

Chapter 8

Thailand's Experience of Learning Industrial Technologies and *Monodzukuri* Education with Localization



Izumi Ohno and Junichi Mori

8.1 Introduction

This chapter analyzes Thailand's experience with technology promotion and technical education by learning and localizing Japanese-style manufacturing (*monodzukuri*¹), through two case studies of the Technology Promotion Association (Thailand-Japan) (TPA) and the Thai-Nichi Institute of Technology (TNI). Japan and Thailand have a long history of business partnerships, economic cooperation, and official development assistance (ODA). Japan is the largest investor in Thailand, and many Japanese companies, especially in manufacturing, have established their factories in the country.² Thailand was one of the largest recipients of Japanese ODA

¹ *Monodzukuri* is the Japanese term for manufacturing. It literally means 'making of things' in Japanese. While it is often spelled as *monozukuri* in English, this chapter uses *monodzukuri*, following the usage by the Japanese Ministry of Economy, Trade and Industry (METI), which TPA and TNI also adopt.

² Thailand ranked third in the number of overseas sites of Japanese companies after the United States and China [12]. The Japanese Chamber of Commerce, Bangkok (JCC), established in 1954, has 1,651 member companies in 2022 and is one of the largest overseas Japanese chambers of commerce in the world.

The authors would like to thank Kae Yoshino, research officer of the JICA Ogata Research Institute, for her effective research support.

I. Ohno (✉)

National Graduate Institute for Policy Studies (GRIPS), Tokyo, Japan
e-mail: i-ohno@grips.ac.jp

J. Mori

Skills for Prosperity Programme in Malaysia, International Labour Organization (ILO), Kuala Lumpur, Malaysia
e-mail: jmori@ilo.org

in the 1980s and 1990s until it reached the stage of an upper-middle income country.³ Thanks to such long-standing partnerships and accumulated assets, in Thailand there is a thick layer of industrial human resources familiar with Japanese value and skills. Furthermore, notable initiatives have emerged from those people who were strongly committed to the industrial development of Thailand. They created local organizations to promote technology transfer from Japan, while building extensive networks with the government, the private sector, and academia in both countries.

TPA and TNI are two brilliant examples of such initiatives. TPA is a non-profit organization (NPO) established in 1973 by Thai alumni who graduated from Japanese engineering universities and ex-trainees of the Association for Overseas Technical Scholarships (AOTS, currently renamed the Association for Overseas Technical Cooperation and Sustainable Partnerships)⁴ with a strong commitment to strengthening economic and industrial ties between Thailand and Japan. After returning home, they established TPA to be a center for promoting learning and disseminating new industrial technology from Japan for Thai people and enterprises. TPA offers various industry-related services such as training, calibration, enterprise diagnosis, and consulting, as well as language courses and publication. TNI was established by TPA in 2007 as a ‘Japanese-style *monodzukuri* university’ for Thai people by Thai people. It offers field-oriented and practical education to foster engineers and core human resources for manufacturing and other industries. As such, TNI is designed to share TPA’s experiences not only with industrial circles but also with young generations and academic groups. Both TPA and TNI consider ‘*monodzukuri* human resource development’ to be a central theme of their activities.

How have TPA and TNI learned industrial technologies from Japan and developed localized mechanisms for promoting technical education and training for Thai people and enterprises? What are the key factors contributing to their success? How are they embarking on new challenges of technology learning and promotion in the era of digitalization, while taking advantage of Thailand’s position as a manufacturing hub in Southeast Asia where regional economic integration is advancing?

This chapter aims to answer these questions through in-depth case studies of TPA and TNI. The chapter is organized as follows. Following the introduction, Sects. 8.2–8.3 review the history of the establishment and development of TPA and TNI. Section 8.4 explains the recent efforts of TPA and TNI to address new opportunities and challenges under the changing landscape of industrialization. Section 8.5

³ Thailand’s GDP per capita is 7,233.4 USD in 2021 (World Bank data).

⁴ AOTS was established in 1959 and named The Association of Overseas Technical Scholarship, as an expert training organization for industrial human resource development in developing countries; The Japan Overseas Development Corporation (JODC) was established in 1970 as an expert dispatch organization. The two organizations operated under the jurisdiction of then the Ministry of International Trade and Industry (MITI) and were merged in 2012 under the English name The Overseas Human Resource and Industrial Development Association (HIDA). In 2013, HIDA became a general incorporated foundation, and in 2017, was renamed as the Association for Overseas Technical Cooperation and Sustainable Partnerships (AOTS).

discusses the process of their local learning and step-by-step development of organizational capacities and analyzes key factors contributing to their success through operational sustainability. Section 8.6 summarizes the findings and draws their implications for other developing countries.

8.2 TPA: 50-Years' Efforts Toward Learning and Promoting Industrial Technologies in Thailand

8.2.1 Origin and Background

The establishment of the Technology Promotion Association (Thailand-Japan) (TPA) dates back to the 1970s when the anti-Japanese movement was growing in Southeast Asia, triggered by the expansion of Japanese companies into Southeast Asia. The Japanese government decided to take measures to mitigate economic friction between Japan and Thailand, and based on discussions with the private sector, the Ministry of International Trade and Industry (MITI, currently the Ministry of Economy, Trade and Industry: METI) formulated the concept of private sector-based economic cooperation for Thailand that differed from the prevailing economic cooperation focused on the promotion of exports by Japanese companies. MITI then asked Goichi Hozumi, President of the Asian Students Cultural Association (ACSA) and AOTS, to visit Thailand to firm up how to build close friendship between Thailand and Japan through economic cooperation. Hozumi listened to the opinions of Thai alumni members and local industrial circles and the wishes of Thai people. The Thai representative was Sommai Hoontrakul, former Finance Minister of the Thai government, who also studied in Japan. Based on the discussions, Hozumi made concrete suggestions to MITI, which emphasize the importance of human resource development for the real benefit of Thailand.

Considering Hozumi's suggestions, MITI and the Japanese industrial circle agreed on the following:

1. An organization (=JTECS) shall be established in Japan with contributions of the private circles under the coordination of the Japan-Thailand Trade & Economic Committee of Keidanren (Japan Federation of Economic Organizations), and the subsidy of Japanese government may be expected.
2. The Japanese-side may support financially through JTECS, at the earlier stages, the activities of a private association in Thailand (=TPA) until it becomes a self-supporting organization in the future. All the policy-making and administration shall be managed by the Thai people.
3. The communication channels of both sides, Japan and Thailand, shall be unified to JTECS=TPA in order to avoid any confusion.

[6, p. 8]

In 1972, the Japan-Thailand Economic Cooperation Association Society (JTECS) was established in Tokyo as the parent organization on the Japanese side as a public-interest corporation under the jurisdiction of MITI/METI.⁵ It aims to promote friendship between Japan and Thailand through projects for technology transfer and human resource development, thereby contributing to industrial development in Thailand. Hozumi became President of JTECS. Subsequently, TPA was established in 1973 in Bangkok on the Thai side as a non-profit, public interest organization, to implement this new cooperation framework. Sommai Hoontrakul became the first President of TPA.

Hozumi is a socially minded educator who dedicated his life to the progress of developing countries by receiving foreign students and trainees to Japan, based on his reflection on Japan's World War II experience. He adhered to the principles of: (i) equal partnership (respecting the ownership of partners); and (ii) building 'face-to-face' relationships based on trust. Many Thai alumni stayed at the ACSA-managed dormitory, Asia Bunka Kaikan (ABK), as international students, and were exposed directly to this 'Hozumi spirit.' They became the founders of TPA.

8.2.2 *Philosophy and New Cooperation Framework*

TPA embraces the philosophy of 'disseminating knowledge, building economic base' to promote the growth and advancement of the Thai economy and industry. It has a clearly defined mission to serve as 'a bridge of technology dissemination on management and engineering from Japan to the Thai personnel widely' [6, p. 6].

The founders of TPA, who experienced studying in Japan, were deeply concerned about the worsening popular sentiment towards Japan following economic friction in the 1970s. At the same time, they were convinced of the importance of learning the latest knowledge from Japan and promoting technology transfer to Thailand. JTECS has assumed a facilitating role in this endeavor by securing financial support from the Japanese government, raising funds from private companies through membership fees, gathering information on the trends of Japanese businesses, commissioning training programs to TPA, and dispatching experts to TPA.

Figure 8.1 shows the relationship between JTECS and TPA. Here, it is important to note the partnership principles of TPA-JTECS under this new cooperation framework, which include: (i) full respect for ownership of the Thai side; (ii) economic cooperation based on public-private partnership; and (iii) aid for graduation. The Japanese side will fully respect the ownership of TPA's decision-making and management and will not interfere. Technology transfer will be implemented through private-sector channels. While the Japanese government will provide financial support through

⁵ As part of the Japanese government's administrative reforms launched in 2008, which mandated that existing public interest corporations be transformed into new corporation within five years, JTECS became an incorporated association in 2013, and the government's support was discontinued. Since then, JTECS has been financed through membership fees of companies and motorcycle race subsidies (based on the author's interviews with ABK and JTECS in July 2013).

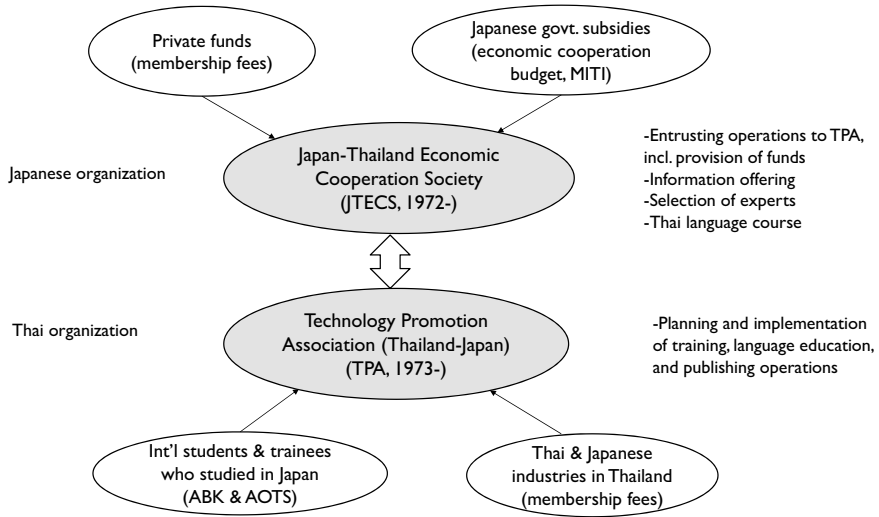


Fig. 8.1 Relationship between JTECS and TPA (Source Compiled by the author based on JTECS information)

JTECS, TPA is expected to graduate from aid once it becomes a self-supporting organization.

