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

Izumi Ohno
National Graduate Institute for Policy Studies (GRIPS)
Sr. Research Advisor, JICA Ogata Research Institute

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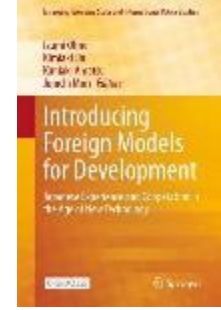
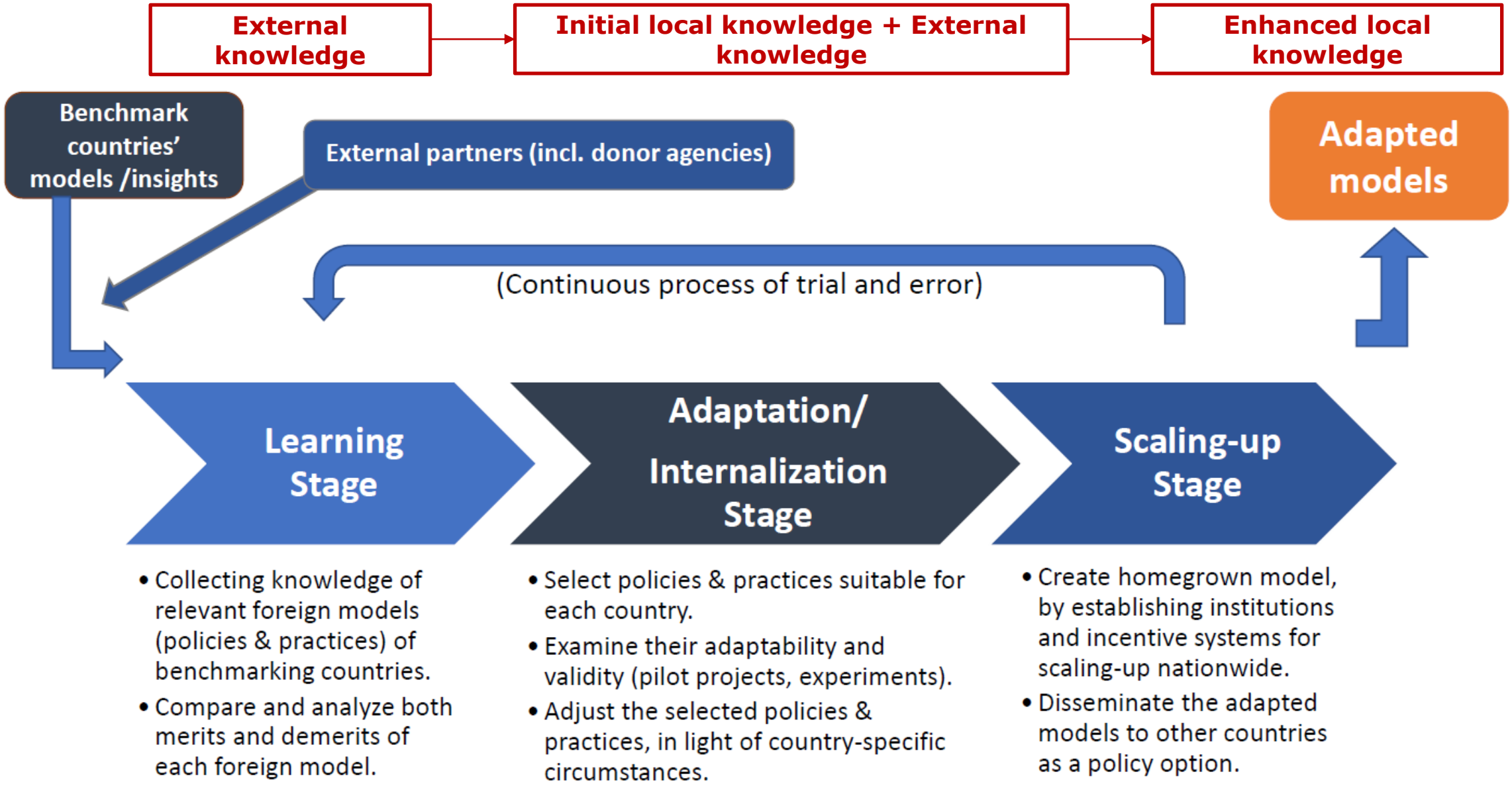
Introducing Foreign Models for Development:
Japanese Experience and Cooperation in the Age of New Technology



