

Article

International Industrial Internship: A Case Study from a Japanese Engineering University Perspective

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Abstract: In this globalization-focused era, the demand for globalized engineers in the creation of borderless societies is increasing. Despite the initiatives by the Japanese government to promote internationalization through increasing the intake of foreign students, the exposures gained by the Japanese students from these programs are minimal. For years, internship has been used globally as a platform for training and educating future engineers, but only a few studies have examined the proactive transformation from domestic to international internship. International internships overseas offer a completely new dimension of experiences when carried out in multicultural environments. This article reports and offers evidence of a Japanese engineering university's rapid global internship reform strategy toward the expansion of international internships in Malaysia. This paper provides insights into the process, from initial setup to implementation of the internship program covering all the necessary preparation and support. From the establishment of an overseas collaboration base and rapport building with hosting industries, the systematic steps taken are reported. Regarding the internship program, feedback from Japanese engineering students who completed their internships show improved satisfaction due to continuous improvement of the internship program with progressing years. It was also discovered that the low participation rate in overseas internship by Japanese students is not due to their inward-looking temperament, but due to the lack of internship program availability that is administered with sufficient preparation enabling them to challenge themselves in a new environment. The challenges encountered in the program, and the sustainable improvements made in alignment with sustainable development goals toward equitable quality education and promotion of lifelong learning are also stated. In this paper, the future perspectives and outlook of internships are also described considering today's rapid technological advancements and the fast-changing needs of industries, which require future internship programs to have flexible approaches and ideologies.

Keywords: international industrial internship; industrial training; cross-cultural exposure; education; globalization; engineering



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1. Introduction

With today's rapid technological advancement, the world has become borderless, and human-centered design, such as Society 5.0, is heavily emphasized. Therefore, engineers' role in society is being redefined because of rapid globalization, technological advancement, and demographics evolution. Engineers of the 21st century face with new challenges and a professional environment that differs from that of their predecessors. According to a study of the National Academy of Engineering titled "The Engineer of 2020: Visions of Engineering in the New Century," the importance of education in the global context is a critical issue in engineering education [1]. The increasing globalization of corporate economies has shifted the face of engineering practice toward innovations that meet the

demand of society in multiple ways, such as connectivity and behavioral patterns through internet of things (IoT) [2–6]. In addition to core engineering skills, modern engineers must possess cross-cultural communication skills, team management skills, and ability to perform in geographically distributed teams [7]. As defined by Parkinson, the global competence for engineering graduates should include attributes such as multicultural diversity appreciation, cross-cultural communication, engineering practice in the global context, and proficiency in handling multicultural differences that are essential for achieving the desired outcomes and goals [8]. One of the most effective ways of cultivating these characteristics is through vigorous internship programs that can stimulate global sensitivity and awareness in mutual multicultural understanding [9].

This study reports an international internship program undertaken by a technical Japanese university to train global engineers overseas. This vigorous internship program is based in Southeast Asia, which is rich with cross-cultural environment; the student interns are exposed to cultural diversity, with opportunities to harness their soft skills and communication skills in both English and local languages [10,11]. In this era of borderless education, which is aligned with “the world is flat” concept, a sustainable methodology of cultivating globalized engineers through an innovative approach is important [4]. Therefore, this study surveys the status of internships in Japan and describes the development of an international internship program that is implemented overseas. Furthermore, the motivation of Japanese engineering education to revolutionize and adapt a of new approach to cultivating global engineers through international internship programs is discussed. To address the effect of the country’s declining working population, the Japanese government has initiated various projects toward internationalization, such as the following:

- a. 300,000 International Students Plan: This plan was launched in 2008 and aimed to accept in 300,000 international students by 2020 [12] (Source: MEXT homepage: https://www.mext.go.jp/a_menu/koutou/ryugaku/081210/001.pdf, accessed on 5 November 2020).
- b. Global 30 Project: Established in 2009 by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Global 30 Project is designed to promote the internationalization of the academic environment of Japanese universities and more acceptance of outstanding international students into Japanese universities [13] (Source: MEXT homepage: <https://www.mext.go.jp/en/policy/education/highered/title02/detail02/sdetail02/1373894.htm>, accessed on 5 November 2020).
- c. Inter-University Exchange Project (Re-Inventing Japan Project): This funded project aims to foster human resources that can be globally active, and to ensure the mechanisms for mutual recognition and grade management through an international framework [14] (Source: MEXT homepage: <https://www.mext.go.jp/en/policy/education/highered/title02/detail02/sdetail02/1373893.htm>, accessed on 5 November 2020).
- d. Go Global Japan Project: The Go Global Japan Project was launched by the Japan Society for Promotion of Science (JSPS) in 2012 to overcome the inward tendency of Japan’s younger generations in order to foster a global vision toward global competitiveness and to create ties with other nations (Source: JSPS homepage: <https://www.jspso.go.jp/english/e-ggj/outline.html>, accessed on 5 November 2020).

