Last updated: April 18, 2025

Bridging Two Systems – Adapting KOSEN's Japanese Engineering Education to Thailand

KOSEN's Japanese engineering education is being adapted to fit Thailand's educational system. Can this cross-cultural approach meet the growing demand for skilled engineers?

At a Glance

Country	KOSEN Japan Founded	KOSEN-KMITL Founded
Japan - Thailand	1961	2019

Introduction

As industries worldwide shift towards automation, artificial intelligence, and high-tech manufacturing, the demand for skilled engineers has never been greater. In Japan, the KOSEN school system has produced industry-ready engineers for over six decades, contributing to the country's technological leadership. Now, as Thailand moves towards a high-tech economy and demands skilled engineers, it is the first country to officially adopt the KOSEN model.

However, integrating a specialized Japanese education system into Thailand's different academic and economic landscape presents challenges. How can the KOSEN school system in Japan fit into Thailand's educational structure when it must fit into a different cultural and educational system?

This case study explores the adaptation of the KOSEN curriculum in Thailand, including opportunities and challenges in the integration to help create a new generation of engineers

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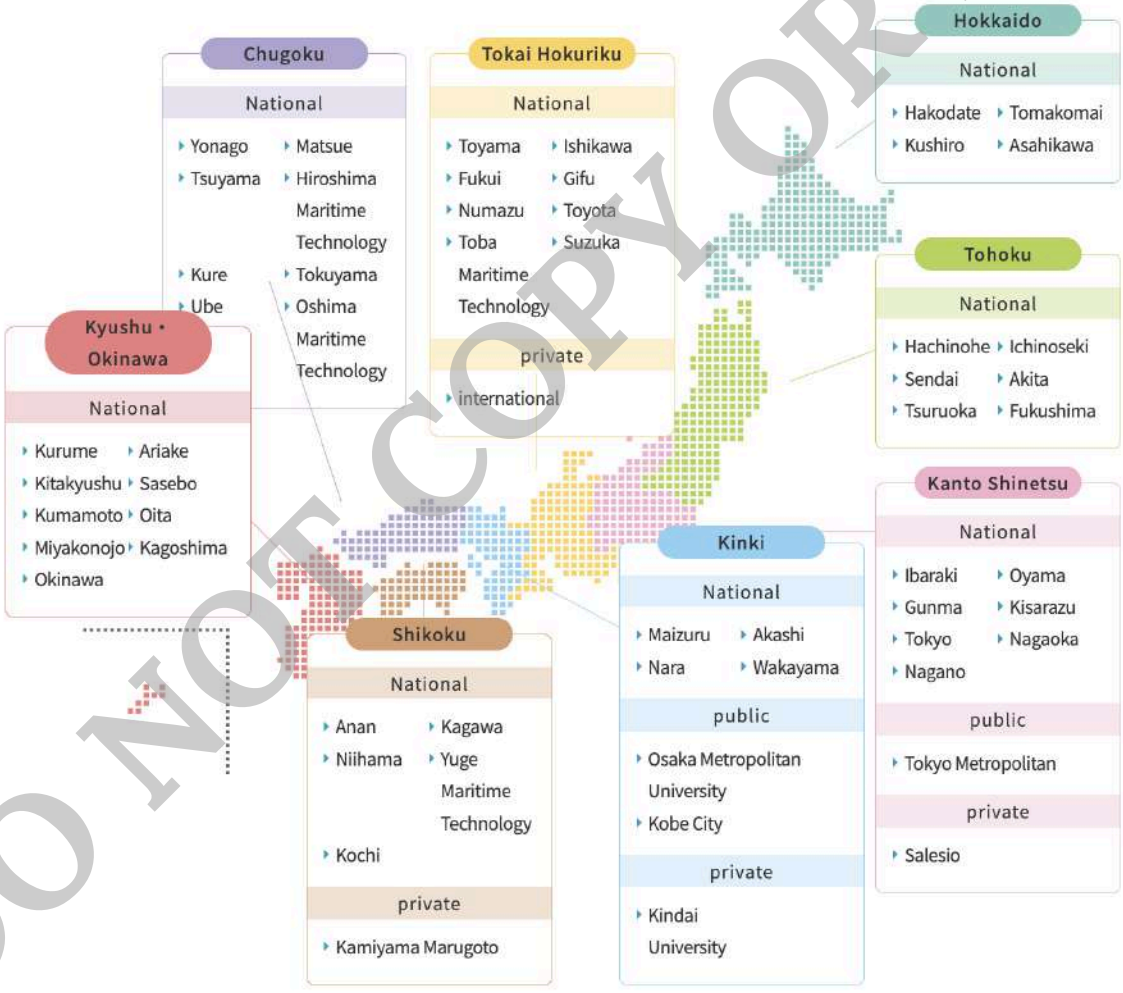
overseas. It highlights the efforts to bring together two educational systems while maintaining the core values of the KOSEN model.

About KOSEN

The National Institute of Technology (KOSEN) was established in June 1961 to foster intermediate-level engineers who could support Japan's rapid postwar growth. Since its initiation, KOSEN has expanded nationwide from 12 schools in 1962 to 58 schools in 2024.



