10 member states of ASEAN[1]

FY 2015 Ex-Post Evaluation of Technical Cooperation Project

"ASEAN University Network/Southeast Asia Engineering Education Development Network
(Phase I & Phase II)"

External Evaluator: Kaneyasu Ida, Tekizaitekisho LLC

0. Summary

The Project aimed to strengthen the capacity of education and research of Member Institutions (MIs) in the Association of Southeast Asian Nations (ASEAN) through the formation of a network of higher education institutions specializing in engineering education. The Project's relevance is high because the Project's objectives were consistent with the policies of ASEAN and the member countries and the needs of the MIs throughout the project duration, and were also in line with the Official Development Assistance (ODA) policies of the Japanese Government at the time of project planning.

Regarding the Project's effectiveness, the teaching staff's academic qualifications have significantly improved, particularly in the case of MIs in Cambodia, Laos, Myanmar and Vietnam (CLMV countries). For example, the alumni members of the ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED-Net) account for more than 30% of the teaching staff in the MIs in Laos and Cambodia. In addition, the Project has had positive effects: (a) Field-specific Regional Conferences have been organized; (b) joint research has been extensively conducted by MIs; (c)AUN/SEED-Net's academic journal, the *ASEAN Engineering Journal*, has been periodically published. Through these achievements, AUN/SEED-Net has earned high recognition. The Project also promoted stronger partnership among MIs. By the time of ex-post evaluation, each MI formed an official agreement with ten other MIs on average. However, less progress was made in the institutional promotion of such mobility programs[2] as joint degree and double degree programs among MIs. The Project also laid a foundation for financial sustainability to some extent through increasing contributions from MIs.

The Project has had a wide-ranging impact. In MIs in CLMV countries, the ratio of alumni members has been increased to the total number of academic staff, and they have extensively conducted joint research. In addition, the alumni members and the lecturers from Host Institutions (HIs) have jointly helped develop and upgrade MIs' educational programs. As a result, quite a number of new courses have been introduced in MIs and the increasing number

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of teaching staff required. This has helped the MIs increase the number of graduate students and academic staff in MIs. Furthermore, the Project indirectly contributed to the development of highly skilled human resources because a large number of MI graduates joined the private sector. Other impacts include the contribution made by alumni members to Japanese Supporting Universities (JSUs) in terms of providing competitive students, the nurturing of leaders for the implementation of international development projects, their support of local universities to improve curriculums and their contribution to local industry through joint research activities. Therefore, the Project's effectiveness and impact are high.

The Project's efficiency is also high because the cost borne by the Japanese side and the project duration were within the plan as project activities were further expanded thanks to the financial contributions made by the MIs and other external support.

Although the policy and institutional sustainability is high, technical support from JSUs is still necessary. As for financial sustainability, the MIs have made their best efforts to establish a financial foundation to sustain scholarship programs; however, it is still difficult for AUN/SEED-Net to maintain its current activities with only the resources provided by MIs. Without Japanese input, it is possible for AUN/SEED-Net to maintain some activities, yet the level and the scope of such activities would be significantly reduced. Therefore, the Project's sustainability is judged to be low. In light of the above, this project is evaluated as satisfactory.

1. Project Description
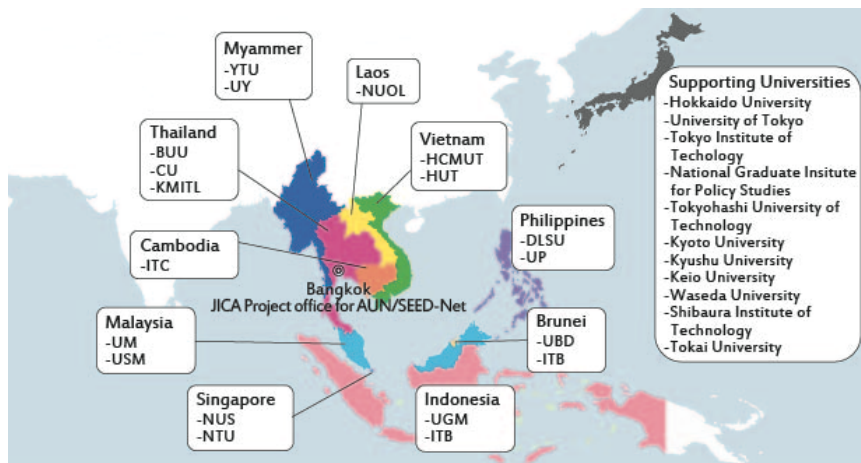
Project Locations

Orientation for young lecturers on University-Industry Linkage

1.1 Background

The concept of AUN/SEED-Net evolved from a 1997 initiative proposed by then-Prime Minister of Japan Ryutaro Hashimoto aimed at tackling the financial crisis in ASEAN through human resources development in higher education. Prior to the financial crisis, Japan actively supported the strengthening of engineering education in ASEAN. In this connection, it was recognized that transfer of Japan's experience and know-how in research and education to higher education institutions in ASEAN in the field of engineering would be effective to develop human resources in response to globalization within ASEAN. To put this concept into action, AUN/SEED-Net was established as a sub-network of the ASEAN University Network (AUN) and the inception project was implemented for two years (2001 – 2003). Phase I of the Project was then officially launched in March 2003 for a five-year period (2003 – 2008). Phase I was implemented to build the foundation for networks among MIs and improve the qualifications of academic staff. Phase II was implemented in March 2008 for a five-year period (2008 – 2013) to further strengthen the foundation of the Project and expand the scope of project activities, as well as continue scholarship programs to upgrade the qualifications of academic staff. Throughout both phases, nineteen universities in ASEAN and eleven universities in Japan participated in the Project.

1.2 Project Outline

	Phase I	Phase II
Overall Goal	Human resources in the engineering field are trained to revitalize the industrial sector and the long-term economic sustainable development of ASEAN countries is ensured.	The human resources in the engineering field, essential for the social and economic development of ASEAN, are sustainably produced.
Project Purpose	Educational and research capacities of MIs are improved through the active exchange of resources between them and a collaborative relationship with JSU consortium.	The foundation for a framework to sustainably train human resources in the engineering field, which aims to contribute to social and economic development of the region, is established in ASEAN.
Output(s)	Faculty qualifications are upgraded through acquisition of graduate degrees (Output 1) Graduate programs are enhanced in Host Institutions (Output 2).	Educational and research capacity of MIs is further enhanced (Output 1)
Output(s)	Joint activities and human connections among MIs are strengthened (Output 3).	Regional academic societies that include not only MIs but also industry, community, existing academic networks and non-MIs are established (Output 2). Collaborative research activities, which contribute to solving common issues faced by industries and communities in ASEAN, are promoted (Output 3).

	Phase I	Phase II
	Information dissemination system, activity management system and communication network are established (Output 4).	The system and network established in the Phase I are strengthened to function as an engineering partnership university among ASEAN and Japan (Output 4).
Main activities	Scholarship programs in ASEAN (Master's and Ph.D.) and in Japan (Ph.D.), dispatch of academic staff, collaborative research programs, field-specific regional conferences and the publication of an academic journal	
Total cost (Japanese Side)	2,132 million yen	2,271 million yen
Period of Cooperation	March 2003 - March 2008	March 2008 – March 2013
Implementing Agency (Member Institutions)	Chulalongkorn University (CU), King Mongkut's Institute of Technology Ladkrabang (KMITL), Burapha University (BUU), Hanoi University of Science and Technology (HUST), Ho Chi Minh City University of Technology (HCMUT), Institut Teknologi Bandung (ITB-INA), Universitas Gadjah Mada (UGM), Institute of Technology of Cambodia (ITC), National University of Laos (NUOL), University of Malaya (UM), Universiti Sains Malaysia (USM), University of the Philippines-Diliman (UP), De La Salle University (DLSU), University of Yangon (UY), Yangon Technological University (YTU), National University of Singapore (NUS), Nanyang Technological University (NTU), Universiti Teknologi Brunei (ITB), Universiti Brunei Darussalam (UBD)	
Other Relevant Agencies / Organizations	Authorities in charge of higher education in ten countries	
Supporting Agency/Organization in Japan (Japanese Supporting Universities)	Hokkaido University, Keio University, Kyoto University, Kyushu University, National Graduate Institute for Policy Studies, Shibaura Institute of Technology, Tokai University, Tokyo Institute of Technology, Toyohashi University of Technology, The University of Tokyo, Waseda University	

	Phase I	Phase II
Related Projects	The Project for Human Resource Development in IT Service Industry at NUOL (December 2008 – November 2012) The Project for Capacity Building of Ho Chi Minh City University of Technology to Strengthen University-Community Linkage （Phase2） (March 2009 – September 2012) The Project for the Improvement of Educational Equipment of the Department of Geo-Resources and Geotechnical Engineering of the Institute of Technology of Cambodia (August 2011 – June 2014) The Project for Educational Capacity Development of Institute of Technology of Cambodia (October 2011 – October 2015) The Development Project of the Institute of Technology in Bandung (January 2009 – September 2015) The Project for Enhancement of Engineering Higher Education in Myanmar (October 2013 – October 2018) The Project for Enhancing Technological Universities in Myanmar (August 2014 – June 2017)	

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Time of the Terminal Evaluation

Phase I: Through active networking among MIs and collaborative work with JSUs, the educational and research capacities of the MIs were expected to be well enhanced by the end of the project duration. However, there was still room and need for further enhancement of educational and research capacities, and utilization of developed human resources for strengthening the networks, especially in CLMV countries. The foundation of AUN/SEED-Net was established, but further effort was required to build the systems that would enable the MIs to develop AUN/SEED-Net in a self-sustainable manner.