Eds. I. Ohno, K. Jin, K. Amatsu & J. Mori, Springer 2023

Themes of chapters	Key areas	Local learning initiatives
Ch.1: Introducing foreign models for development (overview)	Key concepts, analytical frameworks, Japanese perspectives	Govt. & various actors
Ch.2: Industrial policies for learning, innovation & transformation (Japan, South Korea, Malaysia, Brazil, & Chile)	Industrial policy	Govt. & various actors
Ch.3: State learning in the Meiji period (Japan)	Industrial policy	Govt. (esp. national leaders)
Ch.4: National movements for quality & productivity improvement (Japan & Singapore)	Quality & productivity improvement	Private sector (Japan: NPO) & Govt. (Singapore: counterpart organizations)
Ch.5: Bilateral policy dialogue (Argentina, Vietnam, Ethiopia, & Thailand)	Industrial policy	Govt. (esp. national leaders & key policy makers)
Ch.6: Industry engagement in TVET (Vietnam)	Education & training	TVET university (public sector)
Ch.7: Kaizen promotion in Africa (Tunisia & Ethiopia)	Quality & productivity improvement	Govt. (esp. counterpart organizations)
Ch. 8: Industrial technology promotion & monodzukuri education (Thailand)	Education & training / quality & productivity improvement	TVET university & NPO (private sector)
Ch.9: Kaizen and non-cognitive skills development in Africa	Quality & productivity improvement	Individuals (esp. workers, managers)
Ch.10 New industrial landscape	Industrial policy	Govt. & various actors

Translative Adaptation and Local Learning: Three-Stage Process



Source: Elaborated by the author, adapted from Kikuchi (2011) with inputs from Junichi Mori and Akio Hosono.

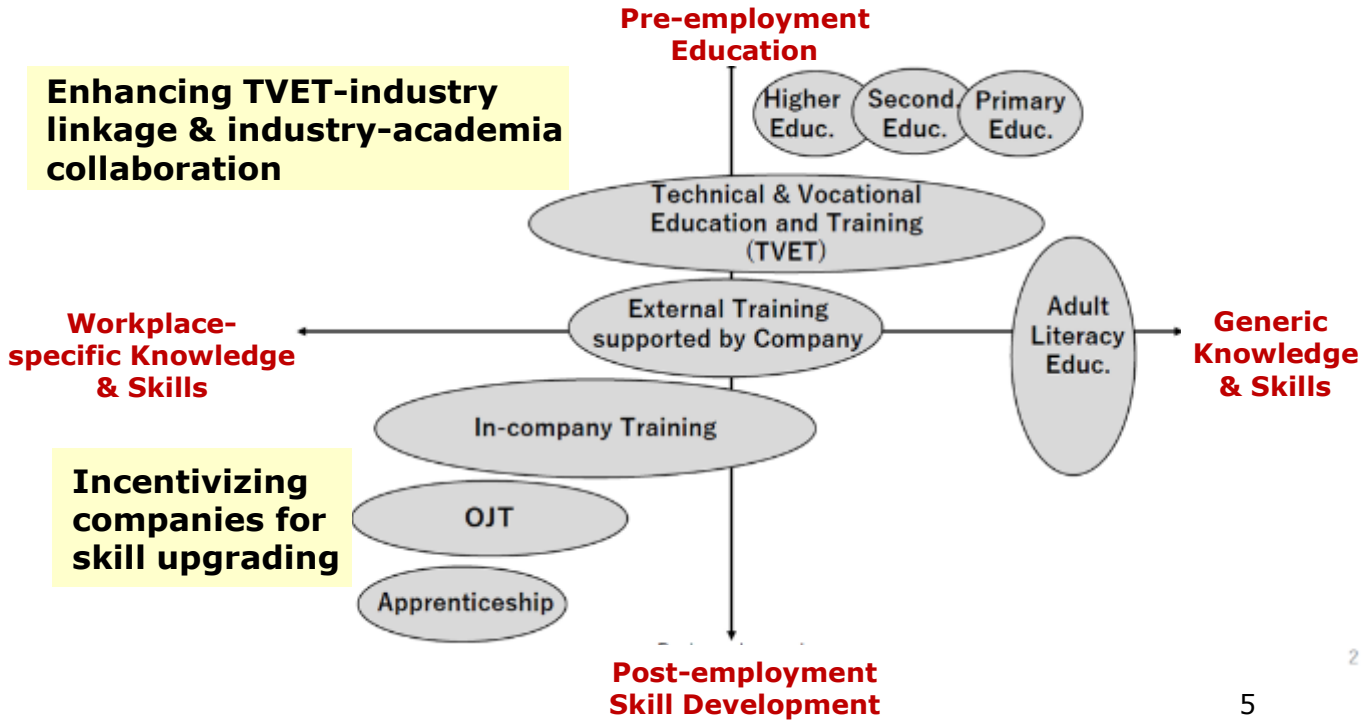
Outline

1. Key issues on industrial human resource development (HRD)
2. History and evolution of TPA and TNI
3. Five stages of development and key factors for their success
4. Implications for industrial HRD in Africa

TPA: Technology Promotion Association (Thailand-Japan)
TNI: Thai-Nichi Institute of Technology

Key Issues on Industrial Human Resource Development

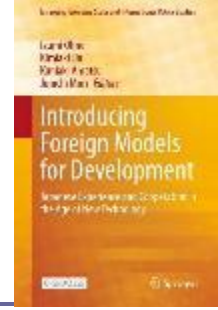
- Vital importance of public-private partnerships to enhance employability & productivity of workforce
  - HRD that matches industry needs: TVET-industry engagement, FDI-local firm linkage building, 5S & Kaizen, etc.
- How to develop training & educational institutions which produce qualified local people that match industry needs?
- How to ensure their financial & operational sustainability?