8.2.3 Activities of TPA

Over the past 50 years, TPA has continuously introduced new technologies from overseas to the Thai industrial sector and has increasingly gained wide recognition from the Thai public. Now, its activities cover various fields instrumental to the development of the Thai economy and industry.

The main activities of TPA are: (i) language education in Japanese, Thai, English, and other languages (including textbook publication); (ii) publication and translation of books related to technology and management; (iii) education and training programs related to business management and technology; (iv) industrial, medical, and laboratory instruments calibration services; and (v) enterprise diagnosis and consultancy businesses. While language education aims at wider beneficiaries, the other activities are primarily for companies and/or their managers and employees.

During the initial phase, TPA heavily relied on funding from the Japanese government, channeled through JTECS. By adding new services one by one, TPA gradually increased its own revenues and achieved a self-financing rate of 100 percent by 2009 (see Table 8.1). It should be noted that from the very outset of its foundation in 1973, TPA's core members set a future goal of establishing a technical university. They were keenly aware of the need to create revenue-generating activities because TPA

membership fees, which were spent primarily for preparation and distribution of its newsletters to its member companies, would not be sufficient to achieve its goal. Accordingly, they decided to take a step-by-step approach, starting with a service that had relatively clear market needs and a high degree of certainty.

Generally, it is not easy for a donor-funded project in the field of technical and vocational education and training (TVET) to achieve effectiveness and sustainability. This is mainly because considerable knowledge and efforts are required to continue

Table 8.1 Key events surrounding TPA and increase in own fund

Year	Key events	Self-financing ratio
1972	JTECS established in Japan	
1973	TPA established in Thailand	0%
	Technology & management seminars, Japanese language courses, and translation & publication of technical books started in Bangkok (U Chu Liang building)	
1974	Thai language course started	
1975	TPA's own building was built in Bangkok (Sukhumvit), where the headquarters was transferred	
1977	Training for industrial measurement technology started	
	SME survey & guidance operation started (e.g., publication of technical books in Thai)	
1979	JTECS started Practical Thai Language Course in Japan	
1985	TPA headquarters annex opened	25%
1986	Operation to receive industrial technology hands-on training delegations started (e.g., energy-saving)	
1987		50%
1989	Operation to promote industrial producer education (distance training) started	
1993	Operation to organize a robot contest in Thailand started	
1994	SME manager development course started	
1995	Regional promotion training operation started	
1996	Construction of Technology Promotion Institute (TPI) started	
1998	TPI opened in Pattanakarn, Bangkok	75%
1999	Training program for SME enterprise/factory evaluators started, commissioned by the Thai govt	
2001	School of language and Culture TPA opened in Rangsit	
2002	The first Thailand 5S Award organized	
2006	Construction of TNI started	
2007	TNI opened	
2009		100%

Source Elaborated by the author, based on JTECS et al. [6] and Mori [10]

providing training programs in a way that properly meets the needs of companies and society, and the facilities and equipment are very expensive. It is also because the results of human resource development projects are hard to measure due to their long gestation period and diverse spillover-effects. Despite all these challenges, TPA grew solidly and by 2007, came to possess two bases in Bangkok (the headquarters and the TPA Technology Promotion Institute: TPI) and a branch school in Rangsit that mainly provides language education.

8.2.3.1 School of Language and Culture

With a wide range of target participants, language education is an area that TPA has been working hard on from the beginning. TPA started with a Japanese course (for Thai people) and a Thai course (for Japanese) in 1973 and 1974, respectively.⁶ The number of participants was initially 497 (in 1973) and grew steadily to reach over 1,000 by the early 1980s. During 1973–2021, TPA offered 25,206 courses in Japanese, Thai, English, Chinese, and other languages for 310,144 participants [17].

TPA particularly has strengths in Japanese language education. To avoid excessive competition and ensure complementarity, it deliberately took a strategy to coexist with private Japanese language schools. TPA endeavored to elevate the overall level of Japanese language learning, by organizing workshops for Japanese language teachers and Japanese speech contests [3]. In 2009, TPA was certified by the Ministry of Education as a private educational institution with 'Excellent Internal Quality Assurance Accredited.' In 2018, TPA developed professional standards and certification examinations for Thai language education, translation, and interpretation for foreigners, entrusted by the Thailand Professional Qualifications Institute (TPQI) under the Prime Minister's Office.

8.2.3.2 Publishing and Translation

When TPA was established, there were few technical books written in the Thai language. To study industrial technology, students, engineers, and business people had to use original English editions. Moreover, few technical books published in Japanese had been translated into Thai, either. Because the number of people capable of reading the original books was limited, it took a long time for Thai people to absorb the foreign technology. TPA has therefore translated many English and Japanese technology books into Thai. TPA also publishes a monthly information magazine, 'Creative & Idea KAIZEN,' which introduces *Kaizen* activities in Japanese manufacturing and service industries with concrete examples. Additionally, TPA publishes various kinds of books such as language textbooks, teaching materials, and Japanese

⁶ JTECS also initiated a practical Thai language course in Japan in 1979. While TPA is particularly strong in Thai and Japanese language courses, it now offers English, Chinese, and Korean language courses for Thai people as well.

culture books. In fact, it boasts the largest number of publications in Thailand in the area of Japanese-language teaching materials. Currently, TPA annually publishes 30–40 books. During 1973–2022, 1,297 new books were published, and 10,918,030 copies were printed [17].

8.2.3.3 Technical and Management Training

TPA offers various types of seminars and training courses by flexibly responding to the needs of markets or specific companies in terms of subjects, size, and periods. These include public trainings (regular training courses), in-house trainings, and distance learning programs in collaboration with SANNON University in Japan.

In 1985, the annex of TPA headquarters was opened, which enabled TPA to increase the number of training participants and expand its activities. The opening of TPI in 1998 in Pattanakarn allowed for further expansion of training activities, with the installation of new facilities and equipment to conduct training programs in various fields, such as automatic controls, CNC (computer numerical control), CAD (computer aided design)/CAM (computer aided manufacturing), and mechatronics. In 1999, its training department obtained ISO 9001 certification and has been conducting seminars and training in more than 20 fields, such as business management, marketing, human resource management, production management, energy, measuring instruments, computers, and logistics. During 1973–2022, TPA offered 27,035 courses, in collaboration with various instructors from the public and private sectors, with the number of participants reaching 1,390,406 [17].

Table 8.2 shows the main training courses related to business management, which are currently offered throughout the year. It is worth noting that the themes of recent training courses include digital technologies, AI (artificial intelligence), IoT (Internet of Things), and automated production. These courses are primarily targeted to Thai people. Separately, TPA runs training courses for Japanese executives in such areas of the rules and regulations on imports/exports, labor, safety, environment, etc. (15 courses) and Japan–Thailand cross culture understanding seminars (4 courses).

In addition to seminars and training courses, TPA organizes lectures by Japanese experts, factory visits, and study tours to Japan. It also hosts awards every year, including Thailand Quality Prize (QC circle) (1983), Thailand 5S Award (from 2002), Thailand Kaizen Award (from 2006), Kano Quality Award (2009), and Thailand Lean Award (from 2009). Moreover, TPA introduced the first ever robot contests to Thailand, with a focus on contests for university and high school students. These include annual TPA Robot Contest Thailand Championship (from 1993), the TPA Robot Junior (from 2001), and the PLC (Programmable Controller Competition) (from 2006). Robot contests aim to strengthen the creativity and skills of the young people responsible for the development of Thailand and to increase general public interest in technology.

Table 8.2 TPA training program (2022–2023)

<p>① Administration and Management (179 courses) e.g.,</p> <ul style="list-style-type: none"> • Kaizen for Production (Practice) • Time Management for Effective Work • Procurement Role in Cost Savings 	<p>④ Energy Environment and Safety (51 courses) e.g.,</p> <ul style="list-style-type: none"> • Water Treatment and Management in Industry • Safety Officer for Management Level • Industrial Waste Management for Supervisor 	<p>⑧ Quality Promotion and Standardization (86 courses) e.g.,</p> <ul style="list-style-type: none"> • Voice of Customer for Quality • MSA: Measurement System Analysis • QC 7 Tools for Maintenance: Practice
<p>② Applied Computer (23 courses) e.g.,</p> <ul style="list-style-type: none"> • How to Use QC 7 Tools in Excel for Quality Control • Infographic & Interactive Presentation by PowerPoint 2016 • Robotic Process Automation by VBA 	<p>⑤ Instrumentation (64 courses) e.g.,</p> <ul style="list-style-type: none"> • Measurement Decision Risk according to ISO/IEC 17025: 2017 • Process Instruments Calibration & Troubleshooting • Metrological Principle of Equipment Verification for Industry 	<p>⑨ Master Certification Program (20 courses) e.g.,</p> <ul style="list-style-type: none"> • Lean Master Certification Program • Six Sigma Black Belt Certification Program • 5S for Executive
<p>③ Digital Technology, AI and IoT (4 courses) e.g.,</p> <ul style="list-style-type: none"> • For Logistics and Transportation, IoT Logistics • Using IoT to Create a Smart Logistics Platform • Grow through Industry 4.0—Connected Industry 	<p>⑥ Manufacturing Management (79 courses) e.g.,</p> <ul style="list-style-type: none"> • Cost Volume and Profit Analysis • Change Control by 4 M (Man, Machine, Method, Material) • Supply Chain Management 	<p>⑩ Factory Automation (14 courses) e.g.,</p> <ul style="list-style-type: none"> • Automation and Karakuri Kaizen • Automation for Maintenance Management • Basics of Fuzzy Logic Control
	<p>⑦ Maintenance Management Skills (75 courses) e.g.,</p> <ul style="list-style-type: none"> • 5S Audit Technique • Electrical Control System & Motor Maintenance for Technician • Safety Maintenance: Practice 	

Source Compiled by the author, based on TPA [21]

8.2.3.4 Industrial, Medical, and Laboratory Instrument Calibration Services

TPA initiated calibration services in 1977 as a fourth main business, following language courses, publishing businesses, and training. In those days, there were few places in Thailand that provided calibration services for measuring instruments. So,

this business significantly improved the capabilities of Japanese and Thai companies and enhanced TPA's ability to generate its own revenue. TPA offers various types of testing and calibration services to measure temperature, humidity, pressure, weight, length, etc. These include: (i) calibration services for industrial measuring instruments; (ii) calibration services for medical and laboratory measuring instruments; (iii) on-site calibration services; and (iv) measuring instruments of secondary standard level. TPA also operates an environment testing center.