Phase II: The educational and research capacities of MIs have been steadily enhanced. Collaborative research activities that continue to solve the common issues of industries and communities were promoted and there was progress in the cost-sharing of MIs. As a result, the foundation for a sustainable framework for AUN/SEED-Net was strengthened. Progress

was made in collaboration among MIs towards the realization of a partnership university[3]. However, there was less progress in building the organizations and systems needed for the mobility programs that would realize a partnership university. For the sustainable development of the AUN/SEED-Net, the financial contributions made by MIs had not reached the initial target as set forth by the Project. As a result, the effectiveness of the Project was judged to be medium.

1.3.2 Achievement Status of Overall Goal at the Time of the Terminal Evaluation
      (including other impacts)

Phase I: As of the evaluation, it was deemed too early to judge the prospects for achieving the overall goal of human resources development in engineering that revitalizes the industrial sector and ensures sustainable development of ASEAN countries. Yet, such impacts as an increase in joint research between MI researchers and industry and academic exchanges among MIs had begun to be recognized. Other recognized impacts included enhanced research activities of MIs that aimed to solve the region's common issues, increased activities for the university management of MIs and active collaboration among MIs and with other universities outside AUN/SEED-Net.

Phase II: Positive changes for human resource development in engineering in ASEAN were observed in terms of the number of the academic staff in MIs, the ratio of alumni members to that of all the academic staff in each MI and the number of undergraduates in engineering and the number of graduates who worked in industry. There were also many cases in which joint research activities were conducted by utilizing the networks established through the Project, resulting in stronger ties among MIs. Therefore, the prospect of the Project's impact would be high.

1.3.3 Recommendations at the Time of the Terminal Evaluation

Phase I: The main recommendations were that (1) relevant organizations such as MIs, higher education authorities in ASEAN countries, the AUN/SEED-Net secretariat office and JICA should promote the achievements, values and comparative advantages of its scholarship programs to respective governments and the public in order to maintain the influence of AUN/SEED-Net, (2) the financial contributions made by MIs should be increased and financial support from external sources sought, (3) some of the functions of the

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[3] Partnership university is a concept that was proposed in Phase II of the Project. It was intended to establish a consortium for joint degree programs among MIs. Discussions were held on the standardization of curriculums and the introduction of double degree and joint degree programs applicable to all MIs.

AUN/SEED-Net secretariat office[4] should be transferred from Chulalongkorn University, which takes on many managerial responsibilities, to other MIs, (4) the dispatch of JSU researchers to MIs should be increased and their duration of stay in MIs should be longer to further strengthen researchers' networks, (5) measures to support alumni members should be devised so that they can continue their research after they return to their universities, (6) the appropriateness of selected topics for joint research should be improved by increased communication among researchers, (7) field-specific seminars tailored to the circumstances of each field should be organized, (8) the number of foreign students from CLMV countries should be maintained by increasing financial contribution from HIs and seeking external support and (9) the number of MIs in AUN/SEED-Net should be increased.

Phase II: The main recommendations were (1) that a tracer survey should be conducted to determine the whereabouts of the alumni members and grasp the ratio of alumni members who returned to SIs , (2) data on the number of research papers, the number of academic staff by degree and information on the graduates in each MI should be collected, (3) the current selection criteria of scholarship programs should be reviewed to introduce stricter application requirements (e.g., requiring higher English language proficiency), (4) measures should be taken to increase the number of applicants for scholarship programs, (5) a plan for the establishment of academic societies should be developed based on the needs of specific fields and possibility of establishing such societies, (6) the concept of "Partnership University" should be translated into a concrete plan, (7) MIs should be made familiar with the Project's objectives, indicators and framework, (8) higher education authorities in member countries should have greater involvement in the Project, (9) more JSUs should be actively involved in the Project and (10) financial contribution by MIs should increase.

2. Outline of the Evaluation Study

2.1 External Evaluator

Kaneyasu Ida, Tekizaitekisho LLC

2.2 Duration of Evaluation Study

Duration of the Study: August 2015 – September 2016

Duration of the Field Study: October 18 – November 13, 2015 (Laos, Thailand and Malaysia), December 1 – 12, 2015 (the Philippines and Vietnam), February 7– March 6, 2016 (Myanmar,

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[4] The functions of the AUN/SEED-Net secretariat office include overall management, coordination among MIs, management of scholarship programs (announcement and promotion, screening of candidates, follow-up on and support of students, etc.), management of collaborative research activities, financial management and accounting and support for various meetings and seminars such as regional conferences, the steering committee meeting and the working group meeting.

Indonesia and Cambodia) and May 8 – 17, 2016 (Thailand)

2.3 Constraints during the Evaluation Study

After the completion of Phase II of the Project in March 2013, the Phase III began in March 2013 for a five-year duration and the number of MIs was increased from 19 to 26.[5] Therefore, inevitably some of the impacts and the financial and institutional sustainability discussed in this report were affected by Phase III, but the evaluator limited the scope of the evaluation of Phases I and II to accurately assess relevance, effectiveness and efficiency.

3.   Results of the Evaluation (Overall Rating: B[6])

3.1 Relevance (Rating: ③[7])

3.1.1 Relevance to the Development Plan of the Region and Member Countries

The Project was planned as a sub-network of the AUN in line with the concept of developing human resources for industry via networking among engineering universities in the region, advocated at the third Japan–ASEAN summit meeting in 1997. In this regard, the Project was aligned with the intention of ASEAN countries at the time of planning. In the latter half of Phase I (2007), the ASEAN Plus Three[8] (APT) Cooperation Work Plan (2007 – 2017) was adopted and aimed to promote higher education cooperation, increase affiliations between universities through the AUN, encourage credit transfers between universities in APT countries and support research activities and exchanges of APT scholars. These aims further endorsed the Project's objective of developing the capacity of higher education institutions through networks of APT researchers. As of the completion, the APT Plan of Action on Education 2010-2016 stated the specific supports through AUN, emphasizing "cooperation, networking and research activities among universities and higher education authorities", and "further enhancing collaboration among universities, promoting credit transfers between APT universities and strengthening higher education through the AUN. Therefore, the Project's objectives were clearly aligned with the ASEAN's policies of enhancing higher education through the AUN from the planning stage to the completion of the Project.

The Project's objectives were also in line with the policies of the member countries. Government policies of the CLMV countries prioritized the development of human resources for the higher education sector and the upgrading of higher education institutions. The policy priorities of other member countries such as Thailand, Malaysia, the Philippines

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[5] 7 new MIs are; Kasetsart University (KU), Thammasat University (TU), Universiti Putra Malaysia (UPM), Universiti Teknologi Malaysia (UTM), Mindanao State University Iligan Institute of Technology (MSU) and Universitas Indonesia (UI).
[6] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[7] ③: High, ② Fair, ① Low
[8] APT is a framework for regional cooperation among ASEAN, Japan, Korea and China.

and Indonesia included the enhanced competitiveness of universities and the strengthening of University–Industry Linkages (UIL). As such, the Project's objective to develop the capacity of higher education institutions through academic staff development and joint research was in line with the policies of the member countries. The policies of higher education authorities are shown in Annex 1.