(Source) Adapted from Figure 1-1, p.37, S. Yamada & I. Ohno (2021)

Thailand's Experience (Ch.8)

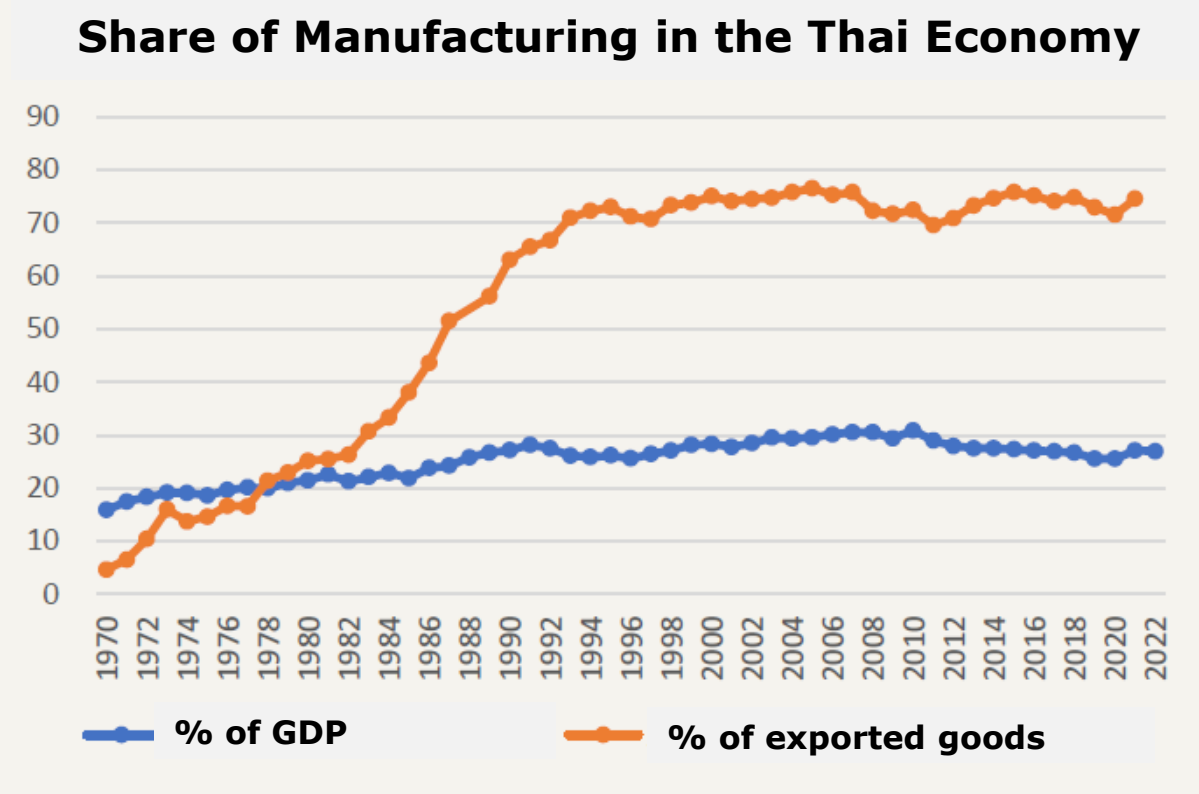
https://link.springer.com/chapter/10.1007/978-981-99-4238-1_8