KOSEN Nationwide | Source: KOSEN

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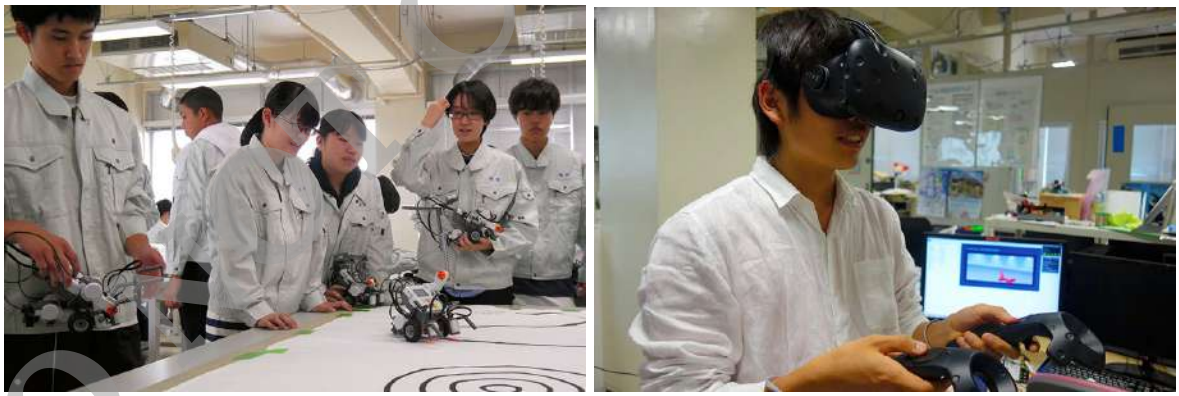
KOSEN's curriculum condenses three years of high school and four years of college into an intensive five-year program. Students typically enter after junior high school at around 15 years old and graduate by the age of 20 or 21. The program offers specialized knowledge and practical skills in fields such as mechanical and materials engineering, electrical and electronic engineering, information technology, biological and chemical engineering, civil engineering, architectural engineering, and maritime technology.

One of KOSEN's defining features is its early specialization, with students beginning technical coursework in their first year. For example, in the Mechanical and Materials course, students study machine design and material properties, which are the manufacturing foundations. The Electrical and Electronic program focuses on controlling devices such as home appliances and robots. Meanwhile, the Information Technology program covers computer systems, software, and programming.

The institute emphasizes hands-on learning, integrating project-based learning with theoretical lectures to prepare students for industrial careers. Upon completing the five-year program, graduates receive an associate's degree. While many enter the workforce immediately, others pursue further education in two-year advanced technical courses or transfer to university as third-year students.



Students at Wakayama KOSEN | Source: Asahi Shimbun

KOSEN graduates enjoy strong employment opportunities. According to *Asahi Shimbun*, alumni are recruited by leading Japanese companies such as Asahi Kasei Corporation, ENEOS Corporation, and Central Japan Railway Company (JR Central). Some graduates take an

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entrepreneurial path, launching their own startups. "*KOSEN has access to the latest information, including algorithms published in recent years. We can implement that research into society before anyone else,*" says Shohei Yano, president of KOSEN, highlighting the institute's role in fostering innovation and entrepreneurship.

Expansion to Thailand

The foundation of KOSEN in Thailand was driven by the Thai government's Thailand 4.0 policy — an initiative aimed at transforming the country's economy into an innovation-driven one. Before this policy, Thailand faced a shortage of highly skilled engineers and technicians, particularly in advanced technologies. Concerned about the middle-income trap — where rising wages make it difficult to compete in labor-intensive industries — Thailand launched Thailand 4.0 to upgrade its industries and workforce.

Launched by Thai Prime Minister Prayut Chan-O-Cha in 2016, Thailand 4.0 aims to integrate digital technology into the country's industrial production processes, including developing data-linked infrastructure, information exchange systems, and Big Data management between internal and external agencies. Unlike the previous era of Thailand 3.0, which focused on mass production and relied heavily on low-skilled labor, Thailand 4.0 seeks to enhance product development by collecting data, analyzing consumer behavior, and responding to individual customer needs. The development plan targets 10 key industries, including Automation and Robotics, Medical, Aerospace, Artificial Intelligence, and Bio-Energy and Bio-Chemicals.

In the context of these development needs, the Japanese government introduced the KOSEN education system to Thailand as a model for producing practical and innovative engineers. This led to the Thai KOSEN project, officially launched in 2019 through the Japan International Cooperation Agency (JICA). The initiative was funded by a 9.43 billion Japanese Yen (US$86 million) loan from the Japanese government and a 2 million Thai Baht (US$61 million) budget from the Thai government.

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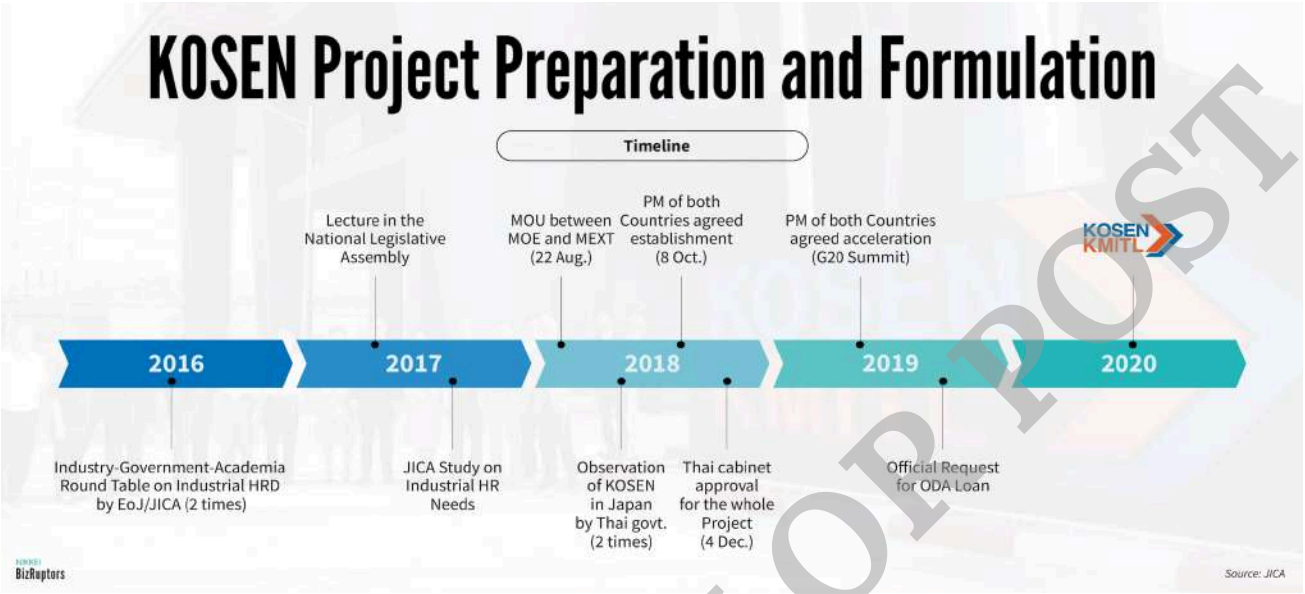