As mentioned above, the opening of TPA-affiliated TPI in 1998 led to increased demand for calibration services, and TPA expanded its operations by adding on-site services. During 1973–2022, the number of calibration services provided by TPA reached 897,163 units [17]. Accredited with ISO/IEC 17025 by the Thai Industrial Standards Institute (TISI) of the Ministry of Industry (MOI), TPA has become one of the leading calibration laboratories in Thailand. Currently, it accounts for a 30 percent share of the Thai calibration market. Calibration service now constitutes about 30 percent of TPA's revenue, providing a stable source of funding.

8.2.3.5 Enterprise Diagnosis and Consulting Businesses

Enterprise diagnosis and consulting businesses were modeled after the Japanese enterprise evaluation (*shindan*)⁷ system—one of the measures promoted in post-war Japan for SME development. When the Thai economy was hit severely by the Asian financial crisis in 1997–1998, the Japanese government launched the 'New Miyazawa Initiative' to help restore the real economies by providing medium- to long-term financial assistance. It also provided policy advice on the Thai government's Industrial Restructuring Plan by sending a high-ranking official from MITI (so called 'Mizutani Plan') and subsequently supported its implementation focusing on the promotion of small and medium-sized enterprises (SMEs) [22, see also Chap. 5]. Training of SME enterprise/factory evaluators (*shindan-shi*) was one of the priority programs of the Thai government, namely, MOI, and implemented with Japanese cooperation through JODC, AOTS, JICA, Japan Small and Medium Enterprise Corporation, and Japan Small and Medium Enterprise Management Consultant Association.

TPA was entrusted by MOI to serve as the major counterpart organization of the enterprise evaluator training program on the ground and worked closely with Japanese experts in conducting both lecture and in-company training from 1999 to 2002. Through this experience, TPA acquired the expertise to organize a training program, foster in-house experts, and build networks with qualified experts who can

⁷ Enterprise diagnosis, or *shindan*, is a comprehensive analysis of enterprise performance from managerial and financial perspectives, with the aim of identifying challenges and opportunities for growth and providing general hints for addressing the challenges and seizing the opportunities. Under the Japanese system, personnel equipped with knowledge and skills for diagnosing enterprises are certified and registered as professional evaluators (*shindan-shi* in Japanese). They play an important role in SME promotion activities [22, pp. 377–78].

serve as master instructors. Based on its accumulated knowledge and expertise, TPA launched enterprise diagnosis and consulting business for SMEs.

As the above experiences show, TPA steadily strengthened its core businesses. It also developed new businesses starting with small-scale pilots, while deliberately avoiding speculative ventures. Being exposed to market competition, TPA management and the heads of departments are always under pressure to come up with new ideas to secure income. Under these circumstances, the TPA staff have constantly looked for ways to survive up until now by studying the trends of Japanese businesses and technologies through JTECS, their counterpart on the Japanese side. In this way, TPA has continuously developed its businesses through trial and error and made efforts to move forward. As a result, TPA accumulated its expertise and financial resources over a long period of time, building the foundation for the establishment of TNI. It is fair to say that solid and realistic management has contributed to the success of TPA today.

8.3 TNI: Promoting *Monodzukuri* Education in Thailand

8.3.1 *Origin and Background*

TNI is a Japanese-style *monodzukuri* university, building on TPA's 34 years of activities. Authorized by the Ministry of Education in 2006, TNI became fully operational in June 2007. It is a technical education institute established by the Thai people and for the Thai people. The establishment of TNI was funded by retained earnings generated from TPA activities and borrowing from private banks. TNI places strong emphasis on field-based, practical education for manufacturing. It aims to produce human resources who understand basic Japanese language and the corporate culture of Japanese businesses. Most executives of TNI, including the president, are returnees who had studied in Japan or possess experience in TPA management. Many of them were faculty members at well-known universities but joined the management team of TNI to contribute to a new initiative to nurture practical engineers and managers equipped with a *monodzukuri* spirit under the free and open atmosphere of a private university.

8.3.2 *Philosophy and Core Values*

In May 2020, TNI published the 'Guide to TNI: Monodzukuri Education—TNI Story' (hereinafter referred to as the TNI Guide) to articulate its philosophy, educational policy, and methods to those interested. Here, the meaning of *monodzukuri* is introduced as 'Creative Design and Manufacturing—Japanese Way' [20]. From this,

we can infer how TNI interprets Japanese *monodzukuri* spirit as unique value and why they consider it useful for Thailand's industrial upgrading.

As an academic and specialized technical institute, TNI builds its educational and research activities on two unique strengths: (i) Thailand-Japan relations; and (ii) student development in line with the *Monodzukuri* Principle [20]. First, TNI fully takes advantages of its multi-dimensional relationships with Japan. These include: economic cooperation from the Japanese government and related organizations such as MITI/METI, JTECS, AOTS, former JODC, and JICA⁸ for technology transfer; partnerships with the Japanese private sector (both in Thailand and Japan) to educate the youth to meet the 'real' needs of industry; and networks with Japanese universities for educational and research exchanges. Second, TNI considers that Japanese-style *monodzukuri* can be acquired effectively when two types of learning—specific skills and the underlying work ethics and corporate culture—are combined. In other words, it is necessary to learn not only hard (technical) skills but also soft skills, such as problem-based learning (PBL), 5S and *Kaizen*, teamwork, innovation, and communication [20]. To this end, TNI extracts the key elements of Japanese-style manufacturing in an easy-to-understand manner as the Six Core Values and 5Gs of *monodzukuri* principles and includes them in teaching materials.

8.3.2.1 Focus on Six Core Values

TNI focuses on the Six Core Values, called 'KM-HR-HoP.' These include: *Kaizen* (continuous improvement), *Monodzukuri* (dedication, creativity, and development), *Hansei* (accept mistakes and learn from them), *Respect* (respect yourself and others), *Honest* (be honest), and *Public-interest consciousness* (consider the public interests) (see Fig. 8.2). The TNI Guide [20] states that these values are important to realize industrial society and are expected to contribute to self-improvement and enhancement of organizational strengths, which will eventually become the main engine for attaining Quality of Work and Quality of Life.

8.3.2.2 5Gs of *Monodzukuri*

TNI teaches the 'Five-Gen Principles' (5Gs of *Monodzukuri*) which consist of: (i) *Genba* (learning from the work place), (ii) *Genbutsu* (learning from the work environment and real material), (iii) *Genjitsu* (learning from practice in real situations), (iv) *Genri* (learning from theories), and (v) *Gensoku* (learning from rules and regulations). This is based on the key principles of Japanese manufacturing.⁹ TNI insists that

⁸ JICA cooperates with TNI through the dispatch of senior volunteers (e.g., curriculum development of Engineering Faculty) and a scholarship program 'Innovative Asia' to study at Japanese universities.

⁹ In Japanese manufacturing, 'Three-Gen Principles' (*Genba*, *Genbutsu*, and *Genjitsu*) have been widely practiced for a long time. Yuzo Furuhashi, who served as an engineer and quality control

6 Core Values of TNI



5Gs of Monodzukuri

1	現場 Genba	Learning from the workplace
2	現物 Genbutsu	Learning from the work environment and real materials
3	現実 Genjitsu	Learning from practice in real situations
4	原理 Genri	Learning from theories
5	原則 Gensoku	Learning from rules and regulations

Fig. 8.2 Six core values and 5Gs of *Monodzukuri* (Source TNI [20, p. 5, 19, p. 8])

its manufacturing education differs from the conventional Thai teaching methods, with a stronger focus on practical training to meet the needs of business and industry. Its education covers not only hard technical skills, but also soft skills—the art and spirit of creating high-quality products based on: (i) the culture and value system of Japanese production, and (ii) science, technology, and technical skills that meet the customers’ requirements. As such, 5Gs of *Monodzukuri* is a broad concept that applies to not only manufacturing but also information technology and services.

8.3.3 Educational Programs

Over the past 15 years, TNI steadily expanded and diversified its educational programs. In 2007, TNI started with four undergraduate program courses and one master’s program course, with 433 students. By 2011, TNI achieved the original target of 1,000 students per school year. By 2022, the number of courses has increased to 21 for the undergraduate program and five for the master’s program, with the total of nearly 4,000 students enrolled. After peaking in 2016 with the total of 4,648 students [20], the number of new students tended to decrease due to the country’s declining birthrate. But, with the introduction of an adult education program in 2020 (see below), this trend has been reversed since 2021.

manager at Denso and the president of Kyosan Denki and later became a management consultant, elevated this concept to ‘Five-Gen Principles’ by adding two Gens (*Genri* and *Gensoku*) based on his conviction that ‘Three Gens’ need to be backed by theories and formalized into rules (see [1]).

8.3.3.1 Educational Courses

TNI’s educational program consists of three faculties: (i) Faculty of Engineering, (ii) Faculty of Information Technology, and (iii) Faculty of Business Administration. Tables 8.3 and 8.4 respectively show the courses offered at the undergraduate (BA) and graduate (MA) programs, and the number of students by course from the academic years of 2007 to 2021.

‘Digital Technology in Mass Communication’ (see Table 8.3 (2)) and ‘Data Science and Analytics’ courses (initially (2), currently under TNIC) were introduced in 2018 in response to the requirements of the digital age, while ‘Logistics and Supply Chain Management’ and ‘Digital Marketing’ courses ((3)) were added in 2017. Moreover, TNI has flexibly changed the name and content of courses to fit the expectation of industry and society at times. For example, regarding this table (1),

Table 8.3 TNI faculty and courses (as of June 2022)

Program	Faculty	Course
Undergraduate (4-year BA)	(1) Engineering	<ul style="list-style-type: none"> • Automotive Engineering (AE) • Robotics and Lean Automation Engineering (RE) • Computer Engineering & AI (CE) • Industrial Engineering (IE) • Electrical Engineering (EE)
	(2) Information Technology	<ul style="list-style-type: none"> • Information Technology (IT) • Multimedia Technology (MT) • Business Information Technology (BI) • Digital Technology in Mass Communication (DC)
	(3) Business Administration	<ul style="list-style-type: none"> • Management of Technology and Innovation (MI) • Business Administration (Japanese) (BJ) • International Business Management (IB) • Accounting (AC) • Japanese Human Resources Management (HR) • Logistics and Supply Chain Management (LM) • Digital Marketing (DM) • Innovative Tourism and Hospitality Management (TH)
	Thai-Nichi International College (TNIC)	<ul style="list-style-type: none"> • Digital Engineering (DGE) • Data Science and Analytics (DSA) • Global Business Management (GBM) • Japanese for International Business (JIB)
Graduate program (2-year MA)		<ul style="list-style-type: none"> • Innovation of Business and Industrial Management (MBI) • Engineering Technology (MET) • Information Technology (MIT) • Japanese Business Administration (MBJ)

Source Elaborated by the author, based on the TNI information .

