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Geneva

Investment, Innovation and Technology for Development:
Thailand's Experiences

By
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Thailand

The views expressed are those of the author and do not necessarily reflect the views of UNCTAD.
Investment, Innovation and Technology for Development: Thailand’s Experiences

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Trade and Development Board
Investment, Enterprise and Development Commission
Fifth Session

1 May 2013
United Nations Conference on Trade and Development (UNCTAD)
Geneva
Thailand at a glance

- An upper middle income and 2\textsuperscript{nd} largest economy in ASEAN after Indonesia
- Total population of 69.5 million in 2012
- World’s Top 3 \textit{rice} exporter
- World’s Top 5 \textit{sugar} exporter
- World’s largest natural \textit{rubber} producer and exporter
- World’s top \textit{chicken} meat exporter
- World’s 2\textsuperscript{nd} largest \textit{hard-disk drive} exporter after China
- \textit{Auto manufacturing} hub of Southeast Asia

Competitiveness ranking:

- \textbf{18}\textsuperscript{th} (from 185) in Ease of Doing Business 2013
- \textbf{38}\textsuperscript{th} (from 144) in Global Competitiveness Report 2012 - 2013 by World Economic Forum
- \textbf{30}\textsuperscript{th} (from 59) in IMD World Competitiveness Rankings 2012
Notes: 2011 Statistics
1. There were 0.3% of the enterprises whose information on size was unavailable.
2. There were 2.2% of the export transactions whose information on the exporters’ size was unavailable.
3. LEs were included their diversification enterprises (12% GDP)
4. SMEs contribute to 99.8% of total enterprises in Thailand
Thai SMEs in the Global Value Chain

Source: Economic Restructuring: Industrial Sector, NESDB proposing to Economic Restructuring Committee
Dependence on Foreign Technology

Million Baht

Source: Bank of Thailand

Technology Payment and Income 2006-2011
# Low R&D Investment

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public R&amp;D Investment (mil. baht)</td>
<td>8,202</td>
<td>8,138</td>
<td>9,571</td>
<td>10,548</td>
<td>9,988</td>
<td>11,550</td>
<td>10,015</td>
<td>11,887</td>
<td>12,737</td>
</tr>
<tr>
<td>Private R&amp;D Investment (mil. baht)</td>
<td>5,284</td>
<td>5,164</td>
<td>5,928</td>
<td>6,023</td>
<td>6,679</td>
<td>7,998</td>
<td>8,210</td>
<td>7,278</td>
<td>8,174</td>
</tr>
<tr>
<td>Total R&amp;D Investment (mil. baht)</td>
<td>13,486</td>
<td>13,302</td>
<td>15,499</td>
<td>16,571</td>
<td>16,667</td>
<td>19,548</td>
<td>18,225</td>
<td>19,165</td>
<td>20,911</td>
</tr>
<tr>
<td>R&amp;D/GDP (%)</td>
<td>0.25</td>
<td>0.24</td>
<td>0.26</td>
<td>0.25</td>
<td>0.24</td>
<td>0.25</td>
<td>0.21</td>
<td>0.21</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Sources: Public R&D Investments from 2001 to 2007 are collected from the national surveys on R&D expenditure and personnel by the Office of the National Research Council of Thailand. Public R&D Investments from 2008 to 2009 are collected from GFMIS, the Comptroller General’s Department, Ministry of Finance. Private R&D Investments from 2001 to 2008 are collected by the national surveys on Private R&D Investment by the National Science Technology and Innovation Policy Office (STI Office).
The National Science Technology and Innovation Policy and Plan 2012 - 2021

• First Time “INNOVATION” is systematically introduced
• Address STI for development and development of STI
• Provide national direction for the next 10 years with periodic adjustments
• Identify Focuses and Balance between Economic and Social Development and Context for Thailand
• Preparedness for Future Changes that will have major impacts to Thai Society
• Plan derived from Intensive and Widespread Public & Stakeholders Participatory Process with Implementation Strategies Incorporated

Approved by the Cabinet on 17 April 2012
STI Investment Targets

2021: 2%
2016: 1%

(2021) 25:10,000
(2016) 15:10,000

2016-2021
70:30

R&D /GDP = 0.24 %

R&D Personnel (FTE)
9.01 : 10,000

R&D expenditure
(Private : Government)
38 : 62

Thailand Status in 2012
● R&D Exp = 21,493 MB
● R&D Exp : Gov : Private = 13,318:8,175 MB
● R&D Personnel = 57,220 (man-year)

Source: National Science Technology and Innovation Policy Office
The Country Strategy 2014

New Growth Model

- **Improving internal process**
  - Getting out of the middle-income trap

- **Growth & Competitiveness**
  - Improved infrastructure, R&D, and productivity