Project Preparation and Formulation Timeline | Source: JICA

Rather than founding independent KOSEN schools, the program was established through strong collaboration with Thailand's leading engineering universities, introducing two KOSEN schools in Thailand: **KOSEN-KMITL** at **King Mongkut's Institute of Technology Ladkrabang (KMITL),** established in 2019, and **KOSEN-KMUTT** at **King Mongkut's University of Technology Thonburi (KMUTT)**, established in 2020. As a human resource development project, the agreement between the two governments spans ten years, from 2020 to 2030.

> *"Most of the yen loan from the Japanese government will be used for the scholarship to send Thai KOSEN students to Japan to study and train under Japanese KOSEN. The loan will also be used for a professional consultant team and Japanese KOSEN professors to teach Thai students and transfer the KOSEN teaching system to Thai teachers. On the other hand, funding from the Thai government will be for domestic scholarships for Thai KOSEN students as well as the facilities, pieces of equipment, and uniforms used in the schools."*
>
> - Katsuya Miyoshi, Representative of Japan International Cooperation Agency (JICA), interview with Nikkei BizRuptors (2024)

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With strong support from the Thai government and leading engineering universities, KOSEN was quickly established. The joint-venture approach not only facilitated a smooth launch but also helped KOSEN gain trust and credibility among local educational institutions that are unfamiliar with the system, and earn faster accreditation as well as integration with Thailand's educational framework.

Thailand's Technical and Vocational Education VS. Japan's KOSEN Education

Thailand's Technical and Vocational Education

Thailand's Technical and Vocational Education (TVE) begins at the high school level, where the average 15-year-old students choose to follow either general or vocational education tracks. TVE offers three levels: 1.) Upper-secondary (leading to the Lower Certificate of Vocational Education after three years of study), 2.) Post-secondary (leading to the Tertiary Vocational Associate Degree after two years of study), and university level (leading to a Bachelor's Degree). Most Thai TVE teaches various specific fields of study, such as Industrial, Electrical, Civil, Production Techniques, and Business Administration.

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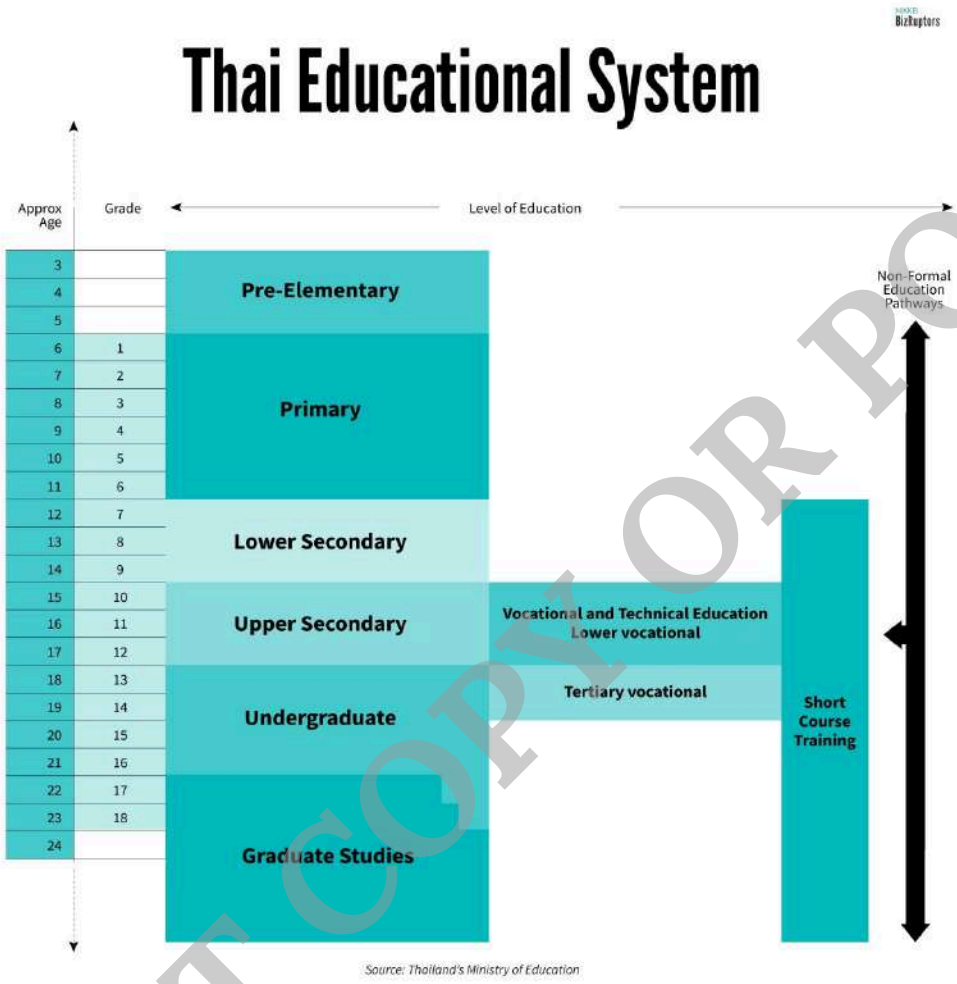