3.1.2 Relevance to the Development Needs of Member Institutions

As of the completion of Phases I and II, the common issues of the MIs included (1) the upgrading of academic standards to the international level and vitalizing research in graduate programs, (2) the strengthening of linkage with industry and community, (3) capacity development through joint research and academic exchange. In addition, the MIs in CLMV countries emphasized (4) the importance of raising the qualifications of academic staff and (5) the introduction of new courses and the improvement of curriculums to upgrade insufficient undergraduate and graduate programs. Therefore, the Project's objectives and approaches responded to the needs of the MIs. Sufficient information was not available to identify their needs during the project planning stage for Phase I. The needs of MIs are shown in Annex 2.

3.1.3 Relevance to Japan's ODA Policy

The Project was formulated as one of the pillars of Japanese assistance to ASEAN after the financial crisis in 1997 following the proposal of the Hashimoto initiative (human resource development for sustainable economic growth) at the Japan–ASEAN summit meeting and the proposal of the Obuchi Plan (the materialization of AUN/SEED-Net to develop industrial human resources) at the APT summit meeting in 1999. The general framework for ODA in Japan aims to strengthen relationships with ASEAN and take measures to reduce disparities within ASEAN. This Project takes the approach of having forerunners among ASEAN countries support CLMV countries, which closely adheres to the general framework of Japanese ODA.

This project was highly relevant to the member countries' development plans and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Effectiveness and Impact (Rating: ③)
3.2.1 Effectiveness
3.2.1.1 Achievement of Project Purpose
Phase I of the Project aimed at developing the capacity of MIs by establishing a network of 19 universities in 10 countries and promoting scholarship programs and joint research

among MIs, utilizing the established framework for cooperation and developed human resources. Phase II of the Project was implemented utilizing the same approach, yet focusing more on outward-looking strategies such as UIL activities and the development of academic societies. In order to cope with common issues to alumni members from SIs (e.g., lack of the environment in SIs to continue their research and losing contact with HIs and JSUs after their graduation), the Project tried to institutionalize joint research to support the alumni members so that they could continue research as well as promote UIL and research activities to tackle common issues in ASEAN. The matrix below shows the main indicators and achievements.

Table 1. Achievement of Project Purpose

Project Purpose	The educational and research capacities of MIs are improved through active exchange of resources among them and collaborative relationship with JSU consortium (Phase I). The foundation for a sustainable framework of human resource development in the engineering field, which aims to contribute to social and economic development of the region, is established in ASEAN (Phase II).
Indicator	Actual
Number of alumni members who become teaching staff in home countries is increased.	The Project's effectiveness to upgrade academic qualifications is judged to be high. When alumni members from CLMV countries and Indonesia are counted, the number of alumni who had become teaching staff in the SIs at the time of the ex-post evaluation was 336, or 49.3% of the total number of the alumni members from the five countries. If the alumni members who are teaching at other universities in their home countries are included, 55.4% are teaching in their home countries. In Laos and Cambodia, alumni members account for more than 30% of all the teaching staff in SIs.
Function of AUN/SEED-Net as a partnership university is enhanced.	Networks among MIs have been strengthened through formal cooperation agreements and academic exchange and research collaboration. However, the mobility programs such as joint degree and double degree programs towards the establishment of a partnership university have not been satisfactorily developed.
Financial sustainability of AUN/SEED-Net is secured.	In the latter half of Phase I, a policy was introduced to lay the foundation for the financial sustainability of AUN/SEED-Net. Since then, MIs have made their best efforts to make financial contributions in such forms as waiver of tuition fees, provision of their own scholarships, financial support for students, covering the cost of dispatching lecturers, etc. Therefore, the financial foundation is deemed to have been prepared to some extent.

(Sources: Results of questionnaire survey and interviews of MIs and the terminal evaluation report for Phase II)

(1) Increase in alumni members who become teaching staff

The total number of scholarship grantees from 2001 to 2015 is 1,164, and 761 (65.4%) of them obtained degrees, 333 (28.6%) are studying and 70 (6.0%) were unable to obtain degrees (32 Master's students and 48 Ph.D. students) (See Figure 1.). As shown in Table 2,67.9% of the alumni members come from CLMV countries. Indonesia also accounts for 21.6%. The effect of the Project is particularly high in these countries.
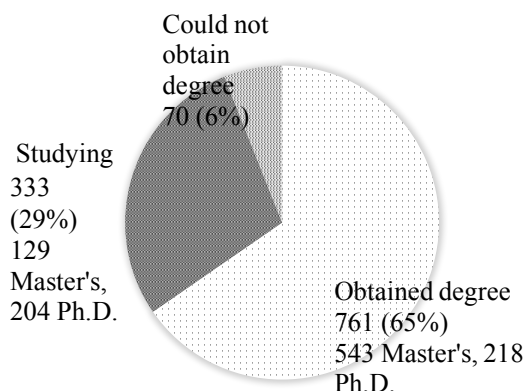

Figure 1 Breakdown of scholarship grantees
(Source: the list of scholarship grantees from the AUN/SEED-Net secretariat office as of September 2015)

Table 2. Breakdown of Scholarship Grantees   (Unit: person)

Country	Master's	Ph.D.	Total	Share
Laos	98	25	123	16.1%
Cambodia	104	20	124	16.3%
Myanmar	31	22	53	7.0%
Vietnam	141	76	217	28.5%
Indonesia	114	50	164	21.6%
Thailand	23	9	32	4.2%
Philippines	24	7	31	4.1%
Malaysia	8	9	17	2.2%
Total	543	218	761	100.0%

(Source: AUN/SEED-Net secretariat office) (as of October 2015)

The basic concept of the scholarship programs of AUN/SEED-Net is that SIs send their academic staff and students to HIs or JSUs, who would then resume working at SIs after earning graduate degrees. According to the questionnaire survey given to SIs in CLMV countries and Indonesia (Table 3), 46.0% (313 alumni members) are teaching at the SIs. This amounts to 55.4% (377 alumni members) when including those who teach at other universities. In Indonesia, Cambodia and Myanmar, 18.8% (64 out of 341) have become teaching staff at non-member universities. Adding such alumni members in Vietnam and Laos who are actually teaching but categorized as "Unknown", the total number of alumni members teaching at higher education institutions in ASEAN would be higher than 55.4%. In

the case of Ph.D. holders, 73.5% (186 out of 253 alumni members who obtained Ph.D. degrees in eight universities in CLMV countries and Indonesia) have become teaching staff. This indicates that Ph.D. holders are more likely to become teaching staff than Master's degree holders.

Table 3. Career Options for Alumni Members from SIs

(Unit: person)

Country	Target	Actual		
	Number of alumni members	Number of alumni members teaching at SIs	Number of alumni members teaching at other universities	Others (seeking higher degree, working in private sector, unknown)
Laos	123	102	(Unknown)	21
Cambodia	124	48	28	48
Vietnam	217	87	(Unknown)	130
Myanmar	53	17	35	1
Indonesia	164	59	1	104
Total	681	313	64	304

(Sources: Questionnaire survey given to NUOL, ITC, HUST, HCMUT, YU, YTU, GMU, ITB)

HIs require that graduate students give presentations at academic societies and contribute to academic journals before he/she obtains a degree. AUN/SEED-Net has provided opportunities for presentation and publication so that graduate students can obtain their degree in a relatively short period of time. Since 2002 the Project has organized the Regional Conference (RC)[9] in nine engineering fields (one more field was subsequently added) on an annual basis, which gives scholarship grantees the chance to present their research results. In addition, the Project has periodically published the *ASEAN Engineering Journal,*[10] which provides scholarship grantees and MI's academic staff with opportunities to publish their papers since July 2011. In this sense, the RCs and journal have been effective in establishing scholarship programs within the region.

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[9] At the beginning of Phase I, the participants were limited to researchers from MIs and JSUs. To date, researchers from other universities, government agencies and the private sector, as well as MIs and JSUs, also participate in RCs. The total number of participants exceeds 1,000 every year. Also, four RCs out of ten are now jointly organized with other international, regional or national academic societies.

[10] To date, 272 research papers have been submitted and 118 have been published in the journal. The journal has been registered with the Thai Scientific Index since 2015 and the ASEAN Scientific Index since 2016. The journal has been published semi-annually. Initially, two to four fields were compiled for each issue. Since 2015 all the fields have been covered in each issue.