- **Inclusive Growth**
  - Reducing social disparity

- **Green Growth**
  - Increasing Environmental friendliness

- **Human security, human development and quality of life**

Source: NESDB, Thailand
# NEW GROWTH MODEL

## 28 strategic issues

<table>
<thead>
<tr>
<th>GROWTH &amp; COMPETITIVENESS</th>
<th>INCLUSIVE GROWTH</th>
<th>GREEN GROWTH</th>
<th>INTERNAL PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>1. Education</td>
<td>1. Eco-industry towns</td>
<td>1. Legal reform</td>
</tr>
<tr>
<td><strong>8. Research &amp; development</strong></td>
<td></td>
<td><strong>8.1 Raise R&amp;D expenditure to 1% of GDP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>8.2 Promote talent mobility</strong></td>
<td></td>
<td><strong>8.2 Promote talent mobility</strong></td>
<td></td>
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<tr>
<td><strong>8.3 Development of regional science parks</strong></td>
<td></td>
<td><strong>8.3 Development of regional science parks</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: NESDB, Thailand
A Snapshot of Government Spending on STI System
(Fiscal Year 2012 – 852 Projects 43,575.52 million Baht)

The “Valley of Death”

Source: Data from 14 ministries, analyzed by STI Office
STI Framework to Enhance Innovation

Strategic Sectors
- Energy
- Food & Agriculture
- Health & Well-being
- Rail System
- Hi-Value-Added Industries

Systems
- Fiscal/Financial System
- Research System
- Manpower System
- Infrastructure System
- IP and Technology Transfer System
- Gov’t Procurement/Mega-Projects

Key Measures/Mechanisms
- Industrial Technical Assistance Program
- Matching Grants/Soft Loan
- Talent Mobility
- Thailand Advanced Institute of S&T
- R&D Tax Deduction
- Reform of IP Management
- Industrial MS/PhD

Physical/Institutional Infrastructures
- Government-Funded Science/Technology Parks
- Private Innovation Districts
- Private R&D Centers

Source: National Science Technology and Innovation Policy Office
5 Science Parks and 60 University-Business Incubators

Thailand Science Park
  Headquarter of NSTDA and 4 National Researcher Centers

Northern Science Park:
  (1) Chiang Mai University
  (2) Maejo University
  (3) Naresuan University
  (4) Mae Fah Luang University

North Eastern Science Park:
  (1) Khon Kaen University
  (2) Suranaree University of Technology
  (3) Maha Sarakham University
  (4) Ubon Ratchathani University

Southern Science Park:
  (1) Prince of Songkla University
  (2) Walailak University

Eastern Science Park (in the-set-up)
  (1) GISDA
  (2) Burapha University
Strategic Sectors of Science Parks

Northern
1. Agriculture & Food Processing
2. IT Software & Digital Content
3. Medical / Health Science/Biotechnology

North Eastern
1. Agriculture & Food Processing
2. Hard disk drive, Enterprise software, Embedded software
3. Mining Industries and Alternative Energy

Southern
1. Food/Agriculture
2. Proactive Medicine - Herb, Cosmetic

Thailand Science Park
1. Organic Printed Electronic
2. Food & Feed
3. Nano-cosmeceutical
Facilities available at Thailand Science Park

- Laboratory
- Pilot Plant
- Long-term Leasehold Land
- National Research Center
- Information Service for R&D
- Convention Center
Hub of High-Quality Research Personnel

Thailand Science Park is hub of highly-skilled R&D personnel from public sector with more than 1,800 researchers of which around 480 are PhD.s.
Tenants in Thailand Science Park

- 61 companies with 500 skilled workforce
  (60% RDE personnel)
Support for STI Activities

**Business & IP**
- Technology Business
- Incubation
- IP Management
- IP Commercialization

**Infrastructure / Facilities**
- Thailand Science Park
- Software Park Thailand

**Financial**
- Research Grant
- Soft Loan
- Joint Investment
- Tax Incentive Program for R&D Expenditure

**R&D / Technology**
- Contract / Joint Research
- Industrial Consultancy
- Testing & Analytical Services
- Information & Technology Acquisition

**Human Resources**
- Training
- Specialist Database
- Specialist Recruitment

**Labor Intensive**
- Skill Intensive
- Technology Intensive
- R&D Intensive
Privileges & Incentives

Revenue Dept. Incentives
- Accelerated Depreciation Rate for R&D Machineries and Equipments
- 200% Deduction for R&D Expense

BOI Privileges
- Import Tax Exemption for Machineries
- Corporate Income Tax Exemption for 8 Years
- 50% Corp. Income Tax Reduction for 5 more Years after Tax Exemption Period Ends
- Work Permit and Visa Facilitation for Foreign Specialists and Researchers
Success Story at Thailand Science Park

Flexoresearch Group

- Special Scoop in CNN, April 2012.
Phase II of Thailand Science Park

Innovation Cluster 2 (INC2)