The Thai Education System | Source: An Introduction to Education in Thailand | Ministry of Education

TVE has the potential to provide relevant education and training opportunities to youth and adults, especially as the demand for technical skills is high. Most upper-secondary vocational students are also likely to be hired in the private sector after graduation. However, the TVE program remains an unattractive option for many students in Thailand, due to a poor image among students and parents, quality issues, and limited progression in both educational and professional pathways.

An Associate Degree from vocational education often doesn't align with job market demands or the qualifications required for many positions. Additionally, these degrees are frequently

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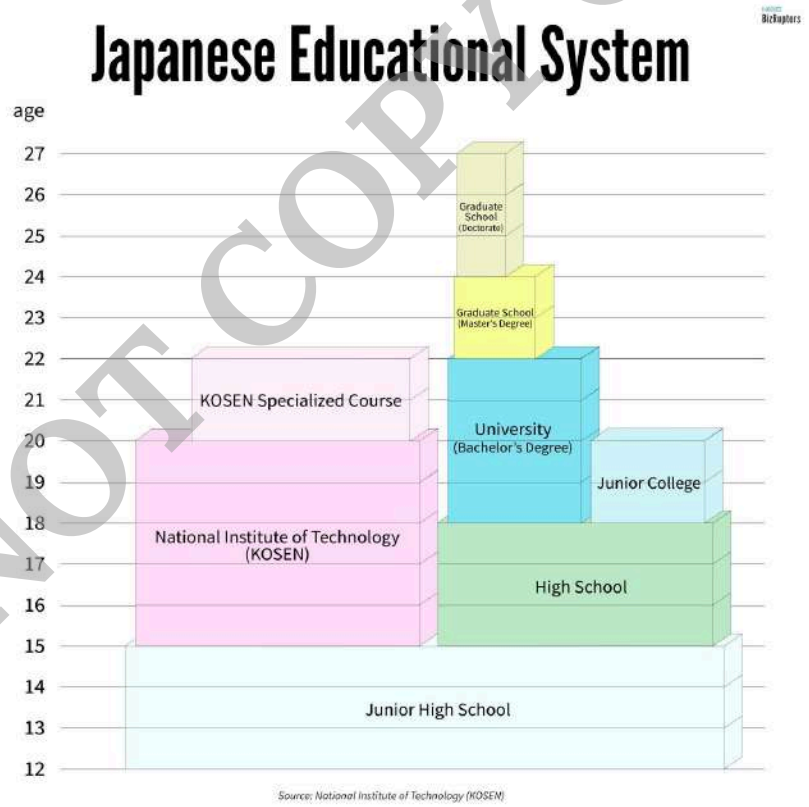
limited in career progression. This can lead to challenges, such as lower salaries or employers' lack of confidence in the graduates' skills. In some cases, employers have high expectations for vocational graduates but are disappointed by their ability to meet those expectations, leaving many adults with TVE degrees in mismatched roles.

Japan's KOSEN Education

KOSEN offers a different degree for junior high school students. Unlike Thailand's Technical and Vocational Education, KOSEN is defined as a "higher education institution" to train practical and creative engineers. After enrollment, students do not receive upper and secondary education but will receive higher education all at once after five years of study (five and a half years for the Maritime Studies Department). They will receive an associate degree and enter the workforce as **engineers** with practical skills.



Source: KOSEN National Institute of Technology

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KOSEN Japan's courses develop a "wedge-shaped" curriculum (くさび型カリキュラム) that effectively acquires specialized knowledge and skills at the same level as those at the university. The curriculum means that as each year passes, the focus shifts to specialized education centered on experiments and practical training. Generally, such full-scale specialized education begins in the third year (20 years old) of university after completing general education courses. However, at KOSEN, students can receive a similar specialized education from many doctoral professors from the age of 15. In short, KOSEN graduates will receive an associate degree but are as knowledgeable and skillful as undergraduate university graduates and can become engineers or advance to graduate school afterward.

> *"In the KOSEN Japanese educational system, the school squeezed everything from seven years of high school and a bachelor's degree into five years. Graduates from KOSEN have the same knowledge as graduates from a university. The advantages fall directly on the industrial sectors. Normally, they have to wait seven years to get a good engineer. But in the case of KOSEN, they just wait only five years and they get graduates who are more experienced and have practical skills than university graduates."*
>
> - Katsuya Miyoshi, Representative of Japan International Cooperation Agency (JICA), interview with Nikkei BizRuptors (2024)

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KOSEN in Thailand's School System: KOSEN-KMITL

[VTR] What is KOSEN-KMITL ?

Using KOSEN-KMITL as a curriculum model, KOSEN in Thailand also adapts Japan's five-year KOSEN program. The school enrolls students at age 15 and offers government scholarships to support their education throughout the courses.