Although the number of international education programs in core Japanese universities is increasing due to active promotion by MEXT, most of these programs focus on intake of international students; their strategies include expansion of English-only courses, improvement of the hosting system for international students, Japanese language learning opportunities, and strategic international programs [15]. Regarding international exposure for Japanese students, although activities involving overseas educational dispatch are available, most of them are short-term exchange programs implemented in collaboration with overseas educational institutions. However, students can gain more significant knowledge and exposure through international industrial internships, as these involve up-to-date real-world manufacturing experience. In this paper, a brief overview of the

status and common internship practices in Japan is first given to emphasize the importance of this study. Although approximately 70% of the universities in Japan have internship programs in their curricula, most universities only offer internship programs with short durations of approximately two weeks during undergraduate students' third-year summer vacation. A longer internship period coupled with problem-solving opportunities is necessary to promote a complete experience and a deeper impression for individual development. According to a survey, only 2% out of approximately 2,600,000 students undertake longer-term internships every year (www.mext.go.jp/b_menu/internship/1387151.htm, accessed on 17 February 2021). This low percentage could be due to several factors, such as (a) Lack of implementation structures within educational institutions, (b) Inadequate motivation for hosting companies (the demerits of some firms outweigh their merits, and they implement internships merely to fulfill their corporate social responsibility), (c) Lack of added advantage for students who undertake internship in their job recruitment, and (d) Untimely internship schedules (overlap with job-hunting window, in which case students prioritize employment security). This study reports the dispatch of Japanese students with engineering backgrounds for internship in overseas education institutions as well as industries in Malaysia, a country with a culturally diverse environment [16]. With the use of a collaborative technology educational center as a base, global education activities can be promoted, and internship collaboration with industrial companies in the Penang region can be established [17]. For the past few decades, the educational interrelation between Japan and Malaysia has been strong and increasing through various cross-border higher education programs [16,17].

This paper aims to survey the status of internships in Japan and understand the reason for their unpopularity in the country. Then, we report the initiation and results of an international industrial internship of a Japanese engineering university. This study includes results obtained from students dispatched by the program between the fiscal years 2013 and 2018 (116 students). The implementation process and the challenges encountered in the study period are also discussed. Recommendations for further internship improvement are provided prior to the conclusion. Most existing works on international industrial internships are based on conceptual planning or internship trials involving very small numbers of students. Thus, the current work reports on the implementation of an overseas industrial internship (outside of Japan) by a technical Japanese university as well as feedback obtained from the Japanese students in this program who interned in various companies in Penang, Malaysia. This study provides clear insights into the obstacles encountered during the program's implementation and their solutions. The findings from this study and project could be a reference for internship and educational institutions that plan to implement global internships.

1.1. Definition of Internship and a Brief Comparison of Internship in Japan with Internship in the Rest of the World

1.1.1. What Is Internship

An internship is a student's learning experience in a real-life working environment that is relevant to his/her major; the student completes his/her internship prior to academic graduation [18]. Internships are widely practiced around the world, such as co-operative (co-op) education in the United States, praktikum in Germany, and the "sandwich" system in the United Kingdom, which is also considered an internship program, or practicum. In a co-op education program, students usually take full-time lectures for a designated period and are then given the opportunity to experience real working environments. Co-op education began in the United States after 1906. The purpose of practicum (United Kingdom) is to establish a connection between theory and practice the earliest possible time so that students can better understand the relationship between what is learned in their institutions and the practical processes in their industries. This sandwich system is implemented as an educational form of the specialized technical curriculum in higher education institutions and for practical training in factories. Lagging behind the United

States, Japan was late in introducing internships and incorporating them as an important component of education.

What are the mutual benefits of internships for interns and hosting industrial companies? In many countries, internships are directly linked to corporate recruitment. For example, in the United States, more than 70% of companies want to employ student interns as full-time employees, and about half of interns are promoted to full-time employees. Internships in the United Kingdom have been spreading rapidly since 2010, and participation in an internship program is precondition for job recruitment in many companies. By underdoing internships, students acquire invaluable skills, such as corporate culture assimilation, career decision-making, and smooth adaptation to new working environments (mitigation of reality shock) [19]. Moreover, the knowledge and wisdom gained during internships benefit students' growth significantly when they return to their educational institutions. Table 1 briefly compares internships in the United States of America, United Kingdom, Germany, and Japan.

Table 1. Internship comparison between the United States, the United Kingdom, Germany and Japan.

Country	USA	UK	Germany	Japan
Name of the program	Internship co-op	Placement Sandwich course Internship	Praktikum	Internship
Begin from	After 1906	1960s Drastic change in 2010	'Meister' from middle ages	1997
Target students	All grades	Mainly 2nd year	-	Mainly 3rd year
Term	Several months	4–8 weeks 8–12 weeks (J58)	Average 3 months	85% less than a month (2011)
Percentage of participating students	More than half	More than half	More than half	Less than 10% of students *
Relationship with employment	Strongly influenced	Prerequisite for hiring	Strongly influenced	Almost non-existent
Allowance	Mostly paid	Mostly paid	Mostly paid	Mostly paid
Recent events affecting internships	Discovery of human resource mismatch in industry (1960s)	Start of tuition increase (1998) Employment difficulties after the Lehman shock (2008)	Bologna Process (1999) Minimum wage law (2015)	Abolition of recruitment agreement for college graduates by Keidanren (Japan Business Federation) (2021)

* Excludes on-site training (e.g., educational, nursing, and clinical training, completed to acquire specific qualifications).

1.1.2. Internship in Japan

The term “internship” began penetrating Japanese education and industry deeply in the second half of the 1990s. In response to employment issues at universities and companies, new policies have been introduced that promote the expansion and widespread acceptance of internships. Recently, the number of unemployed graduates has been increasing, thus causing educational institutions to turn their attention to internships to identify solutions and prevent the employment rate from falling below capacity. Moreover, the turnover rate of fresh graduates has been increasing in recent years (about one-third leave their jobs within three years) due to inadaptability, job incompatibility, and job scope dissatisfaction. Internship can reduce the high turnover rate and promote a smooth transition from tertiary education conditions to real-life working environments. In Japan, students commonly select study majors before taking university entrance exams, and they prefer to seek employment in well-known, established companies without fully understanding the real situations within these firms. These circumstances contribute to the employment rate decline and increased turnover rates in companies. With the redefinition of internship in

1997 that took the employment situation into consideration, the Japanese government has held various seminars (internship enlightenment, coordination training) setting numerical targets for internships, and provided internship scholarships to students. The number of internship programs being implemented increased as a result of these initiatives, which included universities, industrial companies, and government departments. However, even at present, the duration of internship programs in Japan is short, and the percentage of student participation is extremely small compared with those in other countries, which are approximately 50%.