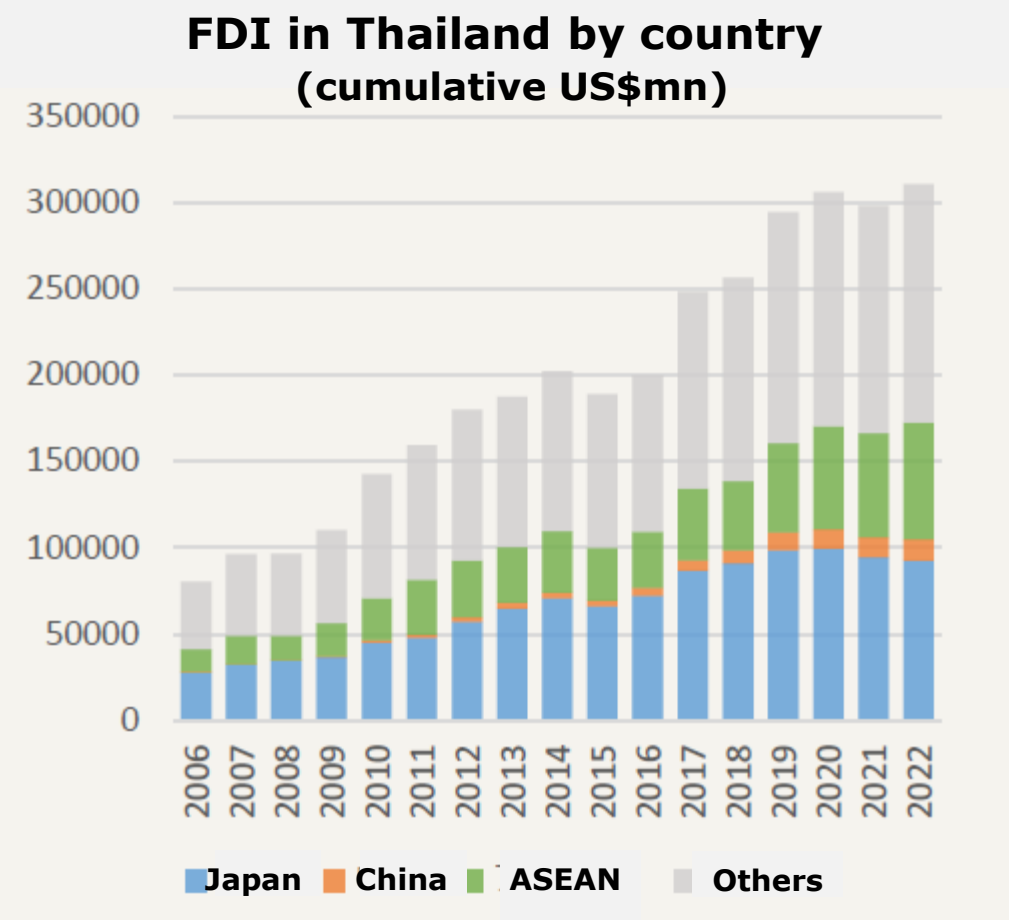


- This presentation focuses on Thailand's experience with technology promotion and technical education by learning and localizing Japanese-style manufacturing (*monodzukuri*), through two case studies:
  - **Technology Promotion Association (Thailand-Japan) (TPA)** – for post-employment education; linkage building with FDI; practical knowledge & skills for the workplace
  - **Thai-Nichi Institute of Technology (TNI)** – pre-employment education; TVET-industry linkages
- These are private-sector initiatives, led by Thai alumni who have networks with Japanese industry, academia, and govt. institutions.

Thailand and Japan as *Monodzukuri* Partners

- Manufacturing accounts for about 30% of Thai GDP.
- Japan has been a main investor in Thailand.





(Source) Presentation by Kazunari Tsukada "Thai Economy and Japan" JETRO-IDE seminar (Dec. 21, 2023) . The original data come from World Bank (WDI), and the Bank of Thailand.

About TPA

- **Technology Promotion Association (Thailand-Japan) (TPA)**: NPO established in 1973 by the initiative of **Thai students and ex-trainees** who studied in Japan (i.e., engineering universities & AOTS), to promote the introduction and dissemination of new industrial technology from Japan for Thai enterprises and people.
  - Amid growing anti-Japanese movement in Southeast Asia in the 1970s, triggered by economic expansion of Japanese companies.
- JTECS (Japanese NPO, 1972-) serving as a counterpart, to mobilize both ODA and private sector support for TPA activities.
- TPA's current activities include:

  (i) School of language & culture; (ii) Education, training & business consulting; (iii) Calibration services (industrial, medical & laboratory instruments); (iv) Publishing & bookstores; and (v) Multimedia & media production center, etc.

Relationship btw. TPA/TNI and Japanese Counterparts

Int'l students & trainees who studied in Japan (ABK & AOTS)

Thai & Japanese industries in Thailand (membership fees)

Technology Promotion Association (Thailand-Japan) (**TPA**, 1973-) (+ **TNI**, 2007-)

-Planning and implementation of training & consultancy, language education, publishing activities, calibration services

<Thai organization>

Mr. Sommai Hoontrakool
former Minister of Finance
(studied in Japanese univ.)

