000.00	Rp400,000,000.00
52	UV/Stain-Free Sample Tray for GelDoc Go Gel Imaging System (Bio-Rad)	1	Rp40,000,000.00	Rp40,000,000.00
53	Holder for Sample Trays and UV Shield (Bio-Rad)	1	Rp6,000,000.00	Rp6,000,000.00

54	GelDoc Go UV Shield (Bio-Rad)	1	Rp8,000,000.00	Rp8,000,000.00
55	XcitaBlue Viewing Goggles (Bio-Rad)	1	Rp2,000,000.00	Rp2,000,000.00
56	Mitsubishi Thermal Printer (Mitsubishi)	1	Rp60,000,000.00	Rp60,000,000.00
57	Gel Cutter (Bio-Rad)	1	Rp1,500,000.00	Rp1,500,000.00
58	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply (Bio-Rad)	2	Rp30,000,000.00	Rp60,000,000.00
59	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm, with Power Supply (Bio-Rad)	2	Rp36,000,000.00	Rp72,000,000.00
60	30-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
61	20-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
62	150-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
63	10-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
64	Preparative Comb for Sub-Cell and Wide Mini-Sub Cell Systems (Bio-Rad)	2	Rp2,500,000.00	Rp5,000,000.00
65	Mini Sub-Cell GT Gel Caster (Bio-Rad)	4	Rp4,600,000.00	Rp18,400,000.00
66	Sub-Cell GT UV-Transparent Gel Tray, 15 x 10 cm (Bio-Rad)	4	Rp3,400,000.00	Rp13,600,000.00
67	Wide Mini-Sub Cell GT Anode (Red) Electrode Assembly (Bio-Rad)	5	Rp6,000,000.00	Rp30,000,000.00
68	Wide Mini-Sub Cell GT Cathode (Black) Electrode Assembly (Bio-Rad)	5	Rp6,000,000.00	Rp30,000,000.00
69	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm (Bio-Rad)	4	Rp3,400,000.00	Rp13,600,000.00
70	15-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
71	8-Well Comb (Bio-Rad)	4	Rp2,500,000.00	Rp10,000,000.00
72	Preparative Comb (Bio-Rad)	2	Rp3,400,000.00	Rp6,800,000.00
73	Mini-Sub Cell GT Anode (Red), QuickSnap Electrode Assembly (Bio-Rad)	5	Rp5,000,000.00	Rp25,000,000.00
74	Mini-Sub Cell GT Cathode (Black), QuickSnap Electrode Assembly (Bio-Rad)	5	Rp5,000,000.00	Rp25,000,000.00
WATERBATH AND INCUBATORS				
75	Reciprocal water bath (Thermolab)	2	Rp90,000,000.00	Rp180,000,000.00

76	Precision Circulating Water Bath (Thermo Scientific)	2	Rp50,000,000.00	Rp100,000,000.00
77	Hybridization Oven, 220V (Ilumina)	1	Rp300,000,000.00	Rp300,000,000.00
78	ThermoMixer® C (Eppendorf)	5	Rp109,250,000.00	Rp546,250,000.00
79	SmartBlockTM plates (Eppendorf)	5	Rp26,619,000.00	Rp133,095,000.00
80	SmartBlockTM 1.5 mL (Eppendorf)	5	Rp21,394,000.00	Rp106,970,000.00
81	SmartBlockTM 2 mL (Eppendorf)	5	Rp21,394,000.00	Rp106,970,000.00
82	SmartBlockTM 15 mL (Eppendorf)	5	Rp21,394,000.00	Rp106,970,000.00
83	SmartBlockTM PCR 96 (Eppendorf)	5	Rp21,394,000.00	Rp106,970,000.00
84	Eppendorf ThermoTop®, with condens.protect technology (Eppendorf)	5	Rp20,000,000.00	Rp100,000,000.00
85	Hybex Microsample Incubator, heating base, 230V (Eppendorf)	1	Rp50,000,000.00	Rp50,000,000.00
86	Infinium MIDI Heatblock Insert (Illumina)	1	Rp12,000,000.00	Rp12,000,000.00
ROBOTIC LIQUID HANDLER				
87	epMotion® 5075tC NGS Solution (Eppendorf)	1	Rp3,801,045,000.00	Rp3,801,045,000.00
88	Thermorack, for 24 Safe-Lock tubes, temperable, 1.5/2.0 mL (Eppendorf)	2	Rp31,312,000.00	Rp62,624,000.00
89	Thermoblock 96 for PCR (96x0.2 mL, 77x0.5 mL, PCR plate 96 semi-skirted) (Eppendorf)	1	Rp24,434,000.00	Rp24,434,000.00
90	Thermoadapter for PCR (PCR plates, 96 wells, skirted) (Eppendorf)	1	Rp23,978,000.00	Rp23,978,000.00
91	ReservoirRack Module TC, temperable, 8 × PCR tubes 0.2 mL (Eppendorf)	2	Rp11,476,000.00	Rp22,952,000.00
92	ReservoirRack Module TC, temperable, 4 × Safe-Lock tubes 0.5/1.5/2.0 mL (Eppendorf)	3	Rp12,160,000.00	Rp36,480,000.00
93	ReservoirRack Module TC, temperable, 4 × Eppendorf Tubes® 5.0 mL (Eppendorf)	1	Rp11,913,000.00	Rp11,913,000.00
94	Reservoir Rack Module NGS (Eppendorf)	1	Rp26,296,000.00	Rp26,296,000.00
95	Reservoir Rack Module Tips (Eppendorf)	1	Rp16,929,000.00	Rp16,929,000.00
96	TipHolder for epTips Motion (Eppendorf)	7	Rp14,573,000.00	Rp102,011,000.00
97	Tip Tool (Eppendorf)	1	Rp12,958,000.00	Rp12,958,000.00
98	epMotion® Editor 40, software CD ROM with instructions, PC installation (Eppendorf)	1	Rp61,845,000.00	Rp61,845,000.00
99	epMotion® 5075vtc (Eppendorf)	1	Rp3,486,192,000.00	Rp3,486,192,000.00

100	epMotion® 5075vtc accessories (Eppendorf)	1	Rp51,986,000.00	Rp51,986,000.00
OXFORD NANOPORE SEQUENCING SYSTEM				
101	MinION Mk1B Enhanced Pack (Oxford Nanopore)	1	Rp75,000,000.00	Rp75,000,000.00
102	MinION Mk1B Basic Pack (Oxford Nanopore)	1	Rp25,000,000.00	Rp25,000,000.00
103	MinION Mk1C Enhanced Pack (Oxford Nanopore)	1	Rp250,000,000.00	Rp250,000,000.00
104	VolTRAX V2 CapEx Automated Lib.Prep for MinION (Oxford Nanopore)	1	Rp210,000,000.00	Rp210,000,000.00
GENERAL EQUIPMENT				
105	MagnaRack™ Magnetic Separation Rack (Invitrogen)	2	Rp12,000,000.00	Rp24,000,000.00
106	Magnetic stand-96 (Invitrogen)	2	Rp18,000,000.00	Rp36,000,000.00
107	DynaMag™-96 Side Magnet (Invitrogen)	2	Rp25,000,000.00	Rp50,000,000.00
108	BioShake XP Tube and Plate Mixer, set. incl. adapter for 0.8 mL Abgene MIDI plate (BioShake)	1	Rp54,000,000.00	Rp54,000,000.00
109	Illumina High-Speed Microplate Shaker (Illumina)	1	Rp75,000,000.00	Rp75,000,000.00
110	Hotplate & Magnetic Stirrer (ISG)	2	Rp5,000,000.00	Rp10,000,000.00
111	Spinbar® magnetic stir bar size 3 in. × 3/8 in. (Sigma Aldrich)	4	Rp1,500,000.00	Rp6,000,000.00
112	Spinbar® magnetic stir bar size 1/2 in. × 3/8 in. (Sigma Aldrich)	4	Rp1,500,000.00	Rp6,000,000.00
113	Spinbar® magnetic stir bar size 11/2 in. × 3/8 in. (Sigma Aldrich)	4	Rp1,500,000.00	Rp6,000,000.00
114	SevenCompact pH meter S220 (Metler Toledo)	1	Rp50,000,000.00	Rp50,000,000.00
115	Microwave oven (Panasonic)	1	Rp4,000,000.00	Rp4,000,000.00
116	Eppendorf® PCR Cooler, iceless cold storage system for 96 well plates and PCR tubes (Eppendorf)	6	Rp7,500,000.00	Rp45,000,000.00
117	IsoSafe and IsoPack, includes 1 IsoSafe and 3 IsoPack, for 1.5/2.0 mL vessels, 0 °C (Eppendorf)	4	Rp7,500,000.00	Rp30,000,000.00
118	IsoPack and IsoRack set, includes one IsoPack and one IsoRack, for 1.5/2.0 mL (Eppendorf)	4	Rp7,500,000.00	Rp30,000,000.00

119	Infinium Hybridization Chambers and Gaskets (Illumina)	1	Rp25,000,000.00	Rp25,000,000.00
120	Infinium Hybridization Chamber Inserts (8) (Illlumina)	1	Rp25,000,000.00	Rp25,000,000.00
121	Infinium Staining Set (Staining Rack and Wash Dish) (Illlumina)	2	Rp25,000,000.00	Rp50,000,000.00
122	Infinium TeFlow Chamber (1) (Illlumina)	4	Rp25,000,000.00	Rp100,000,000.00
123	Infinium TeFlow Thermometer Assembly (Illlumina)	1	Rp25,000,000.00	Rp25,000,000.00
124	Infinium Water Circulator and Teflow Rack Kit (110/220V) (Illlumina)	1	Rp250,000,000.00	Rp250,000,000.00
125	Vaccum dessicator (VWR)	1	Rp25,000,000.00	Rp25,000,000.00
126	PILOT Chemical Resistant Diaphragm Vacuum Pump, 230V/60/50Hz (PILOT)	1	Rp20,000,000.00	Rp20,000,000.00
127	ALPS 50 V Semi automated Microplate Heat Sealer (Thermo Scientific)	1	Rp85,000,000.00	Rp85,000,000.00
128	Digital Vortex Mixers (Thermo Scientific)	10	Rp7,500,000.00	Rp75,000,000.00
129	Concentrator plus + integrated diaphragm vacuum pump + Rotor F-45-48-11 (Eppendorf)	2	Rp150,000,000.00	Rp300,000,000.00
130	Adapter, for 1 PCR tube (0.2 mL, max. Ø 6 mm), for all 1.5/2.0 mL rotors, 6 pcs. (Eppendorf)	4	Rp2,000,000.00	Rp8,000,000.00
131	HANNA HI 98509 Checktemp 1 Digital Thermometer (HANNA)	1	Rp2,000,000.00	Rp2,000,000.00
132	FastPrep-24™ 5G bead beating grinder and lysis system (MP Biomedica)	1	Rp250,000,000.00	Rp250,000,000.00
133	MicroAmp™ Adhesive Film Applicator (Applied Biosystems)	4	Rp2,000,000.00	Rp8,000,000.00
134	Corning® LSE™ Nutating Mixer (Corning)	2	Rp8,000,000.00	Rp16,000,000.00
135	Quintix® Analytical Balance 60 g x 0.1 mg (Sartorius)	1	Rp70,000,000.00	Rp70,000,000.00
136	Quintix® Precision Balance 610 g x 10 mg (Sartorius)	1	Rp70,000,000.00	Rp70,000,000.00
137	Quintix® Precision Balance 210 g x 1 mg (Sartorius)	2	Rp70,000,000.00	Rp140,000,000.00

138	UPS for epMotion, Tape Station, Quant Studio, Digital PCR	8	Rp5,000,000.00	Rp40,000,000.00
WATER PURIFIER				
139	Barnstead™ Smart2Pure™ Water Purification System (Thermo Scientific)	2	Rp110,000,000.00	Rp220,000,000.00
SAMPLING EQUIPMENT				
140	dry shipper mini (Worthington Industries)	1	Rp25,000,000.00	Rp25,000,000.00
141	Yeti hopper M30 portable soft cooler dark blue (Yeti)	3	Rp15,000,000.00	Rp45,000,000.00
142	Portable solar panel (Anker)	1	Rp4,000,000.00	Rp4,000,000.00
143	Mesin Genset Portable Inverter HDG 1880DI (Hyundai)	1	Rp6,000,000.00	Rp6,000,000.00
144	Bento lab (Bento)	1	Rp50,000,000.00	Rp50,000,000.00
145	Water purifier (LifeStraw Mission) 12L (LifeStraw)	1	Rp3,000,000.00	Rp3,000,000.00
146	GARMIN GPS Inreach SE+ satelit comuniator (Garmin)	2	Rp10,000,000.00	Rp20,000,000.00
147	Accselerometer ActiGraph wGT3X-BT (ActiGraph)	30	Rp5,000,000.00	Rp150,000,000.00
148	GPS GPSMAP® 64s SEA (Garmin)	2	Rp5,000,000.00	Rp10,000,000.00
149	DJI Mavic Air 2 (DJI)	1	Rp17,500,000.00	Rp17,500,000.00
150	Elephant Elite EL1907 Waterproof Case (Elephant)	2	Rp10,000,000.00	Rp20,000,000.00
151	Elephant Elite EL2916W Waterproof Case (Elephant)	2	Rp10,000,000.00	Rp20,000,000.00
152	Laptop Lenovo ThinkPad (Lenovo)	1	Rp30,000,000.00	Rp30,000,000.00
	Total			Rp38,852,488,100.00

Note: Catalogues and product details are attached in a separate document

24. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

1. Human resources
2. Research papers
3. Ancestry panel
4. Nutrigenomics panel service
5. Pharmacogenetic panel service

25. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

First, they will provide a new basis for understanding how DNA diversity influences gene expression levels and methylation within populations where most human evolution has occurred. Testing of genotype-phenotype pairs will in turn clarify what proportion of these changes may be functional. Second, these findings will feed into a growing body of genomic health research. While biomedical studies are typically much larger than the study proposed here, their scope is usually narrower – and heavily biased towards European cohorts. This does not paint a representative picture of human diversity, a concern that extends to gene expression and methylation studies. In contrast, this research will provide evolutionary insight into the genome dynamics of ‘natural’ human populations that biomedical studies currently lack. This broader conceptual perspective will yield knowledge fundamental to advancing genomic health research and toward precision medicine.

Appendix 1: Research Profile of Eijkman
1-13: Wildlife Genome Diversity and Diseases

RP-EIJKMAN14

Research Profile

Project Title
Wildlife Genome Diversity and Diseases

Project Coordinator
Dr. Wuryantari Setiadi, M.Biomed

Department and Institution
Wildlife Genome Diversity and Diseases Laboratory
Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

33.1. Research Area

Wildlife, Genetics, Molecular Biology, Cell Biology, Bioinformatics, Infectious Diseases

33.2. Research Topics

1. Genetic diversity of wildlife (Primate, Mammalia, Komodo)
2. Zoonotic diseases
3. Nutrition

33.3. *Objectives (include background of research, brief economic and social benefits from Research Outcomes)*

In the last few decades, forest destruction and loss has continued to increase, resulting in a decrease in the area of protected wildlife habitat so that the number of wildlife populations has decreased. The International Union for Conservation of Nature (IUCN) in 2007 noted that several wild animals such as orangutans, dragons, and large mammals such as the Sumatran elephant, Sumatran rhino, Javan rhino, and Sumatran tiger are categorized as endangered, so the conservation of this wildlife is important and absolutely necessary for the survival of the population and their habitat.

Species-based conservation is a conservation strategy that focuses on one or several key species. This strategy is considered as one of the effective strategies because it focuses on selected species that have important roles and needs in an ecosystem. Large mammals such as elephants, rhinos and tigers are some of the key animals selected in a species conservation strategy. Conservation of species will continue to conserve ecosystems because these species need natural habitats to survive and support environmental health.

The implementation of the conservation program is carried out by considering matters related to genetics, health, behavior and geography. Technology based on molecular biology plays an important role in the conservation of various flora and fauna in Indonesia, and reveals population demographics, various disease phenomena, prevention, diagnosis and treatment.

The relevance of biodiversity to human health has become a global issue, for example changes in population, distribution of disease vectors, emergence and re-emergence of zoonotic diseases. Like the zoonosis of malaria due to massive deforestation in forests in Kalimantan which has resulted in a decrease in the carrying capacity of the natural habitat of primates, which ecologically the area is very suitable as a meeting area between humans, vectors, malaria parasites and primates. Such environmental conditions allow the creation of disease transmission from primates to humans (zoonosis) or vice versa (anthroponosis). It is interesting that reptiles are also natural hosts of the malaria parasites, *Plasmodium mexicanum* and *Plasmodium floridense*, therefore it is interesting to study malaria in reptiles in this case the Komodo dragons. By studying the malaria parasite in Komodo dragons, information will also be obtained related to the evolution of the malaria parasite in general.

Indonesia is part of the Southeast Asian region which is considered to be the biggest endemic to the emergence of new infectious diseases, so it is necessary to develop a unified policy, strategy and program to deal with zoonotic diseases in animals, medicine, public health and environmental health. The concept of one health (one health, one medical science, and one world) developed by the World Health Organization or WHO is urgently needed in Indonesia today. The aim of this concept is to reduce the risk of high impacts of disease on the animal-human ecosystem interface and the importance of preserving the ecology of the animals.

In addition, in implementing conservation programs, the balance of natural habitats for primates, large mammals and komodo dragons must also be considered. The availability of food, disease and habitat carrying capacity can be seen from the nutritional status of the animals themselves. Therefore, in accordance with the concept of one health which is a worldwide strategy to expand interdisciplinary collaboration and communication in all aspects of health services for humans, animals and the environment in relation to the nutritional status of primates and komodo dragons, it is urgently needed through accelerating the discovery of biomedical research in developing molecular identification tools of malaria parasites, improving public health efforts, and expanding the scientific knowledge base on the conservation of primates and komodo dragons that take into account the diversity of genomes, diseases and nutrition.

Economic and Social Benefit of this research:

- Useful scientific information on the genetic diversity of species and sub-species of primates (orangutans, slow lorises and macaque) and Komodo dragons, demographics of large mammal populations, and analysis of habitat suitability based on available nutrients that can be applied in efforts to better conserve wildlife.
- The study on Wildlife Genetic Diversity and Diseases is expected to provide basic data for the application of appropriate conservation strategies for key species, so that in the future it can increase the population size of these species. Research results can be used as input for policy makers in determining the direction of wildlife conservation.

- Scientific information on the relevance of biodiversity to human health, in particular the zoonotic malaria disease:
  - In terms of epidemiology, this study can provide an overview of the zoonotic epidemiological data on malaria in Indonesia, the development of fast and sensitive alternative diagnosis methods and strategies for developing zoonotic malaria vaccines.
  - In terms of public health, this research can provide a basis for developing a malaria disease control program with the emergence of new zoonotic parasites.
  - In term of environmental perspective, this study will provide useful information about the importance of maintaining forest survival as a natural habitat for primates, where ecologically the area is suitable as a meeting area between humans, vectors, malaria parasites and primate animals, so that the possibility of disease transmission primates to humans (zoonosis) can be avoided.
- Supporting wildlife conservation programs in relation to environmental health and human health in an effort to develop the one health concept.

33.4. Research Plan, Themes, Activities, Schedule

Research plan and themes:

1. Building a DNA database for primates (orangutans and slow lorises) and large mammals (Sumatran elephants, Sumatran rhinos, Javan rhinos, and Sumatran tigers) using mitochondrial DNA markers and nuclear DNA
2. Developing technology and specific bioinformatics analysis for kinship studies
3. Meta-analysis of population structure of primates (orangutans and slow lorises) and large mammals (Sumatran elephants, Sumatran rhinos, Javan rhinos and Sumatran tigers)
4. Developing methods of identifying species and subspecies of orangutans and lemurs prior to release using mitochondrial DNA markers
5. Developing a molecular identification tool for malaria parasites and its application in relation to zoonotic diseases

Activities:

24. Field sampling in wildlife conservation areas
25. Field sampling in orangutan rehabilitation center
26. Molecular analyses

27.Bioinformatics analyses

Schedule in one year:

Activities	Month in a year											
	1	2	3	4	5	6	7	8	9	10	11	12
Location and subject identification	X	X										
Contrive research budget	X	X										
Site survey and Socialization	X	X										
Ethical clearance, research permit and reagents/consumables purchasing	X	X	X	X								
Field sampling		X	X	X	X	X	X	X	X	X		
Sample processing			X	X	X	X	X	X	X	X	X	
Data analyses							X	X	X	X	X	X
Manuscript preparation									X	X	X	X
Progress report submission										X	X	X

33.5. Present research status at your Laboratory/ Department / University/ Institution

Research status is still ongoing though hampered with Covid-19 pandemic. So far, we have collected samples and data related to research on wildlife genetic diversity and diseases from various conservation areas in Indonesia

33.6. Future Research Plan

1. Developing a molecular identification tool for malaria parasites and its application in relation to zoonotic and anthroponotic diseases and studying their pathomechanisms
2. Predicting the susceptibility of a disease from individual genomic data
3. Studying nutritional status by looking at the gut microbiome in relation to various genetic factors and changes in the ecosystem
4. Screening for COVID-19 in orangutan
5. Application of molecular biology technology for genetic conservation and to support the one health program

1-34. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

34.1. Indonesian Researchers

Research Coordinator

Dr. Wuryantari Setiadi, M.Biomed
Eijkman Institute for Molecular Biology

Team Members

1. Iskandar Adnan Alisyahbana, S.Si
   Eijkman Institute for Molecular Biology
2. Sinta Hamidatus Saidah, S.Si
   Eijkman Institute for Molecular Biology
3. Jessica Rodearni Saragih, S.Si
   Eijkman Institute for Molecular Biology

34.2. Japanese Researchers (If any)

N/A

2.3. *Collaboration with Industries (If any)*

N/A

2.4. Other Research Collaborators

Borneo Orangutan Survival Foundation (Indonesia)
International Animal Rescue (Indonesia)
Dept. of Anthropology, Boston University (USA)

1-35. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: 1 person
  Training Duration: 4 years
- Master's degree
  Number of candidates: 2 persons
  Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 4 persons
- Position: technical training and post-doc research
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be ____ ___ persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the project	Price	Quantity	Total
LAMINAR HOOD, BIO SAFETY CABINET				
1	Biological Safety Cabinet Class II A2	Rp391,500,000	2	Rp783,000,000
2	PCR Cabinet	Rp61,690,446	4	Rp246,761,784
3	Airstream® Polymerase Chain Reaction Cabinets	Rp110,000,000	1	Rp110,000,000
4	Purifier® Vertical Clean Benches	Rp150,000,000	1	Rp150,000,000
FREEZER & REFRIGERATOR				
1	Temperature Freezer -40	Rp242,000,000	2	Rp1,936,000,000
2	Refrigerator and Freezer (Combo)	Rp86,300,000	2	Rp172,600,000
3	Lab Refrigerator	Rp178,632,300	1	Rp178,632,300
4	Smart-Vue™ Sensors	Rp10,000,000	6	Rp60,000,000
5	Freezer rack	Rp4,000,000	30	Rp120,000,000
6	Tempshield™ Cryo-Gloves™	Rp3,500,000	3	Rp10,500,000
7	Thermo Scientific™ TSX Series ultra-low freezers, Upright, 682 liter, fits 600 boxes	Rp400,000,000	2	Rp800,000,000
CENTRIFUGE, SPIN-DOWN, AND VORTEX				
1	Thermo Scientific™ Megafuge 16R (large	Rp288,460,000	2	Rp576,920,000

No	**Equipment/facilities to be procured for the project**	**Price**	**Quantity**	**Total**
	refrigerated centrifuge)			
2	Heraeus™ Pico™ 17 Microcentrifuge	Rp150,000,000	2	Rp300,000,000
3	Heraeus™ Fresco™ 17 Microcentrifuge	Rp220,000,000	4	Rp880,000,000
4	Thermo Scientific™ LP Vortex Mixer	Rp20,000,000	2	Rp40,000,000
5	FastPrep-24™ 5G	Rp900,000,000	1	Rp900,000,000
6	Thermo Scientific mySPIN Mini Centrifuge Series	Rp14,000,000	2	Rp28,000,000
7	Multi Spin Battery-Powered Mini Centrifuge	Rp5,500,000	4	Rp22,000,000
8	Centrifuge 5430 R incl. Rotor FA-45-30-11 + Rotor A-2-MTP + Adapter for PCR plate 96 wells, set of 2	Rp266,104,000	1	Rp266,104,000
THERMAL CYCLER				
1	Proflex 96-well PCR System	Rp390,000,000	3	Rp1,170,000,000
2	ProFlex 2 x 96-well PCR System Kit	Rp250,000,000	1	Rp250,000,000
3	7500 Fast Real-Time PCR System	Rp400,000,000	1	Rp400,000,000
DNA QUANTIFICATION				
1	4200 TapeStation System	Rp1,800,000,000	1	Rp1,800,000,000
3	Qubit 4 Quantification Starter Kit	Rp60,000,000	1	Rp60,000,000
3	Thermo Scientific™ NanoDrop™ One Microvolume UV-Vis Spectrophotometer	Rp345,000,000	1	Rp345,000,000
4	Thermo Scientific™ NanoDrop™ One/OneC Microvolume UV-Vis Spectrophotometer	Rp400,000,000	1	Rp400,000,000
ELETROPHORESIS APPARATUS				
1	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm tray, with PowerPac Basic Power Supply #1640301	Rp36,000,000	2	Rp72,000,000
2	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply #1640300	Rp30,000,000	2	Rp60,000,000
3	GelDoc Go System	Rp400,000,000	1	Rp400,000,000

No	**Equipment/facilities to be procured for the project**	**Price**	**Quantity**	**Total**
4	UV/Stain-Free Sample Tray for GelDoc Go Gel Imaging System	Rp40,000,000	1	Rp40,000,000
5	Holder for Sample Trays and UV Shield	Rp6,000,000	1	Rp6,000,000
6	GelDoc Go UV Shield	Rp8,000,000	1	Rp8,000,000
7	XcitaBlue Viewing Goggles	Rp200,000	1	Rp200,000
8	Mitsubishi Thermal Printer	Rp60,000,000	1	Rp60,000,000
9	Gel Cutter	Rp1,500,000	1	Rp1,500,000
10	Microwave Oven	Rp3,000,000	1	Rp3,000,000
11	30-Well Comb	Rp2,500,000	4	Rp10,000,000
12	20-Well Comb	Rp2,500,000	4	Rp10,000,000
13	15-Well Comb	Rp2,500,000	4	Rp10,000,000
14	10-Well Comb	Rp2,500,000	4	Rp10,000,000
15	Preparative Comb for Sub-Cell and Wide Mini-Sub Cell Systems	Rp2,500,000	2	Rp5,000,000
16	Mini Sub-Cell GT Gel Caster	Rp4,600,000	6	Rp27,600,000
17	Sub-Cell GT UV-Transparent Gel Tray, 15 x 10 cm	Rp3,400,000	6	Rp20,400,000
18	Wide Mini-Sub Cell GT Anode (Red) Electrode Assembly	Rp6,000,000	4	Rp24,000,000
19	Wide Mini-Sub Cell GT Cathode (Black) Electrode Assembly	Rp6,000,000	4	Rp24,000,000
20	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm	Rp3,400,000	4	Rp13,600,000
21	15-Well Comb	Rp2,500,000	4	Rp10,000,000
22	8-Well Comb	Rp2,500,000	4	Rp10,000,000
23	Preparative Comb	Rp3,400,000	2	Rp6,800,000
24	Mini-Sub Cell GT Anode (Red), QuickSnap Electrode Assembly	Rp5,000,000	6	Rp30,000,000
25	Mini-Sub Cell GT Cathode (Black), QuickSnap Electrode Assembly	Rp5,000,000	6	Rp30,000,000
ROBOTIC LIQUID HANDLER				
1	epMotion 5075vt	Rp3,500,000,000	1	Rp3,500,000,000
2	CleanCap & Completely contained housing		1	

No	Equipment/facilities to be procured for the project	Price	Quantity	Total
3	MultiCon PC controller incl keyboard		1	
4	Enhanced feature set 1		1	
5	8-channel dispensing tool TM50-8, 1-50µl		1	
6	8-channel dispensing tool TM1000-8, 40-1000µl		1	
7	Waste bag holder		1	
8	Reservoir rack, for use with reagent reservoirs		1	
9	TipHolder for epTips Motion		4	
10	TipHolder73 for epTips Motion		3	
GENERAL				
1	Hotplate & Magnetic Stirrer	Rp7,000,000	2	Rp14,000,000
2	SevenCompact pH meter S220	Rp50,000,000	1	Rp50,000,000
3	SpinbarR magnetic stir bar	Rp1,500,000	2	Rp3,000,000
4	SpinbarR magnetic stir bar	Rp1,500,000	2	Rp3,000,000
5	SpinbarR magnetic stir bar	Rp1,500,000	2	Rp3,000,000
6	Quintix™ Analytical Weighing Balances	Rp70,000,000	1	Rp70,000,000
7	Quintix® Precision Balance 610 g x 10 mg	Rp70,000,000	1	70,000,000
8	Eppendorf® Research® plus pipette, variable volume (single-channel, pack of 6, volumes 0.1-2.5/0.5-10/2-20/10-100/20-200/100-1000 µL)	Rp180,000,000	12	Rp2,160,000,000
9	Eppendorf® Research® plus pipette, multi-channel (8-channel, variable volume, volume 0.5-10 µL)	Rp60,000,000	2	Rp120,000,000
10	Eppendorf® Research® plus pipette, multi-channel (8-channel, variable volume, volume 10-100 µL)	Rp60,000,000	2	Rp120,000,000
11	Eppendorf® Research® plus pipette, multi-channel (8-channel, variable volume, volume 30-300 µL)	Rp60,000,000	2	Rp120,000,000
12	F1-ClipTip™ Multichannel Pipettes, 8-channel, 10 to 100 µL	Rp11,000,000	2	Rp22,000,000

No	Equipment/facilities to be procured for the project	Price	Quantity	Total
13	F1-ClipTip™ Multichannel Pipettes, 8-channel, 5 to 50 µL	Rp11,000,000	2	Rp22,000,000
14	F1-ClipTip™ Multichannel Pipettes, 8-channel, 30 to 300 µL	Rp11,000,000	2	Rp22,000,000
15	F1-ClipTip™ Multichannel Pipettes, 12-channel, 10 to 100 µL	Rp12,000,000	2	Rp24,000,000
16	F1-ClipTip™ Multichannel Pipettes, 12-channel, 5 to 50 µL	Rp12,000,000	2	Rp24,000,000
17	F1-ClipTip™ Multichannel Pipettes, 12-channel, 30 to 300 µL	Rp12,000,000	2	Rp24,000,000
18	Pipette Carousel 2	Rp4,680,500	15	Rp70,207,500
19	ThermoMixer® C	Rp109,250,000	2	Rp218,500,000
20	SmartBlockTM plates	Rp26,619,000	2	Rp53,238,000
21	SmartBlockTM 1.5 mL	Rp21,394,000	1	Rp21,394,000
22	SmartBlockTM 2 mL	Rp21,394,000	1	Rp21,394,000
23	SmartBlockTM 15 mL	Rp21,394,000	1	Rp21,394,000
24	SmartBlock PCR 96	Rp21,394,000	1	Rp21,394,000
25	Eppendorf ThermoTop®, with condens.protect technology	Rp20,000,000	2	Rp40,000,000
26	Eppendorf® PCR Cooler, iceless cold storage system for 96 well plates and PCR tubes	Rp5,000,000	6	Rp30,000,000
27	IsoSafe and IsoPack, includes 1 IsoSafe and 3 IsoPack, for 1.5/2.0 mL vessels, 0 °C	Rp5,000,000	4	Rp20,000,000
28	IsoPack and IsoRack set, includes one IsoPack and one IsoRack, for 1.5/2.0 mL vessels, 0 °C	Rp5,000,000	4	Rp20,000,000
29	MagnaRack™ Magnetic Separation Rack	12,000,000	2	24,000,000
30	Magnetic stand-96	18,000,000	2	36,000,000
31	Thermo Scientific™ LP Vortex Mixer	Rp20,000,000	6	Rp120,000,000
32	Themo Scientific Speci-Mix Test Tube Rocker	Rp5,000,000	2	Rp10,000,000
33	Shaking Waterbath	Rp12,000,000	2	Rp24,000,000

No	Equipment/facilities to be procured for the project	Price	Quantity	Total
34	24 x 2 mL All-Metal QuickPrep Sample	Rp96,000,000	1	Rp96,000,000

Note: Catalogues and product details are attached in a separate document

26. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers and human resources (from bachelor to master, and from master to PhD).

27. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Conservation and health policies and thus may affect indirectly local economy.