The numbers of students in Japan who did and did not participate in internships (both domestic and overseas) from fiscal year 2014 to 2019 are shown in Figure 1. Although statistics show an upward trend of students taking part in internship programs, the increment is rather minimal. As shown in Figure 2, only approximately 3% of undergraduate students in the studied years participated in internship programs. Among them, only approximately 10% completed internships with periods longer than one month (0.3% of total students). These findings show that internship remains unpopular in Japan, and this could be due to the (a) Short internship durations (unavailability of internships with longer periods), (b) Mentality of students and (c) Students' poor awareness of the long-term advantages that could benefit them. Only a few universities in Japan have implemented international internship programs outside of Japan that rigorously cultivate students' engineering ideologies and soft skills, such as active communication and English ability. Most international internships outside of Japan for students with engineering backgrounds are executed through research collaboration between two educational institutions.

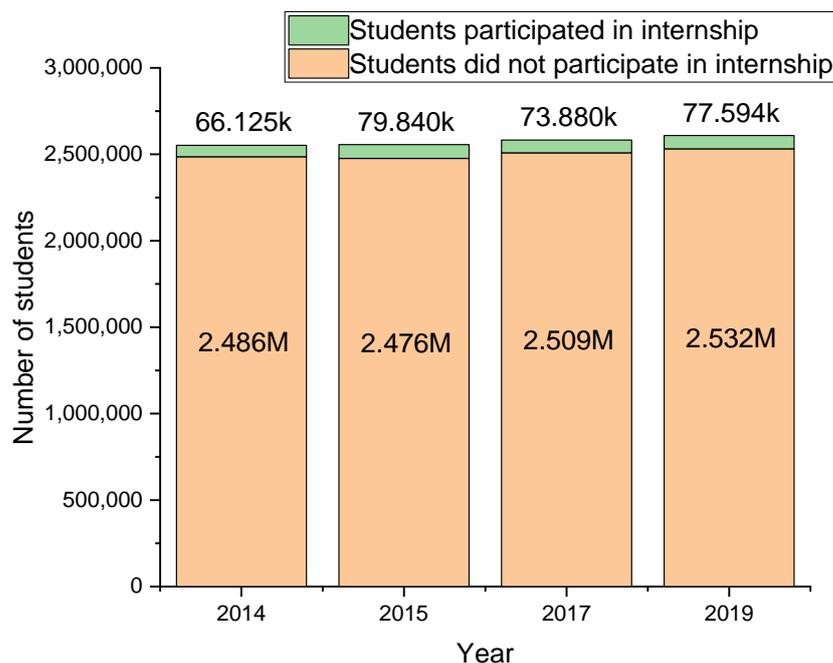


Figure 1. Comparison between numbers of students in Japan who did and did not participate in internship programs (domestic and/or overseas). The number of students who participated in internship programs exclude those who attended on-site training (e.g., educational, nursing and clinical training) to acquire specific qualifications (Source: MEXT homepage: https://www.mext.go.jp/content/20200825-mxt_chousa01-1419591_8.pdf, accessed on 21 February 2021).

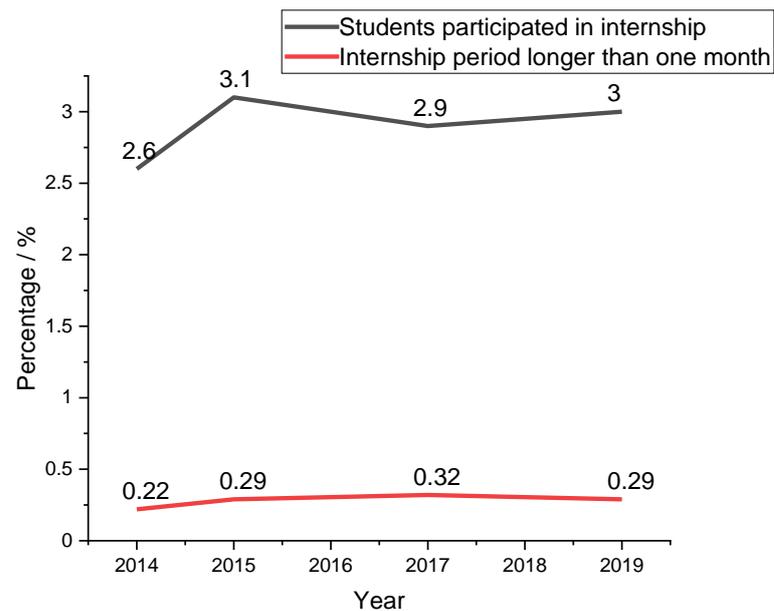


Figure 2. Percentage of students in Japan who participated in internships and the percentage of these internships that lasted longer than one month [20]. The number of students who participated in internship programs exclude those who attended on-site training (e.g., educational, nursing and clinical training) to acquire specific qualifications (Source: MEXT homepage: www.mext.go.jp/b_menu/internship/1387151.htm, accessed on 17 February 2021).

The number of students in Japan who participated in international internships abroad is rather low, as shown in Figure 3. Although an increasing trend can be observed, the number of internships with periods longer than one month was very low. In 2019, only 848 students participated in international internships with periods longer than one month; they are only 0.0033% of the total students, reflecting a surprisingly small number. Therefore, added effort is needed to promote international internship toward globalization initiatives in Japan.