(2) Enhanced functions as a partnership university

There are many academic alliances and consortiums in the world. The salient feature of the AUN/SEED-Net is that it uses scholarship programs to develop networks among MIs and alumni members. Originally, the Project envisaged the establishment of a partnership university that would offer joint graduate degrees. However, in the course of Phase II, the Project decided to use the established networks to facilitate the development of mobility programs (e.g., student exchange, credit transfer, double degree) among MIs due to different circumstances of MIs and also difficulties for MIs to make necessary institutional arrangements to recognize other MIs' credits. According to the results of a questionnaire survey given to MIs (16 responses), on average each member university has had cooperation agreements with nearly 10 other MIs. In regards to the development of mobility programs, some progress has been recognized. HUST and Shibaura Institute of Technology, ITB-INA and Kyushu University have respectively started a double degree program and CU and Hokkaido University plan to start a double degree program. The Project also facilitated the dispatch of lecturers and academic exchange through RCs among MIs and JSUs. This helped USM implement student exchange programs with other three MIs. KMITL has dispatched lecturers and provided training to NUOL based on their agreement. ITB-INA and HUST have jointly conducted research and curriculum development. These institutional arrangements were made possible through the mentoring relationships developed by the Project's scholarship programs, RCs and the dispatch of academic staff.

The Project has also helped develop networks of researchers in ASEAN. For example, in the field of material engineering, the researchers in USM, KMITL, BUU and UGM have maintained strong mentoring relationships and continued to conduct joint research through the scholarship programs provided by the Project. Their strong relationships are partly because not so many MIs have a department specializing in material engineering. In Myanmar and Cambodia, alumni members in the field of geological engineering have developed a network of researchers in their respective countries. As explained earlier, various networks have been formed at the university, field and individual levels, and utilized for joint research and UIL activities.

(3) Preparation of managerial and financial foundation to operate AUN/SEED-Net

MIs, the AUN/SEED-Net secretariat office, JICA and JSUs began discussing measures to secure the financial sustainability of AUN/SEED-Net in 2003. The position paper for financial sustainability was adopted by MIs in 2004. In response, NUS and NTU started to provide scholarships to Ph.D. students from MIs in 2005. This facilitated other HIs' active financial contributions in the forms of waivers of tuition fees, additional financial support to scholarship grantees as well as shouldering administrative costs, seminars, publications and

laboratory expenses. As a result, the financial contribution made by MIs accounted for 11.8%, whereas JICA provided 84.4% and other organizations provided 3.8% of the total operation cost of Phase II of the Project. MIs' financial contributions could not reach the target of 20%, according to the results of the questionnaire survey given to MIs, but each MI made their best efforts to provide financial support for the Project. At the end of Phase II, AUN/SEED-Net was able to establish its financial foundation to some extent.

In the light of the Project's achievements in the capacity development of academic staff, enhanced collaboration among MIs and financial foundation laid by the Project, it is judged that the project mostly achieved its purpose.

<u>Box 1 Evaluation of the quality of the AUN/SEED-Net's scholarship program</u>

Ensuring that students have access to quality graduate programs and research projects within ASEAN was one of the most important effects of the Project, even though it was not specified in the project framework. In this respect, scholarship grantees must be highly evaluated by supervisors in HIs and JSUs and also the AUN/SEED-Net scholarship programs must be popular among students in SIs.

According to the results of the questionnaire survey and interviews, the supervisors in HIs and JSUs feel that most of the AUN/SEED-Net scholarship grantees have the knowledge and technical capacity needed to complete graduate programs and also that they are willing and motivated, partly because the duration of scholarship is relatively short.

As for the popularity of AUN/SEED-Net scholarship program, the admission rates show some decline from Phase I to Phase II as shown in Table 4. Yet, it was confirmed with SIs through interviews that the AUN/SEED-Net scholarship programs are still popular among students to some extent. This can be seen in some SIs such as ITC, which have decided that only the students with the highest grades are eligible to apply for the AUN/SEED-Net scholarship programs.

On the other hand, it was found through interviews to scholarship grantees that for some students in SIs where many scholarship programs are offered from abroad or for some students who have high English proficiency, the AUN/SEED-Net scholarship programs are not necessarily the first choice. Therefore, the AUN/SEED-Net should further promote its scholarship programs in SIs and HIs should make further effort to improve the quality of their curriculum and research environment in order to increasingly attract competitive students.

Table 4. Admission rates of AUN/SEED-Net scholarship programs

Programs	Master's degree program in ASEAN	Sandwich Ph.D. Program in ASEAN*	Ph.D. program in Japan	Ph.D. program in Singapore
Phase I	2.49	2.30	3.57	3.77
Phase II	2.43	1.44	2.35	3.70

(Sources: Annual reports of AUN/SEED-Net (2001 – 2015))

*Sandwich Ph.D. program: One of the AUN/SEED-Net scholarship programs in which Ph.D. students in HIs conduct research for eight months in Japan under the supervision of researchers in JSUs.

Box 2. AUN/SEED-Net's scholarship programs and other similar programs

Based on the results of the internet-based survey* given to scholarship grantees and alumni members, the following measures could be effective in attracting more and more competitive students to the AUN/SEED-Net scholarship programs:

Emphasis on the advantages of the AUN/SEED-Net's scholarship programs

Most of the alumni members interviewed by the evaluator agreed that the advantages of the AUN/SEED-Net's scholarship programs are (1) the provision of research funds to scholarship grantees, (2) access to funds for joint research exclusively for alumni members, and (3) long-lasting working and mentoring relationships with former supervisors in HIs and JSUs through joint research, RCs and academic staff exchange. However, many of the interviewees mentioned that they had not been aware of these advantages when they applied for an AUN/SEED-Net scholarship program. Therefore, AUN/SEED-Net should emphasize the advantages of its scholarship programs more extensively to prospective applicants who consider applying for other scholarship programs.

Earlier announcement of selection results to applicants

Generally, applicants for graduate programs want to get a scholarship as early as possible. According to the interviewees who took another scholarship program even though they were admitted to an AUN/SEED-Net scholarship program, they did so because they were informed of their admission to another program prior to the AUN/SEED-Net scholarship program. On the other hand, some interviewees took an AUN/SEED-Net scholarship program because AUN/SEED-Net was the first scholarship program that accepted them. This suggests that informing students of admission ahead of other scholarship programs may be an effective measure to attract students with high grades.

Provision of opportunities to study in Japan and the improvements to research environment in MIs

Many AUN/SEED-Net scholarship grantees and alumni members mentioned that they had applied for an AUN/SEED-Net scholarship program, expecting that they would have an opportunity to study in Japan through a Ph.D. sandwich program or a Ph.D. program in Japan. Most of those who completed a sandwich program or a Ph.D. program in Japan mentioned that studying in Japan was critically important to conducting research and producing academic papers in an intensive manner. Therefore, such opportunities are still necessary to maintain the popularity of the AUN/SEED-Net scholarship programs. At the same time, some alumni members of a Master's degree program in ASEAN or a sandwich program requested for improvements regarding shortage of laboratory equipment and rules/regulations of equipment management in HIs. Therefore, HIs should make further effort to provide an environment conducive to research activities and improve the equipment management systems in order to enhance the reputation of their graduate programs under AUN/SEED-Net.

*An Internet-based survey, targeting all AUN/SEED-Net scholarship grantees and alumni members was conducted over the five-month period from October 2015 to March 2016. The evaluator requested that the AUN/SEED-Net secretariat office and MIs encourage the scholarship grantees and alumni members to respond to the Internet-based survey. Out of 1,165 scholarship grantees/alumni members, 545 (242 incumbent students and 303 ex-students of them (46.8%) responded.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

Because Phases I and II of the Project set very similar overall goals, they can be combined into one overall goal of the increase of teaching staff/researchers and graduates in the field of engineering in ASEAN. The table below shows the indicators and achievements set for both Phases.

Table 5. Achievement of Overall Goal

Overall Goal	Economic stability is enhanced through engineering human resource development as to reinvigorate the industrial sector of ASEAN countries. (Phase I) Human resources in engineering field, which is needed for social and economic development of ASEAN, is sustainably produced. (Phase II)
Indicator	Actual
Increase of academic staff in engineering department in MIs	Out of 761 scholarship grantees who obtained degrees, at least 331 of them have become academic staff. The number of academic staff in MIs increased from 4,141 in 2002 to 8,740 in 2013. The number of Master's holders increased from 3,719 to 8,005 and the number of Ph.D. holders increased from 422 to 735. In Laos and Cambodia, the ratio of alumni members is quite high relative to the total number of academic staff in MIs.
Increase of graduates of MIs	The total number of students who graduated with engineering-related degrees from 13 MIs[11] increased from 15,877 in 2002 to 25,629 in 2015. The number of graduates increased 1.5 times from 11,736 to 17,319 for bachelor degrees, 2 times from 3,719 to 7,525 for Master's degree and 1.9 times from 422 to 785 for Ph.D. respectively.
Increase of graduates who get engineering-related jobs	The relevant data were made available from six MIs.[12] According to the latest data, of 6,225 graduates with bachelor degrees in engineering, 79.5% of them were employed, 8.1% were seeking further education and 12.4% were not employed. There is little difference by MI in terms of employment rate. In other three MIs,[13] which provided the information by rate of employment, more than 80% of bachelor graduates found jobs. These data indicate that MIs are making good contributions to industry in terms of providing industrial human resources.