Appendix 1: Research Profile of Eijkman

1-14: The Establishment of Ancient DNA Facility to Support Indonesian Genetic Diversity Studies

RP-EIJKMAN15

Research Profile

Project Title

The Establishment of Ancient DNA Facility to Support Indonesian Genetic Diversity Studies

Project Coordinator

Prof. Herawati Sudoyo, MD, PhD

Department and Institution

Ancient DNA Laboratory, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1.1. Research Area

Ancient DNA, paleogenomics, population genetics, molecular anthropology, bioinformatics, evolutionary biology

1.2. Research Topics

- Reconstructing the genetic history of Indonesian population
- Investigating adaptive evolutionary history of diseases and human health in Indonesia
- Understanding population dynamics and phylogeny of prehistoric humans
- Studying paleoenvironmental and conservation genetics (wildlife and plants diversity)

1.3. Objectives (include background of research, brief economic, and social benefits from research outcomes)

Indonesia is an important hotspot for human migration in the past. This is evident from the trove of the extinct archaic and modern humans remains, as well as the environmental fossils found in this world's biggest archipelago. The Eijkman Institute pioneered the in-depth genomic studies on the Indonesian diverse populations more than twenty years ago. Our main focuses include tracing the population origins and uncovering its recent evolutionary history. Such fundamental knowledge is important for understanding the roles and implications of the vast biological diversity for human health today, especially as we move towards precision medicine. For instance, our recent genetic analysis on Indonesian ethnic groups shows traces of genetic materials from archaic humans *Homo sapiens neanderthalensis* and *Denisovan*, suggesting the interbreeding in the past and potential adaptive responses at molecular level passed down to current populations (Jacobs et al 2019 Cell). Investigating the selective pressures and gene regulations as the results of the population interactions and environmental adaptation in the past is also integral for understanding responses to communicable (infectious) and non-communicable (lifestyle-related) diseases today.

The cutting-edge DNA technology and powerful computational analysis today enable researchers to obtain high-quality genomic sequences from small amount of degraded DNA. The rapid advancement in Ancient DNA field (including obtaining results from the tropical areas where the damaging process of genetic material occurs at much faster rate) making it one of the latest scientific breakthroughs. Unfortunately, even as an important modern human migration hub in the past and an epicenter of tropical infectious diseases today, Indonesian genomics data are alarmingly underrepresented. Genetic studies on ancient samples in Indonesia is virtually absent, despite the wealth of archaeological findings from various timelines found in this region (including from the Late Pleistocene). This is largely because the country lacks a dedicated laboratory for handling archaeological and paleontological remains. Therefore, the establishment of the Ancient DNA laboratory is exceptionally crucial to facilitate the human genomic studies from this region. It is also much more cost-effective in the long run if Indonesian researchers can conduct the research locally and independently. As this is will be the first Ancient DNA laboratory in Indonesia and Southeaast Asia, it will open opportunities for collaborations with other national institutions and international researchers in the region.

Activity Objectives

1. To study human migration population diversity, health, and environmental adaptation of Indonesian populations in the past
2. To build the research capacity of Indonesian researchers in analyzing ancient samples to support the fields of evolutionary genetics and molecular anthropology

1.4. Research Plan, Themes, Activities, Schedule

Research plan and theme:

1. Preparation and study of literature
2. Preparation of research proposals
3. Submission of research ethics
4. Submission of research permits
5. Method optimization
6. Sample collection
7. DNA analysis and identification in the laboratory
8. Data analysis of genetic variation and molecular examination
9. Progress reports
10. Manuscripts writing

Schedule in one year:

Activities	**Months**

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Literature study	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Proposal writing	▨	▨	▨									
Research ethics	▨	▨	▨									
Research permits	▨	▨	▨									
Method optimization		▨	▨	▨	▨							
Sample collection				▨	▨	▨	▨	▨				
DNA analysis						▨	▨	▨	▨			
Data analysis							▨	▨	▨	▨	▨	
Progress report								▨	▨	▨	▨	▨
Manuscript writing									▨	▨	▨	▨

1.5. Present research status at your Laboratory/ Department / University/ Institution

The Ancient DNA laboratory will be a new facility built to support the ongoing research on human and wildlife genetic diversity at the Eijkman Institute.

1.6. Future Research Plan

This state-of-the-art Ancient DNA laboratory facility will be the first of its kind in Indonesia and in the Southeast Asia region. The establishment of an ancient DNA laboratory will significantly contribute to the research on human evolution, diseases response, and human-environmental adaptation in Indonesia. The Indonesian researchers will have the capacity and independence to study the prehistoric bone, teeth, and environmental samples locally while maintaining national and international collaboration. The study will include genomic analysis of ancient human and wildlife remains excavated from various prehistoric sites in Indonesia (such as Tiger Cave, Liang Bua, Bada Valley, Sangiran, Wajak, Leihatu peninsula) to complement the study of Indonesian human and wildlife population diversity and diseases.

2. RESEARCH PERSONNEL

Senior researchers, research assistants and graduate students

2.1. Indonesian Researchers

Research Coordinator

Prof. Dr Herawati Sudoyo

Eijkman Insititute for Molecular Biology

Team Members

1. Dr. Pradiptajati Kusuma

Eijkman Insititute for Molecular Biology

2. Gludhug Ariyo Purnomo, S.Si

Eijkman Insititute for Molecular Biology

3. Isabella Apriyana, M.Sc

Eijkman Insititute for Molecular Biology

4. Chelzie Crenna Darussalam, S.Si

Eijkman Insititute for Molecular Biology

5. Leonard Taufik, S.Si

Eijkman Insititute for Molecular Biology

And others to be employed

2.2. Japanese Researchers

Okinawa Institute of Science and Technology

2.3. *Collaboration with Industries*

Collaborating industries or expected collaboration industries

N/A

2.4. *Other Research Collaborations*

1. Center for national Archaelogy/Pusat Penelitian Arkeologi Nasional/ARKENAS (Indonesia)
2. Balai Arkeologi Yogyakarta (Indonesia)
3. Balai Arkeologi Maluku (Indonesia)

4. Balai Arkeologi Bali (Indonesia)
5. Balai Arkeologi Sumatera Selatan (Indonesia)
6. Balai Arkeologi Papua
7. The Australian National University (Australia)
8. University of Adelaide (Australia)
9. University of Toulouse (France)
10. Max Planck Institute for Evolutionary Anthropology (Germany)

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree

Number of candidates: 2 persons

Training Duration: 4 years

- Master’s degree

Number of candidates: 1 person

Training Duration: 4 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 5 persons
- Position: _Senior researchers, junior researchers, research assistant
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be around 2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Thermo Scientific™ TSX Series ultra-low freezers, Upright, 682 liter, fits 600 boxes (Thermo Scientific TSX60086D)	1	525,000,000	525,000,000
2	Refrigerator and Freezer Combo (Thermo Scientific ES Series 263C-AXW-TS)	4	52,000,000	208,000,000
3	Smart-Vue™ Sensors	6	10,000,000	60,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
4	Freezer rack (Thermo Scientific 1950520)	10	4,000,000	40,000,000
5	Tempshield™ Cryo-Gloves™ (TempShield 11-394-307)	1	3,500,000	3,500,000
6	Walk-in coolers (custom-made)	1	2,000,000,000	2,000,000,000
7	Sure-Grip® EX Flammable Safety Cabinet,30 gallon,2 self-close doors (Justrite™, Model No. 893020 / 893021 / 893023 / 893025)	1	14,000,000	14,000,000
8	Sure-Grip® EX Undercounter Corrosives/Acid Stl Safety Cabinet, 22 gallon, 2 manual close doors, Blue (Justrite™, Model No. 892302)	1	25,000,000	25,000,000
9	Fire-proof filing cabinet	1	30,000,000	30,000,000
10	Locker 4-door	2	5,000,000	10,000,000
11	Office cabinet	5	15,000,000	75,000,000
12	Shoe rack	1	2,000,000	2,000,000
13	Fisherbrand™ Mini UV Sterilization Cabinet with Timer (15903.00 SEK - 16696.00 SEK)	8	125,000,000	1,000,000,000
14	Pyrex® graduated beaker, heavy duty capacity 250 mL (CLS1003250-12EA)	1	4,000,000	4,000,000
15	Pyrex® graduated beaker, heavy duty capacity 1000 mL (CLS10031L-6EA)	2	5,000,000	10,000,000
16	Pyrex® graduated beaker, heavy duty capacity 600 mL (CLS1000600-6EA)	2	2,500,000	5,000,000
17	Duran® laboratory bottles, with caps, capacity 25 mL, blue PP screw cap and pouring ring (Duran, Z305154)	5	250,000	1,250,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
18	Duran® laboratory bottles, with caps, capacity 50 mL, blue PP screw cap and pouring ring (Duran, Z305162)	5	250,000	1,250,000
19	Duran® laboratory bottles, with caps, capacity 100 mL, blue PP screw cap and pouring ring (Duran, Z305170)	5	250,000	1,250,000
20	Duran® laboratory bottles, with caps, capacity 250 mL, blue PP screw cap and pouring ring (Duran, Z305189)	5	250,000	1,250,000
21	Duran® laboratory bottles, with caps, capacity 500 mL, blue PP screw cap and pouring ring (Duran, Z305197)	5	250,000	1,250,000
22	Duran® laboratory bottles, with caps, capacity 1,000 mL, blue PP screw cap and pouring ring (Duran, Z305200)	10	250,000	2,500,000
23	Caps for Duran® laboratory bottles, GL 25 neck thread, blue polypropylene (with lip seal) (Duran, Z232327)	25	250,000	6,250,000
24	Mini personal centrifuge Tomy (Tomy MPN)	2	5,500,000	11,000,000
25	Heraeus™ Pico™ 17 Microcentrifuge (Thermo Scientific 75002410)	4	150,000,000	600,000,000
26	Thermo Scientific™ Megafuge 16R (large refrigerated centrifuge)	2	288,460,000	576,920,000
27	Large Centrifuge 5910 R + S-4x Universal + Adapter for 25 mL tube / 50 mL tube / Plates / 250 mL bottle	2	472,074,000	944,148,000
28	Research® plus, Adj., Single Channel, Volume: 0.1 - 2.5 µL (Eppendorf-	10	6,993,000	69,930,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Germany)			
29	Research® plus, Adj., Single Channel, Volume: 0.5 - 10 µL (Eppendorf-Germany)	10	6,993,000	69,930,000
30	Research® plus, Adj., Single Channel, Volume: 10 - 100 µL (Eppendorf-Germany)	10	6,993,000	69,930,000
31	Research® plus, Adj., Single Channel, Volume: 20 - 200 µL (Eppendorf-Germany)	10	6,993,000	69,930,000
32	Research® plus, Adj., Single Channel, Volume: 30- 300 µL (Eppendorf-Germany)	10	6,993,000	69,930,000
33	Research® plus, Adj., Single Channel, Volume: 100 - 1000 µL (Eppendorf-Germany)	10	6,993,000	69,930,000
34	Pipette Carousel 2 (Eppendorf-Germany)	10	4,680,500	46,805,000
35	Thermal Cycler with Six Separate Peltier Blocks (Applied Biosystems USA, Model: VeritiTM 96-Well)	3	242,000,000	726,000,000
36	QuantStudio™ 3D Digital PCR System (Applied Biosystems)	1	3,500,000,000	3,500,000,000
37	SPEX®SamplePrep 6875D Freezer/Mill® Dual Chamber Cryogenic Grinder + accessories (SPEX SamplePrep, Cat no: 6875)	1	600,000,000	600,000,000
38	AnalytikJena UVP Crosslinker CL-3000	5	75,000,000	375,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
39	NSK Volvere i7 drill E-Type Micromotor System (VOLVERE i7 E (120V) Y1002893)	2	30,000,000	60,000,000
40	NSK Dental handpieces (NSK FX45M)	6	10,000,000	60,000,000
41	4 Piece Heavy Duty Combo Kit with 2 x 6.0Ah Li-ion Batteries and Charger + accessories (BOSCH 0 615 990 L8N)	3	100,000,000	300,000,000
42	Barnstead™ Smart2Pure™ Water Purification System (Thermo Scientific 50129688)	1	110,000,000	110,000,000
43	Digital Vortex Mixers (Thermo Scientific 88882010)	4	7,500,000	30,000,000
44	SevenCompact pH meter S220 (Metler Toledo 15573423)	1	50,000,000	50,000,000
45	Qubit 4 Quantification Starter Kit (Thermo Scientific Q33239)	2	60,000,000	120,000,000
46	Reciprocal water bath (Thermolab GFL-1086)	2	90,000,000	180,000,000
47	ThermoMixer® C (Eppendorf-Germany 5382 000.015)	2	109,250,000	218,500,000
48	Quintix® Analytical Balance 60 g x 0.1 mg (Sartorius QUINTIX64-1S)	2	70,000,000	140,000,000
49	Quintix® Precision Balance 610 g x 10 mg (Sartorius QUINTIX612-1S)	1	70,000,000	70,000,000
50	Thermal Cycler with Six Separate Peltier Blocks (Applied Biosystems VeritiTM 96-Well)	3	242,000,000	726,000,000
51	HANNA HI 98509 Checktemp 1	1	2,000,000	2,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
	Digital Thermometer (Hanna HI 98509)			
52	Hotplate & Magnetic Stirrer (ISG 153-005)	1	5,000,000	5,000,000
53	Spinbar® magnetic stir bar (Sigma Aldrich, cat#Z105066)	2	1,500,000	3,000,000
54	Spinbar® magnetic stir bar (Sigma Aldrich, cat#Z127035)	2	1,500,000	3,000,000
55	Spinbar® magnetic stir bar (Sigma Aldrich, cat#Z127094)	2	1,500,000	3,000,000
56	Lab spoons Lab spoons stainless steel, L 7 1/2 in (Sigma Aldrich, cat#Z511455-1PAK)	1	2,000,000	2,000,000
57	Honeywell™ North™ High Performance Face Shield Headgear - 4 in. Crown (Honeywell™ 11380048)	1	10,000,000	10,000,000
58	Nalgene™ Unwire™ Test Tube Racks: Resmer™ Manufacturing Technology (Nalgene, 5970-0513)	1	5,000,000	5,000,000
59	96-Well Flipper™ Microtube Racks	4	5,000,000	20,000,000
60	4-Way Flipper™ Racks	1	5,000,000	5,000,000
61	Fisherbrand™ Floating Test Tube Racks (Fisherbrand 14-127-44)	1	5,000,000	5,000,000
62	Axygen™ Microtube Racks: 80-Well Axyracks (Axygen Scientific 9573)	1	10,000,000	10,000,000
63	All-in-One Desktop Computer	2	15,000,000	30,000,000
64	HP Printer Color Laser 150nw	1	5,000,000	5,000,000
65	Mirror	1	1,500,000	1,500,000
66	ESDDI Photo Studio Light Box	1	3,000,000	3,000,000

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
67	DSLR Camera Canon + accessories	1	25,000,000	25,000,000
68	CCTV systems	1	200,000,000	200,000,000
69	Telephones/Intercom	4	5,000,000	20,000,000
70	SP Scienceware™ Trigger Sprayers with 53mm Adapters	1	1,500,000	1,500,000
71	Conveyor belt with UV	1	300,000,000	300,000,000
72	UV Room Disinfection Devices Systems	1	1,500,000,000	1,500,000,000
73	Positive pressure rooms systems	1	2,000,000,000	2,000,000,000
74	FastPrep-24™ 5G bead beating grinder and lysis system (MP Biomedicals, Cat. #6005500)	2	250,000,000	500,000,000
75	Agate mortar and pestle Standard form, O.D. 95 mm (Z112526-1SET)	3	1,500,000	4,500,000
76	20L Cryogenic Container Liquid Nitrogen LN2 Tank with Straps and Carry Bag	1	25,000,000	25,000,000
77	Biohazard waste container (MERCK Z370665-1EA)	5	12,000,000	60,000,000
78	Fume hood (lemari asam) + accessories (Cleatech Ductless Exhaust Fume Hood, 24" Portable, Clear Polycarbonate + accessories)	1	200,000,000	200,000,000
79	Airflow systems (HEPA) package	1	2,000,000,000	2,000,000,000
80	CurranTaylor™ Scotsman Brand Flake Ice Maker Floor Model (CurranTaylor™ SCF424A)	1	300,000,000	300,000,000

Note: Catalogues and product details are attached in a separate document

4. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers, human resources (bachelors, masters, PhDs)

5. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Scientific merit in human evolution study, capacity building for local researchers, independence and competencies in conducting ancient DNA research in Indonesia, international research collaborations

Appendix 1: Research Profile of Eijkman
1-15: Bioinformatics Unit

RP-EIJKMAN17

Research Profile

Project Title
Bioinformatics Unit

Project Coordinator
Ismail Ekoprayitno Rozi, M.Eng

Department and Institution
Bioinformatics Unit, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1.1. Research Area

Bioinformatics, big data analysis, database

1.2. Research Topics

- Building capacity and capability for advanced bioinformatics and big-data analysis, database management and other scientific computing services.
- Providing state-of-the-art facility for bioinformatics, big data analysis and database management system

1.3. Objectives **(include** *Background of research, Brief economic and social benefits from Research Outcomes)*

Background

Latest breakthrough in scientific computing has enabled many analyses in bioinformatics and big data that were previously unavailable due to lack of both affordable computing power and better algorithmic methods. Combined with the advances in the experimental data acquisition technology in molecular biology, such as NGS in genomics, MS in proteomics, better automation and other molecular biology techniques, as well as the ability to collect observational and survey data, a comprehensive choices of analytical methodologies can be used to better answer the research questions.

As more research projects in molecular biology and public health generate more experimental data and collect more observational temporal-spatial data and clinical data, the ability to devise sound systematic methodology to manage and analyze the data is a necessity for Eijkman Institute. Appropriate and sound analytical methodology will ensure the quality and validity of the research results, which in turn might help in publishing the research in reputable international journals.

Bioinformatics Unit will support researchers in Eijkman by building the capacity and capability to perform advanced scientific computing necessary to do analysis in bioinformatics, big-data and database management.

1.4. Research Plan, Themes, Activities, Schedule

Activity plan:

1. Literature studies to obtain latest information on bioinformatics analysis methods, big-data analysis and database management.
2. Procure latest state-of-the-art HPC/HTC systems, database systems and related supporting equipments.
3. Install or build the necessary software to implement methods of analyses.
4. Performing pilot projects to gain experiences and skills with the latest analytical methods/software and database management system

1.5. Present research status at your Laboratory/ Department / University/ Institution

Bioinformatics Unit has been facilitating the analyses and data managements of various research projects from research groups within Eijkman Institute and their external collaborators. The analyses include, but not limited to, sequence, WGS and GWAS analysis, population genetics and various statistical analysis. Data managements include building and maintaining database system in support for public health research topics.

The unit has been providing and facilitating scientific computing environments where users can conduct their analysis activity independently and perform various computing tasks such as emails and shared workgroup space. As of 2020, the unit has contributed to co-author 49 international publications.

1.6. Future Research Plan

- Further facilitating research projects in molecular biology related to molecular medicine and public health
- Adapting to future advances in scientific computing, especially in big-data field.

2. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

2.1. Indonesian Researchers

Research Coordinator
Ismail Ekoprayitno Rozi
Eijkman Institute for Molecular Biology

Team Members
1. Hidayat Trimarsanto
   Eijkman Institute for Molecular Biology
2. Suprapto
   Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

Collaborating industries or expected collaboration industries
N/A

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: ____ persons
  Training Duration: ____ years
- Master’s degree
  Number of candidates: ____ persons

Training Duration: ____ years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 2 persons
- Position: technical training and workshops_
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: _____________
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: _____________

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity, Price, Amount
1	High Throughput Computing / High Performance Computing system based on blade clusters	1 set: USD 2,650,000
2	Networking equipments	1 set: USD 350,000
3	Main servers	1 set: USD 480,000
4	Server room	1 set: USD 225,000
5	Workstations and notebooks	30 units: USD 96,000
6	PC for workshops/training	70 units: USD 160,000

Note: Catalogues and product details are attached in a separate document

4. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

- contribution to research publications

- human resource and expertise in data analysis
- national and international research collaborations

5. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Supporting the research environment by increasing the quality and quantity of research project in molecular biology and public health with sound analytical methods.

Appendix 1: Research Profile of Eijkman
1-16: Bioinformatics Unit 2

RP-EIJKMAN17

Research Profile

Project Title
Bioinformatics Unit

Project Coordinator
Ismail Ekoprayitno Rozi, M.Eng

Department and Institution
Bioinformatics Unit, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

3.1. Research Area

Bioinformatics, big data analysis, database

3.2. Research Topics

- Building capacity and capability for advanced bioinformatics and big-data analysis, database management and other scientific computing services.
- Providing state-of-the-art facility for bioinformatics, big data analysis and database management system

3.3. Objectives (include *Background of research, Brief economic and social benefits from Research Outcomes)*

Background

Latest breakthrough in scientific computing has enabled many analyses in bioinformatics and big data that were previously unavailable due to lack of both affordable computing power and better algorithmic methods. Combined with the advances in the experimental data acquisition technology in molecular biology, such as NGS in genomics, MS in proteomics, better automation and other molecular biology techniques, as well as the ability to collect observational and survey data, a comprehensive choices of analytical methodologies can be used to better answer the research questions.

As more research projects in molecular biology and public health generate more experimental data and collect more observational temporal-spatial data and clinical data, the ability to devise sound systematic methodology to manage and analyze the data is a necessity for Eijkman Institute. Appropriate and sound analytical methodology will ensure the quality and validity of the research results, which in turn might help in publishing the research in reputable international journals.

Bioinformatics Unit will support researchers in Eijkman by building the capacity and capability to perform advanced scientific computing necessary to do analysis in bioinformatics, big-data and database management.

3.4. Research Plan, Themes, Activities, Schedule

Activity plan:

5. Literature studies to obtain latest information on bioinformatics analysis methods, big-data analysis and database management.
6. Procure latest state-of-the-art HPC/HTC systems, database systems and related supporting equipments.
7. Install or build the necessary software to implement methods of analyses.
8. Performing pilot projects to gain experiences and skills with the latest analytical methods/software and database management system

3.5. Present research status at your Laboratory/ Department / University/ Institution

Bioinformatics Unit has been facilitating the analyses and data managements of various research projects from research groups within Eijkman Institute and their external collaborators. The analyses include, but not limited to, sequence, WGS and GWAS analysis, population genetics and various statistical analysis. Data managements include building and maintaining database system in support for public health research topics.

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3.6. Future Research Plan

- Further facilitating research projects in molecular biology related to molecular medicine and public health
- Adapting to future advances in scientific computing, especially in big-data field.

4. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

4.1. Indonesian Researchers

Research Coordinator
Ismail Ekoprayitno Rozi
Eijkman Institute for Molecular Biology

Team Members
1. Hidayat Trimarsanto
   Eijkman Institute for Molecular Biology
2. Suprapto
   Eijkman Institute for Molecular Biology

4.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

Collaborating industries or expected collaboration industries
N/A

5. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: ____ persons
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- Master’s degree
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Training Duration: ____ years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 2 persons
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3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: _____________
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: _____________

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity, Price, Amount
1	High Throughput Computing / High Performance Computing system based on blade clusters	1 set: USD 2,650,000
2	Networking equipments	1 set: USD 350,000
3	Main servers	1 set: USD 480,000
4	Server room	1 set: USD 225,000
5	Workstations and notebooks	30 units: USD 96,000
6	PC for workshops/training	70 units: USD 160,000

Note: Catalogues and product details are attached in a separate document

6. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

- contribution to research publications

- human resource and expertise in data analysis
- national and international research collaborations

7. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Supporting the research environment by increasing the quality and quantity of research project in molecular biology and public health with sound analytical methods.

Appendix 1: Research Profile of Eijkman
1-17: National Genome Center

RP-EIJKMAN21

Research Profile

Project Title
National Genome Center

Project Coordinator
Safarina G Malik, DVM, MS, PhD

Department and Institution
National Genome Center, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

1.1. Research Area

Sequencing, genotyping, genomics, NGS, WGS, GWAS

1.2. Research Topics

- Building the capacity and capability for conducting sequencing and genotyping with latest and future sequencing/genotyping platforms/technology
- Applying the latest/future platforms by providing service to/facilitating current on-going and future research projects in Eijkman Institute
- Optimizing the sequencing/genotyping methods/protocols for better suited for the research questions in the related research projects

1.3. Objectives

(include *Background of research, Brief economic and social benefits from Research Outcomes)*

Background

Advances in genomics have strategic importance in biomedicine, biodiversity and biosecurity fields. As such, the ability to conduct genomics-related research is very crucial especially in Indonesia which has very vast genetic diversity and is rich in biodiversity.

The National Genome Center was formed to support and encourage genomics-related research projects at Eijkman Institute by providing state-of-the-art facility and expertise in latest sequencing technology and platforms. The center has also been facilitating other institutions and university in the field of sequencing and haplotyping. Topics that have been supported, both within Eijkman Institute and other institutions, include but not limited to variant identification for infectious diseases, genetic variation related to human non-communicable diseases, natural resource conservations, preliminary development of precision medicine, and vaccine development.

As more research projects in molecular biology and health sectors lean on genomics, it is a necessity to build the capacity and capability to adapt the latest advances in sequencing and genotyping to be able to conduct advanced genomic-based experiments.

1.4. Research Plan, Themes, Activities, Schedule

Activity plan:

1. Literature studies to obtain latest information on sequencing and genotyping technologies and their application methods.

2. Procure latest state-of-the-art sequencing/genotyping instruments and their supporting apparatus.
3. Performing pilot projects to gain experiences and skills with the latest platform/technology.

1.5. Present research status at your Laboratory/ Department / University/ Institution

The National Genome Center has facilitated and supported more than 6 research projects by performing sequencing, genotyping and related analysis, including research projects related to Covid-19.

1.6. Future Research Plan

- Further facilitating research projects in genomics and transcriptomics
- Adapting to future technology in sequencing and genotyping

2. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

2.1. Indonesian Researchers

Research Coordinator

Safarina G Malik, DVM, MS, PhD
Eijkman Institute for Molecular Biology

Team Members

1. Hidayat Trimarsanto, B.Sc
   Eijkman Institute for Molecular Biology
2. Iskandar A. Adnan, B.Sc
   Eijkman Institute for Molecular Biology
3. Willy Agustine, B.Sc
   Eijkman Institute for Molecular Biology

2.2. Japanese Researchers

N/A

2.3. *Collaboration with Industries*

Collaborating industries or expected collaboration industries

N/A

3. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

A) Doctor degree
Number of candidates: ____ persons

Training Duration: ____ years

B) Master degree

Number of candidates: 2 persons

Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 4 persons
- Position: technical training and workshop
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year.__________
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity	Price (IDR)	Total (IDR)
1	Oligonucleotide synthesizer	1	8,081,214,682.17	8,081,214,682.17
2	QuantStudioTM 12k Flex Real-Time PCR System, AccufillTM System	1	6,027,560,000	6,027,560,000
3	Magnetic Purification System	2	578,950,000	1,157,900,000
4	Automation Liquid Handling i7-Hybrid	2	11,000,000,000	22,0000,000,000
5	Nanofluidic Chip Digital PCR Systems	2	2,550,000,000	5,100,000,000

Note: Catalogues and product details are attached in a separate document

28. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Outcomes expected from this research are:

- contribution to research papers
- human resource and expertise (experienced and skilled personnel in genomics experiments)
- more national and international research collaborations

29. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Supporting the research environment by Increasing the quality and quantity of the genomic-related research projects in Eijkman Institute and Indonesia.

Appendix 2: Research Profile of Andalas University

Research Profile

Project Title

Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders

Project Coordinator

Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.

Department and Institution

Cytogenetics Laboratory, Eijkman Institute for Molecular Biology

For

Higher Education and Research Facility Development:
Research and Innovation Capacity Development Project
Kemenristek/BRIN – JICA, Indonesia

15 December 2020

1. RESEARCH AREA, RESEARCH TOPICS AND RESEARCH PROJECT

35.1. Research Area

Cytogenetics: Disorder of Sex Development (DSD), Down syndrome, Multiple Congenital Anomaly Cases, and other rare or difficult cases of chromosomal abnormalities.

35.2. Research Topics

1. Copy Number Variations in Multiple Congenital Anomaly Cases in Indonesia: A Chromosomal Microarray Study.
2. Chromosomal microarray: Detection of genetic abnormalities in Down syndrome cases with normal karyotyping
3. Mutation detection in Indonesian 46,XY DSD patients
4. The effect of divalent cation and scaffold protein on human chromosomal structure

35.3. Objectives (include background of research, brief economic, and social benefits from research outcomes)

The diagnostic techniques that are currently available in our country has been inadequate to reveal the etiology of 46,XY DSD, multiple congenital anomaly dan Down syndrome cases. Most of the cases showed normal results following karyotyping, which indicates more advanced and accurate diagnostic techniques are required for such cases.

Our data review showed that only 22% of 46,XY DSD cases referred to our lab, could be detected by conventional cytogenetics techniques and the rest are still etiologically unknown. In our country, Next Generations Sequencing (NGS) and Whole Exome Sequencing (WES) techniques are not commonly used for diagnosis of DSD. These techniques must be developed to increase diagnostic yield of 46,XY DSD by detection of known and/or novel genes mutations responsible for the abnormal development of reproductive organs .

Based on our 3-year data review (2017-2019), diagnosis using conventional cytogenetics in cases of multiple congenital anomaly (MCA) and Down syndrome (DS) revealed normal karyotyping in 60% (26/43) and 9% (43/477), respectively. This indicates that higher resolution technique is required to get better diagnosis. Chromosomal microarray (CMA) has been used in some countries to detect copy number variations (CNVs) in DS and MCA cases that cannot be detected by conventional techniques. Using this technique, the detected genes involve in the abnormal CNV's could explain the genotype-phenotype correlations.

Economic and Social Benefits: The genetic data of Indonesian patients with DSD, MCA and DS has been lacking. By doing these researches, besides the obtained genetic data, genotype-phenotype correlations can be verified at molecular level. The developed molecular cytogenetics techniques will produce more accurate, effective and efficient diagnosis hence genetic counseling and more targeted patients' management can be given as early as possible based on etiology.

35.4. Research Plan, Themes, Activities, Schedule

Research plan and activities

1. Preparation: Literature study and research planning (type of sample, sample collection and transportation, number of samples needed, methods and techniques, and the analytical method that will be used)
2. Sample Collection: fresh blood, amnion and chorionic villus samples from patients referred to our clinic for chromosome (karyotyping) analysis.
3. Sample Processing: Based on karyotyping analysis. Those with normal karyotyping will be further analyzed using FISH (Fluorescence In Situ Hybridization) technique (DSD and DS cases), and/or PCR technique (DSD). NGS and/or WES will be applied on certain DSD samples. Microarray will be applied on MCA and non-mosaic DS cases.
4. Data analysis: Descriptive data analysis will be applied. The data will include summaries about the sample, clinical data and diagnosis of the patients. Conclusions will be made after all data, including the results, have been collected and completed.
5. Reports Submission and Manuscript Preparation: Reports will be written after completion of data analysis and the manuscript will be published in International scientific journals

Research Schedules in One Year:

ACTIVITIES	MONTH

	1	2	3	4	5	6	7	8	9	10	11	12
Preparation (Literature study and research planning)	▨	▨	▨									
Sample collection			▨	▨	▨	▨	▨	▨	▨	▨		
Sample processing				▨	▨	▨	▨	▨	▨	▨	▨	
Data analysis					▨	▨	▨	▨	▨	▨	▨	
Reports submission & manuscript preparation										▨	▨	▨

35.5. Present research status at your Laboratory/ Department / University/ Institution

Ethical clearance has just been submitted to the Eijkman Institute Research Ethics Commission. Validation of chromosomal microarray technique has been going on since the beginning of 2020 using evaluated blood samples (abnormal controls) that represent various abnormalities (duplications and deletions) of both autosomal and sex chromosome abnormalities.

35.6. Future Research Plan

1. Study on cases of unspecific mental retardation and other rare chromosomal abnormalities at molecular level.
2. Study on the effect of divalent cation and scaffold protein on human chromosomal structure

1-36. RESEARCH PERSONNEL

Experienced professors, senior researchers and graduate students

36.1. Indonesian Researchers

Research Coordinator

Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.
Eijkman Institute for Molecular Biology

Team Members

8. Dr. dr. Andi Nanis Sacharina Marzuki, SpA (K)
   Eijkman Institute for Molecular Biology
9. Chrysantine Paramayuda, BSc, MSc

Eijkman Institute for Molecular Biology

10. Dipl.-Ing. Firman Prathama Idris, S.T., MMolBiol
    Eijkman Institute for Molecular Biology
11. Faiza Az Zahra, S.Si., MSc
    Eijkman Institute for Molecular Biology
12. Debby Dwi Ambarwati, S.Si.
    Eijkman Institute for Molecular Biology
13. Mualifah, S.Si.
    Eijkman Institute for Molecular Biology
14. Astari Dwiranti, M.Eng., Ph.D
    Biology Department, Faculty of Mathematics and Natural Sciences, Universitas Indonesia

36.2. Japanese Researchers

N/A

2.3. Collaboration with Industries

N/A

1-37. SUPPORTING ACTIVITIES IN THE PROJECT

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

- Doctor degree
  Number of candidates: 1 person
  Training Duration: 4 years
- Master's degree
  Number of candidates: 1 person
  Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidates: 4 people
- Position: Senior researchers and junior researchers
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. Contributions through the Visiting Scholar Program in the Project

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be 2 persons/year.
- The number visiting scholar for Indonesian researchers to Japan estimated be around 2 persons/year.