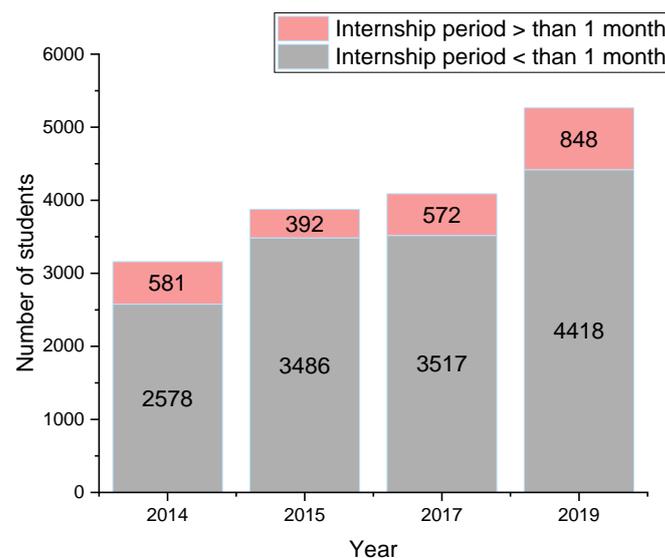


Figure 3. Numbers of students who participated in international internship programs abroad with durations of less than one month and students who participated in such programs lasting more than one month (Source: MEXT homepage: www.mext.go.jp/b_menu/internship/1387151.htm, accessed on 17 February 2021).

Engineering students rarely manage to complete their internship in overseas companies in their fields of interest due to setbacks such as travel visa restrictions, communication barriers, and lack of information and coordination. Many industrial companies are also reluctant to accept foreign interns due to their short internship durations, which lead to insufficient time for the students to complete assignments or parts of projects, excessive paperwork for visa applications, and additional costs. Therefore, a strategic base that enables good coordination, proper arrangement, and prompt response throughout internship program implementation is vital. Considering important factors, such as strategic location, communication, cost efficiency, and safety, Penang, Malaysia, was chosen as the base location for the implementation of the international industrial internship program under study. A technological collaboration center established in 2013 is used as a platform for contacting the local (Malaysian), multinational, and Japanese companies that are strategically and densely located within this region. The studied internship program is also continuously improved with sustainability in mind every year to create an equitable high-quality educational program.

2. Research Method/Pedagogy

This case study was conducted in an engineering-based Japanese university that has had a good internship track record since its establishment. Final-year undergraduate students are required to undergo internship to fulfill their graduation requirements. Each year, approximately 400 students, where more than 90% of them are 4th grade students in their final undergraduate year (out of approximately 2000 enrolled students) are dispatched to domestic industries within Japan for their internship. This strong background of domestic internship was a good foundation for the development of the institution's international internship program, whose backbone is a curriculum embedded with a two-month internship. However, for the international internship program, new factors must be taken into consideration, such as culture, language, internship visa, health and risk management. Cooperation of the industries in the region and local educational institutions is also crucial for the realization of this program. Prior to international internship implementation, internship collaboration seeking and initiation with related industries (mechanical, electrical and electronics; information technology; applied life sciences; and civil engineering firms) are performed, and the process is shown in the flowchart in Figure 4. The timeline for the yearly internship program is shown in Figure 5.

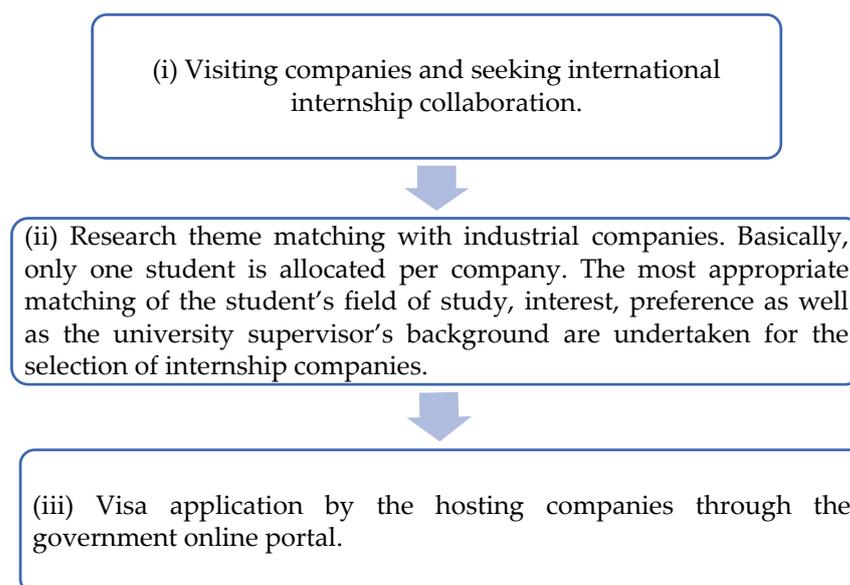


Figure 4. Flowchart showing the steps taken to initiate internship collaboration with the industries in Penang, Malaysia.