Japan-Thailand Economic Cooperation Society (JTECS, 1972-)

-Entrusting operations to TPA, incl. provision of funds
-Information offering
-Selection of experts
-Thai language course

<Japanese organization>

Mr. Goichi Hozum
Social philanthropist

Private funds (membership fees)

Japanese govt. support (economic cooperation budget, MITI)

TPA Launch Event (May 24, 1973)
Messrs. Goichi Hozumi & Sommai Huntrakul

TPA Sukhumvit Main Office, 1975
(Language & Publication Activities)

TPA Pattanakarn New Office, 1998
(Seminars & Training, Calibration, Shindan & Consulting Services)

TNI Opening Ceremony (Aug. 2, 2007)
With the presence of Princess Sirindhorn

(Source) TPA & TNI information from websites

TPA

Shindan (Enterprise Diagnosis) & Consulting Services

Calibration Services

Calibration Center for Industrial Instrumentation

Publishing Activities

TPA Robot Contest

(Source) TPA information from websites

Examples of TPA Training Program (2022-23)

(1) Administration & Management (179 courses)
e.g.
- Kaizen for Production (Practice)
- Time Management for Effective Work
- Procurement Role in Cost Savings

(2) Applied Computers (23 courses)
e.g.
- How to Use QC 7 Tools in Excel for Quality Control- Time Management for Effective Work
- Infographic & Interactive Presentation by Powerpoint 2016
- Robot Process Automation by VBA

(3) Digital Technology, AI & IoT (4 courses)
e.g.
- For Logistics & Transportation, IoT Logistics
- Using IoT to Create a Small Logistics Platform
- Grow through Industry 4.0 – Connected Industry

(4) Energy Environment & Safety (51 courses)
e.g.
- Water Treatment & Management in Industry
- Safety Officer for Management Level
- Industrial Waste Management for Supervisor

(5) Instrumentation (64 courses)
e.g.
- Measurement Decision Risk Decision according to ISO/IEC 7025: 2017
- Metrological Principle of Equipment Verification for Industry

(6) Manufacturing Management (79 courses)
e.g.
- Cost Volume & Profit Analysis
- Change Control by 4M (Man, Machine, Method, Material)
- Supply Chain Management

(7) Maintenance Management Skills (75 courses)
e.g.
- 5S Audit Technique
- Electrical Control System & Motor Maintenance for Technician
- Safety Maintenance: Practice

(8) Quality Promotion & Standardization (86 courses)
e.g.
- Voice of Customer for Quality
- MSA: Measurement System Analysis
- QC 7 Tools for Maintenance: Practice

(9) Master Certification Program (20 courses)
e.g.
- Lean Master Certification Program
- Six Sigma Black Belt Certification Program
- 5S for Executives

(10) Factory Automation (14 courses)
e.g.
- Automation & Karakuri Kaizen
- Automation for Maintenance Management
- Basics of Fuzzy Logic Control

About TNI

- **Thai-Nichi Institute of Technology (TNI)**: Established in 2007 **by TPA**, as a technical education institute, highlighting field-oriented, practical education for manufacturing and other industries.
- *Monodzukuri* University **by Thai people for Thai people**
  - Courses of automobile, electronics, production technology, ICT.
  - Emphasis on practical knowledge, internship with Japanese firms/organizations in Thailand & Japan.
  - High employment rate, mostly at Japanese companies or local suppliers affiliated with Japanese companies.
  - Recently, starting new International College (TNIC) for Asian students (neighboring ASEAN & Japanese, etc.).

TNI

Job Fair (held every January, with the participation of about 150 companies incl. Japanese)

Biannual Speech Context
(The winner will receive an opportunity to study in Japan)

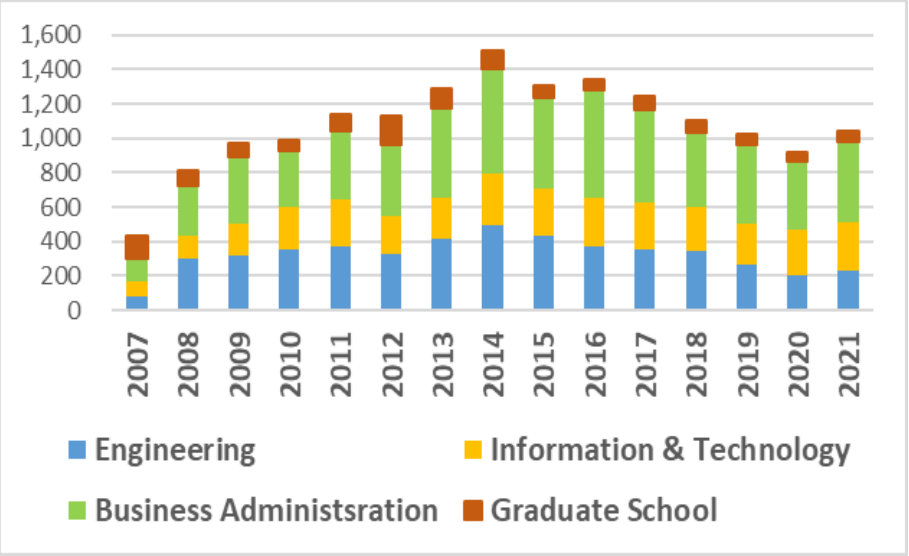
Former PM Abe's visit to TNI and donation of books (Jan. 17, 2013)

(Source) TPA information from websites

TNI Faculty and Courses (as of June 2022)