Since students enter the program directly from junior high school, the Thai Ministry of Education mandates the inclusion of Liberal Arts courses in the early years. These courses cover subjects such as Japanese language and literature, Thai history, English, Mathematics, and Chemistry. As students progress, the curriculum gradually shifts toward intensive, specialized coursework in their chosen engineering fields, as seen in the chart below.

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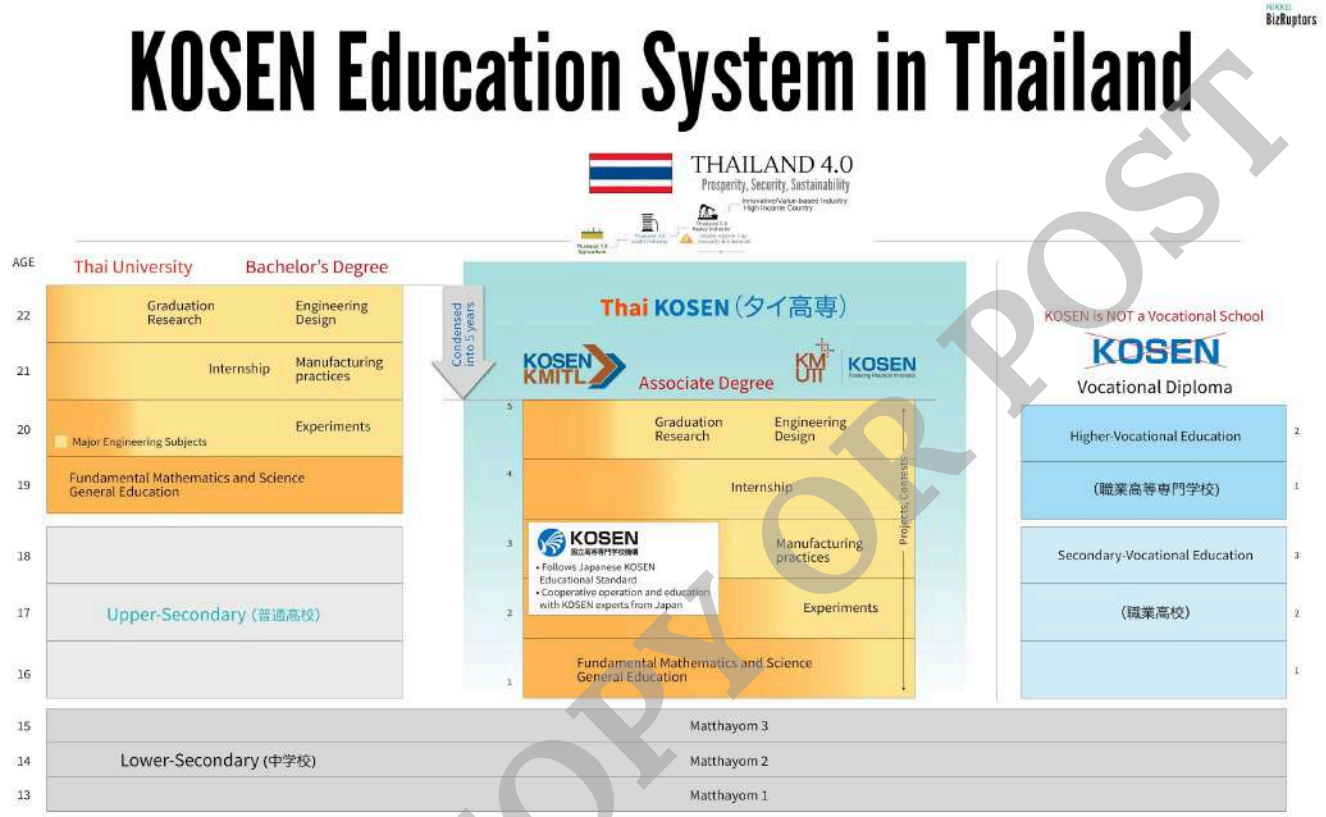

Source: KOSEN-KMITL

Following Japanese KOSEN educational standards, KOSEN-KMITL offers three core engineering programs: Mechatronics Engineering, Computer Engineering, and Electrical and Electronic Engineering.

Although classes are primarily taught in English by Japanese doctoral professors from KOSEN Japan and Thai professors from KMITL, students must also develop proficiency in Japanese.

Unlike traditional Thai university engineering programs, which focus heavily on theory, KOSEN-KMITL emphasizes hands-on learning. Engineering experiments are integrated throughout the curriculum, allowing students to apply theoretical knowledge to practical scenarios. Problem/Project-Based Learning (PBL) plays a key role, particularly in the third and fourth years, accounting for 40 percent of the curriculum. This approach immerses students in

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real-world projects, incorporating laboratory work, training programs, and specialized engineering subjects to provide a more in-depth, fast-tracked learning experience.

Problem-based Learning (PBL) at KOSEN-KMITL | Source: KOSEN-KMITL

In the fourth and fifth years, students undertake internships and final-year projects (FYP) respectively, collaborating with companies to solve real-world engineering challenges. Internships and the FYP structure are designed to nurture practical, innovative, and industry-ready engineers, as the students are required to enter the workforce and experience the profession.

Upon completing the five-year program, graduates earn an associate degree in engineering. The first batch of 24 graduates in 2024 successfully secured engineering positions, enrolled in KOSEN-KMITL advanced courses, or pursued further education in Japan. The school has also seen a steady increase in interest and applications, rising from 306 applicants in 2019 to 5,612 in 2024, according to the KOSEN-KMITL report.