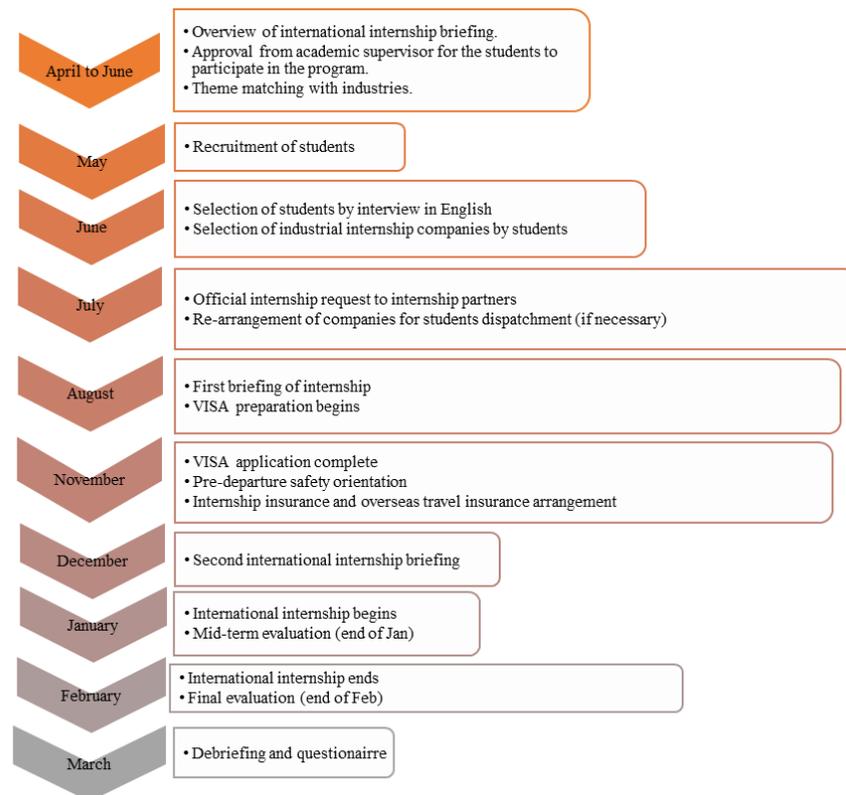


Figure 5. Timeline for the internship program.

After students are accepted for internship by their respective companies, further arrangements are accessed, such as accommodation, insurance, commutation and risk management. Students are given the freedom to choose and arrange their accommodation, but, the university also provides an accommodation list for the students' reference and consideration. Students are given English language lessons, basic Malay language lessons, geographical information, and risk management information for their travel and stay in Malaysia. Some students in this international internship program, are eligible for the Japan Student Services Organization (JASSO) scholarship, which can ease their financial burden during the internship period. Moreover, depending on the hosting companies, an internship stipend may also be provided. Internship evaluation is conducted by the students' academic supervisors one month into the internship. Two evaluation presentations are performed by the students (midway and after internship completion). They then fill out a questionnaire to give their feedback regarding the internship program.

Unlike other individual internship programs, this international industrial internship which covers a broader perspective in terms of preparation and provision of inclusive-, high-quality education toward a sustainable lifelong learning:

- a. Development of cross-cultural understanding and English communication skills: Predeparture briefing, and training sessions are given to the students prior to the commencement of their internship. A cross-cultural lecture is given by faculty staff with assistance from foreign students from Malaysia. The English communication skills of participating students are improved through active group discussions and presentation practice. The inclusion of this basic skills development initiative educates the students about the importance of information gathering and preadaptation, which would help not only in their internship but also in their preparation for their future career in global activities.
- b. Selection of relevant hosting companies and internship program coordination: Students can gain firsthand experience in industries that are aligned with current demand and technological advancements [6]. Coordination and arrangement between industrial partners and the university are first performed for a deep mutual under-

- standing of each other's expectations from the internship program. This also allows for a clear design of the internship schedule and goals that would benefit all parties.
- c. Selection of strategic region for efficient logistics handling: The international internship program is implemented within a region that is dense with various companies of diverse backgrounds. This simplifies logistics matters, such as manpower, overhead cost control and follow-up response. The close proximity of the education base to the host companies also provides confidence and a sense of support for both the industries and the students.
 - d. Diversity of hosting companies: A wide range of multinational, Japanese, and local companies at different scales is available for this internship program. Students gain a broad perspective for learning, as the atmosphere in these firms varies, and they can select their preferred environments for their internship experience. This strategy also enables the university to maintain enough companies to be hosts for this internship program without being affected by external factors, such as the economy, internal restructuring, and unavailability of persons-in-charge.
 - e. An internship program with sustainable capacity: This program was created with sustainability in mind. As it was initiated using government funding aid with a specific timeframe, a gradual reduction in financial aid is expected. To avoid any administrative burden upon the depletion of the funding and to relieve any burden that might affect students, the program is constantly improved to achieve sustainability. In the pilot year, full financial support was provided to cover the students' air fare, accommodation, and commuting expenses. Gradually, the expenses incurred are being covered by the students themselves through an affordable and sustainable approach. Despite the reduction in financial support, the number of students who are keen to participate in this international internship increased. Questionnaires are distributed to the students and the host companies upon completion of the program. This informs the university about the actual experiences of the students and the effectiveness of the internship and the preparatory programs. The feedback obtained is considered for further improvement of the program in the following years. Such an approach was also reported by Erickson involving 25 students who participated in an internship program [21]. The satisfaction of the students with the program, the extent of preparation, and the extent of the experience, as determined through the questionnaire survey, helps change the university's view of certain issues.

3. Results and Discussion

3.1. Initiation of the International Internship Program and Its Participation Rates

Technical, professional, and global skills are core elements of engineering education that can shape-up students to become global talents [22,23]. Many engineering educators promote global competency, and one of the main challenges is the incorporation of a global competency syllabus into a compact curriculum [3]. In a curriculum based on technical and engineering education, international internship is executed via an education framework that is embedded with a two-month compulsory internship program required for the completion of an undergraduate degree. Therefore, the implementation of a new international internship program is simplified using the aforementioned framework by incorporating a new system into the timeline. In the initiation stage, the biggest obstacle was lack of industrial connections with the industries in Penang, Malaysia. The first step was to actively establish collaboration with industries (multinational firms, overseas Japanese branches and local companies) in Penang to participate in this internship program and host student interns. Industrial collaboration partnership with an established local university was also leveraged. Introduction to companies with established internship collaboration with a local university helped in the rapport building and understanding of the internship program. After a pool of internship companies was generated, this new international internship program was integrated into the existing core curricular structure. Information gathered from the companies willing to participate in this internship

program, such as backgrounds and specialties of these firms, was then compiled for theme matching with students with similar engineering backgrounds. The numbers of students who participated in this program in the study period are shown in Figure 6. In general, the number of participating students increased from fiscal year 2013 to 2018.