Note The course list of this table covers the period after the establishment of TNIC in June 2022

Table 8.4 Composition of TNI courses and the number of students (2007–2021)

Program	Faculty	Courses	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total		
Undergraduate (4-year BA)	Engineering	Automotive Engineering (AE)	77	137	123	148	183	148	207	149	131	120	112	133	88	69	35	1,305		
		Production Engineering—Lean Automation System & Integration Engineering—Robotics & Lean Automation Engineering (RE)	52	73		70	81	57	33	92	86	78	48	50	26	21	14	22+15	732	
		Computer Engineering & AI (CE)	90	116	133	107	92	86	94	77	68	81	69	81	69	76	54	75	1,216	
		Industrial & Logistics Engineering—Industrial Engineering (IE)				29	52	65	71	72	51	38	35	25	38	35	25	18	458	
		Electrical & Electric Engineering—Electrical Engineering (EE)					38	53	72	61	58	52	35	29	30	29	30	30	488	
		Digital Engineering (DE)														14	13	13	39	
		Information Technology (IT)	77	288	314	352	372	398	418	483	420	387	362	345	286	208	203	231	4,843	
		Subtotal	381	136	187	80	113	78	91	25	115	93	95	106	109	118	139	151	1,455	
		Information Technology				87	129	108	111	117	143	136	109	116	139	151	151	151	1,455	
		Business Administration				23	33	37	38	38	64	52	46	45	35	19	25	22+8	487	
		Subtotal	89	138	187	250	275	221	240	308	278	282	276	232	238	259	285	3,572		
		Business Administration				93	114	158	110	134	106	94	139	96	37	36	51	21+6	24+13	1,327
		Business Administration (Japanese) (B.J)				148	203	218	242	194	160	173	158	191	169	157	158	125	141	2,437
		Business Administration – Continuing Program (IMC)				37	31	33		19	14	31	17	5	Suspended					
		International Business Management (IB)							104	163	109	128	149	95	67	75	69	74	1,033	
		Accounting (AC)								75	66	69	92	57	35	28	22	19+9	470	
		Japanese Human Resources Management (HR)									103	72	102	43	36	20	17	27+14	434	
Logistics & Supply Chain Management (LM)													82	47	48	54+15	59+22	327		
Digital Marketing (DM)													54	31	26	21	20	152		
Specialized Courses in Hospitality Management (TH)																		53		
Global Business Management (GBM)																		69		
Subtotal	130	263	394	328	395	417	523	607	528	630	537	435	455	397	482	6,531				
Graduate School (2-year MA)			286	728	895	930	1,043	984	1,178	1,408	1,235	1,278	1,185	1,032	960	882	978	14,952		
Engineering Technology (MET)							20	30	28	20	15	12	14	9	11	10	8	177		
Information Technology (MIT)							16	23	13	7	12	13	15	28	23	24	21	195		
Industrial Management—Innovation of Business and Industrial Management (MBI)	137	41	38	30	31	81	34	35	14	21	17	8	13	10	8	8	518			
Strategic Planning & Management for Entrepreneurs—Lean Manufacturing System & Logistics Management (LMS)	43	35	28	26	30	35	14	12	4	14	10	10	10	10	8	9	288			
Japanese Business Administration (MBJ)																		138		
Total of graduates enrolled	433	812	968	998	1,136	1,128	1,289	1,507	1,311	1,343	1,246	1,101	1,023	922	1,043	1,026	1,246	16,246		

Source: Elaborated by the Author, based on TNI information.
 Note: 1) Because this table covers the period up to 2021 (before the establishment of TNIIC), the course list does not necessarily coincide with that of Table 8-3 which includes TNIIC.
 2) TNI launched adult education program in 2020. The table includes the figures of those enrolled in adult education program (21 persons in 2020, 81 persons in 2022), as indicated with +.

‘Robotics and Lean Automation Engineering’ course was initially called ‘Production Engineering’ and then ‘Lean Automation and System Integration Engineering.’ Regarding Table 8.3 (3), ‘Management of Technology and Innovation’ course was changed from ‘Industrial Management.’ Regarding the master’s program, the current ‘Innovation of Business Management and Industrial Management’ was initially called ‘Industrial Management,’ and ‘Lean Manufacturing Systems and Logistics Management’ was called ‘Executive Enterprise Management.’

TNI recently launched two initiatives: (i) establishment of Thai-Nichi International College (TNIC) in 2022 as an international education program; and (ii) opening of an adult education program in 2020. First, TNI started to teach several courses in English from August 2018, aiming at providing opportunities for youth from the neighboring Association of Southeast Asian Nations (ASEAN) countries to learn *monodzukuri* education. This program was upgraded and institutionalized in 2022, on the occasion of TNI’s 15th anniversary (see Sect. 8.4.4 for details).

Second, in 2020, TNI introduced a new program for working adults, offered on weekends online. This program provides practical training in industrial technologies demanded by business today, and a bachelor’s degree is granted in a minimum of two and a half years. The program has earned popularity, and the number of course has expanded to nine by 2022.¹⁰ This was the time where the entire world suffered from the COVID-pandemic. But, TNI proactively responded to the crisis and initiated online classes.

8.3.3.2 Emphasis on Language Education

To increase the employability of its graduates at Japanese companies or their local suppliers, TNI attaches importance on Japanese language education. This is based on the belief that theoretical knowledge alone is not sufficient to understand how Japanese *monodzukuri* has developed and that it is necessary to combine language and cultural education with technical education. The majority of the courses incorporate a total of 225 hours of Japanese lessons into the four-year curriculum (elective from the second semester of the second year) to train engineers and managers who can understand the certain level of Japanese language and the Japanese way of doing business. In the case of the Business Administration course which specializes in Japanese language, students are required to take a total of 540 hours of Japanese lessons over four years. For TNIC, English is the primary language of instruction, and the Japanese lessons are limited to 140 hours.

¹⁰ The nine courses under the adult education program include: (i) Faculty of Engineering—Robotics and Lean Automation Engineering, Industrial Engineering; (ii) Faculty of Information Technology—Information Technology, Business Information Technology; and (iii) Faculty of Business Administration—Management of Technology and Innovation, Accounting, Japanese Human Resources Management, Logistics and Supply Chain Management, Digital Marketing.

As a result, TNI boasts a 100 percent employment rate of graduates, with about half of them working for large companies and SMEs respectively. As TNI graduates can speak Japanese, many Japanese companies are interested in hiring them. About 40 percent of TNI graduates seeking jobs find employment with Japanese companies or their local suppliers in Thailand.¹¹

8.3.3.3 Collaboration with Industry Circle

Strengthening industry engagement is a major challenge for TVET institutions in developing countries [11]. In this sense, it is worth noting TNI's efforts to build strong industry-academia linkages and provide field-oriented and practical education. Two examples are given below.

First, regarding curriculum development, TNI has been making efforts to incorporate the industry needs into its curricula. At the time of its establishment, TNI conducted a survey to identify their needs [10]. For example, the curriculum for Automotive Engineering course was designed with the support of Toyota's Training Center, and the introductory part of the Toyota Production System has been taught in the course. TNI also incorporated material engineering and the use of CNC machine tools into its curriculum, in response to the request by companies. In addition, TNI advisors visit several industrial parks once a month to hold coordination meetings with tenant companies.

More recently, under the Thailand-Japan Industrial Human Resource Development Initiative launched in late 2015 by then Japanese ambassador to Thailand, TNI newly established the 'Monodzukuri Engineer Program' in collaboration with Japanese companies, for courses taught at the Faculty of Engineering. This program focuses on *Kaizen* and automation of the manufacturing process and combines learning the Six Core Values (KM-HR-HoP), Japanese and English languages, theory and methodology (related to engineering studies), practical training based on the PBL method, engagement on a specific project (for the graduation thesis), and internships at Japanese companies (see Fig. 8.3).

It should be noted that internship is one of the prerequisites for TNI graduation and that the students are required to complete either: (i) a four-month (full) internship to earn credit, or (ii) a two-month internship as part of their graduation thesis, in the second semester of the senior year. The TNI program expects that students would be accepted by about 200 companies as interns, and staff members are in daily discussions with companies. There are cases where students find jobs at their internship sites after graduation.

¹¹ According to the TNI Guide [20], about 57 percent of TNI graduates from the Engineering Faculty found employment with Japanese companies or their local suppliers during 2016–2018, while about 40 percent of those from the Information Technology and Business Administration Faculties did so.

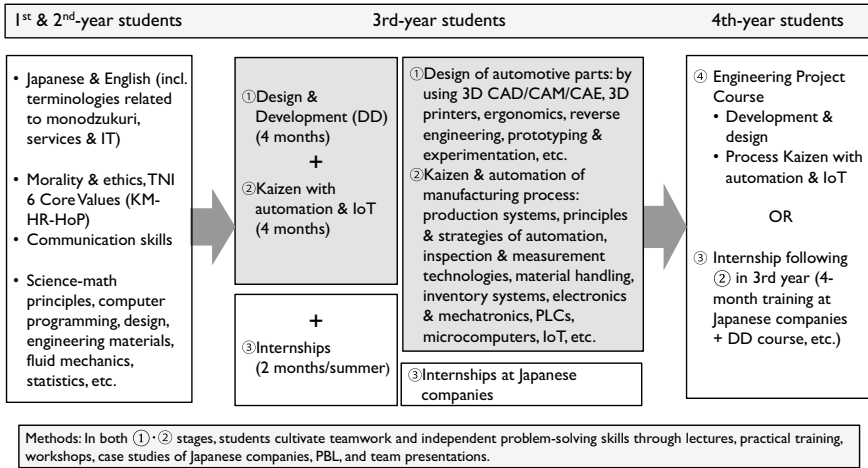


Fig. 8.3 Key features of TNI Monodzukuri engineer program (Source Elaborated by the author, based on TNI [19])

Second, TNI has established collaborative partnerships with Japanese and local companies by utilizing the TPA networks and its own management team. The nature of such partnerships is mutually beneficial. On the one hand, TNI would expect companies to provide: (i) scholarships, (ii) training equipment, (iii) short-term lectures at TNI by their in-house experts, and (iv) internship opportunities. On the other hand, the companies would expect TNI to train and supply qualified students. In particular, the Japanese Chamber of Commerce, Bangkok (JCC) plays a key role in facilitating TNI’s partnership with Japanese companies.¹² The JCC has a TNI Committee that meets roughly once every three months, and TNI is asked to submit activity reports twice a year. As it is practically impossible for TNI to visit all companies to ask for their contributions, JCC’s cooperation has been considerably helpful to TNI. The JCC has been supporting scholarships for TNI since its establishment. The JCC networks also contribute to the provision of equipment and the dispatch of lecturers to TNI.