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Adaptation to Thai Education

Curriculum Adaptation

While most courses and curricula at KOSEN-KMITL are adapted from KOSEN Japan, certain aspects have been modified to align with Thailand's education system. Fundamentally, KOSEN Japan collaborates with Thailand's Ministry of Higher Education, Science, Research and Innovation (MHESI) to adjust certain course requirements for junior high school students. As mentioned earlier, Thai KOSEN included fundamental courses, such as Thai history, Math, Science, and Japanese Language, in its early years. However, beyond curriculum adjustments, another significant adjustment involves school accreditation and degree recognition.

On-site Model Classes at KOSEN-KMITL | Source: KOSEN

In Japan, KOSEN graduates earn an associate degree, which is widely regarded as equivalent to a bachelor's degree in engineering. However, in Thailand, where associate degrees are uncommon, KOSEN was initially perceived as a technical vocational program rather than an engineering degree. As most local companies were unfamiliar with KOSEN's curriculum and educational depth, graduates were not automatically recognized as skilled engineers. As a result, many employers assumed that KOSEN graduates lacked the same qualifications as those from traditional universities. This unfamiliarity also created uncertainty among Thai parents, making them hesitant to enroll their 15-year-old children in the program.

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To address these concerns, KOSEN in Thailand introduced an optional bachelor's degree pathway in collaboration with the university, King Mongkut's Institute of Technology Ladkrabang (KMITL). Students who complete the five-year KOSEN program can pursue two additional years of advanced innovative coursework and research at KMITL and earn a Bachelor's Degree from the university (See Appendix A). This initiative not only improves KOSEN's degree recognition but also reassures parents and local institutions about the program's credibility.

> *"After the students complete their five-year KOSEN program, students can work in companies while developing the research and final projects based on what they learn from the companies. The university will also provide additional online courses throughout their two years to ensure that the students learn both theory and practice in parallel. That way, the KOSEN-KMITL students will graduate with a Bachelor's Degree at the same age as other Bachelor's Degree students from other faculties, but with workforce experience."*
>
> - KOSEN-KMITL President, Assoc. Prof. Komsan Maleesee,
> interview with Nikkei BizRuptors (2024)

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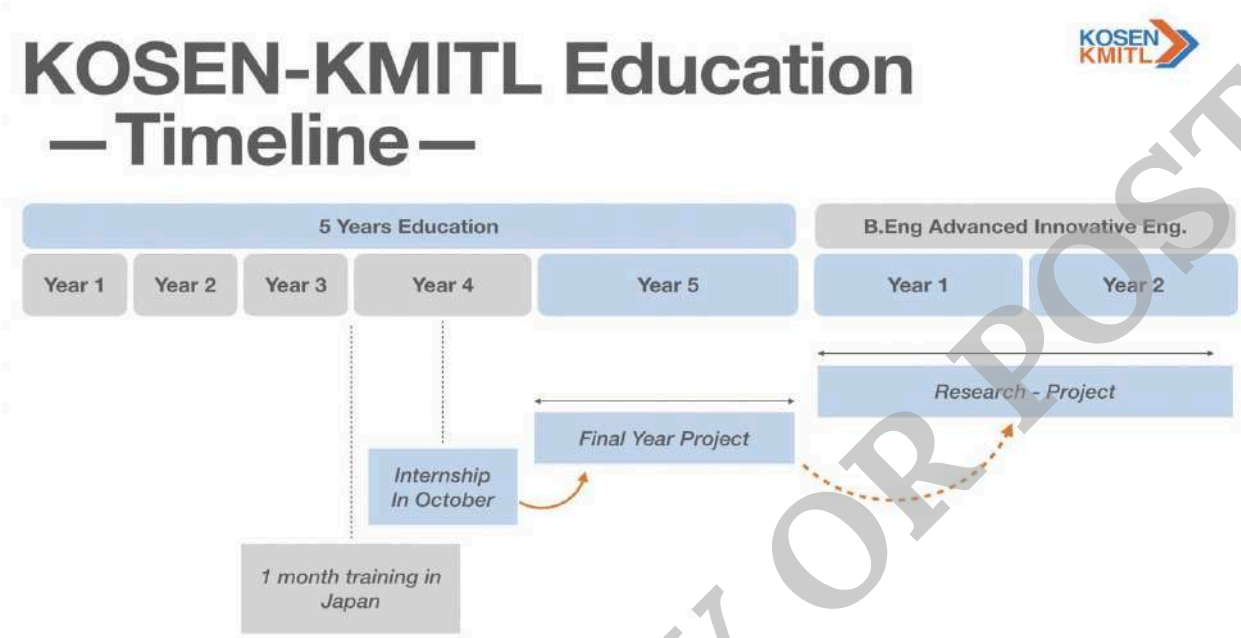

KOSEN-KMITL Education Timeline | Source: KOSEN-KMITL

Educational System Adaptation

To maintain academic standards equivalent to KOSEN Japan, KOSEN-KMITL follows the same graduation credit requirements and faculty standards. One key adaptation is the addition of 19–20 credits of Japanese language courses, making the Thai curriculum more intensive than its Japanese counterpart. In response to international expansion, KOSEN Japan developed the KOSEN International Standard (KIS) Accreditation System to ensure that overseas programs meet the same academic and teaching quality standards.

Adapting to the Thai educational system has not only impacted students but also Thai professors at KMITL, who must adopt KOSEN Japan's teaching methodologies. To facilitate this KOSEN teaching method transition, around 20 Japanese professors from KOSEN are stationed in Thailand for two years, training both Thai faculty members and students. Eventually, KOSEN-KMITL will be fully operated by Thai professors.