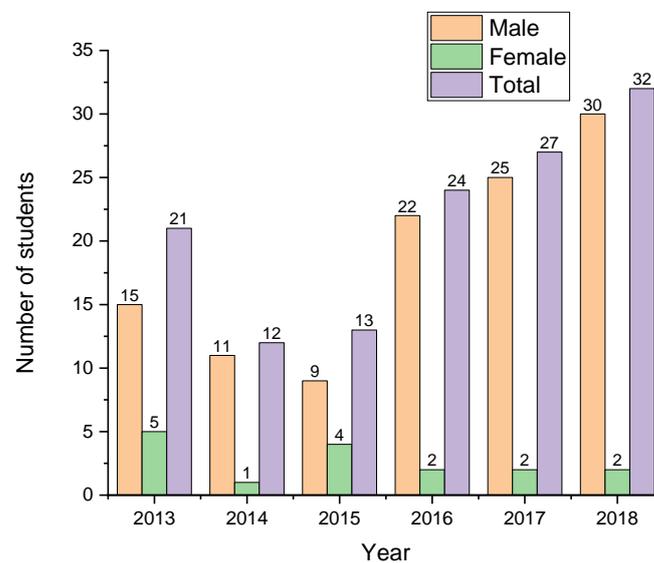


Figure 6. Numbers of students who participated in the international internship program from 2013 to 2018.

Notably, at the initial stage (fiscal year 2013), more students were dispatched to Japanese companies; a progressive shift then occurred, with more students completing their internship in multinational and local companies, as shown in Figure 7. Every year from 2014 to 2016, the number of students dispatched to local, multinational, and Japanese companies was approximately one-third of the total. For most of the Japanese students, participation in this international industrial internship was their first overseas travel. Therefore, they felt comfortable completing their internship in overseas Japanese branches with Japanese personnel. Students in the subsequent batches gained considerable confidence from the positive experiences and feedback of their seniors who completed their internship in multinational and local companies.

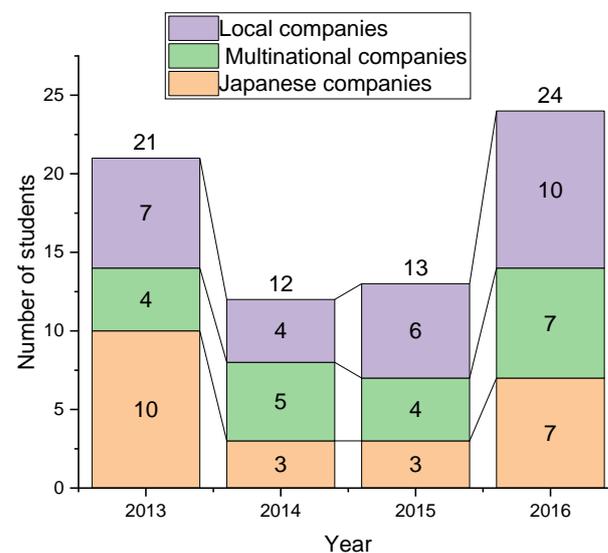


Figure 7. Numbers of students dispatched to local, multinational and Japanese companies from 2013 to 2016.

3.2. Benefits Obtained from the Internship

3.2.1. Adaptation of New Soft Skills

This internship program enables a novel integration of borderless education toward a modern internship era. As most internship programs focus on employment experience (part of job-hunting) [24] and acquisition of technical skills or knowledge (often practiced in Japanese engineering organizations) [16], this internship program incorporates a “spiral-up concept” for students development, which includes the adaptation of soft skills, such as communication, survival in foreign communities and development of critical thinking skills and new outlooks in technologically related multicultural environments [3,21]. This concept is taken from the university’s “spiral-up education system” that is based on global engineering education covering fundamental subjects, specialized subjects, graduation research project, liberal arts education and internship as reported in our previous work [17]. From their internship exposure, the students realize the importance of the knowledge they gained throughout their undergraduate study and could further enhance their skills and deepen their knowledge in their postgraduate study.

During their internship in new environments, the acknowledged consciousness in the students can promote different communication patterns during their daily routines involving engineering-related tasks. These patterns are also known as “intra-science-community communication”. The terms used in this mode of communication are usually familiar to students, as the terminology used in engineering fields is quite constant or similar. However, in totally new environments, the communication patterns are vastly different from what they experience in Japan. Students have to engage and work with people who have different interaction patterns or unfamiliar discourse. This communication, which is more diverse, is also known as “inter-community communication” and would be a challenge for both the students and the persons with whom they are interacting. Given the lack of a standard interpretation and a mutual foundation for understanding (currently in the initial stage of development), there is potential for miscommunication, which will only gradually increase their capacity to cope with inter-community communication. The students exhibit signs of metalevel awareness of communication through such interaction, as observed during midterm and final-term evaluations conducted during the internship.

By communicating with people with different cultural backgrounds and religions, the students learned about intercultural understanding stimulating new way of thinking in their cross-cultural communication skill development. In the development of modern business models especially the current borderless community, a good intercultural communication skill is indispensable [25]. This is further supported by an interview survey conducted by Yoshida et al., all interviewees unanimously agreed that everyone in an organization should undertake intercultural communication training [26]. Therefore, students gain firsthand experience of intercultural communication during their internship abroad. This creates an awareness among them that can act as a steppingstone for future globalization development, when they assume higher management positions at later stages of their careers.

3.2.2. Broadening of Critical Thinking Skills

In completely new environments, the curiosity and consciousness of Japanese students are stimulated with daily experiences that are substantially different from those in their comfort zone (in Japan). Language is the being the greatest single difference, but other factors, such as religion, customs, and communication patterns in unique multicultural environments, offer plenty of learning opportunities for students. They can gain new perspectives from understanding other religions, and the mutual respect they develop can aid in their transformation into global engineers.