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
1	Biological Safety Cabinet Class II A2 (Thermo Scientific-Heraeus)	2	Rp783,000,000	Rp391,500,000
2	Lab Refrigerator (Thermo Scientific)	1	Rp178,632,300	Rp178,632,300
3	Temperature Freezer -40 (Thermo Scientific)	1	Rp242,000,000	Rp242,000,000
4	Ultra Low Temperature Freezer, Upright, 682 liter (Thermo Scientific)	1	Rp574,750,000	Rp574750000
5	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 0.1 - 2.5 µL	4	Rp6,993,000	Rp27,972,000
6	Research® plus, Adj., Single Channel Brand : Eppendorf -	4	Rp6,993,000	Rp27,972,000

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
	Germany Volume : 0.5 - 10 µL			
7	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 10 - 100 µL	4	Rp6,993,000	Rp27,972,000
8	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 20 - 200 µL	4	Rp6,993,000	Rp27,972,000
9	Research® plus, Adj., Single Channel Brand : Eppendorf - Germany Volume : 100 - 1000 µL	4	Rp6,993,000	Rp27,972,000
10	Pipette Carousel 2 (Eppendorf)	4	Rp4,680,500	Rp18,722,000
11	Stereo zoom microscope, with LED Stand for Diascopic and episcopic observation (dissecting microscope) (Nikon)	1	Rp62,400,000	Rp62,400.000
12	Vortex mixer (General Lab)	4	Rp20,350,000	Rp81,400,000
13	Research inverted microscope, phase contrast (Nikon)	1	Rp287,000,000	Rp287,000,000
14	Incubator (Non CO2) (Thermo Scientific Heratherm)	1	Rp66,000,000	Rp66,000,000
15	CO2 Incubator (Thermo Scientific Heraeus)	2	Rp385,600,000	Rp771,200,000
16	Centrifuge 5424 R (Eppendorf)	1	Rp174,214,500	Rp174,214,500
17	Hot Plate Magnetic Stirrer (Thermo Scientific)	1	Rp17,611,000	Rp17,611,000
18	Reciprocating Thermostatic Shaking Water Bath (Biobase)	1	Rp120,000,000	Rp120,000,000
19	Thermo Scientific mySPIN Mini Centrifuge Series (Thermo Scientific)	3	Rp14,000,000	Rp42,000,000
20	Binocular microscope for	3	Rp157,000,000	Rp471,000,000

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
	chromosome analysis (Nikon, Eclipse Ci-L (Ci-L BF-T-P))			
21	Research fluorescence microscope system+ Karyotyping + FISH imaging system (Nikon Ex. Japan)	1	Rp1,080,600,000	Rp1,080,600,000
22	Metafer Scanning and Imaging Platform (automated slide scanner) including Motorized Microscope and Ikaros Software (Metasystems)	1	Rp4,115,475,000	Rp4,115,475,000
23	Biobase Denaturation and Hybridization System (Biobase)	1	Rp240,000,000	Rp240,000,000
24	Biobase Slide Cabinet BKC-S400 (Biobase)	4	Rp53,000,000	Rp212,000,000
25	Easypet® 3 pipette controller	2	Rp17,043,000	Rp34,086,000
26	ThermoMixer® C (Eppendorf-Germany)	1	Rp109,250,000	Rp109,250,000
27	SmartBlockTM plates (Eppendorf-Germany)	3	Rp26,619,000	Rp79,857,000
28	SmartBlockTM 1.5 mL (Eppendorf-Germany)	3	Rp21,394,000	Rp64,182,000
29	Thermal Cycler with Six Separate Peltier Blocks (Applied Biosytems)	1	Rp242,000,000	Rp242,000,000
30	Compact pH Ion Meter (Mettler Toledo)	1	Rp48,000,000	Rp48,000,000
31	Refrigerator and Freezer (Combo) (Biobase)	3	Rp86,300,000	Rp258,900,000
32	Memmert Oven UN110 Lab 108L/ Memmert UN110 Universal Oven Drying	2	Rp40,800,000	Rp81,600,000
33	Fisher Scientific 77 Slide Warmer	1	Rp8,011,250	Rp8,011,250
34	Fisher Scientific Precision GPD 10 Water Bath	1	Rp13,137,000	Rp13,137,000

No	Equipment/facilities to be procured for the project	Quantity	Price	Total
35	Thermo Sorvall ST 8 Benchtop Centrifuge Thermo Scientific	1	Rp43,885,386	Rp43,885,386
36	Set Owl™ EasyCast™ B2 Mini Gel Electrophoresis Systems (Thermo Fisher)	1	Rp8,399,502	Rp8,399,502
37	Set Owl™ A1 Large Gel System, complete system (Thermo Fisher)	1	Rp11,484,000	Rp11,484,000
38	Liquid/supernatan Aspiration Pump (Vacuubrand)	2	Rp27,147,828	Rp54,295,656

Note: Catalogues and product details are attached in a separate document

30. EXPECTED RESEARCH OUTCOMES (PAPER, PRODUCT, PATENT, HUMAN RESOURCES ETC.)

Research papers and human resources (staff development)

31. PROJECTED RESEARCH OUTPUTS (CONTRIBUTION TO THE SOCIETY, ECONOMY ETC.)

Health policies that refers to better and more targeted patient's management, specifically for those with multiple congenital anomalies, Down syndrome and mental retardation. This can lead to early detection thus early treatment can be given. More children with mental retardation and Down syndrome will have better quality of life. Better generations may lead to better country's economy.

(Attachment 2) Research Profile of Andalas University

APPENDICES

Research Profile

(Project Title) **Strengthening COVID-19 related Health and Medical Research, Innovation and Services Managed by Science Techno Park of Andalas University**

(Name of Project Coordinator) **Dr.-Ing Uyung Gatot S. Dinata**

(Name of Department, University / Institution) **Science Techno Park, Andalas University**

For

Higher Education and Research Facility Development: Research and Innovation Capacity Development" Project
Indonesia
(Kemristek/BRIN–JICA)

(Date of submission)

1. Research Area, Research Topics and Research Project

5.1. Research Area

I. Development of medical products for curing and handling COVID-19 diseases (including its derivatives and mutations);

II. Strengthening of institutional capacity of Science Techno Park in facilities and human resources, and;

III. Commercialization of the COVID-19 related medical products

5.2. Research Topics

I. Development of medical products for curing and handling COVID-19 diseases (including its derivatives and mutations)

  A) Development of Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
  B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
  C) Non-COVID ILI Rapid Test Product Development;
  D) COVID 19 Vaccine Product Development;
  E) Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
  F) Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;
  G) Product Development of Five COVID-19 Nanoparticle Technology Immunomodulators;
  H) Development of Therapeutic Technology for COVID-19 based on Herbal Products;
  I) Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
  J) Development of Catechin-based Antibody and Stress Reduction Supplement Products;
  K) Open-Source Ventilator Product Development;
  L) CPAP (Continuous Positive Airway Pressure) Ventilator Product Development;
  M) Digital Statoscope Product Development for COVID-19 Patients;
  N) PPE (Personal Protective Equipment) Product Development for Infectious COVID-19;
  O) Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services;
  P) COVID-19 patient room disinfectant robot;
  Q) Patrol robots suspecting COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients;
  R) Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients;

S) Product Development for Powered Air Purifying Respirator;

T) Development of Infectious Waste Incinerator Products with Plasma Pyrolysis;

U) Development of Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom with Nanotechnology in the New Norm;

II. Strengthening of institutional capacity of Science Techno Park in 1) facilities, and 2) human resources

1) Facilities

- Quadrupole GCMS, VOC Analysis, Autosampler (Thermal Desorption, air sampler, CDS Thermal Desorbed), Seek Scan package, REVEAL FIREPRO, NIR Measurement Packages, Raman Measurement Packages, HES Spectrometer, aerosol monitor, calibrator, particle sizer spectrometer, flow analyzer, ventilator test system, cleanroom condensation particle counter, charged aerosol detection, Liquid Chromatography, gas sensors (COx, Ox, NOx, hydrocarbon) for research and development of

  A) Automated Early warning detection system for airborne viruses and microorganism prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;

- Gas Analyzer, Nano Sight, MONITORING SYSTEM, Spectrometer FT-NIR, 3D Printer, CNC Laser, laser engraved, Flow Cytometer, apheresis, Elisa, PCR for research and development of

  B) Carbon-photocatalyst for Absolut ULPA filter;

- Andalas Covid-19 Laboratory, Andalas University Hospital, Centrifuge, cross-test tools, Convalescent plasma storage refrigerator, Donor chairs, and automatic Sealer for research and development of

  C) Non-COVID ILI Rapid Test Product

  D) COVID 19 Vaccine;

- Nano Technology Tools, Nano sizer, Zeta Sizer, Ultraturax, Homogenizer, sonicator, Freeze Drying, Climatic chamber, Electron Microscope, UV-Vis Spectrophotometer, Immunomodulator, Elisa, and Immunohistochemical for research and development of

  G) Immunomodulators COVID-19 with Nanoparticle Technology

  U) Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom;

- Genovac, High-performance FTIR Analyzer for research and development of

  H) Therapeutic Technology for COVID-19 based on Herbal Products

  E) Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19

  F) Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU;

- UPLC-MS-MS and lyovapor for research and development of

  U) Supplement Immune Booster and Anti-oxidative stress Using Catechin (Uncaria gambir)

  - I) Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19
  - J) Catechin-based Antibody and Stress Reduction Supplement Products;
- Arduino, Digital Stethoscope, Bluetooth Module, LCD OLED, UART Sesrial, Amplifier, Speaker, Sound Sensor and Laser Printing Services for research and development of
  - M) Digital Statoscope for COVID-19 Patients
  - O) Amira Robot for Infectious Case Management patient services
  - P) COVID-19 patient room disinfectant robot
  - Q) Patrol robots suspecting COVID-19 and handling bodies and flying robots delivering goods for COVID-19 patients
  - R) Wearable Sensors & Machine Learning in Handling COVID-19 Patients;
- Pyrolysis incinerator, Plasma reactor, Measurement and monitoring system, Plasma furnace, Power transformer, Lightning and surge protection systems, for research and development of
  - T) Infectious Waste Incinerator with Plasma Pyrolysis
  - K) Open-Source Ventilator
  - L) CPAP (Continuous Positive Airway Pressure) Ventilator
  - N) PPE (Personal Protective Equipment) for Infectious disease
  - S) Product Development for Powered Air Purifying Respirator

2) Human Resources (200 Persons)

- Degree Program (Master Degree, Ph.D.) in Japan and in Indonesia
- Non-Degree Program (Post-Doc Research, Technical Training, Internship) in Japan
- Visiting Scholar Program (Exchange Researchers between Indonesia and Japan)

III. Commercialization of the COVID-19 related medical products

- Collaboration between Science Techno Park and industries (Shimadzu, Kimia Farma, Aichikikai Techno System, Shintec Hozumi Co. Ltd. and Infinitigroup)

5.3. Objectives

(include *Background of research, Brief economic and social benefits from Research Outcomes)*

Background of Research

COVID-19 pandemic nowadays is a very serious problem. The virus has been infecting more than 50 million people and caused more than 1.2 million deaths in the world. It has been affecting human social life and world economy immensely. This situation could continue for the next several years without effective measures.

Andalas University (Unand) has capacity and experiences in research and innovation in the field of food, drug, and health. Unand has been developing drugs particularly for natural and herbal medicine as well as health science & technology especially for medical devices. Unand has been engaged in testing COVID-19-suspected patients, tracing the potential infection routes, and providing medical treatment in West Sumatra Province. Due to the highly skilled services of Unand, the spread of COVID-19 was slowed-down in that area. However, it is expected that Unand should develop more useful medical products such as devices, treatment, medicine, etc. to devastate the prevalence of COVID-19. The past activities in research and innovation and implementation of measures for COVID-19 prove that Unand is capable of developing more useful medical products and commercialize them so that people can easily access them. Also, it is worth while to strengthen their facilities and human resources to accelerate their R&D.

Economic and Social Benefits

Research and development of A) automated early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker will have a big impact on preventing infectious disease airborne transmission. The system provides alert and awareness for disease transmission in closed rooms (i.e. office, home, mass gathering places) or transportation / vehicles. Once it is merchandised, people can procure the system at a much low price.

Research and development of B) Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) Portable, Modular, and installed air purifier system for COVID-19 infection in closed room will have a big impact on preventing infectious disease airborne transmission. The system provides safety and preventive measures for disease transmission through air in closed rooms (i.e. office, home, mass gathering places) or transportation / vehicles. Once it is merchandised, people can procure the system at a much low price, and rooms can safely accommodate more occupants.

Research and development of C) Non-COVID ILI Rapid Test will have a big impact on delivering immediate results on screening, diagnosis and monitoring of infectious and transmitted disease. The kits provide quick and technically simple assays that are easily read and offer relatively high throughput. Once it is merchandised, people can procure the system at a much low price.

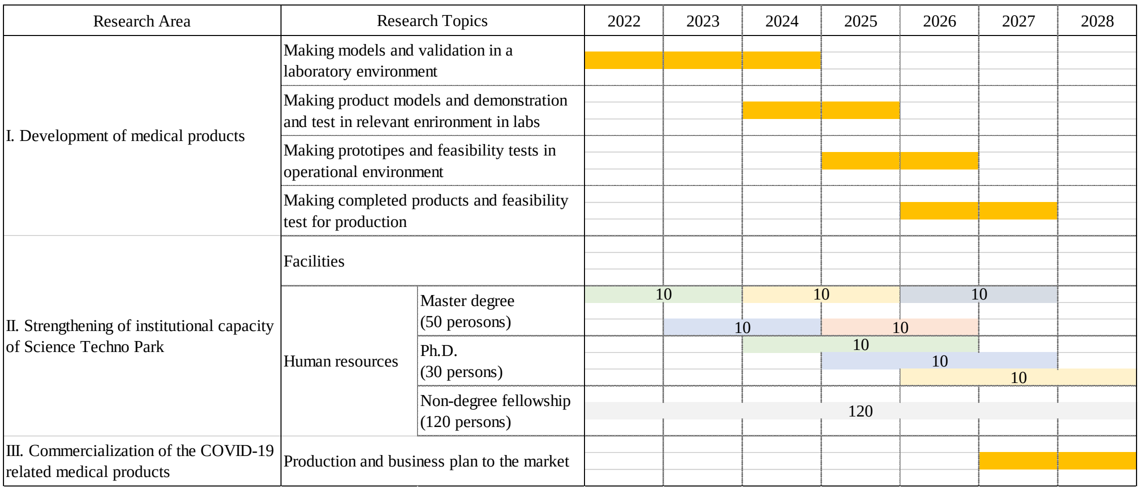
Research and development of M) Digital Statoscope for COVID-19 Patients, O) Amira Robot for Infectious Case Management patient services, P) COVID-19 patient room disinfectant robot, Q) Patrol robots suspecting COVID-19 and handling bodies and flying robots delivering goods for COVID-19 patients, R) Wearable Sensors & Machine Learning in Handling COVID-19 Patients, will have a big impact on assisting the fight against Covid-19 and other transmitted infectious diseases. The Robots and wearable devices will prevent the healthcare workers being exposed to high risk situation. Once it is merchandised, people can procure the system at a much low price.

Research and development of T) Infectious Waste Incinerator with Plasma Pyrolysis, K) Open-Source Ventilator, L) CPAP (Continuous Positive Airway Pressure) Ventilator, N) PPE (Personal Protective Equipment) for Infectious disease, and S) Product Development for Powered Air Purifying

Respirator, will have a big impact on assisting the fight against Covid-19 and other transmitted infectious diseases which attach the respiratory systems in particular, and safely discharged the waste and disposable products afterwards. The products will prevent the healthcare workers being exposed to high-risk situation, and accelerated the recovery of the patients. Once it is merchandised, people can procure the system at a much low price.

Research and development of G) Immunomodulators COVID-19 with Nanoparticle Technology, U) Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom, H) Therapeutic Technology for COVID-19 based on Herbal Products, E) Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19, F) Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU, U) Supplement Immune Booster and Anti-oxidative stress Using Catechin (Uncaria gambir), I) Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19, and J) Catechin-based Antibody and Stress Reduction Supplement Products, will have a big impact on assisting the fight against Covid-19, other transmitted infectious diseases, and their secondary infections. The products will prevent the patients to recover quickly and reduce the side effect of the disease. Once it is merchandised, people can procure the system at a much low price.

5.4. *Research Plan, Themes, Activities, Schedule*



Research Area	Research Topics		2022	2023	2024	2025	2026	2027	2028
I. Development of medical products	Making models and validation in a laboratory environment		🟨	🟨	🟨				
	Making product models and demonstration and test in relevant enrironment in labs				🟨	🟨			
	Making prototipes and feasibility tests in operational environment					🟨	🟨		
	Making completed products and feasibility test for production						🟨	🟨	
II. Strengthening of institutional capacity of Science Techno Park	Facilities								
	Human resources	Master degree (50 perosons)	🟩 10	🟩	🟨 10	🟨	⬜ 10	⬜	
				🟦 10	🟦	🟧 10	🟧		
		Ph.D. (30 persons)			🟩 10	🟩	🟩		
						🟦 10	🟦	🟦	
							🟨 10	🟨	🟨
		Non-degree fellowship (120 persons)	⬜ 120	⬜	⬜	⬜	⬜	⬜	⬜
III. Commercialization of the COVID-19 related medical products	Production and business plan to the market							🟨	🟨

5.5. *Present research status at your Laboratory/ Department / University/ Institution*

Present status of researches and process of production/development

- The prototype of Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker is being developed;
- Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) filter Portable, Modular, and installed air purifier system for COVID-19 infection in closed room is being developed;
- Non-COVID ILI Rapid Test Product Development is being developed;

- COVID 19 Vaccine Product Development is being developed;
- Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19 is being developed;
- Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients in the ICU is being developed;
- The prototype of Product Development of Five COVID-19 Nanoparticle Technology Immunomodulators is in invitro process;
- Development of Therapeutic Technology for COVID-19 based on Herbal Products is in invitro process;
- Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19 is in invitro process;
- Development of Catechin-based Antibody and Stress Reduction Supplement Products is in invitro process;
- Open-Source Ventilator Product Development is in invitro process;
- CPAP (Continuous Positive Airway Pressure) Ventilator Product Development is being developed;
- Digital Statoscope Product Development for COVID-19 Patients is being developed;
- PPE (Personal Protective Equipment) Product Development for Infectious COVID-19 is being developed;
- Amira Robot Product Development (temperature detection, food delivery, medication reminder, information) Infectious Case Management patient services is being developed;
- COVID-19 patient room disinfectant robot is being developed;
- Patrol robots suspect COVID-19 and handling bodies, flying robots delivering goods for COVID-19 patients is being developed;
- Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients is being developed;
- Product Development for Powered Air Purifying Respirator is being developed;
- Development of Infectious Waste Incinerator Products with Plasma Pyrolysis is being developed;
- Development of Stunting and Immune Booster Handling Products Using Food Ingredients Based on Local-Wisdom with Nanotechnology in the New Norm is being developed

Present status of collaboration with Japanese laboratories/researchers

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker

Japanese Institution and Researcher: Kobe University, Dr. Shinichiro KUROKI

Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) filter Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
Japanese Institution and Researcher: Gifu University, Dr. Kohei NAKANO
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: Non-COVID ILI Rapid Test Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: COVID 19 Vaccine Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Hirowati Ali, PhD

Topic: Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients at ICU;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Dwi Yulia, SpPK

Topic: Nanoparticle Technology Five Immunomodulator Products;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Drs. Yufri Aldi, M.Si. Apt.

Topic: Development of COVID-19 Therapeutic Technology based on Herbal Products;

Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Friardi Ismet.

Topic: Development of Supplement Products for Antibody Strengthening and Stress Reduction based on Catechins;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: Development of CPAP (Continuous Positive Airway Pressure) Ventilator Product, Digital Stateskop for COVID-19 Patients, Product Development for Powered Air Purifying Respirator;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Ilhamdi Rusydi.

Topic: Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Zaini.

Topic: Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Zaini

Topic: Open Source Ventilator Product, Infectious Waste Incenerator Products with Plasma Pyroly;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Aulia, M. Eng.

Topic: Amira Robot Product Development (temperature detection, food delivery, medicine reminder, information) Management of Infectious Cases, patient services;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Firman Ridwan, M. ASc.

Topic: Disinfectant robot for COVID-19 patient room;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Hanalde Andre, MT.

Topic: PPE (Personal Protective Equipment) Product Development for COVID-19 Infections;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Lusi Susanti, MT.

Topic: Development of Stunting and Immune Booster Management Products Using Food Ingredients Based on Local Wisdom with Nanotechnology in the Era of New Normal;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Syahrial, M. Biomed.

Topic: Empowerment of Technology and Business Incubation for Science Techno Parks (STP);
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs
Researcher at Unand: Universitas Andalas Science Techno Park.

Topic: e-Business Gathering & e-Meeting of STP's COVID-19 Handling Products;
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs

Researcher at Unand: Universitas Andalas Science Techno Park.

Present status of commercialization of research outputs with industries

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
Company/Institute: Institute for Researches and Community Services
Current Status of Commercialization: Product and Market development

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
Company/Institute: Institute for Researches and Community Services
Current Status of Commercialization: Product and Market development

Topic: Non-COVID ILI Rapid Test Product Development;
Company/Institute: PT Kimia Farma
Current Status of Commercialization: Product and Market development

Topic: COVID 19 Vaccine Product Development;
Company/Institute: PT Bio Farma
Current Status of Commercialization: Product and Market development

Topic: Development of COVID-19 Therapeutic Technology based on Herbal Products;
Company/Institute: PT Fitofarmaka Lab
Current Status of Commercialization: Product and Market development, Marketing.

5.6. Future Research Plan

Future research outputs and its commercialization

- Automated Early warning detection system for airborne microorganism and viruses;
- Carbon-photocatalyst Absolut ULPA (Ultra-Low particulate air) filter;
- Non-COVID ILI Rapid Test;
- COVID 19 Vaccine;
- Tell Inducted Mesencimal Cells for Pneumonia Therapy
- Convalescent Plasma Products for Therapy
- Five Nanoparticle Immunomodulators
- Therapeutic from Herbal Products
- Herbal Medicines and Phytopharmaca from Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants
- Catechin-based Antibody and Stress Reduction Supplement

- Open-Source Ventilator
- CPAP (Continuous Positive Airway Pressure) Ventilator
- Digital Statoscope
- PPE (Personal Protective Equipment) Product
- Amira Robot (temperature detection, food delivery, medication reminder, information)
- Room disinfectant robot
- Patrol robots and handling bodies, flying robots delivery
- Wearable devices
- Powered Air Purifying Respirator
- Waste Incinerator Products with Plasma Pyrolysis
- Anti Stunting and Immune Booster

In the future we will reproduce this prototype to be commercialized and sold in various hospitals in facilitating hospital services for patients infected with Covid19. Also, marketing for the product at niche markets, in particular, for government facilities, health facilities, public facilities (airports, seaports, convention centers, etc.) is also expected to be conducted.

Potential collaboration with Japanese laboratories/researchers

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker
Japanese Institution and Researcher: Kobe University, Dr. Shinichiro KUROKI
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: Carbon-photocatalyst for Absolut ULPA (Ultra-Low particulate air) filter Portable, Modular, and installed air purifier system for COVID-19 infection in closed room;
Japanese Institution and Researcher: Gifu University, Dr. Kohei NAKANO
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Muhammad Makky

Topic: Non-COVID ILI Rapid Test Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: COVID 19 Vaccine Product Development;
Japanese Institution and Researcher: Kobe University, (TBA)

Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Andani Eka Putra

Topic: Development of Tell Inducted Mesencimal Cells as Adjuvant Cytokine Storm Therapy In Pneumonia COVID-19;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Hirowati Ali, PhD

Topic: Development of Convalescent Plasma Products for Therapy of Critical COVID-19 Patients at ICU;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: dr. Dwi Yulia, SpPK

Topic: Nanoparticle Technology Five Immunomodulator Products;
Japanese Institution and Researcher: Kobe University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Drs. Yufri Aldi, M.Si. Apt.

Topic: Development of COVID-19 Therapeutic Technology based on Herbal Products;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: Development of Standardized Herbal Medicines and Phytopharmaca Candidates from bioactive fractions and purified extracts of Kayu Angin (Usnea sp.) for Anti-Pneumonia and Immunostimulants in Secondary Infection of COVID-19;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Friardi Ismet.

Topic: Development of Supplement Products for Antibody Strengthening and Stress Reduction based on Catechins;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs

Researcher at Unand: Prof. Dr. Dedi Prima Putra.

Topic: Development of CPAP Ventilator Product, Digital Stateskop for COVID-19 Patients, Product Development for Powered Air Purifying Respirator;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Ilhamdi Rusydi.

Topic: Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Zaini.

Topic: Patrol robot suspect COVID-19 and handling bodies, Flying robot delivering goods for COVID-19 patients, Implementation of Wearable Sensors & Machine Learning in Handling COVID-19 Patients ;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Zaini

Topic: Open Source Ventilator Product, Infectious Waste Incenerator Products with Plasma Pyroly;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Aulia, M. Eng.

Topic: Amira Robot Product Development (temperature detection, food delivery, medicine reminder, information) Management of Infectious Cases, patient services;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Firman Ridwan, M. ASc.

Topic: Disinfectant robot for COVID-19 patient room;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs

Researcher at Unand: Hanalde Andre, MT.

Topic: PPE (Personal Protective Equipment) Product Development for COVID-19 Infections;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Lusi Susanti, MT.

Topic: Development of Stunting and Immune Booster Management Products Using Food Ingredients Based on Local Wisdom with Nanotechnology in the Era of New Normal;
Japanese Institution and Researcher: Japan University, (TBA)
Type of Collaboration: Joint Research and development Programs
Researcher at Unand: Dr. Syahrial, M. Biomed.

Topic: Empowerment of Technology and Business Incubation for Science Techno Parks (STP);
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs
Researcher at Unand: Universitas Andalas Science Techno Park.

Topic: e‑Business Gathering & e-Meeting of STP's COVID-19 Handling Products;
Japanese Institution and Researcher: Japan Science Techno Park, (TBA)
Type of Collaboration: Joint development Programs
Researcher at Unand: Universitas Andalas Science Techno Park.

Potential commercialization of research outputs with industries

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
Company/Institute: Institute for Researches and Community Services
Current Status of Commercialization: Product and Market development

Topic: Research on Automated Early warning detection system for prevention of airborne transmission of infectious disease (i.e. COVID-19) using biomarker;
Company/Institute: Institute for Researches and Community Services
Current Status of Commercialization: Product and Market development

Topic: Non-COVID ILI Rapid Test Product Development;
Company/Institute: PT Kimia Farma
Current Status of Commercialization: Product and Market development

Topic: COVID 19 Vaccine Product Development;
Company/Institute: PT Bio Farma
Current Status of Commercialization: Product and Market development

Topic: Development of COVID-19 Therapeutic Technology based on Herbal Products;
Company/Institute: PT Fitofarmaka Lab
Current Status of Commercialization: Product and Market development, Marketing.

6. Research Personnel

Experienced professors, senior researchers and graduate students

6.1. Indonesian Researchers

Research Coordinator

Name: Dr. -ing. Uyung Gatot S Dinata
Affiliation
<Andalas University >

Team Members

1. **Name:** Dr. Eng Muhammad Makky_
   Afflication
   < Andalas University>
2. **Name:** Dr. Eka Candra Lina_
   Afflication
   < Andalas University>
3. **Name:** Dr. Andani Eka Putra_
   Afflication
   < Andalas University>
4. **Name:** dr. Hirowati Ali, PhD_
   Afflication
   < Andalas University>
5. **Name:** dr. Dwi Yulia, SpPK_
   Afflication
   < Andalas University>
6. **Name:** Prof. Dr. Drs. Yufri Aldi, M.Si. Apt._
   Afflication
   < Andalas University>
7. **Name:** Prof. Dr. Dedi Prima Putra_
   Afflication
   < Andalas University>
8. **Name:** Dr. Friardi Ismet_
   Afflication
   < Andalas University>
9. **Name:** Prof. Dr. Dedi Prima Putra_
   Afflication
   < Andalas University>
10. **Name:** Dr. Ilhamdi Rusydi_
    Afflication
    < Andalas University>
11. **Name:** Dr. Zaini_
    Afflication
    < Andalas University>
12. **Name:** Dr. Aulia, M. Eng._
    Afflication
    < Andalas University>
13. **Name:** Dr. Firman Ridwan, M. ASc_
    Afflication
    < Andalas University>
14. **Name:** Hanalde Andre, MT._
    Afflication
    < Andalas University>
15. **Name:** Dr. Lusi Susanti, MT._

Afflication
< Andalas University>

16.Name: Dr. Syahrial, M. Biomed._
Afflication
< Andalas University>

17.Name: Prima Fitri, MT_
Afflication
< Andalas University>

18.Name: Caesar Welya, MP_
Afflication
< Andalas University>

19.Name: Wenny Surya M, MP_
Afflication
< Andalas University>

20.Name: Beeri B, MSc_
Afflication
< Andalas University>

Please add another research member, including researcher from partner institutions and industries, if any.

