Human capacity-building: STI and entrepreneurship promoting policies and practices

Case of Thailand

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National Innovation System

Demand
- Consumers (final demand)
- Producers (intermediate demand)

Industrial system
- Large Companies
- Mature SMEs
- New tech-based firms

Intermediaries
- Research institutes
- brokers (TLOs)

Education and Research system
- Public sector research
- Higher Education and Research
- Professional education and training

Political system
- Policies
- Governance

Framework conditions
- Financial environment; taxation and incentives;
- propensity to innovation and entrepreneurship;
- talent mobility

Infrastructure
- Banking, Venture capital
- IPR and Information
- Innovation and business support
- Standards and norms
- Science Parks / Innovation District

Source: adapted from Kuhlmann and Arnold (2001)
National Innovation System

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Source: adapted from Kuhlmann and Arnold (2001)
National Innovation System

**Demand**

**Consumers (final demand)**
Too few market innovation schemes

**Producers (intermediate demand)**
Lack of market model & demand boosting schemes for innovation

**Framework conditions**

Financial environment; taxation and incentives; propensity to innovation and entrepreneurship; mobility

Too restricted & risk-averse with regard to govt grants, funding and direct subsidies

- Supply-side dominant
- Demand-side platform

**Industrial system**

- Large Companies
  - MNCs / LNCS
- Mature SMEs
  - M to L / Traditional SMEs / Smart SMEs
- New tech-based firms
  - Tech Startups

**Intermediaries**

Research institutes brokers (TLOs)

Immature

Problem solving, Testing, Product Development

Reliance on external STI capabilities from Universities & RTOs

**Education and Research system**

Public sector research
Under utilization of IP for private sector

Higher Education and Research
Does not create innovators

Professional education and training
Limited by traditional way of thinking

**Political system**

Policies
Arbitrary selective policies for particular sectors/clusters create market distortions

Governance
Lack of synergy

**Infrastructure**

Banking, Venture capital
Fast growth

IPR and information
Ineffective use of IPR to support innovation

Innovation and business support
Increasing mentors, incubators, accelerator

Standards and norms
Underperforming NQI

Science Parks / Innovation District
Growing

Source: adapted from Kuhlmann and Arnold (2001)
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Previously</th>
<th>Presently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post–industrialization</td>
<td>National–production value chain</td>
<td>Global–service value chain</td>
</tr>
<tr>
<td>City as new innovation factory</td>
<td>Linear model of innovation (RDI)</td>
<td>Unconventional and place–based innovation</td>
</tr>
<tr>
<td>A shift from manufacturing to service domination</td>
<td>Manufacturing–dominated sectors</td>
<td>Service–orientated sectors</td>
</tr>
<tr>
<td>Size doesn’t matter</td>
<td>Corporate concept</td>
<td>Startup concept</td>
</tr>
<tr>
<td>Towards Open Era</td>
<td>Corporate in–house innovation</td>
<td>Open innovation / Knowledge free–flow / Demand–side value chain</td>
</tr>
<tr>
<td>Monopoly is not the only way to win</td>
<td>Platform economy / Trade collectivism</td>
<td>Data economy / Trade individualism</td>
</tr>
<tr>
<td>Requiring alternative ways to support</td>
<td>Traditional mechanisms (financial support / technical support)</td>
<td>Different factor conditions (regulatory sandbox, instructional agility, new corporate culture, etc.)</td>
</tr>
</tbody>
</table>
Roles of MHESI in promoting STI

- **Inspiring new generation** – to inspire and encourage young generation to S&T [e.g. Public Universities, National Science Museum, STEM Workforce, Startup Thailand]

- **Embracing diversity** – to diffuse S&T to various target groups [e.g. Regional Science Parks (SPA), STI Coupon for OTOP Upgrade (TISTR)]

- **Leveraging advancement** – to upgrade technological capabilities in private sectors [e.g. DSS, NIMT, TISTR, TINT, GISTDA]

- **Directing new frontiers** – to identify and be excellent in future areas of research and development [e.g. Public Universities, NSTDA, TISTR, TCEL, SLRI (Synchrotron), GISTDA, NARIT]
Mechanisms for Nurturing Innovation Ecosystem

- **Increasing Inputs to innovation** – e.g. R&D tax credits, grants for R&D, public support for VC

- **Increasing Innovation Capabilities** – e.g. technical support services, mobility schemes

- **Enhancing connections and complementarities** – e.g. cluster policy, collaborative R&D programs, support for intermediaries

- **Enhancing demand of innovation** – e.g. public procurement policies, standards, regulation

- **Improving framework condition** – e.g. support for the business environment

- **Improving discourse and preparedness** – e.g. information services, technology roadmapping exercises
## Roles of National Innovation Agency (NIA)