Despite differences in religion and communication pattern, the multi-ethnic community in Malaysia often portrays a uniqueness of communication and respect toward each other. For Japanese students, who are accustomed to a monocultural environment, this would provide a stimulating environment for them to broaden their knowledge and their

view toward global communities. These future engineers should also improve their communication skills and experience project management in cross-culture environments [27].

3.3. Students' Feedback of the Internship Program

To gain insights into students' motivation to participate in this internship program and their view on the communication skills improvement, the university administers a questionnaire survey at the end of the program. For the question "Are you satisfied with your participation in the Penang international internship program?" the following five-point calculation system is used. 'Very satisfied' is rated 5 points, while 'very dissatisfied' is rated 1 point. The average score was evaluated annually, and it increased gradually from 4.05 in 2013 to 4.22 and 4.89 in 2014 and 2015, respectively. The feedback obtained is summarized in Table 2.

Table 2. Summary of the feedback obtained from the students.

Questions	Responses
(1) Reasons for participating in the international internship	<ul style="list-style-type: none"> • To experience the difference in the living and working styles abroad. • To experience working in a foreign company. • To broaden horizons with overseas experience and decide on future path. • To experience using practical English and learn diverse values. • A real experience living abroad, not merely a short trip. • A lifetime opportunity to experience two months of new cultures. • An opportunity to improve English skills. • A self-test after learning English and preparation for future globalization.
(2) Communication skills	<ul style="list-style-type: none"> • The participants felt they lacked English-speaking skills and had limited vocabulary. • They realized they were studying English the wrong way. • Communication speed is more important than language perfection. • Smiling is important. • Both local English and local languages other than English are vital. • The better one's English ability, the better their life abroad will be. • Gestures will help when words are not understood. • One's English skills rapidly improve during the internship period. • Being abroad does not mean that one will learn English.
(3) Advice for prospective participants	<ul style="list-style-type: none"> • Be prepared to explain Japanese culture and history. • A good understanding of local customs, cultures and languages is important. • Given that the internship offers a compact, two-month experience, it would be a shame for one to not participate due to lack of confidence in their English ability.

4. Efforts and Considerations Taken and Required toward the Popularization of International Internship in Japan

The positive feedback of the students shows that international internship not only helps to improve their communication skills but also enhances their confidence, gives them new insights, and helps them believe that they can be global engineers of the future. Given the program's positive outcomes, which can benefit engineering education and globalization, international internship should be further promoted not only within Japan but also around the world. The following subsections present suggestions for promoting and encouraging the implementation of international internship programs in Japan.

4.1. Curricula That Enable the Implementation of International Internship Programs

Generally, final-year undergraduate students in Japanese universities spend more effort in the beginning of the fiscal year toward employment seeking, as job opportunities

are limited in the second half of the year, when most companies already have their vacancies filled. After securing employment, students focus on their undergraduate research projects, which makes longer-term internship participation impossible. This issue is avoided at the studied university because a large percentage of its students proceed to graduate school upon completion of their undergraduate studies. A shorter period for undergraduate research projects could enable students to devote their attention to internship programs. Other universities in Japan can use similar approaches, but a restructuring of curricula is indispensable.

4.2. Growth Stimulating Educational Internship Programs for Students

Students not only adapt to new culture and environments (which they can experience through study abroad programs) but also undertake responsibilities in their work assignment under the same circumstances. This shows that overseas internship helps to stimulate significant growth in students' educational development. This finding is tally with the report by Blumenthal and Grothus, where they compared students who worked abroad in foreign companies and those who worked in international branches of US companies; They found that the work experience gained by these students vastly differed from mere study abroad experience [28].

As internship is often less structured than coursework study, hands-on education covering soft skills, such as teamwork, communication, leadership and project management, is invaluable to students [26,29]. In a case study, Beate et al. stated that interdisciplinary collaborations involving language and engineering can be highly productive toward global competency. This aligns with the new emphasis given toward liberal arts education, which plays an important role in instilling creativity and cultivating professionalism with the required intercultural skills to enable students to navigate diverse collaborations in any situation [30,31].

4.3. Improvement in the Mindset of Hiring Companies

The cooperation and flexibility of hiring companies are needed to promote a better response to longer-term internship. First, unlike a limited hiring period, a year-round recruitment approach will allow students to think and focus on the development of their hard and soft skills through internship programs. Companies will benefit in the long run, as they can recruit students who are competent and calibrated not only domestically but also globally. As Japan is facing a declining population growth, one solution to the resulting manpower constraint is to recruit foreign talents. In advanced territories, such as Europe and the United States, internship experience is an important criterion in hiring candidates. Therefore, adoption of this approach will also enable Japanese companies to recruit global top talents.

4.4. Internship Programs That Benefit All Concerned Parties

In addition to making internship a compulsory subject in curricula, the creation of desirable internship programs is crucial. This incorporation of preparation, training, and program competitiveness will benefit not only students but also the hosting companies and the universities, generating a win-win situation for all [32]. For example, students should be educated and prepared with the necessary skills and mentality before their internship; They would be able to take advantage of the lessons learned in the classroom and further develop them during their internship. Hosting companies can benefit from new perspectives or insights from the new ideas of interns. Apart from fulfilling firms' social corporate responsibility, the networks they establish with engineering-based dispatching universities can benefit their research and development activities. As for dispatching universities, research collaboration and proof-of-concept testing of their innovations could lead to the creation of interesting ventures.