(Sources: Results of questionnaire surveys given to and interviews of MIs)

Out of 761 AUN/SEED-Net scholarship grantees who obtained degrees, at least 313 of them were working as academic staff at universities in ASEAN countries as of October 2015. The Project made a good contribution to the increase of academic staff in MIs. Alumni members accounted for 88.7% and 30.2% in NUOL and ITC, respectively. In MIs in Indonesia and Vietnam, the number of alumni members is large but the ratio is as low as 2−5%. In Myanmar,

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[11] YTU, YU, NUOL, HCMUT, HUST, ITC, ITB-INA, GMU, KMITL, BUU, CU, MU and UP.
[12] HCMUT, HUST, ITC, ITB-INA, UGM, KMITL
[13] BUU, UM and USM

the Project's contribution is recognized to some extent and the ratio is 4.2%. This is because academic staff are transferred to another national university periodically.

Table 6. Percentage of Alumni Members by Country

	Number of academic staff (2015)	Number of AUN/SEED-Net alumni members	Percentage of AUN/SEED-Net alumni members in MIs
Laos	115	102	88.7%
Cambodia	159	48	30.2%
Vietnam	1,783	87	4.9%
Myanmar	410	17	4.2%
Indonesia	3,062	59	1.9%
Total	5,529	313	5.7%

(Sources: Questionnaire surveys given to NUOL, ITC, HUST, HCMUT, YU, UTY, GMU, ITB-INA)

As shown above, the Project contributed to an increase in the number of academic staff and graduates in engineering, and graduates with engineering-related jobs. Therefore, the Project has achieved the overall goal of developing and sustainably producing human resources in the engineering field.

3.2.2.2 Other Impacts
(1) Development and improvement of educational programs of MIs

The Project supported the dispatch of lecturers from HIs and JSUs to SIs and academic staff training from SIs in HIs and JSUs. The academic staff who had returned their countries introduced new curriculums. As a result of such activities, a number of new courses and programs were established in 14 MIs during Phases I and II (33 new Ph.D. courses, 27 new Master's courses, four new undergraduate courses, seven new subjects, two joint programs). These have also contributed to the increase of academic staff and students of the new courses/programs in MIs. Furthermore, international programs have started in four HIs since they received international students under AUN/SEED-Net scholarship programs. [14] Therefore, the Project has also contributed to the internationalization of HIs.

(2) Contribution to Japanese universities

The Japanese universities involved in the Project have also benefitted because alumni members who studied in JSUs continue to conduct joint research with Japanese researchers

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[14] ITB-INA, UGM, KU and TU

after their graduation, utilizing the developed networks between MI and JSU researchers. According to a questionnaire survey given to supervisors in JSUs[15], 56 out of 61 students whom they supervised were judged to be above or about average in their academic performance when compared to other foreign students. The alumni members who obtained Ph.D. in Japan have also played important roles in conducting UIL and joint research. Furthermore, they have contributed to strengthening inter-organizational cooperation between their universities and their host universities in Japan, utilizing the networks developed through project activities. For example, Kyushu University has signed agreements to start a joint degree program with GMU and ITB-INA, and is scheduled to sign an agreement with CU. Nagoya University, a new member from Phase III, signed an agreement with ITS on academic exchanges through discussion at the RC. Another new member, Osaka University, also made agreements on academic exchanges with four MIs after its participation in the Project in 2013.

(3) Contribution to industry through UILs

In ASEAN countries, the need for research to develop specific technology is limited. However, there is an increasing demand, particularly from foreign companies for development (e.g., commercialization and localization of foreign products, improvement of product quality and productivity) in the region. Between 2011 and 2015, 36 joint research projects under the Project were implemented between alumni members and industry, responding to such needs for development. Among MIs, alumni members in Indonesia and Vietnam have been particularly active in joint research with industry, and some projects such as the development and clinical trial of the synthesis of carbonate apatite composite bone graft, utilizing a material produced by a Japanese company, helped a local company commercialize a dentistry material in Indonesia. Other projects, such as the development of a robot for post-stroke patients' rehabilitation, the use of waste plastic to create fuel, and the development of solid fuel production from solid waste by employing a hydrothermal briquetting process, and prospecting for strategic rare earth elements are in the last stage of commercialization or waiting for social applications. Also, Japanese companies are to some extent benefitting from the Project because Japanese companies participated in five out of 36 research projects.

(4) Contribution by MIs to non-member universities in their own countries

The ex-post evaluation study found that alumni members had also contributed to educational development in non-member universities in their own countries. In Vietnam, a local network of engineering universities similar to AUN/SEED-Net was formed for

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[15] The questionnaire forms were given to 14 JSUs through email and eight responses were obtained.

educational improvement of engineering universities. For example, alumni members in HCMUT supported the establishment of a faculty of engineering in one university and the introduction of new curriculum in four universities. In Myanmar, there is a regulation that teaching staff must be transferred to another national university every three years. Therefore, many of the alumni members from YU and YTU helped improve curriculums and pedagogy in the universities to which they were transferred.

(5) Contribution to international development projects

  One international development project was planned and implemented based on a developed network of researchers among JSUs and MIs. The Project for the Establishment of Environmental Conservation Platform of Tonle Sap Lake in Cambodia (2015 – 2019), Science and Technology Research Partnership for Sustainable Development (SATREPS) Project, originated in discussions between researchers from ITC and the Tokyo Institute of Technology at a regional conference. Currently, 20 ITC alumni participate in this project. Many of them played key roles in another JICA's technical cooperation project in ITC in Cambodia. Similarly, many alumni members played active roles in a technical cooperation project between JICA and NUOL.

(6) Retention of graduate students in ASEAN

  One important intended effect of the Project is that academic human resources could be developed within the ASEAN region. According to an Internet-based survey of AUN/SEED-Net scholarship grantees (468 responses with multiple answers allowed), many of them also considered applying or actually applied for other programs outside the ASEAN region (21.8% in Europe, 13.0% in China, Taiwan or Korea, 21.8% in Japan, 7.9% in North America and 7.1% in Oceania).[16] Therefore, the AUN/SEED-Net scholarship programs were effective to some extent in retaining graduate students in ASEAN.

As a result of the Project, the foundation for academic human resource development, which was the project purpose of Phases I and II, was prepared, and the overall goal of expansion and upgrading of education and research of MIs were also achieved as expected. Therefore, the effectiveness and impact of the Project is judged to be high.

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[16] The total number of respondents was 468. Of these, 53.4% only applied for an AUN/SEED-Net scholarship program. The remaining 46.6% of them considered or actually applied for one or more than one program.

3.3 Efficiency (Rating: ③)

3.3.1 Inputs

Table 7. List of planned and actual inputs

Phase	Phase I		Phase II	
Input	Plan	Actual	Plan	Actual
(1) Experts	Long-Term (five persons)	Long-Term (nine persons) Short-Term (two persons)	Long-Term (Not specified) Short-Term (Not specified)	Long-Term (eight persons) Short-Term (four persons)
(2) Dispatch of JSU lecturers	225 persons	293 persons	Not specified	349 persons
(3) Scholarships	450 persons	426 persons	400 persons	422 persons
(4) Operation cost	Research fund, management costs, scholarships, etc.	Research fund, management costs, scholarships, etc.	Research fund, management costs, scholarships, etc.	Research fund, management costs, scholarships, etc.
(5) Japanese Side Total Project Cost	2,400 million yen	2,132 million yen	2,170 million yen	2,271 million yen
(6) Thai Government	Salary of Thai management staff	Salary of Thai management staff	Salary of Thai management staff	Salary of Thai management staff
(7) Member Institutions	Scholarships, waiver of tuition fees, provision of dormitory, transportation costs, etc.	Scholarships, waiver of tuition fees, provision of dormitory, transportation costs, etc.	Scholarships, waiver of tuition fees, provision of dormitory, transportation costs, etc.	402 million yen for Scholarships, waiver of tuition fees, provision of dormitory, transportation costs, etc.