6.2. Japanese Researchers (If any)

Research Coordinator
Name: Jichi University
Affiliation
< >

Research Coordinator
Name: Prof. Dr. Eiji Morimoto
Affiliation
< Tottory University>

Research Coordinator
Name: Prof. Kohei NAKANO
Affiliation
< Gifu University >

Team Members
Name: Prof. Shinichiro Kuroki
Affiliation
< Kobe University >

Research Coordinator
Name: Shin Kaneko, M.D, Ph.D (contacting in progress)
Affiliation
CiRA, Kyoto University

Research Coordinator
Name: Prof. Jun Ota
Affiliation

< The University of Tokyo >

2.3. *Collaboration with Industries (If any)*

Collaborating industries or expected collaboration industries

Name: Kimia Farma
State of collabiration
< >
Name: Shimadzu Corporation, Japan
State of collabiration
< Developing machine/parts for biomarker detection >
Name: Japan Air Filter, Japan
State of collabiration
< Developing machine/parts for Absolute ULPA Filter with Carbon Photocatalist>
Name: Aichikikai Techno System
State of collabiration
< >
Name: Shintec Hozumi Co.,Ltd.
State of collabiration
< >
Name: INFINITIGROUP Indonesia
State of collabiration
< >

Key personnel
1. Name:________________________
Affiliation
< >

7. Supporting Activities in the Project

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow:

O) Doctor degree
Number of candidates: 30 persons
Training Duration: 3 years
P) Master degree
Number of candidates: 50 persons
Training Duration: 2 years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 120 persons
- Position: administration staff, laboratory analyst
- Program: Non-degree (Post-doc research, technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. *Contributions through the Visiting Scholar Program in the Project*

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: 40 persons/year
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: 40 persons/year

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. Contributions through the Hardware Procurement Program in the Project

The following facilities and equipment in your university can be used for the implementation of this project:

No	Equipment	Quantity	Price/ Unit (Rp)	Total (Rp)
1	2020 Attune NxT Flow Cytometer (Invitrogen - A24863)	1	3,120,000,000	3,120,000,000
2	Alat aferesis	3	4,000,000,000	12,000,000,000
3	Alat ELISA uji kadar Antibodi COVID 19/ uji saring IMLTD	1	3,000,000,000	3,000,000,000
4	Alat PCR untuk uji RNA COVID 19	1	4,000,000,000	4,000,000,000
5	Sentrifus pemisah komponen	2	1,000,000,000	2,000,000,000
6	ALat uji silang serasi	2	1,000,000,000	2,000,000,000
7	Kulkas penyimpanan plasma konvalesen	3	1,000,000,000	3,000,000,000
8	Kursi donor 3 set	3	200,000,000	600,000,000
9	Sealer otomatic	5	50,000,000	250,000,000
10	Koagulometer pemantau donor plasma konvalesense pasien Covid 19	1	2,000,000,000	2,000,000,000
11	Hematologi analizer skrining donor	1	1,500,000,000	1,500,000,000
12	Kimia klinik analizer pemantau donor plasma konvalesen	1	3,000,000,000	3,000,000,000

No	Equipment	Quantity	Price/ Unit (Rp)	Total (Rp)
13	flowsitometri pemantauan progresifitas selama terapi plasma konvalesense infeksi Covid 19	1	4,000,000,000	4,000,000,000
14	Nanosizer dan Zeta sizer (Horiba)	1	800,000,000	800,000,000
15	Ultraturax	1	100,000,000	100,000,000
16	Homogenizer-sonicator	1	80,000,000	80,000,000
17	Freeze Drying	1	300,000,000	300,000,000
18	Climatic chamber	1	300,000,000	300,000,000
19	Transmission Electron Microscope	1	1,400,000,000	1,400,000,000
20	Spektrofotometer UV Vis	1	400,000,000	400,000,000
21	Buchi Chromatography flash/prep	1	1,850,000,000	1,850,000,000
22	BÜCHI ROTAVAPOR R-220 PRO - Industrial Evaporation	1	1,676,600,000	1,676,600,000
23	CNC milling beserta kelengkapanya	1	2,086,278,000	2,086,278,000
24	Desktop PC design CAD for CNC milling machine	1	20,000,000	20,000,000
25	PCB Etching Machine for making printed circuit board	1	400,000,000	400,000,000
26	Peralatan las lengkap (MIG/TIG welding dll)	1	300,000,000	300,000,000
27	CNC turning beserta kelengkapanya	1	1,862,960,000	1,862,960,000
28	Desktop PC design CAD CNC turning machine	1	20,000,000	20,000,000
29	CNC laser cutting 4 axis beserta kelengkapanya	1	4,631,388,000	4,631,388,000
30	Desktop PC design CAD for CNC laser cutting	1	20,000,000	20,000,000
31	Giant 3D printing	1	689,397,500	689,397,500
32	Laptop for design 3D Printer	1	31,000,000	31,000,000
33	Kerja Bangku (rakum, geinda meja, mesin bor, osiloskop, gergaji dll)	1	300,000,000	300,000,000
34	Printer 3D	3	169,278,181	507,834,543
35	PCB machine (Base unit)	2	187,000,000	374,000,000
36	Scion Single Quadropole 436 GCMS for VOC Analysis. Equiped 72 capacity Autosampler Thermal Desorbtion and air sampler	1	2,000,000,000	2,000,000,000
37	CDS Thermal Desorber Autosampler	2	388,000,000	776,000,000
38	Seek Scan package	1	131,000,000	131,000,000
39	REVEAL FIREPRO	1	22,500,000	22,500,000

No	Equipment	Quantity	Price/ Unit (Rp)	Total (Rp)
40	NIR Measurement Packages: BUNDLE-NIRQUEST-NIR	1	500,000,000	500,000,000
41	Raman Measurement Packages	1	1,100,000,000	1,100,000,000
42	HES Spectrometer	1	1,200,000,000	1,200,000,000
43	BUNDLE-HDX-BIO	1	250,000,000	250,000,000
44	BUNDLE-HR-PLASMA	1	150,000,000	150,000,000
45	BUNDLE-QEPRO-FL	1	450,000,000	450,000,000
46	Absorbance Measurement Packages	1	450,000,000	450,000,000
47	DUSTTRAK DRX AEROSOL MONITOR 8534	1	200,000,000	200,000,000
48	SIDEPAK PERSONAL AEROSOL MONITOR AM521	1	200,000,000	200,000,000
49	PRIMARY CALIBRATOR 4046	1	35,000,000	35,000,000
50	DUSTTRAK II AEROSOL MONITOR 8530EP	1	150,000,000	150,000,000
51	SCANNING MOBILITY PARTICLE SIZER SPECTROMETER 3938	1	1,000,000,000	1,000,000,000
52	CERTIFIER FLOW ANALYZER PLUS VENTILATOR TEST SYSTEM 4080	1	175,000,000	175,000,000
53	AEROTRAK CLEANROOM CONDENSATION PARTICLE COUNTER 900	1	1,000,000,000	1,000,000,000
54	FACILITY MONITORING SYSTEM	1	150,000,000	150,000,000
55	Tungku pirolyisis plasma 2 unit	2	500,000,000	1,000,000,000
56	Sistem saringan gas bertingkat	5	15,000,000	75,000,000
57	Penyimpan hidrogen	5	15,000,000	75,000,000
58	Tabung oksigen	5	5,000,000	25,000,000
59	Elektroda tahan suhu tinggi	5	30,000,000	150,000,000
60	modul konverter 20 kV	3	150,000,000	450,000,000
61	kompresor 3 HP dan pengatur tekanan	2	12,000,000	24,000,000
62	Roof top solar panel 15 kW	1	600,000,000	600,000,000
63	Modul sistem proteksi tegangan lebih dan tegangan impuls	2	75,000,000	150,000,000
64	Modul cetakan logam sisa pengolahan sampah metal	2	15,000,000	30,000,000
65	Modul inverter 75 kW, 20 kV	3	180,000,000	540,000,000
66	microsteam turbine 5 kW	3	150,000,000	450,000,000
67	microgas turbine 5 kW	3	150,000,000	450,000,000

No	Equipment	Quantity	Price/ Unit (Rp)	Total (Rp)
68	Waste scrubber machine	2	130,000,000	260,000,000
69	Waste sorter machine	2	130,000,000	260,000,000
70	printer 3D untuk pembuatan modul dan sistem pemipaan dari PVC	2	23,000,000	46,000,000
71	CNC plasma cutter/solder	2	250,000,000	500,000,000
72	Mesin potong presisi tinggi	2	45,000,000	90,000,000
73	Mesin bubut	2	65,000,000	130,000,000
74	Elektroda tahan suhu tinggi	2	45,000,000	90,000,000
75	Meja kerja	2	15,000,000	30,000,000
76	Comsol multy physic	1	35,000,000	35,000,000
77	Sensor arus, suhu tinggi, kelembaban dan tegangan	2	25,000,000	50,000,000
78	CCTV Camera	2	15,000,000	30,000,000
79	Monitor 40 inches di sentral	2	6,500,000	13,000,000
80	Monitor 32 inches	5	3,500,000	17,500,000
81	Sensor suhu dan modul arduino	3	2,500,000	7,500,000
82	Sensor gerak dan modil arduino	3	2,500,000	7,500,000
83	High performance PC	2	35,000,000	70,000,000
84	Android based smart phone for mobile monitoring	2	6,500,000	13,000,000
85	DAQ for highspeed data trasmission	2	35,000,000	70,000,000
86	Thermal imaging sensor	2	25,000,000	50,000,000
87	Sensor gas tunggal (H2, O2, CO, CO2, O3)	5	18,500,000	92,500,000
88	Sensor multigas	1	85,000,000	85,000,000
89	mixer mill MM 500 nano	1	400,000,000	400,000,000
TOTAL				**74,924,958,043**

Note: Please attach relevant catalogues of each item separately

32. Expected Research Outcomes (Paper, Product, Patent, Human Resources etc.)

A. Paper
B. Product
C. Patent
D. Human resources
E. Royalty

33. Projected Research Outputs (Contribution to the society, economy etc.)

To produce medical products related to COVID-19 diseases and its derivatives/mutations that are produced in Indonesia
To carry out commercialization, business and services of the COVID-19 products especially for national needs
To support the fighting of COVID-19 diseases in Indonesia and World
Could be used for research and innovation of products for handling other viruses

Appendix 3: Research Profile of BATAN

RP- -

Research Profile

(Project Title)

Development of radioisotope and radiopharmaceutical for nuclear medicine application

(Name of Project Coordinator)

Dr. Rohadi Awaudin

(Name of Department, University / Institution)

National Nuclear Energy Agency of Indonesia

For

Higher Education and Research Facility Development: Research and Innovation
Capacity Development" Project
Indonesia
(Kemristek/BRIN–JICA)

(Date of submission)

1. Research Area, Research Topics and Research Project

37.1. Research Area

a. Development of radioisotope production technology using research reactor
b. Develompent of radiopharmaceutical production technology
c. Preclinical studies of radioisotope and radiopharmaceutical
d. Clinical studies of radiopharmaceutical in nuclear medicine

37.2. Research Topics

a. Development of radioisotope production technology
  - Development of Technetium-99m (Tc-99m) production technology using neutron-irradiated molybdenum.
  - Development of Lutetium-177 (Lu-177) production technology
  - Development of Iodine-131 (I-131) production technology
  - Development of Gadolinium153 (Gd-153) production technology

b. Develompent of radiopharmaceutical production technology
  - Development of PSMA-based radiopharmaceuticals
  - Development of Nano HSA radiopharmaceutical kit production technology
  - Development of EDTMP radiopharmaceutical kit production technology
  - Develompent of radiopharmaceutical for radiosynovectomy

c. Preclinical studies of radioisotope and radiopharmaceutical
  - Development of animal model for cancer
  - Preclinical studies of Lu-177-InhPSMA for prostate cancer

d. Clinical studies of radiopharmaceutical in nuclear medicine
  - Clinical studies for Nano HSA radiopharmaceutical for lymphoscintigraphy
  - Clinical studies for Lu-177-InhPSMA for prostate cancer

37.3. Objectives

(include *Background of research, Brief economic and social benefits from Research Outcomes)*

Background

- Prevalence of cancer in indonesia increases drastically in recent years.
- Most of the radioisotope and radiopharmaceuticals used in Indonesia is imported from abroad.
- Research reactor, main facility for radioisotope and radiopharmaceutical has been operated for more than 33 years, some system must be revitalized.

Objectives

- increasing national capacity in research and innovation of radioisotopes radiopharmaceuticals and nuclear medicine
- increasing market share of domestic production of radioisotope for nuclear medicine services,
- increasing technological capacity related to radioisotope radiopharmaceutical and nuclear medicine
- improving reliability and safety performance of the G.A. Siwabessy nuclear research reactor as the main facility for radioisotope radiopharmaceutical research and innovation.

37.4. Research Plan, Themes, Activities, Schedule

Plan for infrastructure Development and supporting activities

No	Activities	Y-1	Y-2	Y-3	Y-4	Y-5
Output 1: Reactor protection systems and replacing beam tube in GA Siwabessy Reactor						
1	Preparation and tender process	▨				
2	Phase 1		▨			
	- feasibility study		▨			
	- system requirement and specifications		▨			
3	Phase 2: system design		▨			
4	Phase 3			▨		
	- detailed design			▨		
	- manufacturing of cabinets			▨		
5	Phase 4: Test bay			▨		
6	Phase 5: installation and commisioning				▨	
7	Normal operation					▨
Output 2: Radioisotope and radiopharmaceutical facility						
1	Preparation and feasibility study	▨				
2	Design for revitalization of old laboratory building	▨				
3	Licensing		▨			
4	Facility renovation			▨	▨	
5	Equipment procurement and installation		▨	▨	▨	
6	Commisioning					▨
Output 3: Nuclear medicine facility						
1	Preparation and feasibility study	▨				
2	basic design	▨				
3	detailed design		▨			
4	Licensing		▨			
5	Building construction			▨	▨	
6	Installation of facilities and equipments			▨	▨	
7	Commisioning					▨
Output 4: Supporting activities						
1	Human resource development	▨	▨	▨	▨	▨
2	Regulation evaluation	▨	▨	▨		
3	Stakeholder intermediation			▨	▨	▨
4	Radiopharmaceutical market survey and analysis	▨	▨	▨	▨	▨

No	Activities	Y-1	Y-2	Y-3	Y-4	Y-5
1	Development of Technetium-99m (Tc-99m) production technology using neuton-irradiated molybdenum.	▨	▨	▨	▨	
2	Development of Lutetium-177 (Lu-177)	▨	▨	▨	▨	

Plan for research activities

No	Activities	Y-1	Y-2	Y-3	Y-4	Y-5
1	Development of Technetium-99m (Tc-99m) production technology using neuton-irradiated molybdenum.	🟦	🟦	🟦	🟦	
2	Development of Lutetium-177 (Lu-177) production technology	🟦	🟦	🟦	🟦	
3	Development of Iodine-131 (I-131) production technology	🟦	🟦	🟦		
4	Development of Gadolinium153 (Gd-153) production technology	🟦	🟦	🟦	🟦	
5	Development of PSMA-based radiopharmaceuticals	🟦	🟦	🟦	🟦	🟦
6	Development of Nano HSA radiopharmaceutical kit production technology	🟦	🟦	🟦	🟦	
7	Development of EDTMP radiopharmaceutical kit production technology	🟦	🟦	🟦		
8	Development of radiopharmaceutical for radiosynovectomy			🟦	🟦	🟦
9	Development of animal model for cancer	🟦	🟦	🟦	🟦	
10	Pre-clinical studies of Lu-177-InhPSMA for prostate cancer		🟦	🟦		
11	Clinical studies for Nano HSA radiopharmaceutical for lymphoscintigraphy				🟦	🟦
12	Clinical studies for Lu-177-InhPSMA for prostate cancer				🟦	🟦

37.5. Present research status at your Laboratory/ Department / University/ Institution

Status of research infrastructure

- G.A. Siwabessy nuclear research reactor has been operated since 1987. The reactor is used for radionuclide production, material testing and colorization of gemstone. Since the reactor protection system has been used for more than 33 years, it is necessary to revitalize the system to increase the reliability and safety of the reactor.
- BATAN has facility for radioisotope and radiopharmaceutical development. Since some radioisotopes and radiopharmaceuticals production technology has been successfully developed, it is necessary to produce the radioisotope and radiopharmaceuticals routinely for user. The facility should be developed for routine production for some radioisotopes dan radiopharmaceuticals.
- At present, BATAN must cooperate with hospitals for radiopharmaceutical clinical trials since BATAN doesn't have nuclear medicine facilities. However nuclear medicine facility in hospitals have a very high load for public services. Hence, clinical trial of radiopharmaceuticals will be better if BATAN can carry out clinical trial in BATAN, integrated with radiopharmaceutical development and production facility.

Status of research activities

- Some radioisotop production technology using research reactor has been obtained. For example: Samarium-153, molybdenum-99 (small radioactivity), Lutetium-177 (low specific radioactivity) and Iodine-131 (low radioactivity)
- Some radiopharmaceutical production technology has been established: MIBI radiopharmaceutical kit, DTPA radiopharmaceutical kit, MDP radiopharmaceutical kit, ^{153}Sm-EDTMP and ^{131}I-MIBG.
- Some radiopharmaceutical quality control methods have been established: QA methods of MIBI radiopharmaceutical kit, DTPA radiopharmaceutical kit, MDP radiopharmaceutical kit, Sm-153-EDTMP and I-131-MIBG

37.6. Future Research Plan

- Operation of G.A. Siwabessy reactor with higher safety and reliability for radioisotope production and technology development.
- Development of neutron irradiation technology for radioisotope production and other applications
- Development and routine production methods of radioisotope and radiopharmaceutical.
- Development of radiopharmaceuticals for molecular imaging and targeted therapy
- Development of animal model and preclinical studies for radiopharmaceutical using animal model
- Clinical studies of radiopharmaceutical for diagnosis and therapy
- International research collaboration in research reactor utilizations

1-38. Research Personnel

Experienced professors, senior researchers and graduate students

38.1. Indonesian Researchers

Research Coordinator

Name: Rohadi Awaludin
Affiliation
<National Nuclear Energy Agency>

Team Members

1. **Name: Roziq Himawan**
   Affiliation
   < National Nuclear Energy Agency>
2. **Name: Yusi Eko Yulianto**
   Affiliation
   < National Nuclear Energy Agency>
3. **Name: Yusi Eko Yulianto**
   Affiliation
   < National Nuclear Energy Agency>
4. **Name: Eko Madi Parmanto**
   Affiliation
   < National Nuclear Energy Agency>

Please add another research member, including researcher from partner institutions and industries, if any.

38.2. Japanese Researchers (If any)

Research Coordinator

Name: Dr. Kunihiko Tsuchiya (土谷邦彦)
Affiliation
<Japan Atomic Energy Agency >

Team Members
1. Name:________________________
Affiliation
< >

2.3. *Collaboration with Industries (If any)*

Collaborating industries or expected collaboration industries
Name: PT Kimia Farma (state-own pharmaceutical company)
State of collaboration
< Collaboration in radiopharmaceutical development and production>

Key personnel
1. Name: Ridho Eko Mulyono
Affiliation
< PT. Kimia Farma>

1-39. Supporting Activities in the Project

3.1. Contributions through the Degree Program in the Project

Under the Project the following degree fellowships for staff development in Japan is proposed as follow: **no degree programe in this project**

- Doctor degree
  Number of candidates: persons
  Training Duration: years
- Master degree
  Number of candidates: persons
  Training Duration: years

These candidates will carry out the research activities of project research under the supervision of research coordinators or other person in the project team. The results of their research (Master thesis or PhD dissertation) will present as the result of the project.

3.2. Contributions through the Non-Degree Program in the Project

Under the Project program the following non-degree fellowships for professional development and research collaboration for the staff of the University/Institution is proposed as follow:

- Number of candidate: 100 persons
- Position: researchers and operators
- Program: Non-degree (technical training or internship)

Contribution to the Research Project

These candidates are researcher of the Department, School/Faculty, University/Institution. After return back to their departments, they will contribute their obtained knowledge for the project activities.

3.3. *Contributions through the Visiting Scholar Program in the Project*

The visiting scholar program will be enabled for Japanese researchers to Indonesia and Indonesian researchers to Japan.

- The number visiting scholar for Japanese researchers to Indonesia estimated to be persons/year: none
- The number visiting scholar for Indonesian researchers to Japan estimated be around persons/year: 00

During the visit, the research ideas and investigated results will be exchanged and discussed.

3.4. *Contributions through the Hardware Procurement Program in the Project*

The following facilities and equipments in your university can be used for the implementation of this project:

No	Equipment/facilities to be procured for the Research	Quantity, Price, Amount
1	Research reactor protection system (replacing the existing system)	1 system
2	Replacing existing (installed) neutron beam tube with the spare neutron beam tube	1 beam tube
3	Semi-automatic system for radioisotope and radiopharmaceutical production	5 systems
4	Radioiodine monitoring systems	2 systems
5	Revitalization (replacing) existing system in the radioisotope lab (air conditioning and circulating system, electrical systems etc)	1 building system
6	Equipment for radiopharmaceutical development and quality control	8 equipments
7	Equipment for animal lab (pre clinical trials)	10 equipments
8	Nuclear medicine buildings and the supporting systems	1 building
9	Nuclear medicine equipment (SPECT/CT systems and the supporting equipments)	1 systems

Note: Please attach relevant catalogues of each item separately

34. Expected Research Outcomes (Paper, Product, Patent, Human Resources etc.)

- Revitalized research reactor protection system
- Facility for routine production of radioisotopes and radiopharmaceuticals
- Nuclear medicine facility
- Human resources with required competences
- Publication in international journal
- Patents
- Prototipes of radiopharmaceutical
- International and national collaborations

35. Projected Research Outputs (Contribution to the society, economy etc.)

- Increasing national capacity in research and innovation of radioisotopes, radiopharmaceuticals and nuclear medicine.
- Increasing market share of domestic production of radioisotope for nuclear medicine services.
- Increasing the utilization of nuclear research reactor to meet national needs and international collaboration
- Meningkatkan akses layanan kesehatan masyarakat.

Appendix 4: Summary of Research Profiles of Eijkman

Summary of Research Profiles of Eijkman

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
A. INFECTIOUS DISEASE											
1-1	Advancing the Dengue Research in Indonesia	Dengue	RP-EIJKMAN 01	Dr. R. Tedjo Sasmono, Ph.D.	1. Dr. Amalina G. Komarudin, Ph.D. 2. Benediktus Yohan, M.Biomed. 3. Rahma F. Hayati, M.Sc. 4. Mercy Egrina Adiniko, M.Sc. 5. Farhan Azwin Maulana, M.Sc.	Kouichi Morita MD & PhD, Professor and Head Department of Virology, Institute of Tropical Medicine Nagasaki University	PT Bio Farma Dr. Neni Nuraini	Dengue Vaccine Consortium (Indonesia), COVID-19 Vaccine Development Consortium (Indonesia), Universitas Indonesia (Indonesia) Universitas Gadjah Mada (Indonesia), University of Cambridge (UK), University of Edinburgh – Napier (UK)	・ Doctor degree: 3 persons/ 4 years ・ Master's degree: 3 persons / 2 years	• Number of candidates: 3 persons, Position: research assistant	・Japanese researchers to Indonesia: around 3 persons/year. ・Indonesian researchers to Japan: around 3 persons/year
1-2	Diagnosis and Drug Discovery for Infectious Diseases	Diagnosis and Drug Discovery for Infectious Diseases	RP-EIJKMAN 02	Josephine E. Siregar, SSi, MSc, PhD	1. Normalita E. Pravitasari, SSi 2. Andita F. M. Rizki, SSi	N/A	N/A	Fakultas Sains dan Teknologi, Universitas Jambi (Indonesia) PT Jamu Borobudur Semarang (Indonesia) Balai Penelitian dan Pengembangan Teknologi Hasil Hutan Bukan Kayu Badan Penelitian, Indonesia Pengembangan dan Inovasi Kementrian Lingkungan Hidup dan Kehutanan (Indonesia)	・ Doctor degree: 2 persons/ 4 years ・ Master's degree: 1 person/ 2 years	• Number of candidates: 4 persons, Position: Research Assistant	• Japanese researchers to Indonesia: 2 persons/year. • Indonesian researchers to Japan: around 2 persons/year.
1-3	Endemic and Emerging Viruses in the Indonesian Archipelago	Emerging Virus Research Unit (EVRU)	RP-EIJKMAN 03	Frilasita Aisyah Yudhaputri, M.BiomedSc (Foreign Researchers) Khin Saw Myint, MD., PhD. Eijkman Institute for Molecular Biology	1. Edison Johar 2. Yora Permata Dewi, M.Biomed 10. Ageng Wiyatno, S.Si 11. Chairin Nisa Ma'Roef 12. Aghnianditya Kresno Dewantari 13. Ungke Anton Jaya 14. Rama Dhenni	Eijkman Institute for Molecular Biology	N/A	FKIK, Universitas Warmadewa (Indonesia) FK, Universitas Sam Ratulangi (Indonesia) FK, Universitas Padjajaran (Indonesia) US-CDC Fort Collins (USA) Department of Medical Research (DMR), Yangon (Myanmar) National University of Singapore (Singapore) Cambridge University (UK) University of Melbourne (Australia)	A) Doctor degree: 2 persons Training Duration: 4 years B) Master's degree : 2 persons Training Duration: 2 years	• Number of candidates: 7 persons • Position: technical training, internship and post doc research	• Japanese researchers to Indonesia: around persons/year. • Indonesian researchers to Japan: around persons/year.

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
1-4	Hepatitis	Hepatitis	RP-EIJKMAN 04	Prof. David H. Muljono, MD, PhD	1. Meta D. Thedja, MD, PhD 2. Turyadi, M.Biomed. 3. Korri El Khobar, PhD 4. Dhita P. Wibowo, BSc. 5. M. Rezki Rasyak, BSc. 6. Billy Witanto, BSc.	N/A	N/A	PT. Biofarma, Bandung (Indonesia) Institut Teknologi Bandung, Bandung (Indonesia) Badan Pengkajian dan Penerapan Teknologi (Indonesia) PT. Medquest Jaya Global (Indonesia) Poltekkes Kemenkes Kupang, Nusa Tenggara Timur (Indonesia) Universitas Hasanuddin, Makassar, Sulawesi Selatan (Indonesia)	A) Doctor degree:1 person Training Duration: 4 years B) Master’s degree : 1 person Training Duration: 2 years	• Number of candidates: 5 persons	• Japanese researchers to Indonesia: 1-2 persons/year. • Indonesian researchers to Japan: around 3 persons/year.
1-5	Malaria and Vector Resistance Unit	Malaria and Vector Resistance	RP-EIJKMAN 05	Dr. Puji Budi Setia Asih	1. Prof. Din Syafruddin, MD, Ph.D 2. Ismail Ekoprayitno Rozi, M.Eng 3. Dendi Hadi Permana, M.Sc 4. Sully Kosasih, M.Sc 5. Lepa Syahrani, M.Si 6. Farahana Kresnop Dewayanti, S.Si 7. Rifqi Risandi, B.Sc 8. Suradi	Masaharu Tokoro (Kanazawa University)	N/A	Lembaga Ilmu Pengetahuan Indonesia (Indonesia) Universitas Hasanuddin (Indonesia) Notre Dame University (USA) Notre Dame University (USA) UNICEF	A) Doctor degree: 3 persons Training Duration: 4 years B) Master degree : 2 persons Training Duration: 2 years	• Number of candidates: 7 persons • Position: technical training and post doc research	• Japanese researchers to Indonesia: 1 person/year. • Indonesian researchers to Japan: around 4 persons/year.
1-6	Malaria Pathogenesis: Genomics and Immunological Studies in Search for Diagnostics and Vaccine	Malaria Pathogenesis	RP-EIJKMAN 06	Dra Rintis Noviyanti, PhD	1. Farah Novita Coutrier, SSi. PhD 2. DR. Leily Trianty, SSi. MSi 3. Retno Ayu Setya Utami, SSi. MPhil. 4. Agatha Mia Puspitasari, SSi 5. Nadia Fadila, SSi 6. Pinkan Kariodimedjo, SSi 7. Ristya Amalia, SSi 8. Hidar 9. Fahira Ainun Nisa	N/A	N/A	Menzies School of Health Research Darwin (Australia) Walter and Eliza Hall Institute of Medical Research, Melbourne (Australia) Nanyang Technology University (Singapore) FIND Diagnostics, Geneva (Switzerland) Centers for Disease Control and Prevention, Atlanta (USA)	A) Doctor degree: 2 persons Training Duration: 4 years B) Master’s degree : 4 persons Training Duration: 2 years	• Number of candidate: 5 persons (3 PhDs, 4 Masters) • Position: Senior Scientist, Research Assistant/Junior Scientist	•Japanese researchers to Indonesia: 3 persons/year. •Indonesian researchers to Japan: around 5 persons/year.

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
1-7	Molecular Epidemiology and Antimicrobial resistance of *Streptococcus pneumoniae* in Indonesian population	Molecular Bacteriology	RP-EIJKMAN 07	Dodi Safari, PhD	1. Wisnu Tafroji, BSc 2. Miftahuddin Majid Khoeri, MSc 3. Wa Ode Dwi Daningrat, MSc 4. Korrie Salsabila, BSc 5. Wisiva Tofriska, BSc 6. Yayah Winarti 7. Hanifah 8. Sarah Fitria	N/A	N/A	Universitas Jenderal Soedirman, Purwokerto (Indonesia) Fakultas Kedokteran, Universitas Indonesia/RSCM (Indonesia) Fakultas Kedokteran, Universitas Andalas (Indonesia) Fakultas Kedokteran, Universitas Sam Ratulangi (Indonesia) Centers for Disease Control and Prevention, Atlanta (USA) University of Greifswald (Germany)	A) Doctor degree: 3 persons Training Duration: 4 years B) Master's degree : 3 persons Training Duration: 2 years	• Number of candidates: 3 persons • Position: Post-doc research and technical training	• Japanese researchers to Indonesia: 2 persons/year. • Indonesian researchers to Japan: around 2 persons/year.
B.	**HUMAN GENETICS**										
1-8	Development of Molecular Cytogenetics Techniques for Advanced Diagnosis of Chromosomal Disorders	Cytogenetics	RP-EIJKMAN 08	Hannie Dewi Hadyani Kartapradja, S.Si., M.Biomed.	1. Dr. dr. Andi Nanis Sacharina Marzuki, SpA (K) 2. Chrysantine Paramayuda, BSc, MSc 3. Dipl.-Ing. Firman Prathama Idris, S.T., MMolBiol 4. Faiza Az Zahra, S.Si., MSc 5. Debby Dwi Ambarwati, S.Si. 6. Mualifah, S.Si. 7. Astari Dwiranti, M.Eng., Ph.D Biology Department, Faculty of	N/A	N/A		・Doctor degree: 1 person Training Duration: 4 years ・Master's degree : 1 person Training Duration: 2 years	• Number of candidates: 4 people • Position: Senior researchers and junior researchers	• Japanese researchers to Indonesia: 2 persons/year. • Indonesian researchers to Japan: 2 persons/year.
1-9	Red Blood Cells (RBCs) Disorders	RBC Disorders	RP-EIJKMAN 09	Dr. Ita Margaretha Nainggolan	1. Sintia Puspitasari, S.Si Eijkman Institute for Molecular Biology 2. Evira Putricahya, S.Si Eijkman Institute for Molecular Biology 3. Marchella, S.Si Eijkman Institute for Molecular Biology 4 Iswari Setianingsih, MD, PhD	N/A	N/A	Fakultas Kedokteran Ilmu Kesehatan (FKIK), Universitas Jambi (Indonesia) Fakultas Sains dan Teknologi (FST), Universitas Jambi (Indonesia) Fakultas Biologi, Universitas Gadjah Mada (Indonesia) Fakultas Kedokteran, Universitas Padjadjaran (Indonesia)	・Master degree Number of candidates: 1 person Training Duration: 2 years	• Number of candidates: 4 persons • Position: PI and research assistants	• Japanese researchers to Indonesia: ( ) persons/year. • Indonesian researchers to Japan: around 3 persons/year.

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
1-10	Red Blood Cells Membrane and Enzyme Disorders	RBC Membrane and Enzyme Disorders	RP-EIJKMAN 10	Dr. sc.hum Ari Winasti Satyagraha, B.Sc (Hons)	1. Arkasha Sadhewa, M.Biomed.Sci 2. Lydia Visita Panggalo, B.Sc 3. Rahmadania Marita Jusuf, B.Sc 4. Alida R. Harahap, MD, PhD	N/A	N/A	Menzies School of Health Research Darwin (Australia)	・Doctor degree: 1 person Training Duration: 4 years ・Master’s degree : 1person Training Duration: 2 years	• Number of candidate: 5 persons • Position: technical training and post doc research	• Japanese researchers to Indonesia: around persons/year. • Indonesian researchers to Japan: 3 persons/year.
1-11	Stem Cell	Stem Cell	RP-EIJKMAN 11	Dr. Ita Margaretha Nainggolan	1. Hanna Natalia	N/A	Rachmat Sarwono PT. Industri Jamu Borobudur (Indonesia) Dr. Wahyu Widowati, M.Si PT. Aretha Medika Utama, Biomolecular and Biomedical Research Center (Indonesia)		・Master’s degree Number of candidates: 1 person Training duration: 2 years	• Number of candidates: 2 persons • Position: PI and research assistant	• Japanese researchers to Indonesia: ( ) persons/year: •Indonesian researchers to Japan: around persons/year: 2
C.	**GENETIC DIVESITY**										
	Forensic DNA Identification Unit	DNA Forensics									
1-12	Human Genome Diversity and Diseases	Human Genome Diversity and Diseases	RP-EIJKMAN 13	Prof. Herawati Sudoyo, MD, PhD Safarina G. Malik, DVM, MS, PhD (Lifestyle disease) Pradiptajati Kusuma, PhD	1. Sukma Oktavianthi, M.Biomed 2. Clarissa Asha Febinia, M.Phil 3. Lidwina Priliani, M.Si 4. Isabella Apriyana, M.Sc 5. Chelzie Crenna Darusallam, S.Si 6. Leonard, S.Si 7. Others (to be employed)	National Institute of Genetics (Mishima, Japan)	N/A	Indonesian Danone Institute Foundation (Indonesia) Harvard School of Public Health (USA) School of Life and Environmental Science, University of Sydney (Australia) Complexity Institute, Nanyang Technological University (Singapore) Australian Center for Ancient DNA, University of Adelaide (Australia)	• Doctor degree: 4 people Training Duration: 4 years • Master’s degree : 1person Training Duration: 2 years	• Number of candidates: 12 people • Position: Senior researchers and junior researchers	• Japanese researchers to Indonesia estimated to be ___ persons/year • Indonesian researchers to Japan estimated be around 3 persons/year

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
1-13	Wildlife Genetic Diversity and Disease	Wildlife Genome Diversity and Diseases	RP-EIJKMAN 14	Dr. Wuryantari Setiadi, M.Biomed	1. Iskandar Adnan Alisyahbana, S.Si 2. Sinta Hamidatus Saidah, S.Si 3. Jessica Rodearni Saragih, S.Si	N/A	N/A	Borneo Orangutan Survival Foundation (Indonesia) International Animal Rescue (Indonesia) Dept. of Anthropology, Boston University (USA)	• Doctor degree: 1 person Training Duration: 4 years • Master's degree : 2 persons Training Duration: 2 years	• Number of candidates: 4 persons • Position: technical training and post-doc research	• Japanese researchers to Indonesia: ___ persons/year. •Indonesian researchers to Japan: around 2 persons/year.
D.	**SUPPORT FACILITY**										
1-14	The Establishment of Ancient DNA Facility to Support Indonesian Genetic Diversity Studies	Ancient DNA	RP-EIJKMAN 15	Prof. Dr Herawati Sudoyo	1. Dr. Pradiptajati Kusuma 2. Gludhug Ariyo Purnomo, S.Si 3. Isabella Apriyana, M.Sc 4. Chelzie Crenna Darussalam, S.Si 5. Leonard Taufik, S.Si And others to be employed	Okinawa Institute of Science and Technology	N/A	1. Center for national Archaelogy/Pusat Penelitian Arkeologi Nasional/ARKENAS (Indonesia) 2. Balai Arkeologi Yogyakarta (Indonesia) 3. Balai Arkeologi Maluku (Indonesia) 4. Balai Arkeologi Bali (Indonesia) 5. Balai Arkeologi Sumatera Selatan (Indonesia) 6. Balai Arkeologi Papua 7. The Australian National University (Australia) 8. University of Adelaide (Australia) 9. University of Toulouse (France) 10. Max Planck Institute for Evolutionary Anthropology (Germany)	• Doctor degree: 2 persons Training Duration: 4 years • Master's degree : 1 person Training Duration: 4 years	・Number of candidates: 5 persons ・Position: Senior researchers, junior researchers, research assistant	・Japanese researchers to Indonesia: around 2 persons/year. ・Indonesian researchers to Japan: around 2 persons/year.
	Animal Research Facility	Animal Research Facility									

App. No	Project Title	Laboratory	RP Code	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Other Research Collaborators	Degree Program	Non-Degree Program	Visiting Scholar Program
1-15	Bioinformatics Unit	Bioinformatics	RP-EIJKMAN 17	Ismail Ekoprayitno Rozi	1. Hidayat Trimarsanto 2. Suprapto	N/A	N/A		A) Doctor degree: persons Training Duration: years B) Master's degree: persons Training Duration: years	• Number of candidates: 2 persons • Position: technical training and workshops • Program: Non-degree (Post-doc research, technical training or	• Japanese researchers to Indonesia: persons/year: • Indonesian researchers to Japan: around persons/year:
1-16	Biosafety Level 3	Biosafety Level 3	RP-EIJKMAN 18	Ismail Ekoprayitno Rozi	1. Hidayat Trimarsanto 2. Suprapto	N/A	N/A		• Doctor degree: persons Training Duration: years • Master's degree : persons Training Duration: years	• Number of candidates: 2 persons • Position: technical training and workshops	• Japanese researchers to Indonesia: persons/year: • Indonesian researchers to Japan: around persons/year:
	Genetic Counselling	Genetic Counselling									
	Proposed budget for imaging center (Histopathology and TEM Laboratory)	Histopathology and TEM									
1-17	National Genome Centre	National Genome Centre	RP-EIJKMAN 21	Safarina G Malik, DVM, MS, PhD	1. Hidayat Trimarsanto, B.Sc 2. Iskandar A. Adnan, B.Sc 3. Willy Agustine, B.Sc	N/A	N/A		A) Doctor degree: persons Training Duration: years B) Master degree : 2 persons Training Duration: 2 years	• Number of candidate: 4 persons • Position: technical training and workshop	• Japanese researchers to Indonesia: 2 persons/year. • Indonesian researchers to Japan: around 2 persons/year.