Program	Faculty	Course
Undergraduate (4-year BA)	(1) Engineering	・Automotive Engineering (AE) ・Robotics and Lean Automation Engineering (RE) ・Computer Engineering & AI (CE) ・Industrial Engineering (IE) ・Electrical Engineering (EE)
	(2) Information Technology	・Information Technology (IT) ・Multimedia Technology (MT) ・Business Information Technology (BI) ・Digital Technology in Mass Communication (DC)
	(3) Business Administration	・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)	・Digital Engineering (DGE) ・Data Science and Analytics (DSA) ・Global Business Management (GBM) ・Japanese for International Business (JIB)
Graduate program (2-year MA)		・Innovation of Business and Industrial Management (MBI) ・Engineering Technology (MET) ・Information Technology (MIT) ・Japanese Business Administration (MBJ)

TNI Students Newly Enrolled Annually (2007-21)



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

6 Core Values of TNI

Kaizen: continuous improvement
Monozukuri: dedication, creativity, and development
Hansei: accept mistakes and learn from them
Respect: respect yourself and others
Honest: be honest
Public-interest consciousness: consider the public interests

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

(Source) TNI information from website

Key Features of TNI *Monodzukuri* Engineer Program (2015~)

1st & 2nd-year students	3rd-year students	4th-year students

- Japanese & English (incl. terminologies related to monodzukuri, services & IT)
- Morality & ethics, TNI 6 Core Values (KM-HR-HoP)
- Communication skills
- Science-math principles, computer programming, design, engineering materials, fluid mechanics, statistics, etc.

①Design & Development (DD)
(4 months)

+

②Kaizen with automation & IoT
(4 months)

+

③Internships
(2 months/summer)

①Design of automotive parts: by using 3D CAD/CAM/CAE, 3D printers, ergonomics, reverse engineering, prototyping & experimentation, etc.
②Kaizen & automation of manufacturing process: production systems, principles & strategies of automation, inspection & measurement technologies, material handling, inventory systems, electronics & mechatronics, PLCs, microcomputers, IoT, etc.

③Internships at Japanese companies

④ Engineering Project Course
- Development & design
- Process Kaizen with automation & IoT

OR

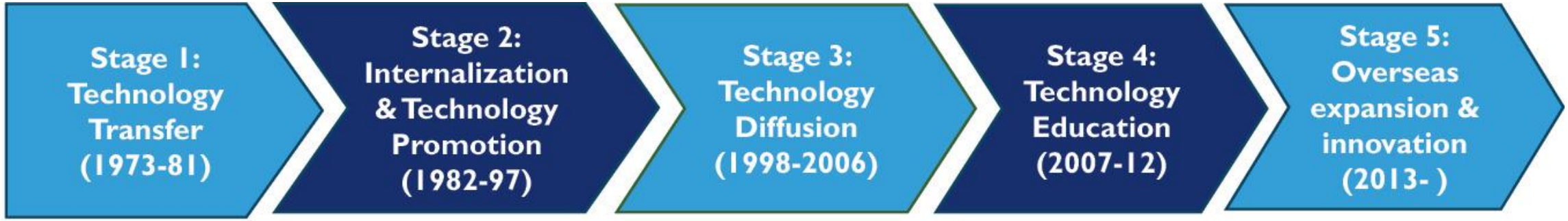
③ Internship following ② in 3rd year (4-month training at Japanese companies + DD course, etc.)

Methods: In both ①・② stages, students cultivate teamwork and independent problem-solving skills through lectures, practical training, workshops, case studies of Japanese companies, PBL, and team presentations.

Strategic Approach: Five-Stage Development of TPA & TNI

1. Learning from Japanese experts (**technology transfer**)
2. Nurturing Thai experts while reducing dependence on Japanese experts (**internalization & technology promotion**)
3. Building capacity of local companies through training & consulting activities (**technology diffusion**)
4. Establishing TNI as a private university specializing in Japanese-style *monodzukuri* (**technology education**), aimed at the wider segment of the Thai society; and
5. Expanding their activities from Thailand to Asia and learning digital technologies (**overseas expansion & innovation**).

Five-stage Development of TPA and TNI



TPA established (initiated by Thai alumni)
- Seminars given by Japanese experts
- Translation/ publication of Japanese technology books in Thai language
- Language courses

- Training Thai master instructors by Japanese experts
- TPA starting calibration services

- TPA expanding training courses by Thai experts
- Awards for Kaizen, 5S, QC circles, etc.
- Expanding calibration services
- TPA learning the Japanese model of enterprise diagnosis and started training for SME factory evaluators & consultancy services

TNI established (initiated by TPA core members)
- Monodzukuri education for Thai people by Thai people
- Language & corporate culture
- Industry-academia linkages (internships, curriculum development, job fairs, etc.)