¹² TNI annually provides scholarships for about 200 students. There are three types of scholarships (THB30,000, THB60,000, and THB90,000), and the majority receive THB30,000. In 2022, JCC contributed to THB500,000 (approximately 2 million Japanese yen). <https://admission.tni.ac.th/old/web/tni2014-jp/index.php?option=contents&category=18&id=30>.

8.4 TPA and TNI under the New Landscape of Industrialization

8.4.1 *New Landscape of Industrialization*

The landscape of industrialization is changing rapidly with the progress of digitalization and globalization. In particular, Thailand is facing rising labor costs and labor shortages due to a declining birthrate. Therefore, it has become essential to improve productivity and skills by using digital technology, in order to continue industrial upgrading and overcome the middle-income trap. Moreover, the establishment of the ASEAN Economic Community (AEC) in 2015 has created a common market within the ASEAN region; Thailand, which is already a manufacturing hub in the region, has an opportunity to expand its production network to neighboring countries while maintaining its own mother factories in the country.

Against this background, the Thai government has launched the 20-year National Strategy: 2017–2036 [13]. Accordingly, MOI has formulated the Strategic Plan (2017–2021) as the direction of industrialization for the first five years. The plan calls for the promotion of industrial transformation through science, technology, and innovation, the enhancement of entrepreneurial capabilities and competitiveness in the global market, and green industrialization. In particular, this strategic plan emphasizes ‘Thailand 4.0’ as an economic model to transform the Thai economy into a value-based economy and specifies 10 targeted industries [7, 18].¹³

In response, TPA and TNI are developing new activities in partnership with MOI, the business community, and foreign investors including Japanese companies, to contribute to Thailand's industrial advancement and human resource development. They are also promoting the internationalization of respective organizations, taking advantage of the opportunities presented by regional economic integration. The following sections explain three recent developments of TPA and TNI in the areas of digitalization and economic integration.

8.4.2 *Smart Monodzukuri Support Team Scheme: Integrating Kaizen into the IoT Process*

Factory automation and robotization are a challenging task, particularly for SMEs which lack human resources familiar with using IoT and robots. It is also necessary to

¹³ Under the concept of Thailand 4.0, the 10 industries are divided into two categories: ‘First S-curved’ and ‘New S-curved’ industries. The former are the existing industries expected to further enhance their competitiveness based on the country's current strengths (new-generation automobiles, smart electronics, medical and wellness tourism, agriculture and biotechnology, and food processing). The latter includes the new industries expected to become major growth drivers in the future (manufacturing robotics, medical hub, aviation and logistics, biofuel and biochemicals, and digital industries).

promote *Kaizen* before robotization because productivity will not increase if robots are taught tasks that are wasteful. Therefore, it is important to take a step-by-step approach to lean automation, such as: (i) promoting IoT (machine visualization), (ii) understanding workers' movements to reduce machine waste and wasteful movements (human movement visualization), and (iii) identifying tasks that are better handled by robots and planning the automation/robotization of those tasks.

To address such challenges faced by Thai SMEs, MOI is collaborating with the Japanese government (METI) to introduce the 'Thai Smart Monodzukuri Support Team Scheme.' This scheme is modeled on the recent Japanese experiences of smart manufacturing support to SMEs by METI and local governments.¹⁴ A pilot project was conducted during 2019–2021, aimed at the development of Thai human resources (training of master instructors and trainers) capable of providing hands-on guidance on on-site *Kaizen* and the introduction of IoT and robotization. With the support of JTECS and AOTS and funding from METI, Japanese experts conducted training in the form of classroom lectures and on-site training at model companies.

A total of 48 Thai IoT support instructors (29 master instructor candidates and 19 instructor candidates) were trained over the three-year period, with 10 Thai SMEs participating as model companies. The trained master instructor candidates came from MOI, consulting companies, manufacturing companies, and educational institutions, while the instructor candidates came from manufacturing companies and educational institutions. Some of them are qualified SME factory evaluators [4]. MOI has shown a strong commitment and sent three staff to the training for IoT support instructors (master instructor candidates). Based on the positive assessment of the pilot project,¹⁵ MOI has decided to institutionalize this scheme with its own budget from 2022. It plans to upgrade the ministry's consultant registration system by adding a new category of expertise related to IoT/robotization and to promote training activities by mobilizing the human resources trained in the pilot project.

Taking advantage of this new trend, TPA proactively participated in the MOI/METI project for 'Thai Smart Monodzukuri Support Team Scheme.' With its expertise in *Kaizen* and *shindan* activities and rich experience with technology promotion, TPA is positioning itself to play a key role in implementing training activities for IoT support instructors.

Here, two points are worth noting. First, quite a few TPA and TNI personnel were trained as IoT support instructors. This should enable the accumulation of knowledge and the management of the future expansion of 'Thai Smart Monodzukuri Support

¹⁴ Like Thailand, Japanese SMEs face challenges in introducing IoT and robotization into their production and management processes. Since 2016, METI and local governments have been supporting the promotion of smart manufacturing in SMEs in various localities by organizing lectures and in-company training by experts familiar with IT technologies, *Kaizen*, and lean automation.

¹⁵ According to JTECS, the results of questionnaire surveys of both Japanese experts and trainees showed a high level of satisfaction and achievement. The model companies which participated in the pilot project also indicated strong expectations for the creation and institutionalization of the Smart Monodzukuri Support Team.

Team Scheme,' in collaboration with MOI. Second, TPA has assumed an important role as a local partner to Japanese experts in organizing activities within the pilot project. For example, TPA undertook the invitation and nomination of training participants, the selection of model companies, and the preparation and implementation of classroom and on-site training, based on its long-standing understanding of the operation of training and consulting business.¹⁶ TPA also organized seminars to disseminate the results by model companies, by utilizing its network with Thai industry and Japanese companies. At the model company where training took place, the *Kaizen* team became the recipient of support for the introduction of IoT and robotization.

It should be noted that despite the COVID-19 pandemic which prevailed from early 2020, the pilot project was implemented without disruption and produced the expected results. Although Japanese experts could not travel and had to conduct remote training in the second and third years, the 11 Thai master instructor candidates trained in the first year were able to implement the project as planned. These Thai instructors conducted both classroom training and on-site company training, assisted by Japanese experts online. This again reconfirms a vital role played by TPA as a local partner in continuing the operation of the pilot project during this difficult time.

8.4.3 Thailand-Japan Investment Promotion Project (J-SME Project)

The recent decade has seen a new wave of internationalization of Japanese SMEs. With the shrinking domestic market due to ageing and a declining birth rate and fierce competition with emerging economies, the traditional Japanese-style production relations, where the parent company and subsidiaries had close contracting relationships, crumbled. As a result, the number of manufacturing SMEs in search of new markets that sought to expand overseas independent of large parent companies increased dramatically.¹⁷ In particular, Southeast Asian countries such as Thailand, Vietnam, and Indonesia have become favored destinations of Japanese SMEs. From around 2011, national and local governments in Japan began actively supporting the overseas business expansion of Japanese SMEs.

Although Japanese manufacturing SMEs possess high-level skills and technologies, they used to rely on the parent company and have limited overseas network, marketing, and communication capabilities. It has become essential for

¹⁶ Candidates were recruited and selected through such channels as MOI, TPA, TNI, AOTS Thai Alumni Association, and Japanese companies.

¹⁷ This is different from the past patterns of SMEs overseas expansion, where SMEs bound in subcontracting relationships with large corporations would be asked by the parent company to relocate their production networks overseas (see [14]). In terms of destination, there has been an increase in outward Japanese FDI into Southeast Asia to avoid the risks associated with doing business in China.

those Japanese SMEs to find reliable local business partners, which could give information on worker recruitment, markets, procurement of parts and raw materials, and so on. In sum, this new era of SME internationalization necessitates building much deeper and co-creative partnerships with Asia.

Against such a background, TPA launched the Thailand-Japan Investment Promotion Project (J-SME project) in 2013. This project is designed to provide various support services to Japanese SMEs interested in expanding businesses in Thailand, by leveraging TPA's unique strengths. At the end of 2021, TPA had 34,705 registered members (including both individuals and corporates), the majority of which were Thai people and companies [17].¹⁸ With accumulated manufacturing expertise and extensive networks with Thai and Japanese companies, the J-SMEs project aims to promote cooperation between Thai and Japanese companies and allow them to grow together through joint ventures and other collaborations rather than competition. More specifically, the J-SME project offers such services as: (i) business matching between Thai and Japanese companies including visits to Thai companies; (ii) training and seminars for both Thai and Japanese SMEs; (iii) consulting services for technology and management; and (iv) arrangement of interpreters and translation services. This suggests that Japanese SMEs and local governments are increasingly seeking advice from TPA and its local business networks, casting them in the role of learners.

8.4.4 Thai-Nichi International College (TNIC): New International Education Program

As explained in Sect. 8.3, TNI has so far focused on nurturing students to meet the needs of Japanese companies. Recently however, it has launched new initiatives aimed at equipping students with the skills required in this era of digitalization and globalization, while taking advantage of Thailand's strengths as a manufacturing hub in Asia and ASEAN. A good example is its international program, designed to create an environment where young Thais and their Asian neighbors can learn together skills needed by today's industries.

In June 2022, TNI established a new independent Thai-Nichi International College (TNIC) by consolidating the courses in English which were opened within the existing faculties in 2018. TNIC runs four programs: (i) Digital Engineering (DGE), (ii) Data Science and Analytics (DSA), (iii) Global Business Management (GBM), and (iv) Japanese for International Business (JIB). TNIC is open to Japanese students, in addition to students from neighboring countries and other Asian countries. While English is the main language of teaching, students are required to learn Japanese

¹⁸ TPA membership consists of: (i) full members (limited to those studied and received training in Japan); and (ii) supporting members (which include both individual and corporate members). At the end of 2021, TPA has 2,376 full members, and regarding supporting members, 24,854 individuals and 7,475 corporates are registered. Together, these total 34,705 [17].

and IT skill improvement. There is also a study abroad system in Japan and various opportunities such as internships at Japanese universities and companies are prepared.