<table>
<thead>
<tr>
<th>Basic Research</th>
<th>Applied Research</th>
<th>Design &amp; Development</th>
<th>Prototype</th>
<th>Commercialization</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research Driven</strong></td>
<td></td>
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**R&D funds / Universities / Research Institutes**

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**Innovation**

**Market Driven**
Roles of National Innovation Agency (NIA)

**Supply Side**
- Government Agencies
- Regional Agencies
- Municipalities
- Universities
- Research Institutes
- Researchers

**Demand Side**
- Areas
- Communities
- LNCs
- SMEs
- Startups

**Support and Mechanisms**
- Financial Support
- Capability Development
- Knowledge Support
Key Challenges in Human Capacity Building

• Labor market shifts and the rise of automation
• Economic shifts and moves toward emerging markets
• Growing disconnect between employer demands and college experience
• The growth in urbanization and a shift toward cities
• Lack of supply but growth in demand
• The rise in non-traditional students

Source: adapted from https://www.educationdive.com/news/8-global-trends-impacting-higher-ed/515272/ (Case of USA)
<table>
<thead>
<tr>
<th>Challenge</th>
<th>Focus</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Focus on academic program development / Teacher-centric (Supply Side)</td>
<td># Focus on completing academic program / Education based on program requirement (Mass Education)</td>
<td># Focus on career development / Student-centric (Demand Side)</td>
</tr>
<tr>
<td>Cognitive-based learning</td>
<td># Focus on fulfilling necessary knowledge and skills / Education based on individual requirement (Personalized Education)</td>
<td># Experience-based learning</td>
</tr>
<tr>
<td>Learning in a classroom / school / system</td>
<td># Learning outside a classroom / school / system</td>
<td># Lifelong learning (especially reskilling, upskilling, multiskilling current workforce and recycling retired workforce)</td>
</tr>
<tr>
<td>Focus on only Age Group 5-22</td>
<td># Lifelong learning (especially reskilling, upskilling, multiskilling current workforce and recycling retired workforce)</td>
<td># Focus on non-diploma / non-degree program</td>
</tr>
<tr>
<td>Focus on diploma / degree program</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Dr Suvit Maesincee (2018) Minister of Science and Technology, Thailand
Innovation Capability Development Program

New Entrepreneurs

Enterprises and Corporates

YOUTH
Innovation Capability Development Program

Innovative Organization Program (IOP)

Startup Thailand Leagues

Founder Apprentice
Breeding new generation of Tech Entrepreneurs
Breeding new generation of Tech Entrepreneurs

< INCENTIVES FOR ECOSYSTEM BUILDING >

- **Tax Incentives for Investors**
  - **Angel investor** that has invested in a start-up company or juristic partnership at either the incorporation or capital increase stage will receive a tax exemption on personal income tax, capped at THB 100,000 for each applicable tax year.
  - **Venture Capital (VC) and Private Equity Trust (PE Trust)** can receive the tax incentives for the income tax on dividends and revenue from the transfer of shares of target companies for 10 years.

- **SMART Visa Initiative for foreign investors and entrepreneurs**
  - Up to 4 years visa granted
  - Launched as a public-private collaboration with the Board of Investment (BOI)
  - 5 types
  - Modelled from French Tech Visa
Entrepreneurial Ecosystem

Funding and support
- Governments
  - International
  - National
  - Regional
  - Local

Individuals & Intermediaries
- Entrepreneurs
- Champions
- Foundations
- NGOs and others

Business
- Entrepreneurs
- SMEs
- High Growth Companies
- Large Companies

The Changing Role of academic institutions
- Entrepreneurial Academic Institutions
  - Primary & Secondary School
  - Higher Education
  - Informal Education

The importance of multi-stakeholder Partnerships

The importance of Outreach

Source: WEF (2009) Educating the Next Wave of Entrepreneurs
Role of Universities in Innovation Development

Major tasks

- Research
- Teaching
- Entrepreneurial
- Academic Service

Challenges

- BMI – Biz Model Innovation
- Mindset
- Ideas
- Change maker
- Self discerning
- Diffusion
- Commercialization

Teaching

- Higher Education Excellence
- HRD Linkages to Industries

Entrepreneurial

- Application Excellence
- Research-to-Biz Spin-off

Research

- Academic Excellence
- Translational Research
Role of Intermediaries in Innovation Development

1) Creativity

Financing + Market

2) Co-creation

Co-creation + Business Matching

3) Collaboration

CE Mark and ISO 13485

Goal ➤ Reach the Global Market
Role of Infrastructure in Innovation Development

Shared Value
Light weight + Pressure Tolerance + Durability + Safety

Composite Container for LPG

Common Goal
Common Platform
Standard Interfaces

High-pressure Test  Burning Test  Impact Test

MSTQ – Metrology + Standardization + Testing + Quality Assurance
National Innovation Agency (Public Organization) | www.nia.or.th