Expansion of TPA activities
- J-SME project, business matching btw. Thai-Japanese companies
- Training for IoT support instructors (for smart monodzukuri)

Expansion of TNI activities
- Starting TNIC for Asian youths
- Adult education program (online)

Source: Elaborated by the author, based on Yoneda (2016), I. Ohno (2017), and JTECS (2022).
Note: The period is approximate. Stages 4 and 5 overlap.

Key Events Surrounding TPA and Increase in Own Fund

- Strong aspiration for TNI creation by TPA core members
- Long-term orientation, incremental approach to securing TPA's revenue sources and achieving financial sustainability
  - Starting with language training, sales of technical books, commercializing the skills learned from Japan
  - A variety of calibration services (incl. on-site services); calibration center accounting for 30% market share in Thailand
  - Training programs & consultancy on enterprise diagnosis by mobilizing SME management consultants (*shindan-shi*)

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%

Assessment:
From a Lens of Translative Adaptation

- TPA & TNI are successful examples of introducing 'foreign' models with localization (= ***translative adaptation***)
- Their five-stage development can be seen as a further evolution of three-stage process of translative adaptation.
  - Actively learned various production management technologies (Kaizen, 5S, QCC, TPA) and the *monodzukuri* mindset from Japan
  - Created localized mechanisms for their dissemination among Thai firms (training, consulting, educational activities) & people
  - Establishment of TNI for broadening a base of *monodzukuri* education in the Thai society (youth, working adults)
  - Latest initiatives: Integrating *Kaizen* into the IoT process (smart *monodzukuri* support team); Thailand-Japan Investment Project (J-SME Project); New international education program (TNIC) for Asian youth, etc.

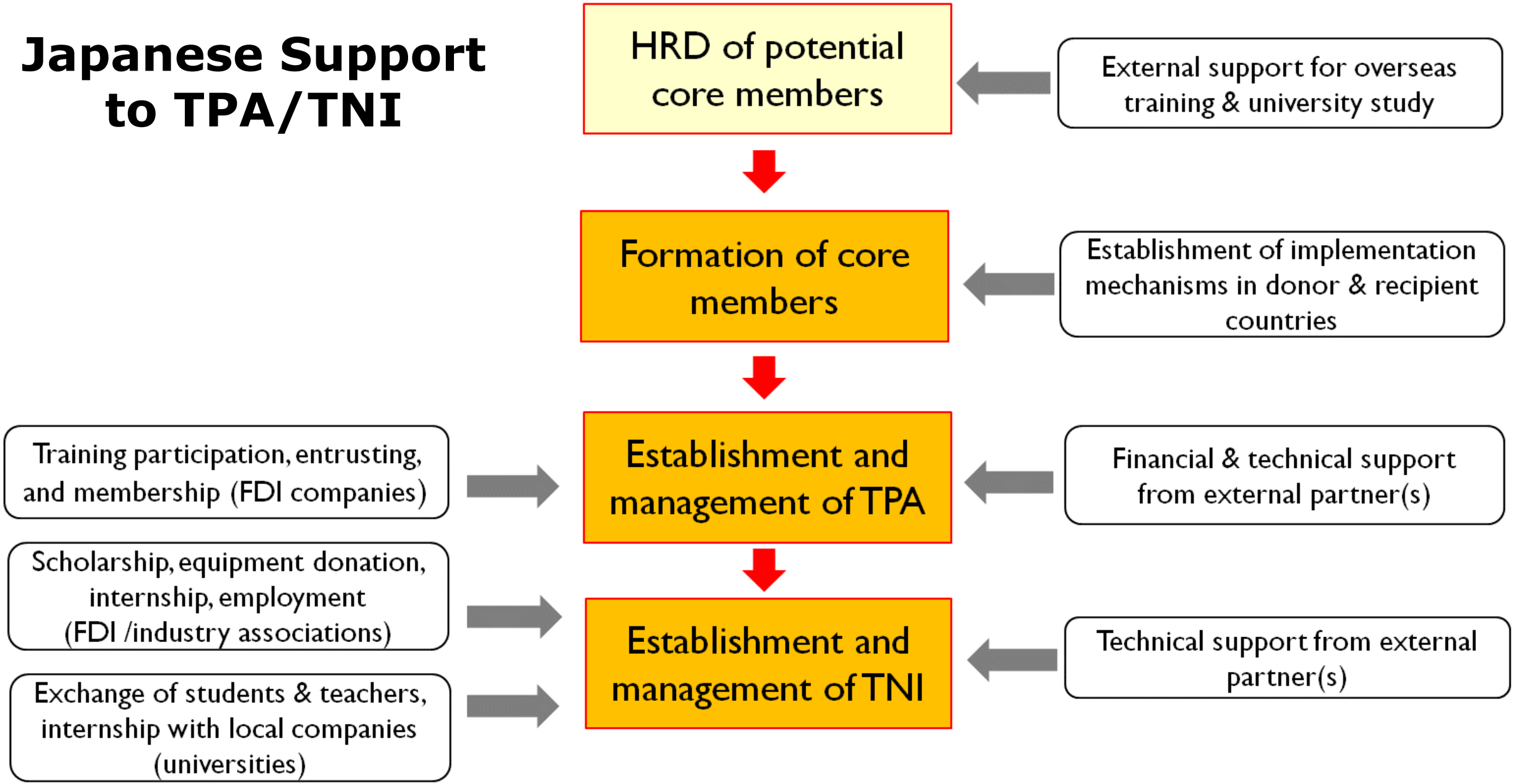
Success Factors for TPA & TNI Development