> *"Currently, KOSEN-KMITL has more than 70 Thai professors and 30 faculty members – all associated with Japanese doctoral professors from KOSEN.*

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> *Japanese professors will lead all the teaching in the classroom, while Thai professors will also be present in the class as co-lecturers to observe and learn how to teach in the KOSEN style. Japanese professors will be the ones who ensure and approve Thai professors' teaching style."*
>
> - KOSEN-KMITL Director, Assoc.Prof. Nattawoot Depaiwa, interview with Nikkei BizRuptors (2024)

Furthermore, KOSEN Japan's expansion overseas offers valuable insights for developing the universal KIS Accreditation System. By engaging with international education systems, KOSEN Japan personnel gain broader perspectives, which are essential for refining global accreditation standards. This collaboration also benefits Japanese professors and students to experience different cultures and enhance their English proficiency, which is becoming increasingly important for the future of KOSEN education worldwide.

Challenges and Future Outlook

Expanding KOSEN's engineering education beyond Japan requires careful adaptation to local educational frameworks, industry expectations, and cultural differences. KOSEN-KMITL, as the first officially recognized international KOSEN institution, has served as a testing ground for this model in Thailand. However, the process of integrating KOSEN's curriculum and teaching methods into a different system has revealed key challenges. These experiences not only shape the future of KOSEN in Thailand but also provide critical insights for future expansions into other countries where interest in the program is growing.

Aligning Educational Policies with Industry Needs

Integrating KOSEN's Japanese education model into Thailand's existing system presents several structural and industry-related challenges. Despite its positive reception among students and parents, differences in academic and industry expectations can present challenges, particularly in internship structures and job market recognition.

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Internships are a critical component of KOSEN's hands-on learning approach for its fourth-year students. However, Thai universities typically offer three- to six-month pre-employment training programs, whereas KOSEN-KMITL follows Japan's one-month internship and one-year Final Year Project (FYP) model that allows students to work on real-world projects. However, Thai Human Resources (HR) managers and technical supervisors who are commonly unfamiliar with this system have often misinterpreted KOSEN internships as conventional Thai-style placements. To address this issue, KOSEN-KMITL must work closely with local companies to ensure they correctly implement both the one-month internship requirement and the one-year FYP structure.

Another challenge lies in KOSEN's recognition in the Thai job market. While KOSEN in Thailand was founded to address the shortage of skilled engineers, its graduates have faced difficulties in securing positions due to differences in degree classification. In Thailand, engineers are typically required to hold an undergraduate degree, while vocational graduates are hired as technicians. Since KOSEN's degree structure is unfamiliar to local employers, there were initial concerns that graduates would struggle to secure engineering roles. To bridge this gap, KOSEN-KMITL established an Employee Support Office to help students find employment, hold company information sessions, and directly engage with employers to explain KOSEN's curriculum and its value in the workforce.

Japanese KOSEN Professors' Training for Thai Teachers | Source: KOSEN

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Cultural Challenges in Establishing an International Accreditation System

The KOSEN International Standard (KIS) Accreditation System was recently introduced following the establishment of KOSEN-KMITL. However, it remains heavily based on Japanese educational culture and regulations, which may not always translate smoothly across different countries.

One example is the adaptation of the Japanese “homeroom” system, which is an essential part of KOSEN’s class schedule, into the Thai educational system. In Japan, homeroom sessions are a part of the school system to provide a space for teachers and students to engage in informal discussions about academic or personal challenges. However, when implementing the class in Thailand, many Thai professors and students are unfamiliar with its purpose, as Thai schools do not have such a practice. This has created uncertainty about how to integrate some Japanese teaching methods into the curriculum effectively.

Additionally, student learning styles differ. According to Dr. Seiji Kanou, a professor at KOSEN-KMITL, Thai students tend to focus on memorizing lecture content and textbook material, while Japanese students are encouraged to analyze open-ended questions and develop creative solutions. This huge contrast presents a challenge for Japanese professors teaching in Thailand, as they must adjust their instructional methods to bridge the gap between rote learning and problem-solving approaches.

These cultural differences raise important questions about whether KIS can be applied effectively in diverse international contexts. As KOSEN looks to expand into other countries, developing a more flexible and context-sensitive standard will be critical. Ultimately, it leads to a critical question: what criteria should a school established abroad meet to be officially recognized as KOSEN?

Future Funding Challenges

One major concern for KOSEN-KMITL is its long-term financial sustainability. While the program currently receives strong government support from both Thailand and Japan, this

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funding is set to end in 2030. Therefore, the continued financial backing to sustain operations is still questionable.

The future of government involvement also raises questions about KOSEN's expansion strategy. If Thailand shifts its educational priorities, KOSEN-KMITL may need to prove its value independently. Likewise, other countries that KOSEN has its eyes on for expansion will need to consider how they can finance importing KOSEN programs without long-term reliance on Japanese support.

Scalability and Long-Term Growth

Currently, KOSEN Thailand remains the only fully established international KOSEN system that operates under official support from both governments and KOSEN Japan. As a result, its educational and operational standards have been carefully maintained on a small scale. However, expanding KOSEN to other countries presents several challenges, particularly in faculty qualifications and maintaining academic standards.

One of the key challenges in maintaining the KOSEN model abroad is the integration of Japanese-style project-based learning into existing educational structures. In Thailand, traditional technical education emphasizes structured classroom lectures and standardized assessments, whereas KOSEN's curriculum prioritizes hands-on, research-driven learning. The one-year internship and Final Year Project (FYP) model, which allows students to work on industry-relevant problems, differs significantly from Thailand's typical internship system.