TNIC is notable in five ways. First, it provides an opportunity to learn digital skills and corporate innovation in English for the new era of globalization. Second, the curriculum is designed so that foreigners can easily understand and learn useful Japanese ideas and methods, including 'Japanese-style *monodzukuri*.' Third, students can learn diverse values and cultures and interact with students from other countries in Thailand, which has become a manufacturing hub in Asia. Fourth, while learning to communicate in English, students will have the opportunity to study Japanese and Thai. Fifth, there is a scholarship program for outstanding students (including Japanese students). It is noteworthy that TNI has launched its own initiative to teach Japanese-style manufacturing to other countries in the context of the new era, to become a central hub for Japanese technology transfer in Asia and ASEAN. Such initiative also suggests the changing nature of partnerships between Thailand and Japan toward mutual learning, with TNI taking a proactive role in sharing its knowledge and experiences on the teaching side.

8.5 Development of TPA and TNI from a Perspective of Translative Adaptation and Local Learning

The previous sections reviewed the origin, major activities, and key features of TPA and TNI. This section analyzes how TPA and TNI have learned industrial technologies and *monodzukuri* mindset from Japan and developed localized mechanisms for their diffusion. Special attention is given to the process of their local learning and translative adaptation, presented in Chap. 1.

8.5.1 *Five Stages of Development of TPA and TNI*¹⁹

Since its foundation in 1973, TPA has developed in five stages: (i) learning from Japanese experts (technology transfer); (ii) nurturing Thai experts while reducing dependence on Japanese experts (technology promotion); (iii) building capacity of local companies through training and consulting activities (technology diffusion); (iv) establishment of TNI as a private university specializing in Japanese-style *monodzukuri* (technology education), aimed at wider segments of the Thai society including the young generation; and (v) expanding their activities from Thailand to Asia and learning digital technologies (overseas expansion and innovation). During

¹⁹ This section is based on a lecture given by Hiroyuki Yoneda [23] and a chapter by Ohno [15] as part the research project 'Strategic Network Building with "Pro-Japan" Asian Monozukuri Human Resources' of the Asia Pacific Institute of Research (APIR) and subsequent updates by the author. Mr. Hiroyuki Yoneda is former executive director of JTECS.

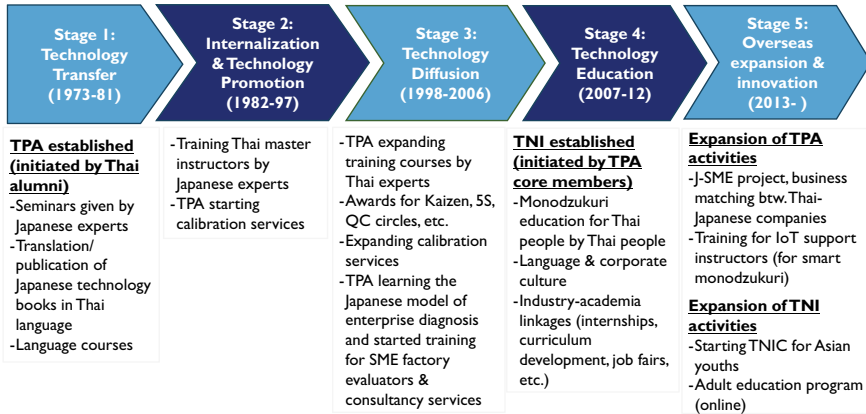


Fig. 8.4 Five-stage development of TPA and TNI (*Source* Elaborated by the author, based on Yoneda [23], Ohno [15], and JTECS [5]; *Note* The period is approximate. Stages 4 and 5 overlap)

the course of its development, TPA has built up networks with a variety of industrial, governmental, and academic organizations in both Thailand and Japan. It has also secured its own revenue sources by gradually introducing new business activities. These independent revenue sources have made it possible to establish TNI in 2007—a long-standing dream of TPA [9]. Figure 8.4 summarizes the five stages of development of TPA and TNI.

At the first stage (around 1973–1981), TPA intensively received the transfer of technologies from Japan by inviting Japanese experts. This learning process was facilitated by JTECS. TPA was not just passive. The lectures by Japanese experts, as well as technology books and textbooks were translated into the Thai language by TPA members, who had studied in Japanese universities. Moreover, TPA launched Japanese language courses for Thai nationals, based on the recognition that an understanding of the language is a good entry point for learning the Japanese way. It also began to provide Thai language courses to Japanese people working in Thailand. These language courses benefited both Thai and Japanese companies operating in Thailand and proved to be profitable for TPA.

At the second stage (1982–1997), efforts were made to internalize foreign technologies taught by Japanese experts and foster Thai master instructors capable of conducting technical training (Training of Trainers) in such areas as quality and productivity management, *Kaizen*, and Total Productive Maintenance (TPM). This aimed at avoiding the Thai side’s permanent dependence on Japanese experts. Gradually, TPA’s master instructors began to train Thai nationals, with the support of Japanese experts. These Thai trainees were sent to Japan to experience and better understand Japanese-style management so that they can become experts providing on-site training. In addition, TPA became one of the first institutions in Thailand offering calibration services for industrial measuring instruments, making an important contribution to quality improvement of both Thai and Japanese companies.

Calibration services contributed to enhancing TPA's income generating capability. TPA organized the first quality control (QC) contest in the country.

The third stage (around 1998–2006) involved the dissemination of technologies to Thai industry and business circles. At this point, TPA became capable of expanding training courses taught by Thai instructors. The newly established TPI building has facilities and equipment to conduct training programs in various fields and greatly contributed to scaling-up training and calibration services. This was also the time when TPA learned the Japanese model of SME factory evaluators (*shindan-shi*) through a project commissioned by MOI and supported by the Japanese government to cope with the Asian financial crisis [12, 22]. TPA acquired the knowledge to offer training and consultancy for enterprise diagnosis and launched new services for SMEs. In fact, the participation of MOIs in the project increased the profile of TPA, which in turn led to the expansion of its training courses and strengthened TPA's profitability. As Sucharit Koontanakulymong, former President of TPA, stated, 'the financial crisis of 1997 was both a crisis and a window of opportunity' and 'this combination of crisis and opportunity was particularly valuable for TPA' [9].

The fourth stage (2007–around 2012) includes the provision of technical education through the establishment of TNI. TPA has for long time embraced its goal of creating a Japanese-style manufacturing university to develop high-quality human resources who could contribute to the industrial development of Thailand.

As of around 2013, TPA and TNI are entering into the fifth stage of development. Both institutions are expanding activities overseas and enhancing their capacities to prepare for the age of digital technologies. This includes the J-SME project and the more recent 'Thai Smart Monodzukuri Support Team Scheme,' in partnership with MOI. Similarly, TNI has been enhancing an international education program through the establishment of TNIC in 2022 targeted at Asian youth. It also added new courses related to digital technology, digital marketing, and data science and launched an online program for working adults in 2020.

The five-stage TPA and TNI development can be understood as a further evolution of the three-stage process of translational adaptation presented in Chap. 1 (see Fig. 1.2). They have actively learned various production management technologies (such as *Kaizen*, 5S, QCC, TPM) and the *monodzukuri* mindset from Japan, and created localized mechanisms for their dissemination among Thai people and enterprises, through training, consulting, and educational activities. It is notable that their developments go beyond the three stages. Through the establishment of TNI, they have built a mechanism for promoting *monodzukuri* education in broader segments of the Thai society including youth and working adults—which could lead to societal learning. More recently, TPA and TNI are actively engaged in overseas expansion of their experiences, particularly in Asia.

8.5.2 Key Factors for Successful Development of TPA and TNI

As described above, TPA and TNI are successful examples of translative adaptation and local learning. What factors have contributed to their development with operational sustainability? On the Thai side, five factors deserve special attention.

8.5.2.1 Strong Ownership and the Existence of Dedicated Core People on the Thai Side

The primary factor contributing to the success of TPA and TNI is the existence of a core group of Thai people who had strong ownership and enthusiasm for learning external knowledge. Studying in Japan during the 1950s–1960s, the founders of TPA keenly recognize the need to introduce Japanese technology and management methods to promote industrial development of Thailand. They were also aware that in Thailand, ‘technical education based on learning practical skills through field-based, hands-on experiences is lacking’ [10]. The anti-Japanese movement spreading in Southeast Asia in the early 1970s also drove them to act in order to bridge the two countries through industrial development.

Here, ‘enthusiasm’ is not passion without concrete thinking. TPA leaders thought realistically about the feasibility of achieving their goals and the concrete steps to be taken. While receiving support from Japan, they did not seek excessive assistance, giving serious consideration to the ownership and sustainability of their initiatives. Such proactive thinking is exemplified by the fact that instead of asking for large-scale financial assistance, they used TPA’s internal reserves accumulated over 30 years of activities when they embarked on the establishment of TNI. TPA core members regarded their knowledge and networks with Japanese industrial technologies as unique strengths and took a step-by-step approach to building institutional and financial capabilities through trial and error.

8.5.2.2 TPA Efforts to Secure Financial Autonomy

TPA has worked hard from an early stage to secure financial autonomy and create revenue-generating businesses. TPA leaders were conscious of building a financial and organizational basis (including the establishment of a secretariat office) that enables it to operate independently while receiving support from Japanese public and private sectors. Major efforts were made to accelerate learning, establish its own fee-based services, and promote technology diffusion to Thai companies and people. While initially learning from Japanese experts, they were conscious about developing local capability and initiated various training programs, enterprise diagnosis, and consultancy. Such TPA efforts can be seen as a good example of ‘aid for graduation.’ From the beginning, both the Thai and Japanese sides had shared an understanding that external support would phase out and that TPA should become a self-sustainable

organization in the future. The TPA core members fully recognized this point and embedded self-sustainability in their operations from the early stages.

8.5.2.3 TPA as a Social Enterprise/NPO

Viewed from today's perspective, it is possible to regard TPA as a pioneer of social enterprise. As a NPO serving the public interest, TPA has provided an organizational environment where motivated members can engage in entrepreneurial initiatives.²⁰ The TPA management team (part-time) and regular members have their own occupations and participated in TPA activities in their personal capacity. They are sensitive to the needs of Thai industry and have proactively introduced new technologies and knowledge from Japan, with the support of JTECS.

Because it is a social enterprise, TPA was able to develop flexibly its members' ideas into innovative business projects. While belonging to various organizations of industry, government, and academia in Thailand, they had a common interest in learning from Japan and developing Thai industry. TPA members are mainly: (i) former international students (many of whom became researchers and educators after returning from Japan); and (ii) former AOTS trainees (who worked for Japanese companies in Thailand and local suppliers after returning from Japan). Those from companies understood the expectations and needs of Japanese companies for Thai human resources, while researchers and educators had the knowledge to support the production of textbooks and teaching materials in the Thai language in order to disseminate Japanese industrial technology and knowledge.

8.5.2.4 Multifaceted Networks Among Industry, Academia, and Government

TPA and TNI have built multifaceted networks among industry, government, and academia in Thailand and Japan. These have contributed to amplifying learning opportunities and promoting technology dissemination within the industry circle and broader segments of the society. Multifaceted networks between Thailand and Japan have also facilitated the understanding of the industrial needs of both countries. Four types of networks are particularly notable.