Appendix 5: Summary of Research Profiles of Andalas University

Summary of Research Profiles of Andalas University

App. No	Project Title	Laboratory	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Degree Program	Non-Degree Program	Visiting Scholar Program
2-1	Strengthening COVID-19 related Health and Medical Research, Innovation and Services Managed by Science Techno Park of Andalas University	Science Techno Park, Andalas University	Dr.-Ing Uyung Gatot S. Dinata	1. Dr. Eng Muhammad Makky 2. Dr. Eka Candra Lina 3. Dr. Andani Eka Putra 4. dr. Hirowati Ali, PhD 5. dr. Dwi Yulia, SpPK 6. Prof. Dr. Drs. Yufri Aldi, M.Si. Apt. 7. Prof. Dr. Dedi Prima Putra 8. Dr. Friardi Ismet 9. Prof. Dr. Dedi Prima Putra 10.Dr. Ilhamdi Rusydi 11. Dr. Zaini 12. Dr. Aulia, M. Eng. 13. Dr. Firman Ridwan, M. ASc 14. Hanalde Andre, MT. 15. Dr. Lusi Susanti, MT. 16. Dr. Syahrial, M. Biomed. 17. Prima Fitri, MT 18. Caesar Welya, MP 19. Wenny Surya M, MP 20. Beeri B, MSc	・Jichi University Name: Prof. Dr. Eiji Morimoto < Tottory University> ・Prof. Kohei NAKANO < Gifu University > ・Prof. Shinichiro Kuroki < Kobe University > ・Shin Kaneko, M.D, Ph.D (contacting in progress) <CiRA, Kyoto University> ・Jun Ota < The University of Tokyo >	・Kimia Farma ・Shimadzu Corporation, Japan <Developing machine/parts for biomarker detection)> ・ Japan Air Filter, Japan < Developing machine/parts for Absolute ULPA Filter with Carbon Photocatalist> ・Aichikikai Techno System ・Shintec Hozumi Co.,Ltd. ・INFINITIGROUP Indonesia	• Doctor degree: 30 persons Duration: 3 years • Master degree: 20 persons Duration: 2 years	• Number of candidate: 120 persons • Position: administration staff, laboratory analist	Japanese researchers to Indonesia : 40 persons/year • Indonesian researchers to Japan: 40 persons/year

Appendix 6: Summary of Research Profiles of BATAN

Summary of Research Profiles of BATAN

App. No	Project Title	Laboratory	Indonesian Research Coordinator	Team Members	Japanese Research Coordinator	Collaboration with Industries	Degree Program	Non-Degree Program	Visiting Scholar Program
3-1	Development of radioisotope and radiopharmaceutical for nuclear medicine application	National Nuclear Energy Agency of Indonesia	Dr. Rohadi Awaudin	1. Roziq Himawan 2. Yusi Eko Yulianto 3. Yusi Eko Yulianto 4. Eko Madi Parmanto	Dr. Kunihiko Tsuchiya (Japan Atomic Energy Agency)	PT Kimia Farma (state-own pharmaceutical company) < Collaboration in radiopharmaceutical development and production> Key personnel 1. Ridho Eko Mulyono < PT. Kimia Farma>	no degree programe in this project	• Number of candidate: 100 persons • Position: researchers and operators • Program: Non-degree (technical training or internship)	• Japanese researchers to Indonesia: persons/year: • Indonesian researchers to Japan: around persons/year:

Appendix 7: Equipment List of Eijkman

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
1	Eijkman Institute	Oligo Synthesizers	1	IDR	8,081,214,682	8,081,214,682	58,831,242.886	Cytiva Life Sciences, Sweden Model : A ¨KTA Oligopilot plus 10	ÄKTA Oligopilot plus 10
2	Eijkman Institute	QuantStudioTM 12k Flex Real-Time PCR System	1	IDR	6,027,560,000	6,027,560,000	43,880,636.800	Applied Biosystems	AccufillTM System
3	Eijkman Institute	Magnetic Purification System	2	IDR	578,950,000	1,157,900,000	8,429,512.000	KingFisher Duo Prime System	Cat #5400110
4	Eijkman Institute	MinION Mk1B Enhanced Pack	1	IDR	75,000,000	75,000,000	546,000.000	Oxford Nanopore, UK	Cat.#EnhancedPack
5	Eijkman Institute	MinION Mk1B Basic Pack	1	IDR	25,000,000	25,000,000	182,000.000	Oxford Nanopore, UK	Cat.#StarterPack
6	Eijkman Institute	MinION Mk1C Enhanced Pack	1	IDR	250,000,000	250,000,000	1,820,000.000	Oxford Nanopore, UK	Cat.#M1CEnhanced2020
7	Eijkman Institute	VolTRAX V2 CapEx Automated Lib.Prep for MinION	1	IDR	210,000,000	210,000,000	1,528,800.000	Oxford Nanopore, UK	Cat. #VTX-CAPEX
8	Eijkman Institute	Biological Safety Cabinet Class II A2	41	IDR	391,500,000	16,051,500,000	116,854,920.000	Thermo Scientific-Heraeus, Germany	Herasafe 2030i (1.2m inc UV-C in side walls) Code No. 51032334 & 50155666
9	Eijkman Institute	Biological Safety Cabinet Class II A2	31	IDR	346,350,000	10,736,850,000	78,164,268.000	Thermo Scientific-Heraeus, Germany	Model : Herasafe 2030i (0.9m inc UV-C in side walls) Code No. 51032328
10	Eijkman Institute	Ductless Fume Hood	3	IDR	134,400,000	403,200,000	2,935,296.000		
11	Eijkman Institute	CO2 Incubator	9	IDR	385,600,000	3,470,400,000	25,264,512.000	Thermo Scientific Heraeus, Germany	Heracell 160i DUAL SST TC 230V Cn : 50145502
12	Eijkman Institute	Small Capacity Thermostatic Shaking Incubator	4	IDR	86,350,000	345,400,000	2,514,512.000	Biobase, China	BJPX-200B
13	Eijkman Institute	Oven, Advanced Protocol, Gravity Convection	3	IDR	77,550,000	232,650,000	1,693,692.000	Thermo Scientific-Heratherm, Germany	OGH100
14	Eijkman Institute	Memmert Oven UN110 Lab 108L/ Memmert UN110 Univeral Oven Drying	2	IDR	40,800,000	81,600,000	594,048.000	Memmert Thermo, Germany	UN110
15	Eijkman Institute	Hybridization Oven, 220V	1	IDR	300,000,000	300,000,000	2,184,000.000	Illumina, USA	Cat. #SE-901-1002
16	Eijkman Institute	Refrigerated Table Top Centrifuge	9	IDR	288,460,000	2,596,140,000	18,899,899.200	Thermo Fisher Scientific, Germany	Megafuge 16R
17	Eijkman Institute	TOMY High Speed Refrigerated Centrifuge SUPREMA 25, include Fixed Angle Rotor NA-610 1000MIX6/8,000 rpm; 1,000 mL bottles (set of 6)	1	IDR	671,134,050	671,134,050	4,885,855.884	Tomy, Japan	Cat# Suprema 25
18	Eijkman Institute	Centrifuge 5430 R incl. Rotor FA-45-30-11	14	IDR	266,104,000	3,725,456,000	27,121,319.680	Eppendorf, Germany	Cat#. 5428 000.015
19	Eijkman Institute	Thermo Scientific mySPIN Mini Centrifuge Series	14	IDR	14,000,000	196,000,000	1,426,880.000	Thermo Scientific, USA	My Spin 6
20	Eijkman Institute	Centrifuge 5424 R	7	IDR	174,214,500	1,219,501,500	8,877,970.920	Eppendorf, Germany	Cat#. 5404 000.014
21	Eijkman Institute	PCR plate spinner centrifuge	2	IDR	12,000,000	24,000,000	174,720.000	Axygen, USA	Axygen
22	Eijkman Institute	Heraeus™ Pico™ 17 Microcentrifuge	3	IDR	150,000,000	450,000,000	3,276,000.000	Thermo Scientific, USA	Cat: 75002410
23	Eijkman Institute	Palm Micro Centrifuges D1008, Mini Centrifuge	3	IDR	5,500,000	16,500,000	120,120.000	Biologix, USA	Biologix, 01-8004
24	Eijkman Institute	Pico 21 Ventilated Microcentrifuge	1	IDR	50,993,000	50,993,000	371,229.040	Thermo Fisher Scientific, USA	Cat# 75002415
25	Eijkman Institute	Refrigerator and Freezer (Combo)	62	IDR	86,300,000	5,350,600,000	38,952,368.000	Biobase, China	BDF--40V288A
26	Eijkman Institute	Ultra Low Temperature Freezer, Upright, 682 liter	39	IDR	574,750,000	22,415,250,000	163,183,020.000	Thermo Scientific, USA	Forma 89000 Code No : 8950086V
27	Eijkman Institute	Temperature Freezer -20	4	IDR	242,000,000	968,000,000	7,047,040.000	Thermo Scientific, USA	REVCO FDE Code No : RDE40040FV
28	Eijkman Institute	Lab Refrigerator	52	IDR	178,632,300	9,288,879,600	67,623,043.488	Thermo Scientific, USA	TSX Series Code No : TSX1205GV

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
56	Eijkman Institute	Trinocular Microscope with High Luminescent LED Illuminator	4	IDR	151,465,000	605,860,000	4,410,660.800	Nikon, Japan	Eclipse Ci-L (Ci-L BF-T-P)
57	Eijkman Institute	Color Photomicrography Digital Camera System, 5,9M	2	IDR	148,500,000	297,000,000	2,162,160.000	Nikon, Japan	DS-Fi3
58	Eijkman Institute	Stereo Zoom Microscopes	4	IDR	60,000,000	240,000,000	1,747,200.000		
59	Eijkman Institute	Microscope Binocular	6	IDR	60,000,000	360,000,000	2,620,800.000		
60	Eijkman Institute	Scanning Transmission Electron Microscope (STEM) Thermofisher	1	IDR	16,263,636,364	16,263,636,364	118,399,272.730	Thermo Fisher, USA	Talos F200X G2 TEM
61	Eijkman Institute	Scanning Electron Microscope JEOL	1	IDR	9,114,325,000	9,114,325,000	66,352,286.000	JEOL, Japan	JSM-IT700HR
62	Eijkman Institute	Light microscope + camera, Upright Microscope Eclipse Ci-S/Ci-L (Nikon)	2	IDR	105,504,000	211,008,000	1,536,138.240	Nikon, Japan	Nikon
63	Eijkman Institute	Stereo Zoom Microscope, with LED Stand for Diascopic and episcopic observation (dissecting microscope)	1	IDR	62,400,000	62,400,000	454,272.000	Nikon, Japan	SMZ 745T
64	Eijkman Institute	Research Inverted Microscope, Phase Contrast	1	IDR	287,000,000	287,000,000	2,089,360.000	Nikon, Japan	Ts2R PH
65	Eijkman Institute	Binocular Microscope for Chromosome Analysis	3	IDR	157,000,000	471,000,000	3,428,880.000	Nikon, Japan	Eclipse Ci-L (Ci-L BF-T-P)
66	Eijkman Institute	Research Fluorescence Microscope System	1	IDR	1,080,600,000	1,080,600,000	7,866,768.000	Nikon, Japan	Eclipse Ni-U + Karyotyping + FISH imaging system
67	Eijkman Institute	Metafer Scanning and Imaging Platform (automated slide scanner) including Motorized Microscope and Ikaros Software	1	IDR	4,115,475,000	4,115,475,000	29,960,658.000	Metasystems	Metafer
68	Eijkman Institute	Light microscope + camera, Upright Microscope Eclipse Ci-S/Ci-L (Nikon)	1	IDR	116,054,400	116,054,400	844,876.032		
69	Eijkman Institute	Leica HistoCore Arcadia H	1	IDR	177,740,200	177,740,200	1,293,948.656	Leica	Leica 14039354090
70	Eijkman Institute	Leica HistoCore Arcadia C	1	IDR	49,647,400	49,647,400	361,433.072	Leica	Leica 14039353599
71	Eijkman Institute	Leica Flattening Bath for Paraffin Section	1	IDR	19,725,200	19,725,200	143,599.456	Leica	Leica 14041521466
72	Eijkman Institute	Leica DM1000	1	IDR	87,139,800	87,139,800	634,377.744	Leica	Leica 11888842
73	Eijkman Institute	Leica EM ICE	1	IDR	9,923,000,000	9,923,000,000	72,239,440.000	Leica	Leica 16771801
74	Eijkman Institute	Leica EM GP2		IDR		0	0.000	Leica	Leica 16706402256900000012569000000
75	Eijkman Institute	Leica EM AFS2	1	IDR	1,400,000,000	1,400,000,000	10,192,000.000	Leica	Leica 16707101
76	Eijkman Institute	Leica EM TRIM 2	1	IDR	775,954,000	775,954,000	5,648,945.120	Leica	Leica 15702801
77	Eijkman Institute	Leica EM FC7	1	IDR	16,706,002	16,706,002	121,619.695	Leica	Leica 16706002
78	Eijkman Institute	Leica UM UC7 Basic Instrument (Ultramicrotome)	1	IDR	2,550,000,000	2,550,000,000	18,564,000.000	Leica	Leica 16706002
79	Eijkman Institute	Leica EM TP automatic tissue processor	1	IDR	668,900,000	668,900,000	4,869,592.000	Leica	Leica 16709202
80	Eijkman Institute	Leica EM CPD 300	1	IDR	1,093,000,000	1,093,000,000	7,957,040.000	Leica	Leica 15771301
81	Eijkman Institute	Leica EM ACE 200	1	IDR	1,376,000,000	1,376,000,000	10,017,280.000	Leica	Leica 16771584
82	Eijkman Institute	Convocal Stellaris LIAchronic	2	IDR	9,100,000,000	18,200,000,000	132,496,000.000	Leica	Leica 158101101
83	Eijkman Institute	Leica Cryostat with Cryozone and UV Disinfectant	1	IDR	738,219,900	738,219,900	5,374,240.872	Leica	Leica 1491950C5EU
84	Eijkman Institute	Leica Aperio AT2	1	IDR	5,334,000,000	5,334,000,000	38,831,520.000	Leica	Leica 23AT2100-EKAT

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
85	Eijkman Institute	SimpliAmp PCR	3	IDR	120,000,000	360,000,000	2,620,800.000	Applied Biosystems, USA	2720
86	Eijkman Institute	QIAcuity Four Platform	1	IDR	4,037,920,000	4,037,920,000	29,396,057.600	Qiagen, Germany	Cat# 911041
87	Eijkman Institute	Thermal Cycler with Six Separate Peltier Blocks	2	IDR	242,000,000	484,000,000	3,523,520.000	Applied Biosystems, USA	Applied Biosystems (USA)
88	Eijkman Institute	High Throughput PCR (Thermal Cycler) with Interchangeable Blocks, 2x96 well	2	IDR	614,818,600	1,229,637,200	8,951,758.816	Applied Biosystems, USA	Cat. No. 4484076
89	Eijkman Institute	Thermal Cycler validated for Human Identification	15	IDR	342,850,000	5,142,750,000	37,439,220.000	Applied Biosystems, USA	Proflex 96 well HID
90	Eijkman Institute	Thermal Cycler with Six Separate Peltier Blocks	9	IDR	242,000,000	2,178,000,000	15,855,840.000	Applied Biosystems, USA	Applied Biosystems (USA)
91	Eijkman Institute	Thermal Cycler (PCR Machine)	2	IDR	342,850,000	685,700,000	4,991,896.000		
92	Eijkman Institute	QuantStudio™ 12K Flex Real-Time PCR System	1	IDR	6,550,000,000	6,550,000,000	47,684,000.000	Applied Biosystems, USA	QuantStudio™ 12k Flex Real-Time PCR System, Accufill™ System
93	Eijkman Institute	Thermocycler ProFlex (Applied Biosystem)	3	IDR	350,000,000	1,050,000,000	7,644,000.000	Applied Biosystems, USA	Applied Biosystem 4484076
94	Eijkman Institute	Thermal Cycler with Six Separate Peltier Blocks	18	IDR	242,000,000	4,356,000,000	31,711,680.000	Applied Biosystems, USA	VeritiTM 96-Well
95	Eijkman Institute	QuantStudio™ 12K Flex Real-Time PCR System	1	IDR	6,027,560,000	6,027,560,000	43,880,636.800	Applied Biosystems, USA	QuantStudio™ 12k Flex Real-Time PCR System, Accufill™ System
96	Eijkman Institute	QuantStudio™ 3D Digital PCR System	1	IDR	2,550,000,000	2,550,000,000	18,564,000.000	Applied Biosystems, USA	QuantStudio™ 3D Digital PCR System
97	Eijkman Institute	Proflex 96-well PCR System	3	IDR	390,000,000	1,170,000,000	8,517,600.000	Applied Biosystems, USA	Applied Biosystem 448075
98	Eijkman Institute	ProFlex 2 x 96-well PCR System Kit	1	IDR	250,000,000	250,000,000	1,820,000.000	Applied Biosystems, USA	Applied Biosystem 448076
99	Eijkman Institute	Real Time PCR 7500Fast Real-time PCR System	13	IDR	1,505,680,000	19,573,840,000	142,497,555.200	Applied Biosystems, USA	Applied Biosystems
100	Eijkman Institute	Malditof	1	IDR	4,196,495,530	4,196,495,530	30,550,487.458	Bruker, Germany	Bruker - Germany
101	Eijkman Institute	ELISA Reader		IDR	2,167,000,000	0	0.000	Infinite 200 PRO with Monochromator Workstation	Infinite 200 PRO with Monochromator Workstation
102	Eijkman Institute	Plate Washer for ELISA	1	IDR	231,000,000	231,000,000	1,681,680.000	HydroFlex ELISA	HydroFlex ELISA
103	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply	1	IDR	43,353,200	43,353,200	315,611.296	BioRad, USA	BioRad #1640300
104	Eijkman Institute	Mini-Sub Cell GT Mini Handcasting Kit	1	IDR	7,364,500	7,364,500	53,613.560	BioRad, USA	BioRad #1704491
105	Eijkman Institute	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm	2	IDR	3,042,600	6,085,200	44,300.256	BioRad, USA	BioRad #1704435
106	Eijkman Institute	Mini Sub-Cell GT Gel Caster	2	IDR	5,359,200	10,718,400	78,029.952	BioRad, USA	BioRad #1704422
107	Eijkman Institute	15-Well Comb	3	IDR	3,111,900	9,335,700	67,963.896	BioRad, USA	BioRad #1704465
108	Eijkman Institute	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm tray, with PowerPac Basic Power Supply	1	IDR	49,921,300	49,921,300	363,427.064	BioRad, USA	BioRad #1640301
109	Eijkman Institute	Wide Mini-Sub Cell GT Mini Handcasting Kit	1	IDR	8,574,500	8,574,500	62,422.360	BioRad, USA	BioRad #1704497
110	Eijkman Institute	Wide Mini-Sub Cell GT UV-Transparent Gel Tray, 15 x 7 cm	2	IDR	4,356,000	8,712,000	63,423.360	BioRad, USA	BioRad #1704426
111	Eijkman Institute	Spectrophotometer		IDR		0	0.000		
112	Eijkman Institute	Multiplate reader SpectraMax Paradigm		IDR		0	0.000		
113	Eijkman Institute	HPLC		IDR		0	0.000		
114	Eijkman Institute	Flash chromatography		IDR		0	0.000		
115	Eijkman Institute	Column chromatography		IDR		0	0.000		

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
116	Eijkman Institute	Econogradient/ fraksinator Biorad		IDR		0	0.000		
117	Eijkman Institute	Chromatochamber 4 degree celcius		IDR		0	0.000		
118	Eijkman Institute	BD FACS Melody 3L9C, 4 way sorting	1	IDR	9,840,754,077	9,840,754,077	71,640,689.681	BD Biosciences	BD Biosciences cat #653885, # 633701, # 633702, #633707
119	Eijkman Institute	ARIES® Two Module System (IVD)	2	IDR	2,024,700,000	4,049,400,000	29,479,632.000	Luminex, USA	Cat# ARIES-M12V1-IVD
120	Eijkman Institute	MAGPIX Instrument (IVD)	2	IDR	1,006,400,000	2,012,800,000	14,653,184.000	Luminex, USA	Cat# MPX-XPON4.1-CEIVD
121	Eijkman Institute	LC-HRMS for Small Molecule, Metabolomic & Proteomic Research	1	IDR	19,259,000,000	19,259,000,000	140,205,520.000	Thermo Scientific, USA	Q Exactive Plus Vanquish and Ultimate RSLC Nano
122	Eijkman Institute	LC-HRMS for Small Molecule & Metabolomic Research	1	IDR	16,640,000,000	16,640,000,000	121,139,200.000	Thermo Scientific, USA	Q Exactive Plus Vanquish
123	Eijkman Institute	UHPLC with Autosampler & UV-Vis Detector	1	IDR	1,225,000,000	1,225,000,000	8,918,000.000	Thermo Scientific, USA	Vanquish Core
124	Eijkman Institute	Optional Accessories - Fraction Collector with Cooling Configuration	1	IDR	393,000,000	393,000,000	2,861,040.000	Thermo Scientific, USA	Fraction Collector FT
125	Eijkman Institute	Fraction Collector Without Cooling Configuration	1	IDR	212,000,000	212,000,000	1,543,360.000	Thermo Scientific, USA	FRACTION COLLECTOR F
126	Eijkman Institute	PDA Detector	1	IDR	436,000,000	436,000,000	3,174,080.000	Thermo Scientific, USA	Diode Array Detector CG
127	Eijkman Institute	FLUORESCENCE DETECTOR	1	IDR	471,000,000	471,000,000	3,428,880.000	Thermo Scientific, USA	FLUORESCENCE DETECTOR C, D-PMT
128	Eijkman Institute	Refractive Index Detector	1	IDR	379,000,000	379,000,000	2,759,120.000	Thermo Scientific, USA	RefractoMax 521
129	Eijkman Institute	Vanquish Charged Aerosol Detector	1	IDR	1,377,000,000	1,377,000,000	10,024,560.000	Thermo Scientific, USA	Vanquish Charged Aerosol Detector F
130	Eijkman Institute	LCMSMS	1	IDR	7,225,000,000	7,225,000,000	52,598,000.000	Thermo Scientific, USA	Thermo Scientific TYPE : TSQ Quantis
131	Eijkman Institute	Gas Chromatography Mass Spectrometer with Liquid & Headspace	1	IDR	2,520,000,000	2,520,000,000	18,345,600.000	Thermo Scientific, USA	TYPE : ISQ-7000 BRAND : Thermo Scientific
132	Eijkman Institute	GC Specification		IDR		0	0.000	Thermo Scientific, USA	Type : TRACE 1310 Brand : Thermo Scientific
133	Eijkman Institute	HEADSPACE & LIQUID SAMPLER		IDR		0	0.000	Thermo Scientific, USA	Type : TriPlus RSH Brand : Thermo Scientific
134	Eijkman Institute	BD FACS Aria Fusion Cell Sorter	1	IDR	31,540,080,000	31,540,080,000	229,611,782.400	BD	BD
135	Eijkman Institute	TSQ Quantis LC-MS/MS System	1	IDR	7,947,500,000	7,947,500,000	57,857,800.000	Thermo Scientific, USA	ThermoScientific, TSQ Quantis (see specification)
136	Eijkman Institute	SQ-7000 GC-MS/MS System	1	IDR	2,772,000,000	2,772,000,000	20,180,160.000	Thermo Scientific, USA	ThermoScientific, ISQ-7000 (see specification)
137	Eijkman Institute	U.S.SOLID 10L Cryogenic Container Liquid Nitrogen LN2 Tank Dewar with Straps 6 Canisters	1	IDR	5,700,000	5,700,000	41,496.000	Tecan Group, Switzerland	U.S. Solid, Model: USS-LNT00003
138	Eijkman Institute	Savant™ SpeedVac™ Integrated Vacuum Concentrator Systems and Kits	2	IDR	310,000,000	620,000,000	4,513,600.000	Thermo Scientific, USA	ThermoScientific, Cat. #SPD1030P1-230
139	Eijkman Institute	Ultrasonicator	1	IDR	120,000,000	120,000,000	873,600.000	Sigma Aldrich, USA	Sigma aldrich, Cat. # Z511471
140	Eijkman Institute	Fisherbrand™ FB11211 Series Advanced Ultrasonic Cleaner	1	IDR	850,000,000	850,000,000	6,188,000.000	Fisherbrand, Canada	Fisherbrand, Model FB11211

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
141	Eijkman Institute	Spectrophotometer UV-1900i set (Shimadzu): UPS, Computer, CPS Controller	3	IDR	500,000,000	1,500,000,000	10,920,000.000	Shimadzu, Japan	Shimadzu
142	Eijkman Institute	Laser Printer Neverstop Laser 1000w (HP)	3	IDR	3,659,000	10,977,000	79,912.560	Hewlett-Packard, USA	HP, 4RY23A
143	Eijkman Institute	Scanner/Printer/Photocopy LaserJet Pro MFP M227fdw (HP)	3	IDR	5,177,000	15,531,000	113,065.680	Hewlett-Packard, USA	HP, G3Q75A
144	Eijkman Institute	Protean i12 IEF System	3	IDR	183,170,000	549,510,000	4,000,432.800	Biorad, 1646000	Biorad, 1646000
145	Eijkman Institute	MINIPULS 3 Pump (Drive Unit) with Two Channel, High Flow Head (R2/HF) (Gilson)	3	IDR	62,000,000	186,000,000	1,354,080.000	Gilson, F155008	Gilson, F155008
146	Eijkman Institute	Akta pure protein purification system	1	IDR	300,000,000	300,000,000	2,184,000.000	Cytiva Life Sciences	Cytiva Life Sciences
147	Eijkman Institute	Trans-Blot® SD Semi-Dry Electrophoretic Transfer Cell (Bio-Rad)	1	IDR	200,000,000	200,000,000	1,456,000.000	Bio-Rad, 1703940	Bio-Rad, 1703940
148	Eijkman Institute	Cuvette semiquarts 2 ml (Starna)	12	IDR	1,665,000	19,980,000	145,454.400	Starna,I-Q-10	Starna,I-Q-10
149	Eijkman Institute	Cuvette quarts 1 ml (Helma)	12	IDR	4,240,000	50,880,000	370,406.400	Helma, HEL-1080001040	Helma, HEL-1080001040
150	Eijkman Institute	Cuvette quarts 2 ml (Shimadzu)	6	IDR	13,780,000	82,680,000	601,910.400	Shimadzu,220-92017-01	Shimadzu,220-92017-01
151	Eijkman Institute	BD Accuri C6 Plus (BD)	1	IDR	200,000,000	200,000,000	1,456,000.000	BD, 660517	BD, 660517
152	Eijkman Institute	Spectrophotometer UV-1900i set include UPS, CPS Controller, and Computer (Shimadzu)	3	IDR	550,000,000	1,650,000,000	12,012,000.000		
153	Eijkman Institute	Laser Printer Neverstop Laser 1000w (HP)	2	IDR	4,024,900	8,049,800	58,602.544		
154	Eijkman Institute	Scanner/Printer/Photocopy LaserJet Pro MFP M227fdw (HP)	1	IDR	5,694,700	5,694,700	41,457.416		
155	Eijkman Institute	MINIPULS 3 Pump (Drive Unit) with Two Channel, High Flow Head (R2/HF) (Gilson)	1	IDR	68,200,000	68,200,000	496,496.000		
156	Eijkman Institute	Akta pure protein purification system (Cytiva Life Sciences)	1	IDR	330,000,000	330,000,000	2,402,400.000		
157	Eijkman Institute	Trans-Blot® SD Semi-Dry Electrophoretic Transfer Cell (Bio-Rad)	1	IDR	220,000,000	220,000,000	1,601,600.000		
158	Eijkman Institute	Power supply for electrophoresis (Bio-Rad)	2	IDR	9,900,000	19,800,000	144,144.000		
159	Eijkman Institute	Cuvette semi quarts 2 ml (Starna)	8	IDR	1,831,500	14,652,000	106,666.560		
160	Eijkman Institute	Cuvette quarts 1 ml (Helma)	8	IDR	4,664,000	37,312,000	271,631.360		
161	Eijkman Institute	Cuvette quarts 2 ml (Shimadzu)	4	IDR	15,158,000	60,632,000	441,400.960		
162	Eijkman Institute	BD Accuri C6 Plus (BD)	1	IDR	220,000,000	220,000,000	1,601,600.000		
163	Eijkman Institute	UPS 1000A (Prolink)	1	IDR	5,299,800	5,299,800	38,582.544		
164	Eijkman Institute	BD Accuri C6 Plus (BD)	1	IDR	220,000,000	220,000,000	1,601,600.000	BD	BD
165	Eijkman Institute	UPS 1000A (Prolink)	1	IDR	5,299,800	5,299,800	38,582.544	Prolink	Prolink
166	Eijkman Institute	Qubit	3	IDR	75,000,000	225,000,000	1,638,000.000	Thermo Fisher	Thermo Fisher
167	Eijkman Institute	Agilent 4200 TapeStation system (G2991AA).	1	IDR	1,800,000,000	1,800,000,000	13,104,000.000		
168	Eijkman Institute	Qubit™ Flex Fluorometer	1	IDR	159,500,000	159,500,000	1,161,160.000	Invitrogen Q33327	Invitrogen Q33327
169	Eijkman Institute	Spectofotometer/ Nanodrop	1	IDR	50,000,000	50,000,000	364,000.000		

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170	Eijkman Institute	Qubit 4 Quantification Starter Kit	1	IDR	60,000,000	60,000,000	436,800.000	Brand: Thermo Scientific Cat No: Q33239	Brand: Thermo Scientific Cat No: Q33239
171	Eijkman Institute	NanoDrop™ 8000 Microvolume UV-Vis Spectrophotometer with Laptop	2	IDR	420,000,000	840,000,000	6,115,200.000	Brand: Termo Scientific Cat No: ND8000LAPTOP	Brand: Termo Scientific Cat No: ND8000LAPTOP
172	Eijkman Institute	Automation Liquid Handling i7-Hybrid	2	IDR	11,000,000,000	22,000,000,000	160,160,000.000	Beckman Coulter Life Science	
173	Eijkman Institute	NanoDrop™ 2000 Microvolume Spectrophotometer with Laptop (Thermo Scientific)	3	IDR	251,143,750	753,431,250	5,484,979.500	Brand: Termo Scientific	
174	Eijkman Institute	Nanofluidic Chip Digital PCR Systems	2	IDR	2,550,000,000	5,100,000,000	37,128,000.000	Applied Biosystems	Model: QuantStudioTM 3D Digital PCR System
175	Eijkman Institute	4200 TapeStation System	3	IDR	2,500,000,000	7,500,000,000	54,600,000.000	Brand: Agilent Part No: G2991AA	Brand: Agilent Part No: G2991AA
176	Eijkman Institute	CO2 Incubator Shaker	2	IDR	496,230,000	992,460,000	7,225,108.800	Brand : New Brunswick - US	Cat# S41I 230.011
177	Eijkman Institute	Fluorometer	1	IDR		0	0.000	Invitrogen	Invitrogen
178	Eijkman Institute	CellXpert® C170i	2	IDR	287,878,000	575,756,000	4,191,503.680	Brand : Eppendorf	Cat#6731 000.011
179	Eijkman Institute	Thermo Scientific™ NanoDrop™ One Microvolume UV-Vis Spectrophotometer	1	IDR	345,000,000	345,000,000	2,511,600.000	Thermo Scientific™ 840274100	Thermo Scientific™ 840274100
180	Eijkman Institute	Thermo Scientific™ NanoDrop™ One/OneC Microvolume UV-Vis Spectrophotometer	5	IDR	400,000,000	2,000,000,000	14,560,000.000	Thermo Scientific™ 701058111	Thermo Scientific™ 701058111
181	Eijkman Institute	PCR Cabinet	27	IDR	65,125,000	1,758,375,000	12,800,970.000	Brand : BiobBase Model : PCR-800	Brand : BiobBase Model : PCR-800
182	Eijkman Institute	UVC/T-AR DNA/RNA UV-cleaner box PCR Workstation	4	IDR	67,320,000	269,280,000	1,960,358.400	Biosan - Latvia, cat# BS-040102-AAA	Biosan - Latvia, cat# BS-040102-AAA
183	Eijkman Institute	Polymerase Chain Reaction Cabinet PCR-3A1	1	IDR	150,000,000	150,000,000	1,092,000.000	Brand: ESCO Model: PCR-3A1	Brand: ESCO Model: PCR-3A1
184	Eijkman Institute	Polymerase Chain Reaction Cabinet PCR-4A-1	1	IDR	200,000,000	200,000,000	1,456,000.000	Brand: ESCO Model: PCR-4A1	Brand: ESCO Model: PCR-4A1
185	Eijkman Institute	PCR cabinet PCR-800 (Biobase)	6	IDR	65,125,000	390,750,000	2,844,660.000	Biobase	Biobase
186	Eijkman Institute	Polymerase Chain Reaction Cabinet PCR-3A1	4	IDR	150,000,000	600,000,000	4,368,000.000	Brand: ESCO Model: PCR-3A1	Brand: ESCO Model: PCR-3A1
187	Eijkman Institute	Polymerase Chain Reaction Cabinet PCR-4A-1	4	IDR	200,000,000	800,000,000	5,824,000.000	Brand: ESCO Model: PCR-4A1	Brand: ESCO Model: PCR-4A1
188	Eijkman Institute	Airstream® Polymerase Chain Reaction Cabinets	1	IDR	110,000,000	110,000,000	800,800.000	ESCO PCR-3A1	ESCO PCR-3A1
189	Eijkman Institute	Purifier® Vertical Clean Benches	1	IDR	150,000,000	150,000,000	1,092,000.000	Labconco Catalog #: 89000-132	Labconco Catalog #: 89000-132
190	Eijkman Institute	Gel doc	4	IDR	466,527,600	1,866,110,400	13,585,283.712	Gel Doc Go Imaging System	Gel Doc Go Imaging System
191	Eijkman Institute	GelDoc Go Imaging System	4	IDR	513,180,360	2,052,721,440	14,943,812.083	Brand: Bio-Rad Laboratories	Brand: Bio-Rad Laboratories
192	Eijkman Institute	UV/Stain-Free Sample Tray for GelDoc Go Gel Imaging System	1	IDR	40,000,000	40,000,000	291,200.000	Brand: Bio-Rad, Cat no: #12012189	Brand: Bio-Rad, Cat no: #12012189
193	Eijkman Institute	Holder for Sample Trays and UV Shield	4	IDR	6,000,000	24,000,000	174,720.000	Brand: Bio-Rad, Cat no: #12009077	Brand: Bio-Rad, Cat no: #12009077
194	Eijkman Institute	GelDoc Go UV Shield	4	IDR	8,000,000	32,000,000	232,960.000	Brand: Bio-Rad, Cat no: #12012164	Brand: Bio-Rad, Cat no: #12012164
195	Eijkman Institute	XcitaBlue Viewing Goggles	2	IDR	2,000,000	4,000,000	29,120.000	Brand: Bio-Rad, Cat no: #1708185	Brand: Bio-Rad, Cat no: #1708185
196	Eijkman Institute	Mitsubishi Thermal Printer	4	IDR	60,000,000	240,000,000	1,747,200.000	Brand: Bio-Rad, Cat no: #1708089	Brand: Bio-Rad, Cat no: #1708089
197	Eijkman Institute	Gel Cutter	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Bio-Rad, Cat no: #1703760	Brand: Bio-Rad, Cat no: #1703760