Phase	Phase I		Phase II	
Input	Plan	Actual	Plan	Actual
(8) Others	Japan – ASEAN Solidarity Fund[17]	35 million yen	ASEAN Fund	10 million yen

(Sources: Preliminary study reports for Phases I and II, terminal evaluation reports for Phases I and II)

3.3.1.1　Elements of Inputs

Prior to the commencement of Phase I, the inception project[17] was implemented at a project cost of 2,200 million yen. Therefore, the actual investment up to Phase II from the inception totaled 4,623 million yen. As for the planned investment, no data are available for the planned costs during the inception period. However, the main component of the inception project was the provision of scholarships whose quotas were somehow pre-determined; therefore, we can assume that there was little difference between the planned and actual costs for the inception project. Thus, the planned investment from the inception to the end of Phase II was estimated to be 4,790 million yen. The actual cost of the Japanese input was about 165 million yen less than the planned cost (96.5% of the planned cost).

For Phase II, MIs and the Japan–ASEAN Solidarity Fund and the ASEAN Fund[18] contributed 11.8% and 3.8% of the total project costs, respectively. This helped reduce Japanese input and expand such activities as organizing RCs. The framework of the inception project was officially approved by all the 19 MIs and relevant government agencies in March 2001. It takes two to three years for the first grantee to graduate and also it was necessary for MIs to make organizational arrangements to declare full participation in the Project. Therefore, it was appropriate for the Project to have implemented the inception project.

In terms of outputs, the number of scholarships provided was almost the same as planned. The number of Japanese experts was slightly higher than planned, but this was because the workload involved in coordinating with all of the MIs and the preparatory work were more than originally expected. In terms of efficiency of inputs, the largest component of the Project was the cost for scholarship programs, and the expenses such as living allowances and tuition fees were much lower than those of other programs in Europe or Japan.

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[17] The main components included scholarships to students in Master's programs, the provision of research grants and the organization of field-wise regional conferences.
[18] Japan–ASEAN Solidarity Fund was established in response to the announcement made in 1998 by Mr. Keizo Obuchi, a former Minister of Foreign Affairs, that 20 million US dollars would be provided for human resource development and poverty reduction in ASEAN. The fund was allocated through the ASEAN Fund.

Therefore, the input of the Project was regarded as cost-effective.[19]

  The inputs from other partners were very effective. Thai side provided the costs for the AUN/SEED-Net office and the salary of director(s). NUS and NTU actively provide inputs for the Project, introducing scholarships. Staff members of the AUN/SEED-Net secretariat office were well experienced in and capable of handling project activities. The only shortcoming in terms of efficiency was that the actual financial contribution was 11.8% of the total project cost during Phase II, which did not reach the target of 20% (No numerical target was set during Phase I.).

3.3.1.2 Project Cost

  The total project cost including the inception project, Phases I and II, was 4,623 million yen, which was lower than the planned cost of 4,790 million yen (96.5% of the planned cost).

3.3.1.3 Period of Cooperation

  Phase I and the Phase II of the Project were planned for five years each and implemented as scheduled (100% of the planned schedule).

Both the project cost and project period were in line with plans. Therefore, the efficiency of the project is high.

3.4 Sustainability (Rating: ①)

  After the end of Phase II, Phase III started in March 2013 for a five-year duration. Like Phases I and II, JICA has continued to support the provision of scholarships and research grants, and the management of the AUN/SEED-Net secretariat office. Therefore, the sustainability of the Project is affected by such inputs.

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

  Recent policy documents of the ASEAN[20], as of the ex-post evaluation, promote the strengthening of university networks through the framework of the AUN and recognize AUN/SEED-Net as an important, active sub-network of the AUN. Therefore, the Project   is in line with the policy in ASEAN.

  The relevant government authorities such as the Ministry of Education or Higher

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[19] When compared to the monthly allowance provided to a Master's student, the AUN/SEED-Net provides approximately 500 US dollars while Japanese Government's scholarship and Erasmus Mundus provide approximately 1,300 US dollars and 1,000 US dollars, respectively.
[20] "ASEAN Plus Three (APT) Plan of Action on Education 2010-2017", "ASEAN Plus Three (APT) Cooperation Work Plan (2007 - 2017)", "ASEAN Socio-economic Community Blueprint 2025".

Education in the member countries prioritize such agendas as industrial human resource development, UILs and the improved competitiveness of universities in the global market. These priority agendas are directly supported by the Project as shown in Annex 3. Also, there is still a strong need among the MIs in Cambodia, Laos and Myanmar to upgrade the academic qualifications of their academic staff, and the Project responds to the policies of these MIs to further enhance the capacity of academic staff. Other MIs focus on such agendas as internationalization of their universities and UILs (The needs of MIs are shown in Annex 4.) and this is also consistent with the direction of the Project. Therefore, the Project's sustainability on the policy level is high.

3.4.2 Organizational Aspects of the Implementing Agency for the Sustainability of Project Effects

The AUN/SEED-Net secretariat office is staffed by a total of 14 staff members, including the Executive Director, Assistant Executive Director, 11 program officers and two secretaries. In addition, the Chief Advisor is periodically dispatched to Thailand from Japan and the Deputy Chief Advisor and three Unit Chiefs/Project Coordinators are stationed in Thailand. The program officers are responsible for their assigned counties or MIs. MIs also assign coordinators (teaching staff) at their universities and conduct activities in close contact with the program officers of AUN/SEED-Net secretariat. Also, each JSU appoints one of its academic staff as a coordinator and they support project activities as focal persons. Many of the AUN/SEED-Net staff are well experienced as they have been with the Project since an earlier phase. Work flows and procedures are also set to systematically conduct activities. Therefore, the institutional and organizational sustainability is high. However, the Phase III is still ongoing and Japanese experts play key roles in managerial activities and coordination with MIs. AUN/SEED-Net needs to secure and foster staff members who can act as managers after Phase III. According to a questionnaire survey given and interviews conducted to MIs, out of 22 MIs who responded, 15 MIs expressed their interest in participating in the management of AUN/SEED-Net. It is necessary to transfer some of the functions of the AUN/SEED-Net to other MIs.

3.4.3 Technical Aspects of the Implementing Agency for the Sustainability of Project Effects

Through the networks formulated by the Project, organizational arrangements in such forms as memorandum of understanding and/or agreement have been made among MIs and JSUs to continue the technical exchange and joint research. In Thailand, Malaysia, the Philippines, Indonesia and Vietnam, the ratio of Ph.D. holders is very high to academic staff in MIs. The ratio of Ph.D. holders in MIs in Cambodia, Laos and Myanmar have been

greatly increased. This suggests that their research capacity has been further improved to continue their research work and the technical sustainability of the Project could be ensured to some extent after the end of Phase III. That said, there are still some issues that must be addressed. These issues include the maintenance of the quality of the Sandwich Program, the level of field-wise regional conferences and the standard of the *ASEAN Engineering Journal*. According to the interviews with incumbent scholarship grantees, many of them favored the Sandwich Program because of the opportunity it provides to conduct research in Japan. The MIs' support capacity for research and research environment for researchers should be further improved to make the program more attractive. Also, the RC should be recognized as the top regional academic conference for ASEAN researchers and the *ASEAN Engineering Journal* should be also recognized as an international journal by registering with international scientific indexes. These are critically important in sustaining the scholarship programs. For the purpose, it is necessary for researchers in MIs to actively participate in joint research and contribute to international journals.

3.4.4 Financial Aspects of the Implementing Agency for the Sustainability of Project Effects

AUN/SEED-Net's financial records of 2014 and 2015 indicates that support of MIs for the scholarship programs have expanded; the number of students whose tuition fees are waived by HIs has increased and the HIs that newly joined MIs after the start of Phase III have offered the waiver of tuition fees. When converting such contributions into monetary value, the contributions made by MIs greatly increased from the annual average amount of 0.73 million US dollars during Phase II to 1.26 million US dollars in 2014. Currently, approximately 885 million yen (790 million yen from JICA and 95 million yen from MIs) (7.35 million US dollars)[21] is required annually to maintain project activities. After Phase III, the budget size would be reduced to 95 million yen without JICA's financial support. Because NUS and NTU provide scholarships and other MIs also support scholarships in the form of the waiver of tuition fees, provision of accommodation, subsidies for transportation and dispatch of lecturers, the AUN/SEED-Net may be able to continue scholarship programs on a much smaller scale. However, it would be very difficult to sustain collaborative research programs, RCs and the dispatch of lecturers. According to a questionnaire survey given to 22 MIs, 13 MIs expressed their intention or willingness to expand or increase their financial support. However, their supports are mostly for RCs, dispatch of academic staff and waiver of tuition fees. It is difficult for MIs to secure a sufficient fund to maintain the scholarship programs; therefore, it is necessary to seek financial support from other organizations such as higher education authorities and science and technology agencies in

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[21] 1 US dollar = 120.36 Japanese yen as of January 1, 2016

MIs and the ASEAN.