The first is the network with industry in Thailand. TPA has strong ties with Thai industry and close relationships with Japanese companies in Thailand and their local suppliers that have sent their staff to Japan for training programs implemented by AOTS. On the Japanese side, the JCC in Bangkok acts as a hub for networking with Japanese companies operating in Thailand. It has set up an internal TNI Committee that cooperates with TNI in such areas as the support to scholarships, the provision

²⁰ Based on the author's interview with Bandhit Rojarayanont, then TNI President in November 2016. Rojarayanont served as Secretary General of TPA (2001–2009), Vice President of TNI (2009–2014), and TNI President (2014–2020). During 1978–1991, he taught at the Engineering Faculty of the Chulalongkorn University.

of training equipment, the dispatching of lecturers, and the provision of internships as mentioned earlier.

Second is the network with the Thai government. Later, some ex-international students who studied at Japanese engineering universities during the 1960s and 1970s became senior officials of the Thai government. Because they share experiences and values regarding Japanese manufacturing with the core members of TPA, TPA has been in a good position to obtain recognition and understanding of its activities from the government. The support of Japanese MITI/METI has also contributed to facilitating TPA's partnerships with the Thai government, particularly MOI. For example, Panuwat Triyangkulsri (currently, Deputy Permanent Secretary of MOI²¹) graduated from the Tokyo Institute of Technology and is known as one of the most knowledgeable Japan alumni in the Thai government. Panuwat himself has been involved in industrial cooperation with various Japanese organizations including the introduction of SME enterprise evaluation or *shindan* [12].

Third is the network with universities and companies in Japan. Since its opening, TNI has placed great emphasis on partnerships with Japanese universities, as well. The number of Japanese universities that signed the Memorandum of Understanding (MoU) with TNI has grown significantly, reaching 74 as of February 2022. Various exchange programs are being implemented, such as sending TNI students to Japanese universities for studies (both short- and long-term stays), accepting Japanese students at TNI for short-term seminars, inviting short-term visiting lecturers from Japan, organizing study tours for TNI faculty and students, and research collaboration. In particular, exposure to Japanese *monodzukuri* education seems to be effective for both faculty and students. Currently, about 200 TNI students per year go to Japan through exchange programs [20].

Lastly, there is the fourth network that TPA and TNI have built with various Japanese organizations as mentioned in the previous sections. Although the Japanese government and public institutions no longer give any direct financial support to TPA or TNI at present, they provided substantial support in the early stages of TPA development. Even now, TPA and TNI continue to collaborate with them on a project basis, including the latest 'Smart Monodzukuri Support Team Scheme,' supported by Japanese METI.

8.5.2.5 Embedding Incentives Mutually Beneficial for Both Thai and Japanese Sides

Finally, in the industry-academia-government networks mentioned above, there exist embedded incentives attractive to both Thai and Japanese stakeholders. TPA has been providing useful services to industry, such as Japanese language courses, calibration of measuring instruments, training in industrial technology, and enterprise diagnosis and consulting, in response to the evolving needs of Thai industry. Recently, Japanese SMEs and local governments have expressed high expectations that TPA

²¹ Based on the informatin at the time of writing (August 2022).

could leverage its networks with Thai companies and people to facilitate business partnerships.

There is a large demand from Japanese companies and local suppliers for TNI graduates, which is why the JCC has been supporting TNI since its establishment. As a token of gratitude to the scholarship sponsors, TNI holds a job fair every January, setting up booths on campus to provide opportunities for company presentations and recruitment. Approximately 110 Thai and Japanese companies (large and SMEs) participate in annual job fairs.

8.5.3 The Role of Japanese Industrial Cooperation

Donors have an important role to play in facilitating translative adaptation and effective learning of partner countries. As the outsiders, they must be mindful of the values presented by local partners and proactively understand and accept their views and propositions [2, 16]. In this regard, the Japanese side has provided distinctive support in the establishment and development of TPA [8]. Much of the support for TPA and TNI has been provided through JTECS as a Japanese counterpart organization, under the new cooperation framework building on the 'Hozumi spirit' (see Sect. 8.2.2).

8.5.3.1 The Role of JTECS as a Learning Facilitator in Public-Private Partnerships

JTECS has acted as a facilitator of local learning and technology transfer, connecting TPA and TNI with various support organizations in Japan including both public and private sectors. Looking back to the 1970s, Kondo [8] views this cooperation framework as a 'pioneer of public-private partnerships.' Two points are worth noting.

First, for many decades, JTECS has functioned as a contact point for receiving ODA and economic cooperation for Thailand, primarily funded by MITI and implemented by AOTS and JODC. Because TPA and TNI are private organizations, MITI's support for them did not take the form of conventional bilateral ODA, which is implemented as government-to-government cooperation. JTECS also coordinated various kinds of support from the Japanese private sector for TPA and TNI.

For example, JTECS encouraged the Japanese side to participate in the projects that TPA and TNI were eager to realize [23]. JTECS supported fundraising for the establishment of TPA-affiliated TPI and encouraged TPA to convince MITI and JTECS member companies of its significance by inviting TPA representatives to Japan. Regarding TNI, JTECS established a TNI Support Committee on the Japanese side, and the then-president of JTECS actively publicized the importance of TNI to the Japanese media. After its establishment, JTECS has been serving as a bridge between TNI and Japanese universities to promote their exchanges. As such, JTECS has served as a coordinator of economic cooperation based on public-private partnerships.

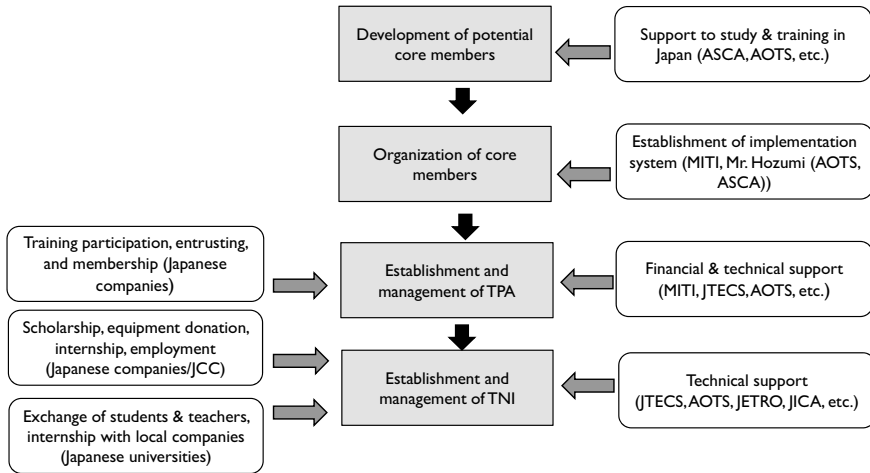


Fig. 8.5 Japanese support to TPA and TNI (*Source* Elaborated by the author based on Mori [10])

Second, ownership of the Thai side has been fully respected, and the Japanese government refrained from influencing their decision and management of TPA. Although the Japanese government provided financial support through JTECS, it was TPA and TNI that identified the needs of local beneficiaries and provided direct services to them. At the same time, ‘Japan does not interfere’ does not mean the Japanese side did nothing. For example, JTECS dispatched experts based on the requests of TPA and TNI and arranged training programs to be conducted in Japan. It also organized internship programs in Japan (which involved the identification of and coordination with host organizations), produced technology-related publications, and provided other services.

The support from JTECS and economic cooperation from various organizations (such as AOTS, JODC, JETRO, and JICA), as well as the Japanese staff at TPA and TNI (seconded by JTECS), was never insignificant. The development of training programs that matched the needs of the times and partnership with Japanese companies would not have been possible without the hard work of Japanese staff. In other words, today’s success of TPA and TNI is made possible through joint efforts by the Thai core team and the JTECS staff who worked behind the scenes with a strong sense of mission.

Figure 8.5 shows how TPA and TNI have been supported in various forms by various people over a long period of time.

8.5.3.2 The Role of Japanese Mentor

The successful establishment and growth of TPA cannot be discussed without Goichi Hozumi, a social educator and the first President of JTECS (see Sect. 8.2.1). Hozumi

served as an unparalleled Japanese mentor. The ‘Hozumi spirit’ continues to serve as the backbone of the relationship between JTECS and TPA and TNI. As he was also the President of ACSA and AOTS at that time, international students and trainees in Japan received guidance and profound inspiration from him. Furthermore, JTECS staff at the time of its establishment were seconded by staff from ACSA and AOTS. They were also influenced by the Hozumi spirit. In sum, on both the Japanese and Thai sides, those who shared the same values gathered at JTECS, TPA, and later TNI and embarked on a new venture together.

8.6 Conclusions and the Way Forward

The experience of TPA and TNI serves as concrete, useful reference for how developing countries can enhance capacity for learning external knowledge and technologies and localizing them for broader dissemination, and how donors could facilitate such a process. It also offers insights into today's context of learning as Thailand has become a key player in the regional economic integration and is promoting industrial transformation through Thailand 4.0. As a concluding section, let us highlight the following five points.

First, the five-stage development of TPA—technology transfer, internalization and technology promotion, technology diffusion, technology education, and overseas expansion and innovation—goes beyond the three-stage process of policy learning and translative adaptation presented in Chap. 1. With the establishment of TNI, they have even created a mechanism for promoting *monodzukuri* education in broader segments of the Thai society including youths and working adults, thus contributing to societal learning. Furthermore, TPA and TNI are now willing to share and teach their experiences abroad, particularly with other Asian economies.

Second, there are five key factors on the Thai side that have contributed to sustainable growth of TPA and TNI. These are: (i) strong ownership and the existence of dedicated core people on the Thai side; (ii) TPA efforts to secure financial autonomy; (iii) TPA as a social enterprise; (iv) the creation of multifaceted networks with industry, academia, and government; and (v) incentives that are mutually beneficial for both the Thai and Japanese sides. While all the factors may not be replicable in other countries, developing countries seriously interested in learning to catch-up are encouraged to assess their situations in these lights and consider how to move forward. Regarding (i) in particular, Thai international students and ex-trainees acted as catalysts for learning, technology and knowledge diffusion, and innovation for Thailand's industrial development. Without their passion and dedication, it would not have been possible to build the foundation and self-sustainable development of TPA and TNI.