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
198	Eijkman Institute	Gel docoumentation XRS+ Bio Rad (Bio-Rad)	4	IDR	85,000,000	340,000,000	2,475,200.000	Bio-Rad, 1708265	Bio-Rad, 1708265
199	Eijkman Institute	Gel Documentation	1	IDR		0	0.000	General Lab	General Lab
200	Eijkman Institute	Precision scale	7	IDR	31,147,930	218,035,510	1,587,298.513	Brand: Mettler Toledo	Brand: Mettler Toledo
201	Eijkman Institute	Mettler Toledo Semi Micro Balance	1	IDR	126,825,000	126,825,000	923,286.000	Model: Mettler Toledo Semi Micro Balane Type MS205DU	Model: Mettler Toledo Semi Micro Balane Type MS205DU
202	Eijkman Institute	Quintix® Analytical Balance 60 g x 0.1 mg	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius Item no.: QUINTIX64-1S	Brand: Sartorius Item no.: QUINTIX64-1S
203	Eijkman Institute	Quintix® Precision Balance 610 g x 10 mg	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius Item no.: QUINTIX612-1S	Brand: Sartorius Item no.: QUINTIX612-1S
204	Eijkman Institute	Quintix® Precision Balance 210 g x 1 mg	2	IDR	70,000,000	140,000,000	1,019,200.000	Brand: Sartorius Item no.: QUINTIX213-1CN	Brand: Sartorius Item no.: QUINTIX213-1CN
205	Eijkman Institute	Analytical scale max 200g EX224 (Ohaus)	3	IDR	113,515,900	340,547,700	2,479,187.256	Ohaus, 83021332	Ohaus, 83021332
206	Eijkman Institute	Precision scale max 2.2kg ME 2002 (Mettler Toledo)	3	IDR	28,316,300	84,948,900	618,427.992	Mettler Toledo,30029121	Mettler Toledo,30029121
207	Eijkman Institute	Quintix™ Analytical Weighing Balances	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius™ QUINTIX224-1S	Brand: Sartorius™ QUINTIX224-1S
208	Eijkman Institute	Quintix® Precision Balance 610 g x 10 mg	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius Item no.: QUINTIX612-1S	Brand: Sartorius Item no.: QUINTIX612-1S
209	Eijkman Institute	pH meter	6	IDR	10,000,000	60,000,000	436,800.000		
210	Eijkman Institute	pH/ion meter	1	IDR	32,475,000	32,475,000	236,418.000	Model: Mettler Toledo S220	Model: Mettler Toledo S220
211	Eijkman Institute	SevenCompact pH meter S220	2	IDR	50,000,000	100,000,000	728,000.000	Mettler Toledo, Cat. #15573423	Mettler Toledo, Cat. #15573423
212	Eijkman Institute	pH meter Lab 875 (S1 Analytics)	4	IDR	26,500,000	106,000,000	771,680.000	S1 Analytics, 285206320	S1 Analytics, 285206320
213	Eijkman Institute	Compact pH Ion Meter	1	IDR	48,000,000	48,000,000	349,440.000	Merek : Mettler Toledo Model : S220-K	Merek : Mettler Toledo Model : S220-K
214	Eijkman Institute	SevenCompact pH meter S220	1	IDR	50,000,000	50,000,000	364,000.000	Brand: Mettler Toledo, cat: 15573423	Brand: Mettler Toledo, cat: 15573423
215	Eijkman Institute	SevenCompact pH meter S220	1	IDR	50,000,000	50,000,000	364,000.000	Brand: Mettler Toledo - 15573423	Brand: Mettler Toledo - 15573423
216	Eijkman Institute	Thermoshaker	1	IDR	35,000,000	35,000,000	254,800.000	Biosan	Biosan
217	Eijkman Institute			IDR		0	0.000		
218	Eijkman Institute	LSETM Digital Microplate Shaker	2	IDR	29,898,000	59,796,000	435,314.880	Corning #6781-4	Corning #6781-4
219	Eijkman Institute	ThermoMixer® C	17	IDR	112,629,000	1,914,693,000	13,938,965.040	Cat#. 5382 000.015 Brand : Eppendorf-Germany	Cat#. 5382 000.015 Brand : Eppendorf-Germany

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220	Eijkman Institute	Orbital shaker labquake tube shaker	1	IDR	9,950,000	9,950,000	72,436.000	Thermo Scientific	Thermo Scientific
221	Eijkman Institute	Shaking Waterbath	1	IDR	76,800,000	76,800,000	559,104.000	GFL, Germany, Type 1086	GFL, Germany, Type 1086
222	Eijkman Institute	SmartBlockTM plates	12	IDR	26,619,000	319,428,000	2,325,435.840	Cat# 5363 000.039 Brand : Eppendorf-Germany	Cat# 5363 000.039 Brand : Eppendorf-Germany
223	Eijkman Institute	SmartBlockTM 1.5 mL	9	IDR	21,394,000	192,546,000	1,401,734.880	Cat# 5360 000.038 Brand : Eppendorf-Germany	Cat# 5360 000.038 Brand : Eppendorf-Germany
224	Eijkman Institute	SmartBlockTM plates	8	IDR	26,619,000	212,952,000	1,550,290.560	Cat# 5363 000.039 Brand : Eppendorf-Germany	Cat# 5363 000.039 Brand : Eppendorf-Germany
225	Eijkman Institute	SmartBlockTM 1.5 mL	8	IDR	21,394,000	171,152,000	1,245,986.560	Cat# 5360 000.038 Brand : Eppendorf-Germany	Cat# 5360 000.038 Brand : Eppendorf-Germany
226	Eijkman Institute	SmartBlockTM 2 mL	8	IDR	21,394,000	171,152,000	1,245,986.560	Cat# 5362 000.035 Brand : Eppendorf-Germany	Cat# 5362 000.035 Brand : Eppendorf-Germany
227	Eijkman Institute	SmartBlockTM 15 mL	8	IDR	21,394,000	171,152,000	1,245,986.560	Cat# 5366 000.021 Brand : Eppendorf-Germany	Cat# 5366 000.021 Brand : Eppendorf-Germany
228	Eijkman Institute	SmartBlockTM 50 mL	8	IDR	21,394,000	171,152,000	1,245,986.560	Cat# 5365000028 Brand : Eppendorf-Germany	Cat# 5365000028 Brand : Eppendorf-Germany
229	Eijkman Institute	SmartBlock PCR 96	8	IDR	21,394,000	171,152,000	1,245,986.560	Cat# 5306 000.006 Brand : Eppendorf-Germany	Cat# 5306 000.006 Brand : Eppendorf-Germany
230	Eijkman Institute	Eppendorf ThermoTop®, with condens.protect technology	2	IDR	20,000,000	40,000,000	291,200.000	Cat# 5308000003 Brand : Eppendorf-Germany	Cat# 5308000003 Brand : Eppendorf-Germany
231	Eijkman Institute	MaxQ™ 4000 Incubated/Refrigerated Orbital Shakers	2	IDR	195,000,000	390,000,000	2,839,200.000	ThermoScientific, Cat. #SHKE4000-8CE	ThermoScientific, Cat. #SHKE4000-8CE
232	Eijkman Institute	ThermoMixer® C (Eppendorf)	1	IDR	109,250,000	109,250,000	795,340.000	Eppendorf, 5382 000.015	Eppendorf, 5382 000.015
233	Eijkman Institute	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	IDR	30,150,000	30,150,000	219,492.000	Corning, 6780FP	Corning, 6780FP
234	Eijkman Institute	Specimix for 8 tube (Thermo Scientific)	2	IDR	9,781,300	19,562,600	142,415.728	Thermo Scientific, M71015Q	Thermo Scientific, M71015Q
235	Eijkman Institute	Temp controlled shaker Innova 2100	1	IDR	150,027,500	150,027,500	1,092,200.200	New Brunswick Scientific	New Brunswick Scientific
236	Eijkman Institute	Reciprocating Thermostatic Shaking Water Bath	1	IDR	120,000,000	120,000,000	873,600.000	Brand : Biobase Model : SWB-110X24	Brand : Biobase Model : SWB-110X24
237	Eijkman Institute	SmartBlockTM plates	3	IDR	26,619,000	79,857,000	581,358.960	Cat# 5363 000.039 Brand : Eppendorf-Germany	Cat# 5363 000.039 Brand : Eppendorf-Germany
238	Eijkman Institute	SmartBlockTM 1.5 mL	3	IDR	21,394,000	64,182,000	467,244.960	Cat# 5360 000.038 Brand : Eppendorf-Germany	Cat# 5360 000.038 Brand : Eppendorf-Germany
239	Eijkman Institute	ThermoMixer® C (Eppendorf)	1	IDR	120,175,000	120,175,000	874,874.000		
240	Eijkman Institute	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	IDR	33,165,000	33,165,000	241,441.200		
241	Eijkman Institute	Specimix for 8 tube (Thermo Scientific)	1	IDR	10,759,430	10,759,430	78,328.650		
242	Eijkman Institute	Temp controlled shaker Innova 2100 (New Brunswick Scientific)	1	IDR	165,030,250	165,030,250	1,201,420.220		
243	Eijkman Institute	ThermoMixer® C (Eppendorf)	1	IDR	120,175,000	120,175,000	874,874.000	Eppendorf	Eppendorf
244	Eijkman Institute	Corning™ LSE™ Low Speed Orbital Shaker (Corning)	1	IDR	33,165,000	33,165,000	241,441.200	Corning	Corning
245	Eijkman Institute	Specimix for 8 tube (Thermo Scientific)	1	IDR	10,759,430	10,759,430	78,328.650	Thermo Scientific	Thermo Scientific
246	Eijkman Institute	Temp controlled shaker Innova 2100	1	IDR	165,030,250	165,030,250	1,201,420.220	New Brunswick Scientific	New Brunswick Scientific
247	Eijkman Institute	Eppendorf ThermoTop®, with condens.protect technology	5	IDR	20,000,000	100,000,000	728,000.000	Cat# 5308000003 Brand : Eppendorf-Germany	Cat# 5308000003 Brand : Eppendorf-Germany
248	Eijkman Institute	Hybex Microsample Incubator, heating base, 230V	1	IDR	50,000,000	50,000,000	364,000.000	SciGene Cat. #1057-30-2	SciGene Cat. #1057-30-2
249	Eijkman Institute	Infinium MIDI Heatblock Insert	1	IDR	12,000,000	12,000,000	87,360.000	Illumina, Cat. #BD-60-601	Illumina, Cat. #BD-60-601

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250	Eijkman Institute	BioShake XP Tube and Plate Mixer, set. incl. adapter for 0.8 mL Abgene MIDI plate	1	IDR	54,000,000	54,000,000	393,120.000	Brand: BioShake, Model: 1808-0505-1172	Brand: BioShake, Model: 1808-0505-1172
251	Eijkman Institute	Illumina High-Speed Microplate Shaker	1	IDR	75,000,000	75,000,000	546,000.000	Illumina, Cat. #11197831	Illumina, Cat. #11197831
252	Eijkman Institute	ThermoMixer® C	4	IDR	109,250,000	437,000,000	3,181,360.000	Eppendorf - Germany, Cat#. 5382 000.015	Eppendorf - Germany, Cat#. 5382 000.015
253	Eijkman Institute	SmartBlockTM plates	4	IDR	26,619,000	106,476,000	775,145.280	Eppendorf - Germany, Cat# 5363 000.039	Eppendorf - Germany, Cat# 5363 000.039
254	Eijkman Institute	SmartBlockTM 1.5 mL	4	IDR	21,394,000	85,576,000	622,993.280	Eppendorf - Germany , Cat# 5360 000.038	Eppendorf - Germany , Cat# 5360 000.038
255	Eijkman Institute	PCR Plate Shaker	1	IDR		0	0.000	BioShake	BioShake
256	Eijkman Institute	Thermo Scientific Speci-Mix Test Tube Rocker	2	IDR	5,000,000	10,000,000	72,800.000	Thermo Scientific - M71015Q	Thermo Scientific - M71015Q
257	Eijkman Institute	Shaking Waterbath	2	IDR	12,000,000	24,000,000	174,720.000	GFL - 1083	GFL - 1083
258	Eijkman Institute	epMotion 5075vt	3	IDR	3,801,045,000	11,403,135,000	83,014,822.800	Brand: Eppendorf Cat# 5075 000 963	Brand: Eppendorf Cat# 5075 000 963
259	Eijkman Institute	Thermorack, for 24 Safe-Lock tubes, temperable, 1.5/2.0 mL	6	IDR	31,312,000	187,872,000	1,367,708.160	Cat# 5075 771.004	Cat# 5075 771.004
260	Eijkman Institute	Thermoblock 96 for PCR (96x0.2 mL, 77x0.5 mL, PCR plate 96 semi-skirted)	3	IDR	24,434,000	73,302,000	533,638.560	Cat# 5075 766.000	Cat# 5075 766.000
261	Eijkman Institute	Thermoadapter for PCR (PCR plates, 96 wells, skirted)	3	IDR	23,978,000	71,934,000	523,679.520	Cat# 5075 787.008	Cat# 5075 787.008
262	Eijkman Institute	ReservoirRack Module TC, temperable, 8 × PCR tubes 0.2 mL	6	IDR	11,476,000	68,856,000	501,271.680	Cat# 5075 799.049	Cat# 5075 799.049
263	Eijkman Institute	ReservoirRack Module TC, temperable, 4 × Safe-Lock tubes 0.5/1.5/2.0 mL	9	IDR	12,160,000	109,440,000	796,723.200	Cat# 5075 799.081	Cat# 5075 799.081
264	Eijkman Institute	ReservoirRack Module TC, temperable, 4 × Eppendorf Tubes® 5.0 mL	3	IDR	11,913,000	35,739,000	260,179.920	Cat# 5075 799.340	Cat# 5075 799.340
265	Eijkman Institute	Reservoir Rack Module NGS	3	IDR	26,296,000	78,888,000	574,304.640	Cat# 5075 751.917	Cat# 5075 751.917
266	Eijkman Institute	Reservoir Rack Module Tips	3	IDR	16,929,000	50,787,000	369,729.360	Cat# 5075 751.950	Cat# 5075 751.950
267	Eijkman Institute	TipHolder for epTips Motion	21	IDR	14,573,000	306,033,000	2,227,920.240	Cat# 5075 751.399	Cat# 5075 751.399
268	Eijkman Institute	Tip Tool	3	IDR	12,958,000	38,874,000	283,002.720	Cat# 5285 000.000	Cat# 5285 000.000
269	Eijkman Institute	High speed vortex	2	IDR	65,000,000	130,000,000	946,400.000	Daiger	Daiger
270	Eijkman Institute	Vortex Mixer	1	IDR	20,350,000	20,350,000	148,148.000	General Lab	General Lab
271	Eijkman Institute	VX-200 Vortex Mixer	3	IDR	8,250,000	24,750,000	180,180.000	Labnet S0200-230V-Eu	Labnet S0200-230V-Eu
272	Eijkman Institute	High Speed Mixer Mix Mate	1	IDR	60,857,000	60,857,000	443,038.960	Eppendorf-Germany, Cat# 5353 000510	Eppendorf-Germany, Cat# 5353 000510
273	Eijkman Institute	Multi Vortex V-1 Plus	1	IDR	6,300,000	6,300,000	45,864.000	Biosan - Latvia, Cat# BS-010203-AAG	Biosan - Latvia, Cat# BS-010203-AAG
274	Eijkman Institute	Multi Vortex V-32	1	IDR	10,800,000	10,800,000	78,624.000	Biosan - Latvia, Cat# BS-010207-AAG	Biosan - Latvia, Cat# BS-010207-AAG
275	Eijkman Institute	Digital Vortex Mixer	5	IDR	7,500,000	37,500,000	273,000.000	Brand: Thermo Scientific Cat no: 88882010	Brand: Thermo Scientific Cat no: 88882010
276	Eijkman Institute	Vortex Mixer	7	IDR	20,350,000	142,450,000	1,037,036.000	General Lab	General Lab
277	Eijkman Institute	Vortex Mixer Maxi Mix (Thermo Scientific)	9	IDR	7,260,000	65,340,000	475,675.200	Thermo Scientific	Thermo Scientific

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278	Eijkman Institute	Digital Vortex Mixers	10	IDR	7,500,000	75,000,000	546,000.000	Brand: Thermo Scientific Cat no: 88882010	Brand: Thermo Scientific Cat no: 88882010
279	Eijkman Institute	Vortex Mixer	1	IDR		0	0.000	General Lab	General Lab
280	Eijkman Institute	Thermo Scientific™ LP Vortex Mixer	2	IDR	20,000,000	40,000,000	291,200.000	Thermo Scientific	Thermo Scientific
281	Eijkman Institute	Thermo Scientific™ LP Vortex Mixer	6	IDR	20,000,000	120,000,000	873,600.000	Thermo Scientific	Thermo Scientific
282	Eijkman Institute	Sub-Cell GT Gel Caster	2	IDR	5,981,800	11,963,600	87,095.008	BioRad #1704412	BioRad #1704412
283	Eijkman Institute	Sub-Cell GT UV-Transparent Gel Tray, 15 x 15 cm	2	IDR	5,531,900	11,063,800	80,544.464	BioRad #1704417	BioRad #1704417
284	Eijkman Institute	Sub-Cell GT Horizontal Electrophoresis System, 15 x 15 cm tray, with casting gates	1	IDR	34,883,200	34,883,200	253,949.696	BioRad #1704402	BioRad #1704402
285	Eijkman Institute	20-Well Comb	5	IDR	3,111,900	15,559,500	113,273.160	BioRad #1704448	BioRad #1704448
286	Eijkman Institute	15-well Comb	5	IDR	3,111,900	15,559,500	113,273.160	BioRad #1704446	BioRad #1704446
287	Eijkman Institute	Electrophoresis apparatus	1	IDR	24,255,660	24,255,660	176,581.205		
288	Eijkman Institute	Scie-Plas Mini Plus Horizontal Gel Unit System HU10, Include : EV1450 Power Supply Unit Consort - Belgium (distributed through Scie-Plas - UK), cat# EV1450	2	IDR	46,810,000	93,620,000	681,553.600	Scie-Plas - UK, cat# HU10	Scie-Plas - UK, cat# HU10
289	Eijkman Institute	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster	2	IDR	36,000,000	72,000,000	524,160.000	Brand: Bio-Rad, Cat no: #1640302	Brand: Bio-Rad, Cat no: #1640302
290	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply #1640300	2	IDR	30,000,000	60,000,000	436,800.000	Brand: Bio-Rad, Cat no: #1640300	Brand: Bio-Rad, Cat no: #1640300
291	Eijkman Institute	20-Well Comb	2	IDR	2,500,000	5,000,000	36,400.000	Brand: Bio-Rad, Cat No: 1704448	Brand: Bio-Rad, Cat No: 1704448
292	Eijkman Institute	15-Well Comb	2	IDR	2,500,000	5,000,000	36,400.000	Brand: Bio-Rad, Cat No: 1704446	Brand: Bio-Rad, Cat No: 1704446
293	Eijkman Institute	Mini-PROTEAN® Tetra Vertical Electrophoresis Cell, 4-gel	1	IDR	12,676,000	12,676,000	92,281.280	Bio-Rad, 1658001FC	Bio-Rad, 1658001FC
294	Eijkman Institute	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster	1	IDR	18,000,000	18,000,000	131,040.000	Bio-Rad, 1640302	Bio-Rad, 1640302
295	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply	1	IDR	13,150,000	13,150,000	95,732.000	Bio-Rad, 1640300	Bio-Rad, 1640300
296	Eijkman Institute	Power supply for electrophoresis (	3	IDR	9,000,000	27,000,000	196,560.000		
297	Eijkman Institute	Set Owl™ EasyCast™ B2 Mini Gel Electrophoresis Systems (Thermo Fisher)	1	IDR	8,399,502	8,399,502	61,148.375	Thermo Scientific	Thermo Scientific
298	Eijkman Institute	Set Owl™ A1 Large Gel System, complete system (Thermo Fisher)	1	IDR	11,484,000	11,484,000	83,603.520	Thermo Scientific	Thermo Scientific
299	Eijkman Institute	Mini-PROTEAN® Tetra Vertical Electrophoresis Cell, 4-gel (Bio-Rad)	1	IDR	13,943,600	13,943,600	101,509.408		
300	Eijkman Institute	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster (Biorad)	1	IDR	19,800,000	19,800,000	144,144.000		
301	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply (Biorad)	1	IDR	14,465,000	14,465,000	105,305.200		
302	Eijkman Institute	Power supply for electrophoresis (Bio-Rad)	2	IDR	9,900,000	19,800,000	144,144.000	Bio-Rad	Bio-Rad

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303	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply #1640300	2	IDR	30,000,000	60,000,000	436,800.000	Brand: Bio-Rad, Cat no: #1640300	Brand: Bio-Rad, Cat no: #1640300
304	Eijkman Institute	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm tray, with PowerPac Basic Power Supply #1640301	2	IDR	36,000,000	72,000,000	524,160.000	Brand: Bio-Rad, Cat No: 1640301	Brand: Bio-Rad, Cat No: 1640301
305	Eijkman Institute	Preparative Comb for Sub-Cell and Wide Mini-Sub Cell Systems	2	IDR	2,500,000	5,000,000	36,400.000	Brand: Bio-Rad, Cat No: 1704442	Brand: Bio-Rad, Cat No: 1704442
306	Eijkman Institute	Mini Sub-Cell GT Gel Caster	4	IDR	4,600,000	18,400,000	133,952.000	Brand: Bio-Rad, Cat no: 1704422	Brand: Bio-Rad, Cat no: 1704422
307	Eijkman Institute	Sub-Cell GT UV-Transparent Gel Tray, 15 x 10 cm	4	IDR	3,400,000	13,600,000	99,008.000	Brand: Bio-Rad Cat No: 1704416	Brand: Bio-Rad Cat No: 1704416
308	Eijkman Institute	Wide Mini-Sub Cell GT Anode (Red) Electrode Assembly	5	IDR	6,000,000	30,000,000	218,400.000	Brand: Bio-Rad Cat No: 1704423	Brand: Bio-Rad Cat No: 1704423
309	Eijkman Institute	Wide Mini-Sub Cell GT Cathode (Black) Electrode Assembly	5	IDR	6,000,000	30,000,000	218,400.000	Brand: Bio-Rad Cat No: 1704424	Brand: Bio-Rad Cat No: 1704424
310	Eijkman Institute	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm	4	IDR	3,400,000	13,600,000	99,008.000	Brand: Bio-rad Cat No: 1704435	Brand: Bio-rad Cat No: 1704435
311	Eijkman Institute	15-Well Comb	4	IDR	2,500,000	10,000,000	72,800.000	Brand: Bio-Rad Cat No: 1704465	Brand: Bio-Rad Cat No: 1704465
312	Eijkman Institute	8-Well Comb	4	IDR	2,500,000	10,000,000	72,800.000	Brand: Bio-Rad Cat No: 1704463	Brand: Bio-Rad Cat No: 1704463
313	Eijkman Institute	Preparative Comb	2	IDR	3,400,000	6,800,000	49,504.000	Brand: Bio-Rad Cat No: 1704461	Brand: Bio-Rad Cat No: 1704461
314	Eijkman Institute	Mini-Sub Cell GT Anode (Red), QuickSnap Electrode Assembly	5	IDR	5,000,000	25,000,000	182,000.000	Brand: Bio-Rad Cat No: 1704362	Brand: Bio-Rad Cat No: 1704362
315	Eijkman Institute	Mini-Sub Cell GT Cathode (Black), QuickSnap Electrode Assembly	5	IDR	5,000,000	25,000,000	182,000.000	Brand: Bio-rad Cat No: 1704363	Brand: Bio-rad Cat No: 1704363
316	Eijkman Institute	Horizontal Electrophoresis	1	IDR		0	0.000	General Lab	General Lab
317	Eijkman Institute	Wide Mini-Sub Cell GT Horizontal Electrophoresis System, 15 x 10 cm tray, with PowerPac Basic Power Supply #1640301	2	IDR	36,000,000	72,000,000	524,160.000	Brand: Bio-Rad, Cat no: #1640302	Brand: Bio-Rad, Cat no: #1640302
318	Eijkman Institute	Mini-Sub Cell GT Horizontal Electrophoresis System and PowerPac Basic Power Supply #1640300	2	IDR	30,000,000	60,000,000	436,800.000	Brand: Bio-Rad, Cat no: #1640300	Brand: Bio-Rad, Cat no: #1640300
319	Eijkman Institute	30-Well Comb	8	IDR	2,500,000	20,000,000	145,600.000	Brand: Bio-Rad, Cat 1704449	Brand: Bio-Rad, Cat 1704449
320	Eijkman Institute	20-Well Comb	8	IDR	2,500,000	20,000,000	145,600.000	Brand: Bio-Rad, Cat No: 1704448	Brand: Bio-Rad, Cat No: 1704448
321	Eijkman Institute	15-Well Comb	8	IDR	2,500,000	20,000,000	145,600.000	Brand: Bio-Rad, Cat No: 1704446	Brand: Bio-Rad, Cat No: 1704446
322	Eijkman Institute	10-Well Comb	8	IDR	2,500,000	20,000,000	145,600.000	Brand: Bio-Rad, Cat No: 1704444	Brand: Bio-Rad, Cat No: 1704444
323	Eijkman Institute	Preparative Comb for Sub-Cell and Wide Mini-Sub Cell Systems	2	IDR	2,500,000	5,000,000	36,400.000	Brand: Bio-Rad, Cat No: 1704442	Brand: Bio-Rad, Cat No: 1704442
324	Eijkman Institute	Mini Sub-Cell GT Gel Caster	6	IDR	4,600,000	27,600,000	200,928.000	Brand: Bio-Rad, Cat no: 1704422	Brand: Bio-Rad, Cat no: 1704422
325	Eijkman Institute	Sub-Cell GT UV-Transparent Gel Tray, 15 x 10 cm	6	IDR	3,400,000	20,400,000	148,512.000	Brand: Bio-Rad Cat No: 1704416	Brand: Bio-Rad Cat No: 1704416
326	Eijkman Institute	Wide Mini-Sub Cell GT Anode (Red) Electrode Assembly	4	IDR	6,000,000	24,000,000	174,720.000	Brand: Bio-Rad Cat No: 1704423	Brand: Bio-Rad Cat No: 1704423

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327	Eijkman Institute	Wide Mini-Sub Cell GT Cathode (Black) Electrode Assembly	4	IDR	6,000,000	24,000,000	174,720.000	Brand: Bio-Rad Cat No: 1704424	Brand: Bio-Rad Cat No: 1704424
328	Eijkman Institute	Mini-Sub Cell GT UV-Transparent Gel Tray, 7 x 10 cm	4	IDR	3,400,000	13,600,000	99,008.000	Brand: Bio-rad Cat No: 1704435	Brand: Bio-rad Cat No: 1704435
329	Eijkman Institute	15-Well Comb	4	IDR	2,500,000	10,000,000	72,800.000	Brand: Bio-Rad Cat No: 1704465	Brand: Bio-Rad Cat No: 1704465
330	Eijkman Institute	8-Well Comb	4	IDR	2,500,000	10,000,000	72,800.000	Brand: Bio-Rad Cat No: 1704463	Brand: Bio-Rad Cat No: 1704463
331	Eijkman Institute	Preparative Comb	2	IDR	3,400,000	6,800,000	49,504.000	Brand: Bio-Rad Cat No: 1704461	Brand: Bio-Rad Cat No: 1704461
332	Eijkman Institute	Mini-Sub Cell GT Anode (Red), QuickSnap Electrode Assembly	6	IDR	5,000,000	30,000,000	218,400.000	Brand: Bio-Rad Cat No: 1704362	Brand: Bio-Rad Cat No: 1704362
333	Eijkman Institute	Mini-Sub Cell GT Cathode (Black), QuickSnap Electrode Assembly	6	IDR	5,000,000	30,000,000	218,400.000	Brand: Bio-rad Cat No: 1704363	Brand: Bio-rad Cat No: 1704363
334	Eijkman Institute	QUANTOM Tx™ Microbial Cell Counter	1	IDR	450,000,000	450,000,000	3,276,000.000	Brand: Logos biosystem	Brand: Logos biosystem
335	Eijkman Institute	Waterbath Precision CIR 19 (Thermo Scientific)	4	IDR	63,175,400	252,701,600	1,839,667.648	Thermo Scientific, TSCIR19	Thermo Scientific, TSCIR19
336	Eijkman Institute	Densitometer (DEN-1B)	2	IDR	15,000,000	30,000,000	218,400.000	Biosan	Biosan
337	Eijkman Institute	Vortex	1	IDR	20,350,000	20,350,000	148,148.000	General Lab	General Lab
338	Eijkman Institute	Autoclave	2	IDR	100,000,000	200,000,000	1,456,000.000	Hirayama	Hirayama
339	Eijkman Institute	Rocker shaker	1	IDR	20,000,000	20,000,000	145,600.000		
340	Eijkman Institute	Orbital shaker inkubator	1	IDR	75,000,000	75,000,000	546,000.000	Biosan	Biosan
341	Eijkman Institute	Automatic Gram Staining	1	IDR	25,000,000	25,000,000	182,000.000		
342	Eijkman Institute	Autoinoculator sensititer	1	IDR	300,000,000	300,000,000	2,184,000.000	Thermo Scientific	Thermo Scientific
343	Eijkman Institute	Thermo Vizion Automated MIC Reader	1	IDR	250,000,000	250,000,000	1,820,000.000		
344	Eijkman Institute	Disk dispenser	1	IDR	15,000,000	15,000,000	109,200.000	oxoid	oxoid
345	Eijkman Institute	BactAlert	1	IDR		0	0.000	Biomerieux	Biomerieux
346	Eijkman Institute	SmartBlockTM 1.5 mL	1	IDR	21,394,000	21,394,000	155,748.320	Cat# 5360 000.038 Brand : Eppendorf-Germany	Cat# 5360 000.038 Brand : Eppendorf-Germany
347	Eijkman Institute	Magnetic stand	1	IDR	14,655,000	14,655,000	106,688.400	Invitrogen, AM10027	Invitrogen, AM10027
348	Eijkman Institute	Sub-Cell GT Horizontal Electrophoresis Cell, 15 x 15 cm tray, with PowerPac™ Basic Power Supply and gel caster	2	IDR	36,000,000	72,000,000	524,160.000	Brand: Bio-Rad, Cat no: #1640302	Brand: Bio-Rad, Cat no: #1640302
349	Eijkman Institute	Mitsubishi Thermal Printer	1	IDR	60,000,000	60,000,000	436,800.000	Brand: Bio-Rad, Cat no: #1708089	Brand: Bio-Rad, Cat no: #1708089
350	Eijkman Institute	Microwave	3	IDR	10,000,000	30,000,000	218,400.000		
351	Eijkman Institute	Rotary evaaporator	1	IDR	15,000,000	15,000,000	109,200.000		
352	Eijkman Institute	Automatic colony counter	1	IDR	451,368,500	451,368,500	3,285,962.680	Bramd: Synbiosis Co Ltd - UK Model : Protocol 3 plus HD	Bramd: Synbiosis Co Ltd - UK Model : Protocol 3 plus HD
353	Eijkman Institute	Automatic media preparation with autodispenser	1	IDR	1,100,000,000	1,100,000,000	8,008,000.000		
354	Eijkman Institute	Magnetic Stirrer	2	IDR	10,450,000	20,900,000	152,152.000	Corning digital stirring hot plate	Corning digital stirring hot plate
355	Eijkman Institute	SmartBlockTM plates	1	IDR	26,619,000	26,619,000	193,786.320	Cat# 5363 000.039 Brand : Eppendorf-Germany	Cat# 5363 000.039 Brand : Eppendorf-Germany
356	Eijkman Institute	BIONEER Agaropower	1	IDR	32,901,000	32,901,000	239,519.280		
357	Eijkman Institute	DBS Puncher	1	IDR	463,196,088	463,196,088	3,372,067.521	Perkin Elmer	Perkin Elmer