4.5. Selection of Location as Focal Point

Locating a strategic base with good access to many multinational companies is essential. Security and safety are given the utmost priority. Therefore, a location with good political stability, economic potential, and ideology combined with a rich multicultural history would be ideal. Amid the diverse cultures in the region, English is a preferable common communication language. The language will serve as a platform for developing mutual understanding for further development. An overseas location with only a small time difference with Japan is also beneficial, as it will ease administrative management and logistics allowing intermediate response to any situation that arises. Southeast Asian countries like Malaysia and Singapore, are good internship dispatching bases for consideration.

4.6. Diverse Selection of Host Companies with Clear Internship Strategies

Companies in relevant fields of engineering should be approached to host students for their internship. The internship objectives, internship period and scope covering educational exposure for students, possible technical research collaboration and requirements of companies should be clearly discussed. Information about hosting companies with backgrounds relevant to engineering must be compiled and provided to students. They should then be given the freedom to select their internship destination considering their interests and prospective career path. In this way, their learning will be further enhanced by their enthusiasm. The backgrounds and curriculum vitae of candidates will be given to hosting companies for screening. The university will play a role in ensuring an even dispatch of students to different companies to maximize the independent learning experience of their students. Prior to the implementation of this internship program and depending on the requirements of hosting companies, preliminary discussion and information sharing between the parties involved must be conducted to ensure a smooth internship. This process will also help to manage expectations and to achieve desired final outcomes from the internship.

4.7. Preliminary Preparation and Student Support

A preparation period of up to five months (August to December) is set for the internship, and focus must be given to the English communication abilities of students. During this period, conversational English practice should be conducted in addition to lectures on areas such as risk assessment, basic local language and cultural educational exposure. Students should be required to research their prospective host companies and perform preliminary background work on the fundamental understanding and skills that might be needed during their internship. Moreover, they should proactively communicate with their respective host to obtain details that are not easily available from their webpages. Experience and information sharing will be ideal between prospective students and students who have finished their international internship. This will help to instill confidence and eliminate any anxiety in the prospective participants prior to their internship. In terms of financial support, JASSO scholarships are available. Logistics matters, such as visa application, lodging and flight arrangements, need to be carefully managed, as any mistake could delay the implementation of an internship program. This procedure is supported by university staff. In addition, students must be given the opportunity to learn survival and travel management skills through shared services such as Airbnb, GrabCar, and Uber for accommodation and transportation. Finally, prior to students' departure, a risk management lecture should be given covering safety issues, crises and actions to be taken in emergencies. Information sharing with Japanese consulates is conducted. Figure 8 summarizes the preparation and support given to the students in the studied institution prior to their departure for internship.



Figure 8. Preparation and support given to the students prior to their internship program.

4.8. Administration of Questionnaire after Completion of Internship Programs

After the completion of internship program, questionnaire surveys regarding the program are conducted. From such questionnaires, the main motivations for the students' participation in this internship program, which may include multicultural exposure, international experience, and language proficiency improvement, could be understood. Besides that, the students also mentioned that daily English conversations help them to gain confidence. Furthermore, sharing by senior students who have completed such internship program will aid prospective students in understanding the local cultures and customs that they would encounter during their internship.

5. Future Outlook and Recommendations for Improvement

Given the significant prospect of industrial internship in cultivating engineering students to become global talents, further support and promotion by academic institutions and industries would be ideal. A pragmatic and effective approach to the implementation of international internship programs will ensure sustainability. In alignment with the rapid transformation of society, the following recommendations for improvement are presented.

- a. **Virtual internship:** With the advancement of technology, virtual internship can now be executed [33]. Although holding virtual internship programs for long periods will be difficult because of tasks that require personal presence, such an initiative could provide useful exposure to students. They can virtually experience the anticipated internship for a few days prior to the In-person implementation. This would give them a clear overview of what to expect and prepare, thereby enabling them to adapt better during their internship.
- b. **Online databases:** It is important to have an easily accessible online platform for prospective participants to refer to and gather information from. A compilation of information regarding the environments of internship such as areas, companies' backgrounds, and benefits obtained from the experience is crucial. With updated information in hand, students and academic institutions can make timely and justified decisions on the internship, such as destination, period, and possible collaborative projects.

- c. Internship blogging: Blogging during internship aids in with a student's collaborative learning, reflection, communication, and social support [33]. Blogging will be a useful platform for interns to reflect, construct knowledge and findings, solve problems, and communicate not only with the public but also with their peers. It would also be a helpful means for their supervisors to track the progress of students throughout their internship in a non-intrusive manner.
- d. Follow-up feedback: Timely periodic follow-up should be initiated with participants about the benefits of their internship experiences for their postgraduate study, job hunting, and even employment. This will enable timely evaluation of internship programs and incorporation with new scopes that meet the current trends and demands of society and industries [34–36].
- e. Second internship experience: Some students may find their first internship experience not as appealing as anticipated. Many factors could cause this, such as the internship scope, change of interest, and lack of job satisfaction. In light of this, another opportunity for students to complete a different internship during their graduate study will be very helpful in their search of a better internship experience [37]. This could aid in with the students' determination of future career paths and inner potential development.

6. Conclusions

In the development of engineering talents and global engineers who meet the rapidly changing industrial needs and demands, industrial internship (industrial education) is indispensable for cultivating a strong foundation and correlation in humanities and the applied sciences. In this study, the recent status of the internship in Japan is briefly reviewed. The rather low number of internship programs abroad from Japan is first described. Then, the establishment of a competitive international internship program in a multicultural country, Malaysia is described. Industrial internship varies among countries, and this study presents a reference model for an international internship implemented overseas (outside of Japan) from the perspective of a Japanese engineering-based university. The institution has been dispatching students every year since 2013 under this internship program (on-going). This article provides an accountable reference for academic institutions, especially those in Japan, about the steps required to create a sustainable international internship program. Finally, outlook and recommendations for internship program improvement are described.

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