As shown above, the Project's sustainability on the policy level is high. Yet, the technical sustainability and the institutional sustainability have some issues. Also, problems have been observed in terms of financial aspects. Therefore, the sustainability of the project effects is low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusions

The Project aimed to strengthen the capacity of education and research of MIs in ASEAN through the formation of a network of higher education institutions specializing in engineering education. The Project's relevance is high because the Project's objectives were consistent with the policies of ASEAN and the member countries and the needs of the MIs throughout the project duration, and were also in line with the ODA policies of the Japanese Government at the time of project planning.

Regarding the Project's effectiveness, the teaching staff's academic qualifications have significantly improved, particularly in the case of MIs in CLMV countries. For example, the alumni members of AUN/SEED-Net account for more than 30% of the teaching staff in the MIs in Laos and Cambodia. In addition, the Project has had positive effects: (a) Field-specific Regional Conferences have been organized; (b) joint research has been extensively conducted by MIs; (c)AUN/SEED-Net's academic journal, the *ASEAN Engineering Journal*, has been periodically published. Through these achievements, AUN/SEED-Net has earned high recognition. The Project also promoted stronger partnership among MIs. By the time of ex-post evaluation, each MI formed an official agreement with ten other MIs on average. However, less progress was made in the institutional promotion of such mobility programs as joint degree and double degree programs among MIs. The Project also laid a foundation for financial sustainability to some extent through increasing contributions from MIs.

The Project has had a wide-ranging impact. In MIs in CLMV countries, the ratio of alumni members has been increased to the total number of academic staff, and they have extensively conducted joint research. In addition, the alumni members and the lecturers from HIs have jointly helped develop and upgrade MIs' educational programs. As a result, quite a number of new courses have been introduced in MIs and the increasing number of teaching staff required. This has helped the MIs increase the number of graduate students and academic staff in MIs. Furthermore, the Project indirectly contributed to the development of highly skilled human resources because a large number of MI graduates joined the private sector. Other impacts include the contribution made by alumni members to JSUs in terms of providing competitive students, the nurturing of leaders for the implementation of international development

projects, their support of local universities to improve curriculums and their contribution to local industry through joint research activities. Therefore, the Project's effectiveness and impact are high.

The Project's efficiency is also high because the cost borne by the Japanese side and the project duration were within the plan as project activities were further expanded thanks to the financial contributions made by the MIs and other external support.

Although the policy and institutional sustainability is high, technical support from JSUs is still necessary. As for financial sustainability, the MIs have made their best efforts to establish a financial foundation to sustain scholarship programs; however, it is still difficult for AUN/SEED-Net to maintain its current activities with only the resources provided by MIs. Without Japanese input, it is possible for AUN/SEED-Net to maintain some activities, yet the level and the scope of such activities would be significantly reduced. Therefore, the Project's sustainability is judged to be low. In light of the above, this project is evaluated as satisfactory.

4.2　Recommendations

4.2.1　Recommendations for the Implementing Agency

Review of priorities and introduction of measures to further improve scholarship programs

At an earlier stage of project implementation, the prime objective of many MIs was to upgrade the academic qualifications of their teaching staff. However, as of the ex-post evaluation, the main focus had shifted to other agendas such as joint research contributing to internationalization of their universities, UILs and promotion of mobility programs. Therefore, the priority of allocation of resources for the Project should be shifted accordingly and the current scholarship programs should be reviewed to operate them on a smaller scale and make them effectively serve the objectives of the Project. As shown earlier, there is still a need to upgrade the academic qualifications of teaching staff in Cambodia, Laos and Myanmar. Therefore, AUN/SEED-Net should limit the target to these countries. Currently the largest scholarship program is Master's program under AUN/SEED-Net. But, the target should not be Master's programs in compliance with the prime objective of the scholarship programs. The target should be limited to Ph.D. programs given the fact that Ph.D. holders are more likely to become teaching staff when they go back to their home countries. Another way to make the scholarship programs more effective would be to allow AUN/SEED-Net to accept application from non-member universities to attract highly competitive students and those who aim to be academic staff, and introduce a bond system, under which alumni members must teach in their home countries for a certain period of time after having obtained their degrees.

<u>Measures to ensure sustainability</u>

  Although discussions have been held regarding sustainability after Phase III and the future vision of AUN/SEED-Net, concrete strategies for selection and concentration should be devised before the fifth year of Phase III based on the facts and relevant data and decide the sustainable size and scope of the Project. The higher education authorities in Thailand, Malaysia and Indonesia have expanded their scholarship programs for studying abroad. Science and technology agencies in these countries have also expanded their competitive research funds for joint research. In order to maintain the current level of activities with available financial sources, the AUN/SEED-Net and MIs should seek the possibility of forming affiliations with relevant organizations (e.g., ASEAN, ministries of education and science and technology agencies) during the remaining period of Phase III. As of the ex-post evaluation, the functions of the AUN/SEED-Net secretariat office are also supported by JICA's input. MIs and the higher education authorities of the member countries should hold discussions and build consensus about cost sharing for the management of AUN/SEED-Net in the near future. Also, further transfer of managerial functions to MIs is necessary to ensure sustainability after Phase III although such functions as organizing RCs have been transferred to MIs. For example, each MI will be assigned to one field and would organize the field-specific RC, oversee joint research in the field and support the scholarship grantees who major in the field.

<u>Public relations for AUN/SEED-Net scholarship programs</u>

  The advantages of AUN/SEED-Net scholarship programs include the provision of research funds to scholarship grantees, access to funds for joint research and long-lasting working and mentoring relationships with former supervisors in HIs and JSUs through joint research, RCs and academic staff exchange. However, according to the scholarship grantees interviewed by the evaluator, they were not aware of these advantages when they applied for an AUN/SEED-Net scholarship program. Therefore, AUN/SEED-Net and MIs should actively promote the advantages of its scholarship programs more extensively to attract prospective applicants with good grades. Also, HIs should make their educational and research environment more attractive (e.g., preparing all necessary laboratory equipment and extending hours of the laboratory) and promote such improvements to prospective applicants in SIs.

<u>Support for *the ASEAN Engineering Journal*</u>

  The ASEAN Engineering Journal has played an important role in the promotion of research and education in the region. The journal has been upgraded as it is registered with the Thai Scientific Index and the ASEAN Scientific Index. However, AUN/SEED-Net should do

more to raise its standards and establish it as more important regional academic journal by allocating more resources.

Reinforcement of Alumni Associations

Various networks of researchers have been strengthened and informal groups of alumni members have been formed through Social Networking Services, and yet there has been little progress in establishing alumni associations in a formal manner. Currently about 40% of alumni members join the private or the government sectors. Therefore, it is increasingly important for the AUN/SEED-Net to strengthen the network with these alumni members in order to facilitate UILs, joint research and collaboration between university and industry for industrial human resource development. The AUN/SEED-Net secretariat office should support representatives of the informal alumni group in each MI in the form of budget support and guidance for the establishment and management of an alumni association.

Support for UIL

The AUN/SEED-Net provides funds for collaborative research with industry and for solving common regional issues, but researchers in MIs are still not fully aware of this. Therefore, the AUN/SEED-Net and MIs should promote these funds more extensively. Because collaborative research has produced successful results, AUN/SEED-Net should share such cases with relevant offices in MIs (e.g., UIL promotion office, incubation center). For the MIs that face difficulty in collaboration with industry, AUN/SEED-Net secretariat office should closely work with the MIs by coordinating with business organizations such as a chamber of commerce and Japanese companies. Many MIs find it difficult to make progress in UIL because they do not have much know-how and a good backup system although access to competitive funds for joint research has increased other than the funds provided by AUN/SEED-Net. Such MIs should strategically use the AUN/SEED-Net's collaborative research funds for the purposes of developing UIL models or building up a track record of UIL activities.

4.2.2 Recommendations to JICA

The AUN/SEED-Net secretariat office is located in Thailand and it does not necessarily has strong ties with relevant organizations (e.g., business associations, Japanese business organizations, higher education authorities and science and technology agencies) in other member countries. Therefore, JICA offices in ASEAN countries should support MIs by introducing such organizations and providing information on UIL.