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358	Eijkman Institute	SmartBlockTM 1.5 mL	3	IDR	21,394,000	64,182,000	467,244.960	Cat# 5360 000.038 Brand : Eppendorf-Germany	Cat# 5360 000.038 Brand : Eppendorf-Germany
359	Eijkman Institute	SmartBlockTM 15 mL	1	IDR	21,394,000	21,394,000	155,748.320	Cat# 5366 000.021	Cat# 5366 000.021
360	Eijkman Institute	Eppendorf ThermoTop	2	IDR	18,746,000	37,492,000	272,941.760	Cat# 5308 000.003	Cat# 5308 000.003
361	Eijkman Institute	Axygen® PlateMax® Semi Automated Plate Sealer, includes adapters for standard and deep well Microplates, 230V	1	IDR	165,000,000	165,000,000	1,201,200.000	Axygen, HS-1230	Axygen, HS-1230
362	Eijkman Institute	Axygen® Sealing Film Roller	2	IDR	2,800,000	5,600,000	40,768.000	Axygen, PCR-SP-ROLLER	Axygen, PCR-SP-ROLLER
363	Eijkman Institute	PCR-Cooler (Blue)	5	IDR	2,368,000	11,840,000	86,195.200	Eppendorf, #3881000031	Eppendorf, #3881000031
364	Eijkman Institute	IsoPack and IsoRack for 0.5ml tubes	2	IDR	5,476,000	10,952,000	79,730.560	Eppendorf, #3880000178	Eppendorf, #3880000178
365	Eijkman Institute	IsoPack and IsoRack for 1.5ml/2ml tubes	2	IDR	5,476,000	10,952,000	79,730.560	Eppendorf, #3880001174	Eppendorf, #3880001174
366	Eijkman Institute	Axygen™ PCR Tube Storage Racks,	5	IDR	1,800,000	9,000,000	65,520.000	Axygen™ R-96-PCR-FSP	Axygen™ R-96-PCR-FSP
367	Eijkman Institute	Magnetic Stand-96	1	IDR	14,655,000	14,655,000	106,688.400	Invitrogen AM10027	Invitrogen AM10027
368	Eijkman Institute	Dry Shipper	4	IDR	100,000,000	400,000,000	2,912,000.000		
369	Eijkman Institute	Dry Shipper	1	IDR	100,000,000	100,000,000	728,000.000		
370	Eijkman Institute	Magnetic Stirer	4	IDR	10,000,000	40,000,000	291,200.000		
371	Eijkman Institute	Speedvac	1	IDR	250,000,000	250,000,000	1,820,000.000		
372	Eijkman Institute	Hot Plate	1	IDR	10,000,000	10,000,000	72,800.000		
373	Eijkman Institute	Heat Block	1	IDR	109,250,000	109,250,000	795,340.000		
374	Eijkman Institute	Nanopure (water purification)	1	IDR	225,449,400	225,449,400	1,641,271.632		
375	Eijkman Institute	Automatic DBS Puncher	1	IDR	266,104,000	266,104,000	1,937,237.120		
376	Eijkman Institute	Microwave	2	IDR	5,000,000	10,000,000	72,800.000		
377	Eijkman Institute	Magnetic Stand-96	2	IDR	14,655,000	29,310,000	213,376.800		
378	Eijkman Institute	Innova 2100	1	IDR	150,027,500	150,027,500	1,092,200.200		
379	Eijkman Institute	Micro Vials and Neoprene Stoppers	20	IDR	10,000,000	200,000,000	1,456,000.000		
380	Eijkman Institute	Specimen Handling Cage	1	IDR	100,000,000	100,000,000	728,000.000		
381	Eijkman Institute	BugDorm-2 and BugDorm-3 Rearing Cages	5	IDR	100,000,000	500,000,000	3,640,000.000		
382	Eijkman Institute	Weather Station	5	IDR	25,000,000	125,000,000	910,000.000		
383	Eijkman Institute	MVP Flex Video Camera System	2	IDR	10,000,000	20,000,000	145,600.000		
384	Eijkman Institute	Dipper	100	IDR	5,000,000	500,000,000	3,640,000.000		
385	Eijkman Institute	Mosquito Breeder	100	IDR	5,000,000	500,000,000	3,640,000.000		
386	Eijkman Institute	Collapsible Cages	10	IDR	5,000,000	50,000,000	364,000.000		
387	Eijkman Institute	Series Collecting Jars	100	IDR	5,000,000	500,000,000	3,640,000.000		
388	Eijkman Institute	Aspirator	500	IDR	100,000	50,000,000	364,000.000		
389	Eijkman Institute	BugDorm-1, Rearing and Observation Cage	2	IDR	100,000,000	200,000,000	1,456,000.000		
390	Eijkman Institute	Insect Vacs	2	IDR	100,000,000	200,000,000	1,456,000.000		
391	Eijkman Institute	Aspirator Syringe Bulb	100	IDR	100,000	10,000,000	72,800.000		
392	Eijkman Institute	Insect Vac Nozzle/Extension Set	1	IDR	100,000,000	100,000,000	728,000.000		
393	Eijkman Institute	Laboratory Chill Table	2	IDR	100,000,000	200,000,000	1,456,000.000		
394	Eijkman Institute	Glass Capsule Vials	100	IDR	100,000	10,000,000	72,800.000		
395	Eijkman Institute	Stereo Zoom Microscopes	1	IDR	60,000,000	60,000,000	436,800.000		
396	Eijkman Institute	MVP Flex Video Camera System	1	IDR	60,000,000	60,000,000	436,800.000		
397	Eijkman Institute	Basic Research Sofware	3	IDR	60,000,000	180,000,000	1,310,400.000		
398	Eijkman Institute	Heavy Duty EVS CO2 Mosquito Trap	1	IDR	100,000,000	100,000,000	728,000.000		
399	Eijkman Institute	CDC Light Traps	10	IDR	60,000,000	600,000,000	4,368,000.000		

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
400	Eijkman Institute	Universal Black Light Traps	10	IDR	60,000,000	600,000,000	4,368,000.000		
401	Eijkman Institute	Malaise Traps	10	IDR	60,000,000	600,000,000	4,368,000.000		
402	Eijkman Institute	Personal computer (to be combined with DS-Fi3 digital camera)	2	IDR	44,831,769	89,663,538	652,750.557		
403	Eijkman Institute	Vial Cabinets	6	IDR	60,000,000	360,000,000	2,620,800.000		
404	Eijkman Institute	Advanced Collecting & Mounting kit	100	IDR	50,000	5,000,000	36,400.000		
405	Eijkman Institute	Night Collecting Sheet	1	IDR	50,000	50,000	364.000		
406	Eijkman Institute	Ambidextrous Pinning Forceps	1000	IDR	25,000	25,000,000	182,000.000		
407	Eijkman Institute	Cornell University System Unit Pinning Tray	100	IDR	500,000	50,000,000	364,000.000		
408	Eijkman Institute	Cornell Open-Faced Cabinets for 6 or 12 Drawer	4	IDR	50,000,000	200,000,000	1,456,000.000		
409	Eijkman Institute	California Academy Cabinets for 24 Drawers	4	IDR	50,000,000	200,000,000	1,456,000.000		
410	Eijkman Institute	Dehumidifier	4	IDR	50,000,000	200,000,000	1,456,000.000		
411	Eijkman Institute	Insect Slide Mounting Kit	1000	IDR	50,000	50,000,000	364,000.000		
412	Eijkman Institute	Steel Insectarium Cabinets	4	IDR	50,000,000	200,000,000	1,456,000.000		
413	Eijkman Institute	Series Insect Pins	2000	IDR	50,000	100,000,000	728,000.000		
414	Eijkman Institute	BG-Sentinel Trap	1	IDR	50,000,000	50,000,000	364,000.000		
415	Eijkman Institute	High Intensity UV Flashlight	100	IDR	100,000	10,000,000	72,800.000		
416	Eijkman Institute	Aquatic Pipettes	1	IDR	50,000,000	50,000,000	364,000.000		
417	Eijkman Institute	Heavy-Duty Sweep Net with Three-Foot Handle	1	IDR	50,000,000	50,000,000	364,000.000		
418	Eijkman Institute	Black Light EVS Trap	20	IDR	50,000,000	1,000,000,000	7,280,000.000		
419	Eijkman Institute	Mosquito Attractant, "Octanol" Cage	1	IDR	50,000,000	50,000,000	364,000.000		
420	Eijkman Institute	Computer	20	IDR	20,000,000	400,000,000	2,912,000.000		
421	Eijkman Institute	Cubicle/Workstation	20	IDR	10,000,000	200,000,000	1,456,000.000		
422	Eijkman Institute	Bottle rainbow kit 1, 6x 230 mL	1	IDR	3,565,000	3,565,000	25,953.200		
423	Eijkman Institute	IQ/OQ cost for S220-K	1	IDR	2,000,000	2,000,000	14,560.000		
424	Eijkman Institute	Tube Holder PCR 96	1	IDR	3,535,000	3,535,000	25,734.800	Cat# 5353 040.113	Cat# 5353 040.113
425	Eijkman Institute	Tube Holder 24 x 0.5 mL conical tubes	1	IDR	3,535,000	3,535,000	25,734.800	Cat# 5353 040.121	Cat# 5353 040.121
426	Eijkman Institute	Tube Holder 24 x 1.5/2.0 mL conical tubes	1	IDR	3,535,000	3,535,000	25,734.800	Cat# 5353 040.130	Cat# 5353 040.130
427	Eijkman Institute	Tube Holder 8 x 5/15 mL conical tubes	1	IDR	3,535,000	3,535,000	25,734.800	Cat# 5353 040.148	Cat# 5353 040.148
428	Eijkman Institute	Tube Holder 4 x 25/50 mL conical tubes	1	IDR	3,535,000	3,535,000	25,734.800	Cat# 5353 040.156	Cat# 5353 040.156
429	Eijkman Institute	Waterbath	1	IDR	45,182,500	45,182,500	328,928.600	Jisico Cat#J-BAL8	Jisico Cat#J-BAL8
430	Eijkman Institute	Laptop/Notebook	2	IDR	17,900,000	35,800,000	260,624.000	HP 340S G7 Notebook PC (8BC22AV)	HP 340S G7 Notebook PC (8BC22AV)
431	Eijkman Institute	Liquid Nitrogen Tank		IDR		0	0.000		
432	Eijkman Institute	Bel-Art™ SP Scienceware™ Dry-Keeper™ Desiccator Cabinets	2	IDR	54,000,000	108,000,000	786,240.000	Brand: Bel-Art Catalog No.08-647-26	Brand: Bel-Art Catalog No.08-647-26
433	Eijkman Institute	Sure-Grip® EX Flammable Safety Cabinet,30 gallon,2 self-close doors.	1	IDR	14,000,000	14,000,000	101,920.000	Brand: Justrite™, Model No. 893020 / 893021 / 893023 / 893025	Brand: Justrite™, Model No. 893020 / 893021 / 893023 / 893025
434	Eijkman Institute	Sure-Grip® EX Undercounter Corrosives/Acid Stl Safety Cabinet, 22 gallon, 2 manual close doors, Blue	1	IDR	25,000,000	25,000,000	182,000.000	Brand: Justrite™, Model No. 892302	Brand: Justrite™, Model No. 892302
435	Eijkman Institute	Fire-proof filing cabinet	1	IDR	30,000,000	30,000,000	218,400.000		
436	Eijkman Institute	Filing Cabinet (Lemari Arsip) with sliding glass door	2	IDR	2,000,000	4,000,000	29,120.000		

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
437	Eijkman Institute	Reciprocal water bath	3	IDR	90,000,000	270,000,000	1,965,600.000	Brand: Thermolab Model: GFL-1086	Brand: Thermolab Model: GFL-1086
438	Eijkman Institute	Precision Circulating Water Bath	1	IDR	50,000,000	50,000,000	364,000.000	Brand: Thermo Scientific Model: CIR 19 Cat No: TSCIR19	Brand: Thermo Scientific Model: CIR 19 Cat No: TSCIR19
439	Eijkman Institute	Barnstead™ Smart2Pure™ Water Purification System	2	IDR	110,000,000	220,000,000	1,601,600.000	Brand: Thermo Scientific Cat No: 50129688	Brand: Thermo Scientific Cat No: 50129688
440	Eijkman Institute	MagnaRack™ Magnetic Separation Rack	1	IDR	12,000,000	12,000,000	87,360.000	Brand: Invitrogen Catalog number: CS15000	Brand: Invitrogen Catalog number: CS15000
441	Eijkman Institute	Magnetic stand-96	1	IDR	18,000,000	18,000,000	131,040.000	Invitrogen, AM10027	Invitrogen, AM10027
442	Eijkman Institute	DynaMag™-96 Side Magnet	1	IDR	25,000,000	25,000,000	182,000.000	Brand: Invitrogen Catalog number: 12331D	Brand: Invitrogen Catalog number: 12331D
443	Eijkman Institute	Hotplate & Magnetic Stirrer	1	IDR	5,000,000	5,000,000	36,400.000		
444	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z105066	Brand: Sigma Aldrich, cat#Z105066
445	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z127035	Brand: Sigma Aldrich, cat#Z127035
446	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z127094	Brand: Sigma Aldrich, cat#Z127094
447	Eijkman Institute	Microwave oven	1	IDR	4,000,000	4,000,000	29,120.000	Panasonic NN-GT353M	Panasonic NN-GT353M
448	Eijkman Institute	Eppendorf® PCR Cooler, iceless cold storage system for 96 well plates and PCR tubes	6	IDR	7,500,000	45,000,000	327,600.000	Brand: Eppendorf, cat: 022510525	Brand: Eppendorf, cat: 022510525
449	Eijkman Institute	IsoSafe and IsoPack, includes 1 IsoSafe and 3 IsoPack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	7,500,000	30,000,000	218,400.000	Brand: Eppendorf, cat: 3880001026	Brand: Eppendorf, cat: 3880001026
450	Eijkman Institute	IsoPack and IsoRack set, includes one IsoPack and one IsoRack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	7,500,000	30,000,000	218,400.000	Brand: Eppendorf, cat: 3880001166	Brand: Eppendorf, cat: 3880001166
451	Eijkman Institute	Concentrator plus complete system, with integrated diaphragm vacuum pump, with Rotor F-45-48-11, 230 V/50 – 60 Hz	2	IDR	150,000,000	300,000,000	2,184,000.000	Brand: Eppendorf Catalog No. 5305000304	Brand: Eppendorf Catalog No. 5305000304
452	Eijkman Institute	Adapter, for 1 PCR tube (0.2 mL, max. Ø 6 mm), for all 1.5/2.0 mL rotors, 6 pcs.	4	IDR	2,000,000	8,000,000	58,240.000	Brand: Eppendorf Catalog No. 5425715005	Brand: Eppendorf Catalog No. 5425715005
453	Eijkman Institute	FastPrep-24™ 5G bead beating grinder and lysis system	1	IDR	250,000,000	250,000,000	1,820,000.000	MP Biomedicals, Cat. #6005500	MP Biomedicals, Cat. #6005500
454	Eijkman Institute	Corning® LSE™ Nutating Mixer	2	IDR	8,000,000	16,000,000	116,480.000	Brand: Corning 20A00J615 Mfr. No. 6720	Brand: Corning 20A00J615 Mfr. No. 6720
455	Eijkman Institute	Waterbath Precision CIR 19 (Thermo Scientific)	1	IDR	63,175,400	63,175,400	459,916.912	Thermo Scientific, TSCIR19	Thermo Scientific, TSCIR19
456	Eijkman Institute	Hotplate Stirrer Cimarec+	2	IDR	10,605,600	21,211,200	154,417.536	Thermo Scientific, SP88857105	Thermo Scientific, SP88857105
457	Eijkman Institute	Hemocue 301 (Hemocue)	2	IDR	13,750,000	27,500,000	200,200.000	Hemocue	Hemocue
458	Eijkman Institute	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	IDR	37,999,000	37,999,000	276,632.720	Apple	Apple
459	Eijkman Institute	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	IDR	23,000,000	23,000,000	167,440.000	Lenovo	Lenovo
460	Eijkman Institute	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	IDR	23,000,000	46,000,000	334,880.000	Lenovo	Lenovo

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461	Eijkman Institute	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	8	IDR	630,200	5,041,600	36,702.848	Fisherbrand,02261840	Fisherbrand,02261840
462	Eijkman Institute	Acid and Corrosive Safety cabinet (Justrite)	1	IDR	17,019,100	17,019,100	123,899.048	Justrite, 892322	Justrite, 892322
463	Eijkman Institute	UPS 1000A (Prolink)	1	IDR	4,818,000	4,818,000	35,075.040	Prolink	Prolink
464	Eijkman Institute	Bilistick System	1	IDR	21,897,000	21,897,000	159,410.160	Bilimetrix, BM-BS 1.0	Bilimetrix, BM-BS 1.0
465	Eijkman Institute	Link 10 Voice Activated Speaker Portable (JBL)	1	IDR	3,299,000	3,299,000	24,016.720	JBL	JBL
466	Eijkman Institute	Camera Mirrorless Z6 (Nikon)	1	IDR	40,000,000	40,000,000	291,200.000	Nikon	Nikon
467	Eijkman Institute	Hot Plate Magnetic Stirrer	1	IDR	17,611,000	17,611,000	128,208.080	RT2 Advanced Hotplate Stirrer. Thermo Scientific. Catalog no. 88880005	RT2 Advanced Hotplate Stirrer. Thermo Scientific. Catalog no. 88880005
468	Eijkman Institute	Fisher Scientific 77 Slide Warmer	1	IDR	8,011,250	8,011,250	58,321.900	Fisher Scientific	Fisher Scientific
469	Eijkman Institute	Fisher Scientific Precision GPD 10 Water Bath	1	IDR	13,137,000	13,137,000	95,637.360	Fisher Scientific	Fisher Scientific
470	Eijkman Institute	Biobase Denaturation and Hybridization System	1	IDR	240,000,000	240,000,000	1,747,200.000	Brand : Biobase Model : HS-500	Brand : Biobase Model : HS-500
471	Eijkman Institute	Biobase Slide Cabinet BKC-S400	4	IDR	53,000,000	212,000,000	1,543,360.000	Biobase BKC-S400	Biobase BKC-S400
472	Eijkman Institute	Liquid/supernatan Aspiration Pump (Vacuubrand)	2	IDR	27,147,828	54,295,656	395,272.376	VACUUBRAND® BVC (Biochem-VacuuCenter)	VACUUBRAND® BVC (Biochem-VacuuCenter)
473	Eijkman Institute	Waterbath Precision CIR 19 (Thermo Scientific)	1	IDR	69,492,940	69,492,940	505,908.603		
474	Eijkman Institute	Hotplate Stirrer Cimarec+ (Thermo Scientific)	2	IDR	11,666,160	23,332,320	169,859.290		
475	Eijkman Institute	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	IDR	41,798,900	41,798,900	304,295.992		
476	Eijkman Institute	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	IDR	25,300,000	25,300,000	184,184.000		
477	Eijkman Institute	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	IDR	25,300,000	50,600,000	368,368.000		
478	Eijkman Institute	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	5	IDR	693,220	3,466,100	25,233.208		
479	Eijkman Institute	Acid and Corrosive Safety cabinet (Justrite)	1	IDR	18,721,010	18,721,010	136,288.953		
480	Eijkman Institute	Automation hybrimax	1	IDR	1,100,000	1,100,000	8,008.000		
481	Eijkman Institute	Waterbath Precision CIR 19 (Thermo Scientific)	2	IDR	7,260,000	14,520,000	105,705.600	Thermo Scientific	Thermo Scientific
482	Eijkman Institute	Hotplate Stirrer Cimarec+ (Thermo Scientific)	2	IDR	11,666,160	23,332,320	169,859.290	Thermo Scientific	Thermo Scientific
483	Eijkman Institute	iMac 27 inch Retina 5K 2020 i7 (Apple)	1	IDR	41,798,900	41,798,900	304,295.992	Apple	Apple
484	Eijkman Institute	LENOVO Desktop AIO V530-7RIF Intel i7-9700T 8GB 1TB R530 W10 PRO TOUCH	1	IDR	25,300,000	25,300,000	184,184.000	Lenovo	Lenovo
485	Eijkman Institute	Lenovo Thinkpad X1 Carbon GEN8 i7 10710 16GB 1TB SSD W10 14.0FHD - 1TB SSD	2	IDR	25,300,000	50,600,000	368,368.000	Lenovo	Lenovo
486	Eijkman Institute	Timer (Fisherbrand™ Traceable™ Multi-Colored Timer)	5	IDR	693,220	3,466,100	25,233.208	Fisherbrand	Fisherbrand

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
487	Eijkman Institute	Acid and Corrosive Safety cabinet (Justrite)	1	IDR	18,721,000	18,721,000	136,288.880	Justrite	Justrite
488	Eijkman Institute	Locator Liquid Nitrogen (2)	1	IDR	1,100,000,000	1,100,000,000	8,008,000.000	1	1
489	Eijkman Institute	Neon Transfection System for Electroporation (Thermo Fisher)	1	IDR	532,000,000	532,000,000	3,872,960.000	Thermo Fisher	Thermo Fisher
490	Eijkman Institute	Tempshield™ Cryo-Gloves™	4	IDR	3,500,000	14,000,000	101,920.000	Brand: Tempshield Cat No: 11-394-307	Brand: Tempshield Cat No: 11-394-307
491	Eijkman Institute	Bel-Art™ SP Scienceware™ Dry-Keeper™ Desiccator Cabinets	3	IDR	54,000,000	162,000,000	1,179,360.000	Brand: Bel-Art Catalog No.08-647-26	Brand: Bel-Art Catalog No.08-647-26
492	Eijkman Institute	Sure-Grip® EX Flammable Safety Cabinet,30 gallon,2 self-close doors.	1	IDR	14,000,000	14,000,000	101,920.000	Brand: Justrite™, Model No. 893020 / 893021 / 893023 / 893025	Brand: Justrite™, Model No. 893020 / 893021 / 893023 / 893025
493	Eijkman Institute	Sure-Grip® EX Undercounter Corrosives/Acid Stl Safety Cabinet, 22 gallon, 2 manual close doors, Blue	1	IDR	25,000,000	25,000,000	182,000.000	Brand: Justrite™, Model No. 892302	Brand: Justrite™, Model No. 892302
494	Eijkman Institute	Fire-proof filing cabinet	1	IDR	30,000,000	30,000,000	218,400.000		
495	Eijkman Institute	Reciprocal water bath	2	IDR	90,000,000	180,000,000	1,310,400.000	Brand: Thermolab Model: GFL-1086	Brand: Thermolab Model: GFL-1086
496	Eijkman Institute	Precision Circulating Water Bath	2	IDR	50,000,000	100,000,000	728,000.000	Brand: Thermo Scientific Model: CIR 19 Cat No: TSCIR19	Brand: Thermo Scientific Model: CIR 19 Cat No: TSCIR19
497	Eijkman Institute	MagnaRack™ Magnetic Separation Rack	2	IDR	12,000,000	24,000,000	174,720.000	Brand: Invitrogen Catalog number: CS15000	Brand: Invitrogen Catalog number: CS15000
498	Eijkman Institute	Magnetic stand-96	2	IDR	18,000,000	36,000,000	262,080.000	Invitrogen, AM10027	Invitrogen, AM10027
499	Eijkman Institute	DynaMag™-96 Side Magnet	2	IDR	25,000,000	50,000,000	364,000.000	Brand: Invitrogen Catalog number: 12331D	Brand: Invitrogen Catalog number: 12331D
500	Eijkman Institute	Hotplate & Magnetic Stirrer	2	IDR	5,000,000	10,000,000	72,800.000		
501	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z105066	Brand: Sigma Aldrich, cat#Z105066
502	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z127035	Brand: Sigma Aldrich, cat#Z127035
503	Eijkman Institute	Spinbar® magnetic stir bar	4	IDR	1,500,000	6,000,000	43,680.000	Brand: Sigma Aldrich, cat#Z127094	Brand: Sigma Aldrich, cat#Z127094
504	Eijkman Institute	Microwave oven	1	IDR	4,000,000	4,000,000	29,120.000	Panasonic NN-GT353M	Panasonic NN-GT353M
505	Eijkman Institute	Eppendorf® PCR Cooler, iceless cold storage system for 96 well plates and PCR tubes	6	IDR	7,500,000	45,000,000	327,600.000	Brand: Eppendorf, cat: 022510525	Brand: Eppendorf, cat: 022510525
506	Eijkman Institute	IsoSafe and IsoPack, includes 1 IsoSafe and 3 IsoPack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	7,500,000	30,000,000	218,400.000	Brand: Eppendorf, cat: 3880001026	Brand: Eppendorf, cat: 3880001026
507	Eijkman Institute	IsoPack and IsoRack set, includes one IsoPack and one IsoRack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	7,500,000	30,000,000	218,400.000	Brand: Eppendorf, cat: 3880001166	Brand: Eppendorf, cat: 3880001166
508	Eijkman Institute	Infinium Hybridization Chambers and Gaskets	1	IDR	25,000,000	25,000,000	182,000.000	Illumina, Cat. #BD-60-402	Illumina, Cat. #BD-60-402
509	Eijkman Institute	Infinium Hybridization Chamber Inserts (8)	1	IDR	25,000,000	25,000,000	182,000.000	Illumina, Cat. #WG-15-301	Illumina, Cat. #WG-15-301
510	Eijkman Institute	Infinium Staining Set (Staining Rack and Wash Dish)	2	IDR	25,000,000	50,000,000	364,000.000	Illumina, Cat. #WG-10-207	Illumina, Cat. #WG-10-207
511	Eijkman Institute	Infinium TeFlow Chamber (1)	4	IDR	25,000,000	100,000,000	728,000.000	Illumina, Cat WG-10-202	Illumina, Cat WG-10-202
512	Eijkman Institute	Infinium TeFlow Thermometer Assembly	1	IDR	25,000,000	25,000,000	182,000.000	Illumina, Cat WG-10-202	Illumina, Cat WG-10-202
513	Eijkman Institute	Infinium Water Circulator and Teflow Rack Kit (110/220V)	1	IDR	250,000,000	250,000,000	1,820,000.000	Illumina, Cat 20028404	Illumina, Cat 20028404
514	Eijkman Institute	Vaccum dessicator	1	IDR	25,000,000	25,000,000	182,000.000	VWR, cat no 24988-197	VWR, cat no 24988-197

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
515	Eijkman Institute	PILOT Chemical Resistant Diaphragm Vacuum Pump, 230V/60/50Hz	1	IDR	20,000,000	20,000,000	145,600.000	PILOT, 1162B28 Mfr. No. TLD5000C-02	PILOT, 1162B28 Mfr. No. TLD5000C-02
516	Eijkman Institute	ALPS 50 V Semi automated Microplate Heat Sealer	1	IDR	85,000,000	85,000,000	618,800.000	Brand: Thermo Scientific Cat : AB-1443A	Brand: Thermo Scientific Cat : AB-1443A
517	Eijkman Institute	Concentrator plus complete system, with integrated diaphragm vacuum pump, with Rotor F-45-48-11, 230 V/50 – 60 Hz	2	IDR	150,000,000	300,000,000	2,184,000.000	Brand: Eppendorf Catalog No. 5305000304	Brand: Eppendorf Catalog No. 5305000304
518	Eijkman Institute	Adapter, for 1 PCR tube (0.2 mL, max. Ø 6 mm), for all 1.5/2.0 mL rotors, 6 pcs.	4	IDR	2,000,000	8,000,000	58,240.000	Brand: Eppendorf Catalog No. 5425715005	Brand: Eppendorf Catalog No. 5425715005
519	Eijkman Institute	HANNA HI 98509 Checktemp 1 Digital Thermometer	1	IDR	2,000,000	2,000,000	14,560.000	Brand: Hanna, cat: HI 98509	Brand: Hanna, cat: HI 98509
520	Eijkman Institute	FastPrep-24™ 5G bead beating grinder and lysis system	1	IDR	250,000,000	250,000,000	1,820,000.000	MP Biomedicals, Cat. #6005500	MP Biomedicals, Cat. #6005500
521	Eijkman Institute	MicroAmp™ Adhesive Film Applicator	4	IDR	2,000,000	8,000,000	58,240.000	Brand: Thermo Scientific Catalog number: 4333183	Brand: Thermo Scientific Catalog number: 4333183
522	Eijkman Institute	Corning® LSE™ Nutating Mixer	2	IDR	8,000,000	16,000,000	116,480.000	Brand: Corning 20A00J615 Mfr. No. 6720	Brand: Corning 20A00J615 Mfr. No. 6720
523	Eijkman Institute	Quintix® Analytical Balance 60 g x 0.1 mg	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius Item no.: QUINTIX64-1S	Brand: Sartorius Item no.: QUINTIX64-1S
524	Eijkman Institute	Quintix® Precision Balance 610 g x 10 mg	1	IDR	70,000,000	70,000,000	509,600.000	Brand: Sartorius Item no.: QUINTIX612-1S	Brand: Sartorius Item no.: QUINTIX612-1S
525	Eijkman Institute	Quintix® Precision Balance 210 g x 1 mg	2	IDR	70,000,000	140,000,000	1,019,200.000	Brand: Sartorius Item no.: QUINTIX213-1CN	Brand: Sartorius Item no.: QUINTIX213-1CN
526	Eijkman Institute	UPS Untuk ePmotion, Tape Station, Quant Studio, Digital PCR	8	IDR	5,000,000	40,000,000	291,200.000	Terserah Mas Anto	Terserah Mas Anto
527	Eijkman Institute	Barnstead™ Smart2Pure™ Water Purification System	2	IDR	110,000,000	220,000,000	1,601,600.000	Brand: Thermo Scientific Cat No: 50129688	Brand: Thermo Scientific Cat No: 50129688
528	Eijkman Institute	dry shipper mini	1	IDR	25,000,000	25,000,000	182,000.000	Worthington Industries CX100 Dryshipper	Worthington Industries CX100 Dryshipper
529	Eijkman Institute	Yeti hopper M30 portable soft cooler dark blue	3	IDR	15,000,000	45,000,000	327,600.000	Brand: Yeti, cat: YHOPM30	Brand: Yeti, cat: YHOPM30
530	Eijkman Institute	portable solar panel	1	IDR	4,000,000	4,000,000	29,120.000	Brand: Anker, Tipe 21W	Brand: Anker, Tipe 21W
531	Eijkman Institute	Mesin Genset Portable Inverter HYUNDAI HDG 1880DI	1	IDR	6,000,000	6,000,000	43,680.000	Brand: Hyundai, Tipe: HDG 1880di	Brand: Hyundai, Tipe: HDG 1880di
532	Eijkman Institute	Bento lab	1	IDR	50,000,000	50,000,000	364,000.000	Brand: Bento Lab	Brand: Bento Lab
533	Eijkman Institute	Water purifier (LifeStraw Mission) 12L	1	IDR	3,000,000	3,000,000	21,840.000	Brand: LifeStraw	Brand: LifeStraw
534	Eijkman Institute	GARMIN GPS INREACH SE+ SATELLITE COMMUNICATOR KOMUNIKATOR SATELIT	2	IDR	10,000,000	20,000,000	145,600.000	Brand: Garmin, cat: 010-01735-20	Brand: Garmin, cat: 010-01735-20
535	Eijkman Institute	Accselerometer ActiGraph wGT3X-BT	30	IDR	5,000,000	150,000,000	1,092,000.000	Brand: Actigraph, Cat:#wGT3X-BT	Brand: Actigraph, Cat:#wGT3X-BT
536	Eijkman Institute	GPS GPSMAP® 64s SEA	2	IDR	5,000,000	10,000,000	72,800.000	Brand: Garmin, Part Number 010-01199-13	Brand: Garmin, Part Number 010-01199-13
537	Eijkman Institute	DJI Mavic Air 2	1	IDR	17,500,000	17,500,000	127,400.000	Brand: DJI, Tipe DJI Mavic Air 2	Brand: DJI, Tipe DJI Mavic Air 2
538	Eijkman Institute	ELEPHANT ELITE EL1907 WATERPROOF CASE	2	IDR	10,000,000	20,000,000	145,600.000	Brand: ELEPHANT ELITE, cat: EL1907	Brand: ELEPHANT ELITE, cat: EL1907
539	Eijkman Institute	ELEPHANT ELITE EL2916W WATERPROOF ROLLING CASE	2	IDR	10,000,000	20,000,000	145,600.000	Brand: ELEPHANT ELITE, cat: EL2916	Brand: ELEPHANT ELITE, cat: EL2916