Before KOSEN expands further internationally, factors such as education policies, labor market needs, and industry demands in each country must be carefully evaluated. Vietnam and Indonesia, for example, may have different workforce structures that could either facilitate or hinder the adoption of KOSEN's model. Ensuring that KOSEN programs remain adaptable while maintaining a high standard of education will be key to their growth outside Japan.

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Conclusion

Unlike business expansion, expanding an educational system through government collaboration presents a different challenge — one that requires alignment of policies, resources, and long-term educational goals. The adaptation of KOSEN at KMITL highlights how international expansion requires balancing core educational principles with local needs and provides a blueprint for future KOSEN expansions abroad.

However, the system adjustments made for Thailand may not be directly applicable to other countries. As KOSEN Japan aims to expand, how can it prepare for future adaptations while maintaining the balance between its core philosophy and the unique needs of each new market?

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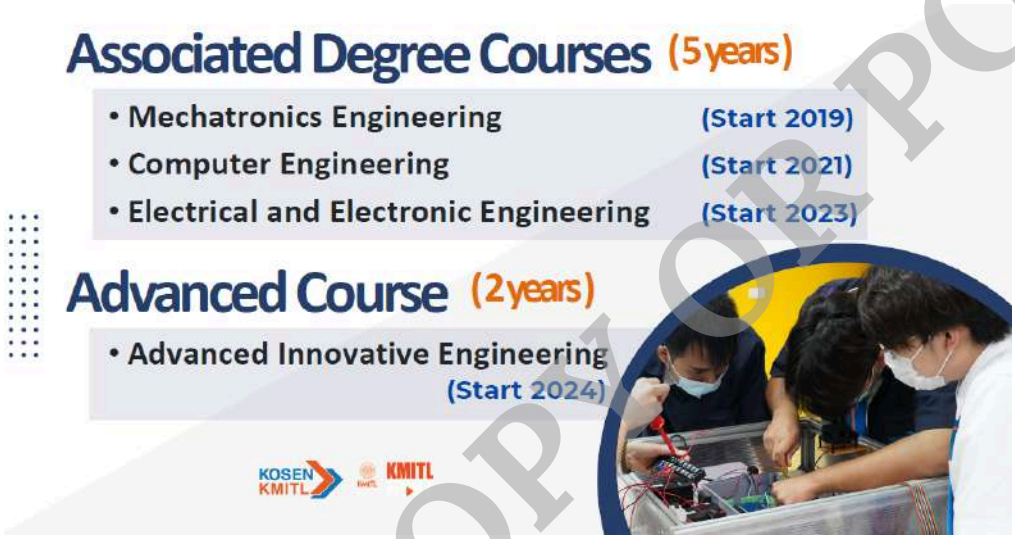
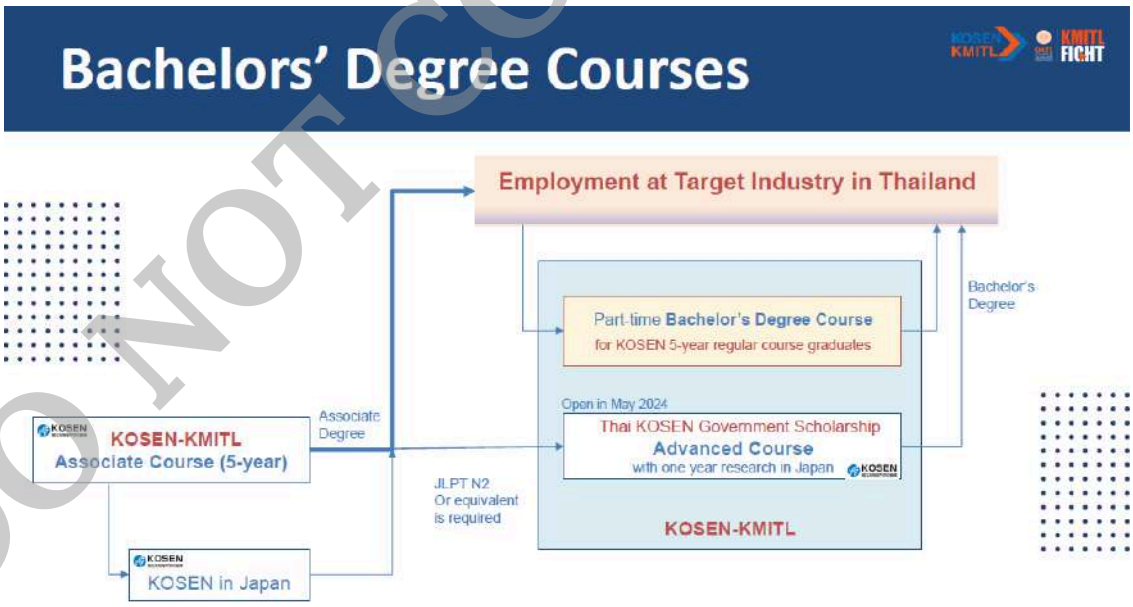
Appendix

Appendix A: KOSEN-KMITL's Advanced Courses for Bachelor's Degree

Source: KOSEN-KMITL





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Discussion Questions

Question 1

What role does Japanese and Thai government collaboration play in expanding the KOSEN school model in Thailand? How does this impact brand perception?

Question 2

How can the KOSEN Japanese College System ensure that its Japanese educational model remains culturally relevant and effective when implemented in different countries like Thailand?

Question 3

How can KOSEN overcome challenges in countries where traditional university education is the dominant pathway to employment? What strategies can KOSEN use to enhance its credibility and attractiveness to students, employers, and policymakers in these markets?

Question 4

What potential challenges might KOSEN face in balancing the standardization of its model with the need to adapt to local educational systems and labor market demands when expanding to other countries?

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