4.3 Lessons Learned

Measures to increase the effectiveness of a scholarship program

  The Project successfully increased the effectiveness of the scholarship programs by creating synergistic effects. Most of the HIs require that graduate students present their papers and contribute to academic journals as a condition to conferring a degree. Thus, the Project decided to establish field-specific regional conferences to provide opportunities for graduate students to present papers. The Project also established an academic journal to provide opportunities for graduate students to publish their papers. By providing such opportunities, the Project was able to help graduate students obtain their degrees in a relatively short period of time. Furthermore, regional conferences and the journal greatly helped develop networks among researchers and facilitate joint research in the region. In planning a project that has a scholarship program, it is advisable to add these components in order to enhance the effectiveness of the program.

Annex 1 Policy Priorities of the Member Countries in Higher Education (at the time of planning Phases I & II)

Country	Policy document(s)	Relevant policy priorities
Cambodia	National Strategic Development Plan （2009-2013）	Human resources development for industrial advances, expansion of scholarships, enhancement of research capacity of teaching staff and acquisition of degrees from oversea (No mention about higher education in earlier national plans)
Laos	7th National Socio-Economic Development Plan （2011-2015）	To strengthen higher education by encouraging local talents to be management staff and highly experienced technical staff (No mention about higher education in earlier national plans)
Myanmar	Thirty-year-long-term Education Development Plan （2001–2030）	Provision of quality higher education, improvement of universities to international standards through receiving accreditation and practical human resources development
Vietnam	The Five-Year Socio-economic Development Plan （2001-2010）	To develop an economy of knowledge and strengthen international competitiveness
The Philippines	National Science and Technology Plan （2002-2020） 1st National Higher Education Research Agenda 1999–2008）	Promotion of Research and Development, technology transfer, human resources development and UIL Improvement of research outcomes of research institutions, promotion of research by competitive research grants and establishment of a sustainable higher education system
Malaysia	National Higher Education Strategic Plan （2007–2010）	To strengthen such key universities as USM and UM in research and innovation and achieve excellence in terms of university ranking, increased percentage of Ph.D. holders and global product development
Thailand	2nd 15-year Long-Range Plan for Higher Education （2008-2022）	Human resources development in energy and environment sectors, university-industry collaboration in industry and services and human resources development in agriculture

Country	Policy document(s)	Relevant policy priorities
Indonesia	Master Plan for Acceleration and Expansion of Economic Development （2010-2025）	To become a high income country by 2025 by securing a national budget equivalent to 1% of GDP for Research and Development, increasing Ph.D. holders and promoting international cooperation in science and technology

(Source: Terminal evaluation reports of Phase I and Phase II, websites of the relevant agencies)

Annex 2 Needs of MIs (at the time of planning of Phase I)

Country	Main needs
Cambodia	Expansion of Master's programs, establishment of new Ph.D. courses and promotion of UIL
Laos	Expansion of graduate programs in collaboration with MIs and the upgrading of academic qualifications of lecturers
Myanmar	Improvement of teaching staff's academic qualifications, promotion of UIL and joint research
Vietnam	Improvement of teaching staff's academic qualifications in selected departments and promotion of joint research
Indonesia	Improvement of teaching staff's academic qualifications, promotion of joint research and UIL (particularly with Japanese companies)
The Philippines	Improved results of university evaluation (e.g., admission of foreign students and achievements of research)
Malaysia	Internationalization of universities, UIL
Thailand	Internationalization of universities, UIL and joint research with Japanese universities

(Sources: Final evaluation report – Phase II)

Annex 3 Policy Priorities of Member Countries in Higher Education (as of 2015 at the time of ex-post evaluation)

Country	Policy document(s)	Policies and needs
Malaysia	11th Malaysia Plan（2016 – 2020）	Human resource development to become a developed country and innovation of science and technology to respond to industrial needs
	Malaysian Education Blueprint（2015–2025）	To internationalize Malaysian universities, accept 250,000 foreign students and have at least two universities ranked top 100 in world university rankings such as QS
Thailand	2nd 15-Year Long Range Plan for Higher Education (2008–2022)	To develop industrial human resources that meet the needs of the labour market and to strengthen international competitiveness of Thai universities
The Philippines	CHED Strategic Plan（2011–2016）	To improve the quality and standards of universities
Indonesia	Leading Innovation Center Program: Pusat Unggulan Inovasi（PUI）	To improve industrial productivity by improving the capacity of science and technology institutions and allocate a special budget to lift 10 Indonesian universities to an international level by 2019
Myanmar	National Education Law（2014）	Preparation of educational environment that satisfies international standards, quality improvement of university education At the time of ex-post evaluation, the priority was to take measures to implement the law.
Cambodia	National Strategic Development Plan（2014–2018）	Development of human resources that meet the needs of the (export) market, strengthening of science and technology and engineering programs that meet ASEAN standards
Laos	7th National Socio-Economic Development Plan（2011-2015）	To increase the ratio of university graduates per population and establish and expand local universities The Ministry of Education plans to improve the qualifications of teaching staff (Ph.D. holders: 10%, Master's degree holders: 60% and Bachelor's degree holders: 30% by the end of 2015).
Vietnam	Socio-economic Development Strategy（2011–2020）	To increase the quality of university education and expand investment for key universities

(Source: the results of interviews and questionnaire survey to higher education institutions)

Annex 4 Needs and Priorities of MIs (as of 2015)

University	Policies and needs
YTU	• To enhance academic staff's capabilities and qualifications, and prepare an environment for research so that YTU can be recognized as a research university in compliance with the National Education Law • The strong need to upgrade academic staff's qualifications because every academic staff member must be transferred to another public university periodically. (Rector)
YU	• To become a comprehensive university. • To upgrade and expand the faculty of engineering • To reorganize the structure to be an autonomous university • The strong need to upgrade academic staff's qualifications because every academic staff member must be transferred to another public university periodically. (Rector and Dean)
NUOL	• To reach an international standard by 2020 by establishing an autonomous engineering university • To upgrade the academic staff who obtained Master's degrees to Ph.D. degrees (Dean)
ITC	• To develop five departments into faculties and enhance UIL through the research and innovation center • The strong need to upgrade the academic staff who obtained Master's degrees to Ph.D. degrees (Rector)
HUST	• Human resource development of teaching staff • Improvement of the university's infrastructure • Strengthening of research activities • 80% of the teaching staff members are Ph.D. holders. The main target group for AUN/SEED-Net scholarship programs is undergraduate students. (Director, International Cooperation Department)
HCMUT	• To encourage teaching staff to study abroad in order to have all teaching staff Ph.D. holders • To promote joint research with industry • To improve technologies relating to the seven core industries (ITC, manufacturing and machinery, food processing, material engineering, water resources and environment, renewable energy, automotive industry) promoted by the Government (Vice Rector)
ITB-INA	• The mid-term goal is to internationalize the university (to obtain international accreditations by 2020). The short-term goals are; (1) to enhance the faculty's international programs, (2) increase double degree programs and (3) promote UIL. At present, the need for upgrading academic qualifications of its teaching staff is relatively low. (Dean)
UGM	• To internationalize the university and increase competitiveness (e.g., lifting UGM's position in university rankings and promote UIL. • At present, the need for upgrading teaching staff's academic qualifications is low. UGM also recruits Ph.D. holders from other universities as teaching staff. (Dean)
DLSU	• To enhance research activities and collaboration with community and improve its position in university ranking by increasing research papers and mobility programs (Dean)
UP	• To upgrade Energy engineering program (Director, Electrical & Electronics Engineering Institute)

University	Policies and needs
UM	• To internationalize the university (e.g., to increase the number of foreign students) and promote UIL by strengthening university's venture companies • The need for accepting foreign students including students from Japan and increasing the number of collaborative programs with foreign universities (Dean)
USM	• To internationalize the university by expanding collaborative research and promote UIL • The need for support to link up with companies including Japanese companies, conduct joint research to deal with reduced budget allocation to universities after 2016 (Dean)
BUU	• To promote UIL by taking various measures (UIL is the highest priority for BUU as it is located near industrial areas.) • The need for upgrading staff's academic qualifications was high during Phases I and II, but the need is not so high as most of teaching staff have already obtained degrees (as of October 2015). (Dean)
CU	• The priority is to develop industrial human resources through UIL and to promote multi-disciplinary research by allocating special budget. AUN/SEED-Net is important for the university's internationalization. (Dean)
KMITL	• To pursue institutional collaboration with industry through formal agreements and joint research. AUN/SEED-Net responds to the need for internationalization of KMITL (Associate Dean, International School of Engineering)

(Source: the results of interviews to representatives of MIs)　( ): main interviewee