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
540	Eijkman Institute	Laptop	1	IDR	30,000,000	30,000,000	218,400.000		
541	Eijkman Institute	Magnetic Stand-96	2	IDR	14,655,000	29,310,000	213,376.800	Invitrogen, AM10027	Invitrogen, AM10027
542	Eijkman Institute	Water Purfication	1	IDR		0	0.000	General Lab	General Lab
543	Eijkman Institute	Magnetic Stand for Tube: Magnesphere Technology Magnetic Separation Stands (12 Positions, 1.5 m)	1	IDR		0	0.000	Promega	Promega
544	Eijkman Institute	Magnetic Stand for PCR Plate Tube	1	IDR		0	0.000	Thermo Fisher Scientific	Thermo Fisher Scientific
545	Eijkman Institute	FastPrep-24TM 5G	1	IDR	900,000,000	900,000,000	6,552,000.000	Brand: MPBIO Ex: Singapore	
546	Eijkman Institute	Microwave Oven	1	IDR	3,000,000	3,000,000	21,840.000	Panasonic NN-GT353M	
547	Eijkman Institute	Hotplate & Magnetic Stirrer	2	IDR	7,000,000	14,000,000	101,920.000	Brand - ISG 153-005	
548	Eijkman Institute	SpinbarR magnetic stir bar	2	IDR	1,500,000	3,000,000	21,840.000	Brand: Sigma Aldrich, cat#Z105066	
549	Eijkman Institute	SpinbarR magnetic stir bar	2	IDR	1,500,000	3,000,000	21,840.000	Brand: Sigma Aldrich, cat#Z127035	
550	Eijkman Institute	SpinbarR magnetic stir bar	2	IDR	1,500,000	3,000,000	21,840.000	Brand: Sigma Aldrich, cat#Z127094	
551	Eijkman Institute	Eppendorf ThermoTop®, with condens.protect technology	2	IDR	20,000,000	40,000,000	291,200.000	Cat# 5308000003 Brand : Eppendorf-Germany	
552	Eijkman Institute	Eppendorf® PCR Cooler, iceless cold storage system for 96 well plates and PCR tubes	6	IDR	5,000,000	30,000,000	218,400.000	Brand: Eppendorf, cat: 022510525	
553	Eijkman Institute	IsoSafe and IsoPack, includes 1 IsoSafe and 3 IsoPack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	5,000,000	20,000,000	145,600.000	Brand: Eppendorf, cat: 3880001026	
554	Eijkman Institute	IsoPack and IsoRack set, includes one IsoPack and one IsoRack, for 1.5/2.0 mL vessels, 0 °C	4	IDR	5,000,000	20,000,000	145,600.000	Brand: Eppendorf, cat: 3880001166	
555	Eijkman Institute	MagnaRack™ Magnetic Separation Rack	2	IDR	12,000,000	24,000,000	174,720.000	Brand: Invitrogen Catalog number: CS15000	
556	Eijkman Institute	Magnetic stand-96	2	IDR	18,000,000	36,000,000	262,080.000	Invitrogen, AM10027	
557	Eijkman Institute	24 x 2 mL All-Metal QuickPrep Sample	1	IDR	96,000,000	96,000,000	698,880.000	MP BIO, 116002545	
558	Eijkman Institute	BioFlo® 120, Standard, CEE 7/7 Rotameter, 5 SLPM	2	IDR	1,083,058,500	2,166,117,000	15,769,331.760	Brand : Eppendorf, USA	Cat# B120SCS031
						466,061,788,594	**3,377,160,489**		
559	Eijkman Institute	High Containment Facility (HCF)	1	IDR	235,000,000,000	235,000,000,000	1,710,799,999.997		
560	Eijkman Institute	Equipment for ancient DNA facility	1	IDR	130,000,000,000	130,000,000,000	946,400,000.000		
561	Eijkman Institute	Equipment for animal facility	1	IDR	39,518,029,598	**39,518,029,598**	**287,691,255**		
Grand Total						**870,579,818,192**	**6,322,051,745**		

Appendix 8: Equipment List of Andalas University

EQUIPMENT LIST ANDALAS UNIVERSITY					
No	**Equipment**	**Quantity**	**Price/ Unit (Rp)**	**Total Price (Rp)**	**Total Price (JPY)**
1	2020 Attune NxT Flow Cytometer (Invitrogen - A24863)	1	3,120,000,000	3,120,000,000	22,713,600
2	Aferesis Tools	1	4,000,000,000	4,000,000,000	29,120,000
3	ELISA test for COVID 19 antibody levels / IMLTD screening test	1	3,000,000,000	3,000,000,000	21,840,000
4	PCR tool for testing RNA COVID 19	1	4,000,000,000	4,000,000,000	29,120,000
5	Component separator centrifuge	2	1,000,000,000	2,000,000,000	14,560,000
6	Matched cross-test tool	2	1,000,000,000	2,000,000,000	14,560,000
7	Convalescent plasma storage refrigerator	3	1,000,000,000	3,000,000,000	21,840,000
8	Donor chair 3 sets	3	200,000,000	600,000,000	4,368,000
9	Sealer automatic	5	50,000,000	250,000,000	1,820,000
10	Convalescent plasma donor monitoring coagulometer for Covid patients 19	1	2,000,000,000	2,000,000,000	14,560,000
11	Hematologi analizer skrining donor	1	1,500,000,000	1,500,000,000	10,920,000
12	Clinical chemistry of conventional plasma donor monitoring analizer	1	3,000,000,000	3,000,000,000	21,840,000
13	flowsitometry monitoring progressivity during convalescent plasma therapy of Covid infection 19	1	4,000,000,000	4,000,000,000	29,120,000
14	Nanosizer dan Zeta sizer (Horiba)	1	800,000,000	800,000,000	5,824,000
15	Ultraturax	1	100,000,000	100,000,000	728,000
16	Homogenizer-sonicator	1	80,000,000	80,000,000	582,400
17	Freeze Drying	1	300,000,000	300,000,000	2,184,000
18	Climatic chamber	1	300,000,000	300,000,000	2,184,000
19	Transmission Electron Microscope	1	1,400,000,000	1,400,000,000	10,192,000
20	Spektrofotometer UV Vis	1	400,000,000	400,000,000	2,912,000
21	Buchi Chromatography flash/prep	1	1,850,000,000	1,850,000,000	13,468,000
22	BUCHI ROTAVAPOR R-220 PRO - Industrial Evaporation	1	1,676,600,000	1,676,600,000	12,205,648
23	CNC milling beserta kelengkapanya	1	2,086,278,000	2,086,278,000	15,188,104
24	Desktop PC design CAD for CNC milling machine	1	20,000,000	20,000,000	145,600
25	PCB Etching Machine for making printed circuit board	1	400,000,000	400,000,000	2,912,000

26	Complete welding equipment (MIG / TIG welding etc.)	1	300,000,000	300,000,000	2,184,000
27	CNC turning and its accessories	1	1,862,960,000	1,862,960,000	13,562,349
28	Desktop PC design CAD CNC turning machine	1	20,000,000	20,000,000	145,600
29	CNC laser cutting 4 axis beserta kelengkapanya	1	4,631,388,000	4,631,388,000	33,716,505
30	Desktop PC design CAD for CNC laser cutting	1	20,000,000	20,000,000	145,600
31	Giant 3D printing	1	689,397,500	689,397,500	5,018,814
32	Laptop for design 3D Printer	1	31,000,000	31,000,000	225,680
33	Kerja Bangku (rakum, geinda meja, mesin bor, osiloskop, gergaji dll)	1	300,000,000	300,000,000	2,184,000
34	3D Printer	3	169,278,181	507,834,543	3,697,035
35	PCB machine (Base unit)	2	187,000,000	374,000,000	2,722,720
36	Scion Single Quadropole 436 GCMS for VOC Analysis. Equiped 72 capacity Autosampler Thermal Desorbtion and air sampler	1	2,000,000,000	2,000,000,000	14,560,000
37	CDS Thermal Desorber Autosampler	2	388,000,000	776,000,000	5,649,280
38	Seek Scan package	1	131,000,000	131,000,000	953,680
39	REVEAL FIREPRO	1	22,500,000	22,500,000	163,800
40	NIR Measurement Packages: BUNDLE-NIRQUEST-NIR	1	500,000,000	500,000,000	3,640,000
41	Raman Measurement Packages	1	1,100,000,000	1,100,000,000	8,008,000
42	HES Spectrometer	1	1,200,000,000	1,200,000,000	8,736,000
43	BUNDLE-HDX-BIO	1	250,000,000	250,000,000	1,820,000
44	BUNDLE-HR-PLASMA	1	150,000,000	150,000,000	1,092,000
45	BUNDLE-QEPRO-FL	1	450,000,000	450,000,000	3,276,000
46	Absorbance Measurement Packages	1	450,000,000	450,000,000	3,276,000
47	DUSTTRAK DRX AEROSOL MONITOR 8534	1	200,000,000	200,000,000	1,456,000
48	SIDEPAK PERSONAL AEROSOL MONITOR AM521	1	200,000,000	200,000,000	1,456,000
49	PRIMARY CALIBRATOR 4046	1	35,000,000	35,000,000	254,800
50	DUSTTRAK II AEROSOL MONITOR 8530EP	1	150,000,000	150,000,000	1,092,000
51	SCANNING MOBILITY PARTICLE SIZER SPECTROMETER 3938	1	1,000,000,000	1,000,000,000	7,280,000
52	CERTIFIER FLOW ANALYZER PLUS VENTILATOR TEST SYSTEM 4080	1	175,000,000	175,000,000	1,274,000

53	AEROTRAK CLEANROOM CONDENSATION PARTICLE COUNTER 900	1	1,000,000,000	1,000,000,000	7,280,000
54	FACILITY MONITORING SYSTEM	1	150,000,000	150,000,000	1,092,000
55	2 unit plasma pyrolysis furnace	2	500,000,000	1,000,000,000	7,280,000
56	Multilevel gas filter system	5	15,000,000	75,000,000	546,000
57	Hydrogen storage	5	15,000,000	75,000,000	546,000
58	Oxygen tube	5	5,000,000	25,000,000	182,000
59	High temperature resistant electrodes	5	30,000,000	150,000,000	1,092,000
60	20 kV converter module	3	150,000,000	450,000,000	3,276,000
61	3 HP compressor and pressure regulator	2	12,000,000	24,000,000	174,720
62	Roof top solar panel 15 kW	1	600,000,000	600,000,000	4,368,000
63	Overvoltage and impulse voltage protection system module	2	75,000,000	150,000,000	1,092,000
64	Metal mold module for waste metal processing	2	15,000,000	30,000,000	218,400
65	Inverter module 75 kW, 20 kV	3	180,000,000	540,000,000	3,931,200
66	microsteam turbine 5 kW	3	150,000,000	450,000,000	3,276,000
67	microgas turbine 5 kW	3	150,000,000	450,000,000	3,276,000
68	Waste scrubber machine	2	130,000,000	260,000,000	1,892,800
69	Waste sorter machine	2	130,000,000	260,000,000	1,892,800
70	3D printer for manufacturing PVC piping modules and systems	2	23,000,000	46,000,000	334,880
71	CNC plasma cutter/solder	2	250,000,000	500,000,000	3,640,000
72	High precision cutting machine	2	45,000,000	90,000,000	655,200
73	Lathe	2	65,000,000	130,000,000	946,400
74	High temperature resistant electrodes	2	45,000,000	90,000,000	655,200
75	Working table	2	15,000,000	30,000,000	218,400
76	Comsol multy physic	1	35,000,000	35,000,000	254,800
77	Current, high temperature, humidity and voltage sensors	2	25,000,000	50,000,000	364,000
78	CCTV Camera	2	15,000,000	30,000,000	218,400
79	Monitor 40 inches	2	6,500,000	13,000,000	94,640
80	Monitor 32 inches	5	3,500,000	17,500,000	127,400
81	Temperature sensor and arduino module	3	2,500,000	7,500,000	54,600
82	Arduino motion sensor and module	3	2,500,000	7,500,000	54,600

83	High performance PC	2	35,000,000	70,000,000	509,600
84	Android based smart phone for mobile monitoring	2	6,500,000	13,000,000	94,640
85	DAQ for highspeed data trasmission	2	35,000,000	70,000,000	509,600
86	Thermal imaging sensor	2	25,000,000	50,000,000	364,000
87	Single gas sensor (H2, O2, CO, CO2, O3)	5	18,500,000	92,500,000	673,400
88	Multigas sensor	1	85,000,000	85,000,000	618,800
89	mixer mill MM 500 nano	1	400,000,000	400,000,000	2,912,000
90	Miseq (ilumina Platform)	2	3,200,000,000	6,400,000,000	46,592,000
91	BSC	3	150,000,000	450,000,000	3,276,000
92	Freezer -80	3	425,000,000	1,275,000,000	9,282,000
93	Gradient PCR	6	150,000,000	900,000,000	6,552,000
94	Elisa reader	1	275,000,000	275,000,000	2,002,000
95	Refrigerated centrifuge	1	100,000,000	100,000,000	728,000
96	DNA Hibridization	1	100,000,000	100,000,000	728,000
97	Gel Dock	1	225,000,000	225,000,000	1,638,000
TOTAL				**76,649,958,043**	**558,011,695**
			Exchange Rate Rp to JPY:	0.00728	
		*Announced by the Bank Indonesia on 4 Dec. 2020			

Appendix 9: Equipment List of BATAN

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price		Amount	EQ to JPY	Manufacturer	Model
		ANIMAL LAB EQUIPMENT								
1	PSTNT-BATAN	IVIS Lumina XR Series III imaging system	1	IDR	Rp	5,100,000,000	5,100,000,000	37,128,000	Perkin Elmer USA	XR Series III
2	PSTNT-BATAN	Licor C Digit Chemiluminescence scanner	1	IDR	Rp	187,000,000	187,000,000	1,361,360	Li-Cor USA	Licor 3600-00
3	PSTNT-BATAN	SNAP ID 2.0 base with mini blot kit and complete mini vertical gel electhrophoresis and blotting apparatus	1	IDR	Rp	125,400,000	125,400,000	912,912	Merck, Germany	SNAP ID 2.0
4	PSTNT-BATAN	Complete mini vertical gel electrophoresis and blotting apparatus	1	IDR	Rp	79,000,000	79,000,000	575,120	Major Science	MV-10CBS
5	PSTNT-BATAN	GLP F2 KIT2	1	IDR	Rp	19,000,000	19,000,000	138,320	Thermofischer, USA	FI 4700880
6	PSTNT-BATAN	Desktop binocular stereo microscope	1	IDR	Rp	74,000,000	74,000,000	538,720	RWD Life Science, China	970-00255-00
7	PSTNT-BATAN	Stereotaxic anasthesia solution set	1	IDR	Rp	243,600,000	243,600,000	1,773,408	RWD Life Science	Anastesia Air Pump (R510-29), Small Animal anastesia Device (R500IK), Streotaxic for mouse (68037), Anastesia induction chamber (V100), Gas filter (R510-31-6), Gas Evacuation Apparatus (R546W), SGL MRI mask for mouse (R510-86), Thermostat
8	PSTNT-BATAN	Evos XL core imaging system	1	IDR	Rp	150,000,000	150,000,000	1,092,000	Thermofischer, USA	Amex 1000
9	PSTNT-BATAN	Benchtop NMR Brucker	1	IDR	Rp	3,500,000,000	3,500,000,000	25,480,000	Bruker Biospin, Bruker Gmbh (	Fourier Edu Lab FT-NMR Benchtop
10	PSTNT-BATAN	Countess II FL Automated Cell Counter	1	IDR	Rp	138,000,000	138,000,000	1,004,640	Thermofischer, USA	AMQAF1000
		RADIOISOTOPE AND RADIOPHARMACEUTICAL DEV. EQUIPMENT								
11	PTRR-BATAN	Dynamic Light Scattering (DLS) with zeta potential measurement	1	IDR	Rp	1,400,000,000	1,400,000,000	10,192,000	malvernpanalytical	Zetasizer Pro ZSU5800 Package
12	PTRR-BATAN	Automatic colony counter	1	IDR	Rp	410,000,000	410,000,000	2,984,800	Acinterlab	Automatic colony counter Scan 1200
13	PTRR-BATAN	Autoclave	3	IDR	Rp	200,000,000	600,000,000	4,368,000	Genecraft Labs	Autoclave FLS-1000
14	PTRR-BATAN	Freeze Dry System with Stoppering Tray Dryer	1	IDR	Rp	1,075,000,000	1,075,000,000	7,826,000	Labconco	FreeZone 12 Liter Console
15	PTRR-BATAN	Western blot equipment set	1	IDR	Rp	2,050,000,000	2,050,000,000	14,924,000	Sciencewerke	V3 Western Workflow, Transfer protein, Cher
16	PTRR-BATAN	Ultra low freezer -86	1	IDR	Rp	300,000,000	300,000,000	2,184,000	Thermo Scientific	ULT TSX Ultra Low Freezer -86
17	PTRR-BATAN	Automatic cell counter	1	IDR	Rp	150,000,000	150,000,000	1,092,000	Sciencewerke	Invitrogen Countess
18	PTRR-BATAN	Spectrophotometer	1	IDR	Rp	400,000,000	400,000,000	2,912,000	Thermo Scientific	Multiskan Sky Microplate, Spectrophotometer
19	PTRR-BATAN	Microscope	1	IDR	Rp	200,000,000	200,000,000	1,456,000	Sciencewerke	EVOS XL Core Cell Imaging System
20	PTRR-BATAN	RT-PCR set	1	IDR	Rp	350,000,000	350,000,000	2,548,000	Bio-Rad	Bio-Rad CFX96
11	PTRR-BATAN	Dissecting microscope	1	IDR	Rp	210,000,000	210,000,000	1,528,800	spachoptics	Leica M80
12	PTRR-BATAN	Double Door (Pass through) autoclave	1	IDR	Rp	960,000,000	960,000,000	6,988,800	systec-lab	Systec HX-150 2D
13	PTRR-BATAN	Dewar with cooling system	2	IDR	Rp	629,000,000	1,258,000,000	9,158,240	ortech	Mobius
14	PTRR-BATAN	radio TLC scanner	1	IDR	Rp	760,000,000	760,000,000	5,532,800	not stated	not stated
15	PTRR-BATAN	HPLC with radioactive detector	1	IDR	Rp	1,876,000,000	1,876,000,000	13,657,280	not stated	not stated
16	PTRR/PPIKSN	Dose callibrator with color LCD touch Screen	3	IDR	Rp	365,000,000	1,095,000,000	7,971,600	not stated	not stated
17	PTRR-BATAN	Cryostat	1	IDR	Rp	500,000,000	500,000,000	3,640,000	leicabiosystems	Leica CM1520
18	PTRR-BATAN	Liquid Nitrogen generator	1	IDR		945,000,000	945,000,000	6,879,600	f-dgs	CRYOGEN.20
19	PTRR-BATAN	Ultra low freezer-196	1	IDR		450,000,000	450,000,000	3,276,000	thermofisher	Cryoplus Storage System
21	PTRR-BATAN	mobile radioiodine monitoring system	2	IDR	Rp	805,000,000	1,610,000,000	11,720,800	Mirion	IM-203M

No.	Owner/ID	Descriptions	Q'ty	Curr.	Unit Price	Amount	EQ to JPY	Manufacturer	Model
		RESEARCH REACTOR INSTRUMENT							
22	PRSG-BATAN	Research reactor protection system	1	USD	8,341,900	8,341,900	60,729	Framatome, France	Reactor protection system for GA. Siwabessy research reactor (30 MW thermal research reactor). The reactor was built by Interatom (Germany). It is a customized instrumetation system.
		NUCLEAR MEDICINE EQUIPMENT							
23	PPIKSN-BATAN	SPECT/CT (nuclear medicine equipment)	1	IDR	18,975,000,000	18,975,000,000	138,138,000	Siemen	Symbia Intevo 6
		RADIOISOTOPE AND RADIOPHARMACEUTICAL PRODUCTION EQUIPMENT							
24	PTRR-BATAN	Semi automatic system for I-131 production	1	IDR	3,200,000,000	3,200,000,000	23,296,000	customized/developed	production system by dry distillation methods. Maximum Tellurium oxyde is 200 gram and maximum Iodine-131 radioactivity is 30 Ci. The system will be put in a lead-shielded hotcell, remotely operated.
25	PTRR-BATAN	Semi automatic system for I-131 oral solution production	1	IDR	3,200,000,000	3,200,000,000	23,296,000	customized/developed	maximum total radioactivity of Iodine-131 is 2,0 Ci, 50 and 100 mCi I-131 per vial as the product. The system size not more than 1,0m x 1,0m x 0,75m. The system will be put in a minicell. The system will be put in a lead-shielded minicell, remotely operated.
26	PTRR-BATAN	Semi automatic system for I-131-MIBG production	1	IDR	3,200,000,000	3,200,000,000	23,296,000	customized/developed	maximum total radioactivity of Iodine-131 is 1,0 Ci, 50 mCi I-131 per vial as the product. The system size not more than 1,0m x 1,0m x 0,75m. The system will be put in a lead-shielded minicell, remotely operated.
27	PTRR-BATAN	Semi automatic system for Sm-153 EDTMP	1	IDR	3,200,000,000	3,200,000,000	23,296,000	customized/developed	maximum total radioactivity of samarium-153 is 2,0 Ci, 75 and 100 mCi per vial as the product. The system size not more than 1,0m x 1,0m x 0,75m. The system will be put in a lead-shielded minicell, remotely operated.
						57,998,341,900	**422,227,929**		

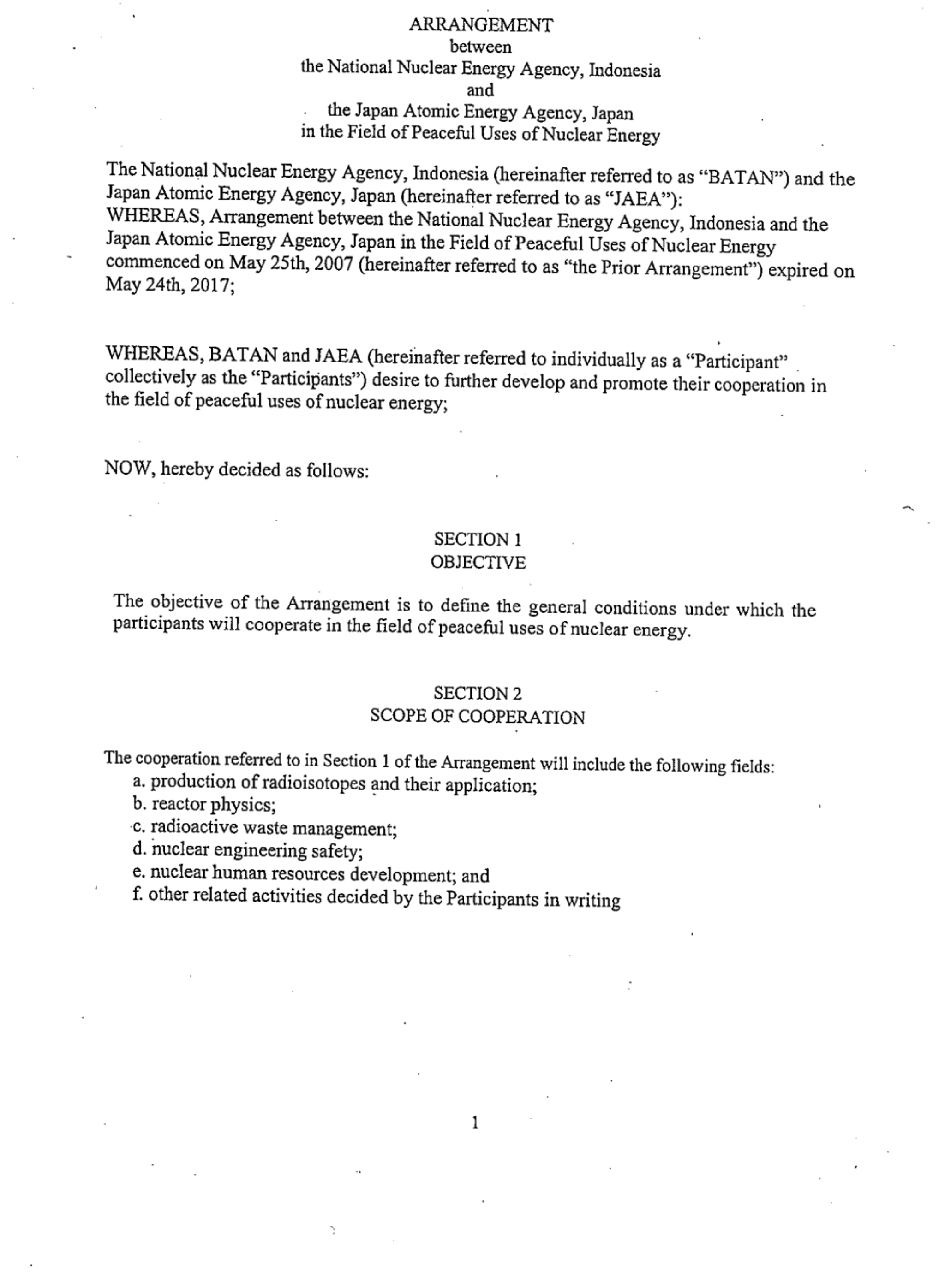
Appendix 10: List of BATAN-IAEA Collaboration Project

Project No	Project Title
INS1026	Utilising Neutron Beam Techniques to Support Research on Industrial Applications
INS1027	Assisting the Preparation of the Bandung TRIGA Research Reactor for Conditions of Normal Operation
INS1028	Enhancing the Utilization of the TRIGA Research Reactor
INS1029	Building Capacity on Advanced Non-Destructive Evaluation and Nuclear Analytical Techniques for Product Quality Improvement and Environmental Risk Assessment
INS5042	Improving Cattle Productivity Through Improved Feeding and Enhanced Reproduction
INS5043	Intensifying Quality Soybean Production to Achieve Self-Sufficiency
INS6018	Establishing Mo-99/Tc-99m Generator Production Technology Using Neutron-irradiated Natural Molybdenum to Support Cancer Management
INS6019	Using Stable Isotope Tracer for Studying the Vitamin A Status of Children
RAS0075	Networking for Nuclear Education, Training, and Outreach Programmes in Nuclear Science and Technology in the Framework of ANENT (Asian Network for Education in Nuclear Technology)
RAS0079	Educating Secondary Students and Science Teachers on Nuclear Science and Technology
RAS0080	Promoting Self-Reliance and Sustainability of National Nuclear Institutions
RAS0081	Supporting Human Resource Development and Nuclear Technology Including Emerging Needs
RAS1021	Harnessing Nuclear Science and Technology for the Preservation and Conservation of Cultural Heritage
RAS1023	Developing and Upscaling of Radiation Grafted Materials for Water Treatment
RAS2018	Supporting Decision Making for Nuclear Power Planning and Development - Phase III
RAS2019	Conducting the Comprehensive Management and Recovery of Radioactive and Associated Mineral Resources
RAS5073	Supporting Climate-Proofing Rice Production Systems (CRiPS) Based on Nuclear Applications-Phase II
RAS5075	Improving Sustainable Cotton Production Through Enhanced Resilience to Climate Change
RAS5078	Enhancing Food Safety Laboratory Capabilities and Establishing a Network in Asia to Control Veterinary Drug Residues and Related Chemical Contaminants
RAS5079	Improving Crop Resilience to Climate Change through Mutation Breeding in Pacific Islands
RAS5082	Managing and Controlling Aedes Vector Populations Using the Sterile Insect Technique
RAS5083	Reducing Greenhouse Gas Emissions through Climate-Smart Agricultural Practices
RAS6073	Using Stable Isotope Techniques to Monitor Situations and Interventions for Promoting Infant and Young Child Nutrition
RAS6080	Preventing Overweight and Obesity, and Promoting Physical Activity among Children and Adolescents

RAS6081	Enhancing Safety and Effectiveness in Diagnostic Radiology through Training of Medical Imaging Professionals in Quality Practices
RAS6088	Strengthening Education and Clinical Training Programmes for Medical Physicists
RAS6090	Promoting the Preparation of Emerging Radiopharmaceuticals for Positron Emission Tomography-Based Molecular Imaging and Radionuclide Therapy
RAS6091	Enhancing the Management of Non-Communicable and Communicable Diseases through Capacity Building under the IAEA Curricula for Nuclear Medicine Professionals
RAS6092	Using Stable Isotope Techniques to Monitor Situations and Interventions for Promoting Infant and Young Child Nutrition - Phase II
RAS9077	Supporting Regional Nuclear Emergency Preparedness and Response in the Member States of ASEAN Region
RAS9078	Strengthening Public and Environmental Radiological Protection in the Asia-Pacific Region
RAS9079	Strengthening Technical Capabilities in Asia and the Pacific Region for Medical Radiation Protection in Compliance with the Requirements of the New International Basic Safety Standards
RAS9080	Enhancing National Capabilities on Occupational Radiation Protection in Compliance with Requirements of the New International Basic Safety Standards
RAS9081	Providing Education and Training in Radiation Safety in the Asia-Pacific Region
RAS9082	Strengthening Capabilities for Radiological and Nuclear Emergency Preparedness and Response in the GCC Member States
RAS9085	Enhancing the Radioactive Waste Management Infrastructure in the Asia - Pacific Region
RAS9086	Strengthening Regulatory Infrastructure and Promoting Safety Culture in Regulatory Authorities
RAS9089	Strengthening Radiation Safety Infrastructure
RAS0082	Facilitating Activities Implemented under the RCA Framework (RCA)
RAS1022	Strengthening Regional Capacity in Non-Destructive Testing and Examination Using Nuclear and Related Techniques for Safer, Reliable, More Efficient and Sustainable Industries Including Civil Engineering (RCA)
RAS5077	Promoting the Application of Mutation Techniques and Related Biotechnologies for the Development of Green Crop Varieties (RCA)
RAS5081	Enhancing Food Safety and Supporting Regional Authentication of Foodstuffs through Implementation of Nuclear Techniques (RCA)
RAS5084	Assessing and Improving Soil and Water Quality to Minimize Land Degradation and Enhance Crop Productivity Using Nuclear Techniques (RCA)
RAS6083	Improving Patient Care and Enhancing Government Parties Capacity in Nuclear Medicine programmes in RCA Region (RCA)
RAS6085	Enhancing Stereotactic Body Radiation Therapy for Frequent Cancers in the RCA Region (RCA)

RAS6086	Strengthening Cancer Management Programmes in RCA States Parties through Collaboration with National and Regional Radiation Oncology Societies (RCA)
RAS6087	Enhancing Medical Physics Services in Developing Standards, Education and Training through Regional Cooperation (RCA)
RAS6093	Strengthening Capacity to Manage Non-Communicable Diseases Using Imaging Modalities in Radiology and Nuclear Medicine (RCA)
RAS7028	Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities in Asia-Pacific Marine Ecosystems (RCA)
RAS7029	Assessing the Impact of Urban Air Particulate Matter on Air Quality (RCA)
RAS7030	Assessing Deep Groundwater Resources for Sustainable Management Through the Utilization of Isotopic Techniques (RCA)
RAS7031	Assessing the Vulnerability of Coastal Landscapes and Ecosystems to Sea-Level Rise and Climate Change (RCA)
INT2018	Supporting Knowledgeable Decision-making and Building Capacities to Start and Implement Nuclear Power Programmes
INT2019	Deploying Technology and Management of Sustainable Uranium Extraction Projects
INT5154	Improving Food Safety through the Creation of an Interregional Network that Produces Reliable Scientific Data Using Nuclear and Isotopic Techniques
INT5155	Sharing Knowledge on the Sterile Insect and Related Techniques for the Integrated Area-Wide Management of Insect Pests and Human Disease Vectors
INT9182	Sustaining Cradle-to-Grave Control of Radioactive Sources
INT9183	Overcoming the Barriers to Implementation of Decommissioning and Environmental Remediation Projects

Appendix 11: Arrangement between JAEA-BATAN



ARRANGEMENT
between
the National Nuclear Energy Agency, Indonesia
and
the Japan Atomic Energy Agency, Japan
in the Field of Peaceful Uses of Nuclear Energy

The National Nuclear Energy Agency, Indonesia (hereinafter referred to as "BATAN") and the Japan Atomic Energy Agency, Japan (hereinafter referred to as "JAEA"):
WHEREAS, Arrangement between the National Nuclear Energy Agency, Indonesia and the Japan Atomic Energy Agency, Japan in the Field of Peaceful Uses of Nuclear Energy commenced on May 25th, 2007 (hereinafter referred to as "the Prior Arrangement") expired on May 24th, 2017;

WHEREAS, BATAN and JAEA (hereinafter referred to individually as a "Participant" collectively as the "Participants") desire to further develop and promote their cooperation in the field of peaceful uses of nuclear energy;

NOW, hereby decided as follows:

SECTION 1
OBJECTIVE

The objective of the Arrangement is to define the general conditions under which the participants will cooperate in the field of peaceful uses of nuclear energy.

SECTION 2
SCOPE OF COOPERATION

The cooperation referred to in Section 1 of the Arrangement will include the following fields:
a. production of radioisotopes and their application;
b. reactor physics;
c. radioactive waste management;
d. nuclear engineering safety;
e. nuclear human resources development; and
f. other related activities decided by the Participants in writing