- Strong ownership and the existence of dedicated core professionals on the Thai side
- TPA efforts to secure financial autonomy
- TPA as a social enterprise/NPO
  - Core members with diverse affiliations, but with shared aspiration for making Thailand a manufacturing hub in Asia
  - Flexibility and eagerness to develop new ideas into innovative business projects
- Multi-faceted human networks among industry, academia, & govt. (in two countries)

Success Factors for TPA & TNI Development (cont.)

- Embedding incentives mutually beneficial for Thai & Japanese sides
  - Language courses, calibration services, training & consultancy (TPA)
  - Responding to demand from Japanese FDI & local suppliers (e.g., TNI job fairs, internships, *monodzukuri* education)
- The role of external support in facilitating the learning process
  - Creating a mechanism for public-private partnerships for industrial HRD in Thailand (coordinated by a Japanese NPO (JTECS))
  - Philosophy of equal partnership ('*Hozumi spirit*'); TPA & TNI identifying the needs of local beneficiaries and providing direct services to them

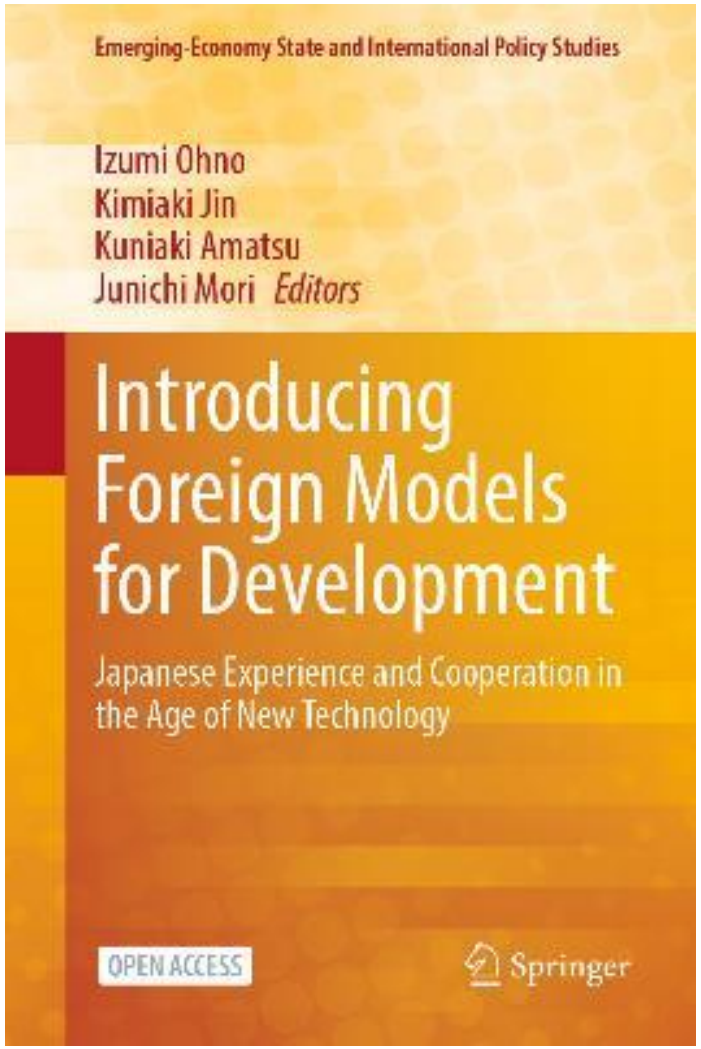
Japanese Support to TPA/TNI



Implications for Industrial HRD for Africa

- There exist ample opportunities for learning to industrialize
  - Donor-supported projects (training, scholarships for higher education…); partnerships with FDI; DX & E-learning platforms, etc.
- Importance of creating homegrown mechanisms for learning and localizing foreign models (‘**brain circulation**’ > ‘brain drain’)
  - Role of **alumni** who studied overseas in creating global human networks for learning & technology transfer
  - At home, almuni networks contributing to industry, academia, & govt. partnerships
- Role of development cooperation
  - Aid for graduation; respecting ownership of partners (sideline); step-by-step capacity development with concrete support

Thank You Very Much !



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