Third, the contribution of Japanese industrial cooperation, channeled through JTECS, should be also noted. The Japanese side provided distinct support to TPA and TNI. JTECS has acted as a learning facilitator in public–private partnership in Japan and between Japan and Thailand, while respecting ownership and needs of

TPA and TNI. TPA has always been run independently, and the Japanese side did not intervene its operations and management. The Japanese side has kept its stance to provide hands-on support tailored to the needs of the Thai side. While such a stance may be partly the reflection of the prevailing anti-Japanese movement at that time, the principle of respecting Thai ownership has continued until now. Various Japanese organizations provided support for the growth of TPA and TNI, with JTECS playing the role of learning facilitator through public–private partnerships.

Fourth, there have been qualitative changes in the nature of partnerships between the Thai and Japanese sides over the past 50 years. In the past, Japan was in the position to teach the Thai side, with its absolute economic power and capability to mobilize ODA and private sector support. However, as their recent initiatives show, the Thai side has begun to play a proactive role by providing advisory services to Japanese SMEs and local governments (J-SME project) and creating space for co-learning through an international program (TNIC) for young Thai, Japanese, and other Asian students. These suggest that the learning process is increasingly becoming two-ways, toward mutual learning and learning together for shared objectives between the Thai and Japanese sides. The nature of bilateral partnership is changing.

Fifth, the recent efforts of TPA and TNI suggest the promising possibility of combining the conventional Japanese-style manufacturing, such as *Kaizen*, with IoT and the robotization of production processes. Both TPA and TNI have begun to introduce digital technology in respective industrial services (such as the Smart Monodzukuri Support Team Scheme) and educational courses (such as AI, data analysis, factory automation). Interestingly, they are incorporating new technologies on the foundation of the core value and 5Gs of *monodzukuri*. Here, new technologies are regarded as complementary, not a replacement of the conventional Japanese-style manufacturing value. This is a useful finding to think about the future of industrial development.

This chapter primarily focused on the successful experiences of TPA and TNI. But, there are also challenges to be addressed in the future. Let us conclude by highlighting two issues. First, looking into the future, TPA and TNI need to continue their efforts to find the technologies and ideas necessary for Thailand's continued industrial progress, capture their essence, and introduce them with localization to the Thai industry and society—as they did in the past. Especially in an era of rapid change, the ability to discern promising and appropriate technologies is becoming even more important. Today, Japan-born technologies and ideas may no longer be the only and superior ones, and TPA and TNI can learn from a wide range of external knowledge and technologies available. This requires an even more sophisticated capacity for learning and translative adaptation.

Second, there is a challenge of how to foster and sustain the young generation of the core people who could lead their organizations with good understanding of Japanese-style manufacturing. As explained before, the development of TPA and TNI was supported by dedicated core members that have knowledge and a keen interest in learning Japanese industrial technologies and the *monodzukuri* mindset. Many of them studied and received training in Japan during the 1960s–1970s. In the past

decades, Japan had dominant technological and economic power over Thailand and the other Asian countries and provided large-scale ODA to Thailand. Against this backdrop, in Thailand there exists a thick layer of human resources, like the founders of TPA, who are willing to learn Japanese industrial technologies and corporate culture and apply them to their own country's industrialization. Now that Thailand has become an upper middle-income country and a manufacturing hub in the ASEAN region, graduating from ODA, it is important to make enhanced efforts to continuously build such human resources among the younger generation in Thailand. It is also important to increase opportunities for young people in both Japan and Thailand to study and work together, sharing their own values and thinking about the future of Asia. To this end, we should be reminded that Japan itself must continue to be attractive to them.

References

1. Furuhata Y (1996) Go-gen syugi nyūmon [Introduction to five-gen principles]. Union of Japanese Scientists and Engineers (JUSE), Tokyo.
2. Jin K, Ohno I (2022) Overview: technology transfer for quality and productivity improvement in africa and its implications for translative adaptation. In: Jin K, Ohno I (eds) Promoting quality and productivity improvement/kaizen in Africa. Research Project-Japanese Experiences of industrial development and development cooperation: analysis of translative adaptation processes, vol II. JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, pp 1–33. https://www.jica.go.jp/jica-ri/publication/booksandreports/20220210_02.html.
3. JTECS (Japan-Thailand Economic Cooperation Society) (2003) Tomoni ayumi, tomoni susunda 30 nen: Kizuna wa umi wo koete [30 years of walking and progressing together: bonds beyond the sea]. JTECS, Tokyo.
4. JTECS (Japan-Thailand Economic Cooperation Society) (2022a) The outline of JTECS activities in FY2021. *Japan–Thailand Partnership* (173) (Spring):2–5.
5. JTECS (Japan-Thailand Economic Cooperation Society) (2022b) JTECS 50 nen no ayumi. [50-year history of JTECS]. JTECS, Tokyo.
6. JTECS (Japan-Thailand Economic Cooperation Society), TPA (Technology Promotion Association [Thailand-Japan]), and TNI (Thai-Nichi Institute of Technology) (2022) Overview of JTECS, TPA, and TNI. April 2022.
7. Kohpaiboon A (2020) Industry 4.0 policies in Thailand. Economic Working Paper No. 2020–2002. ISEAS Yusof Ishak Institute, Singapore.
8. Kondo M (2008) Private-sector-driven international technology transfer with the initiative of a recipient country: the case of technology promotion association (Thailand-Japan). Conference paper. Japan Advanced Institute for Science and Technology (JAIST) Repository. Accessed 15 May 2022. <http://hdl.handle.net/10119/7525>.
9. Koontanakulvmong S (2013) From Japan to Thailand, and on to the ASEAN community. Accessed 15 Jul 2022. <https://www.wochikochi.jp/english/relayessay/2013/11/towards-asean.php>.
10. Mori J (2010) Aiming at technical education internalizing Japanese ‘monozukuri’: cases of Technology Promotion Association (TPA) and Thai-Nichi Institute of Technology (TNI). March 2010. Unpublished manuscript.
11. Mori J (2019) Dynamic skill formation in Vietnam: beyond a ‘skill mismatch’ paradigm. PhD Dissertation, School of Social Sciences, Cardiff University.

12. MRI (Mitsubishi Research Institute) (2017) Evaluation of assistance in the industrial human resource development sector in Thailand. Third party evaluation report 2016. Ministry of Foreign Affairs of Japan, Tokyo.
13. NESDB (Office of the National Economic and Social Development Board) (2017) 20-year national strategy: 2017–2036. NESDB, Bangkok.
14. Ohno I (ed) (2015) *Machi kōba kara Azia no gurōbaru kigyō he: Tyūsyō kigyō no kaigai sinsyutu senryaku to sien saku* [From a small factory in Japan to a global firm in Asia: SMEs' overseas expansion strategy and policy support]. Chuo Keizaisha, Tokyo.
15. Ohno I (2017) Japanese industrial development cooperation and creation of pro-Japan monozukuri human resources. In: Ohno I (ed) *Strategic network building with 'pro-Japan' Asian monozukuri human resources*. Asia Pacific Institute of Research (APIR), Osaka, pp 1–28.
16. Ohno I (2022) Overview: Japanese perspectives on industrial development and the concept of translative adaptation. In: Ohno I, Amatsu K, Hosono A (eds) *Policy learning for industrial development and the role of development cooperation. Research project-Japanese experiences of industrial development and development cooperation: analysis of translative adaptation processes*, vol I. JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, pp 1–55.
17. Shiwattana P (2022) TPA 50 nen no ayumi [50-year history of TPA]. Technology Promotion Association (Thailand-Japan) (TPA), Bangkok.
18. Thaiprasert N, Roidoung P (2021) Thailand's industrial policy: its history and recent development. In: Otsubo ST, Otchia CS (eds) *Designing integrated industrial policies*, vol I. Routledge, Routledge Studies in the Modern World Economy, London, pp 270–295.
19. TNI (Thai-Nichi Institute of Technology) (2017) A story of Japanese-style MONODZUKURI education and technology transfer conducted in Thailand: only ten years, still ten years; out thoughts range 100 years. TNI 10th anniversary booklet. TNI, Bangkok.
20. TNI (Thai-Nichi Institute of Technology) (2020) Guide to TNI: monozukuri education—TNI story. TNI, Bangkok.
21. TPA (Technology Promotion Association [Thailand-Japan]) (2022) TPA 2022: education, training, and business consultancy. TPA, Bangkok. <https://www.tpif.or.th/WebDev/refPDF/2022.pdf>. Accessed 1 Oct 2022.
22. Yamada M (2022) Industrial policy support to Thailand: initiatives in response to the Asian economic crisis and adaptation thereafter. In: Ohno I, Amatsu K, Hosono A (eds) *Policy learning for industrial development and the role of development cooperation. Research project-Japanese experiences of industrial development and development cooperation: analysis of translative adaptation processes*, vol I. JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, pp 363–392.
23. Yoneda H (2016) JTECS-TPA-TNI model: introduction of a successful case of Japanese technical cooperation. Presentation at the study group meeting of the project “strategic network building with ‘pro-Japan’ monozukuri human resources”. Asia Pacific Institute of Research, 25 July 2016. Accessed 15 Jul 2022. https://www.grips.ac.jp/forum/pdf16/JTECS_TPA_TNI_160725.pdf.

Izumi Ohno is a Professor at the National Graduate Institute for Policy Studies (GRIPS), Tokyo. She is also a Senior Research Advisor at the JICA Ogata Sadako Research Institute for Peace and Development and co-leads the Institute's research project on “The Japanese Experiences of Industrial Development and Development Cooperation.” During 2018-2020, she served as Director of the JICA Ogata Research Institute. She specializes in international development policy, industrial development cooperation, business, and development. Prior to joining GRIPS in 2002, she worked at JICA, the World Bank, and the Japan Bank for International Cooperation (JBIC). Her publications include: *Policy Learning for Industrial Development and Development Cooperation* (JICA Ogata Research Institute, 2022, co-edited), and *Eastern and Western Ideas for African Growth:*

Diversity and Complementarity in Development Aid (Routledge, 2013, co-edited). She holds a MPA from the Princeton School of Public and International Affairs in the US.

Junichi Mori is the Chief Technical Advisor for the Skills for Prosperity Programme in Malaysia, International Labour Organization (ILO). Prior to taking this position, he worked for the United Nations Industrial Development Organization (UNIDO) and JICA. He obtained a MA from the Fletcher School, Tufts University in the US and a Ph.D. in social sciences from Cardiff University in the UK. His research and professional work focus on skill development and industrialization in developing countries, particularly in the Southeast Asian region. His publications include: "Revisiting employer perceptions of skill mismatch: The case of the machine manufacturing industry in Vietnam" (*Journal of Education and Work* 34 (2), 2021). He received the merit medal from the Minister of Industry and Trade of Vietnam (2013) for his contribution as a JICA expert in Hanoi University of Industry.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if you modified the licensed material. You do not have permission under this license to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