- 4 Integrated Towers
- Gross area = 124,000 m²
- > 30 Meeting Rooms
- 30,000 m² allocated for private companies.
- Support ~200 tenants and ~2,500 Professional in addition to current Phase
- Completed by 2013

- To enhance the competitiveness of the private sector.
- To host joint/interdisciplinary research projects between National Centers, Universities, and/or Companies.
- To house important national S&T infrastructures.
Private SP Developer: AMATA Science City Project

- A public-private partnership project initiated by AMATA Corporation.
- Objectives:
  - Upgrading standard of living in Thailand
  - Creating value-added to products
  - Shifting activities that driven Thailand’s economy from production-based to R&I-based.
  - Becoming Regional Innovation Hub.
  - Attracting Overseas Thai talent and foreign talent to come to work in Thailand

Source: AMATA Science City – Creating New Opportunities to Foster Innovation Economy in Thailand
Examples of MNCs Establishing R&D Centers in Thailand
Examples of Thai-owned Large Firms Significantly Expanding R&D Investment
# STI Support for SMEs: Grant and Joint Venture

<table>
<thead>
<tr>
<th>Supporting Scheme</th>
<th>Organization</th>
<th>R&amp;D and Lab Testing</th>
<th>Proof of Concept</th>
<th>Prototype</th>
<th>Pilot Production</th>
<th>Commercial Production</th>
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</thead>
<tbody>
<tr>
<td><strong>Grant</strong></td>
<td>Agricultural Research Development Agency</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
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<tr>
<td></td>
<td>National Innovation Agency – Soft Loan</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
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<tr>
<td></td>
<td>Thailand Research Fund</td>
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<td>✔</td>
<td>✔</td>
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<td></td>
<td>SME Promotion Agency – R&amp;D Grant</td>
<td></td>
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<td></td>
<td>SMEs Bank</td>
<td></td>
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<tr>
<td></td>
<td>NSTDA - CD Programme</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td></td>
<td>SME Promotion Agency - Machine Fund</td>
<td></td>
<td></td>
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<tr>
<td><strong>Joint Venture</strong></td>
<td>NSTDA - NIC</td>
<td>✔</td>
<td>✔</td>
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## STI Support for SMEs:
Tax Incentive, Angel Fund/VC and Credit Insurance

<table>
<thead>
<tr>
<th>Supporting Scheme</th>
<th>Organization</th>
<th>R&amp;D and Lab Testing</th>
<th>Proof of Concept</th>
<th>Prototype</th>
<th>Pilot Production</th>
<th>Commercial Production</th>
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<tbody>
<tr>
<td><strong>Tax Incentive</strong></td>
<td>Department of Revenue - 200% Tax Deduction</td>
<td>✓</td>
<td></td>
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<tr>
<td></td>
<td>BOI - STI Programme</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Angel Fund/VC</strong></td>
<td>SME VC</td>
<td></td>
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<td></td>
<td>Competitiveness Fund</td>
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<tr>
<td></td>
<td>Mai Matching Fund</td>
<td></td>
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<td></td>
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<td></td>
<td>Energy Fund</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
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<tr>
<td><strong>Credit Insurance</strong></td>
<td>Thai Credit Guarantee Corporation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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# STI Support for SMEs:
Consulting Service, Pilot Plant and Market Research

<table>
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<th>Supporting Scheme</th>
<th>Organization</th>
<th>R&amp;D and Lab Testing</th>
<th>Proof of Concept</th>
<th>Prototype</th>
<th>Pilot Production</th>
<th>Commercial Production</th>
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</thead>
<tbody>
<tr>
<td>Consulting Services</td>
<td>NSTDA – iTAP</td>
<td>✓</td>
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<td>✓</td>
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<td>NIA – Innovation Coupon</td>
<td>✓</td>
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<td>SME Promotion Agency - Consultancy Fund</td>
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<tr>
<td>Pilot Plant</td>
<td>KMUTT</td>
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<td></td>
<td>NSTDA - Pilot Plant</td>
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<tr>
<td>Market Research</td>
<td>SME Promotion Agency-Internationalization Fund</td>
<td></td>
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<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Industrial Technology Assistance Program (ITAP)

- Investigate technological problem
- Matching supply of & demand for technology
- Technological consultancy service Joint R&D
- Funding subsidies 50:50
- S&T Acquisition Program (Local & Overseas)
- Training/Workshop
- Attach local expert to overseas expert, help technology transfer to firms and universities

**Number of projects**

- 2006: 174
- 2007: 263
- 2008: 321
- 2009: 455
- 2010: 724
- 2011: 883

- 2,820 technology Development& innovation projects
- 10 regional nodes linking with local universities and science parks with 50 project managers
- Total investment 55.4 Million USD

Source: ITAP, NSTDA
To facilitate the mobility of researchers in governmental agencies and higher education institutions to industrial sector.

**Talent Mobility Programme**

Industry reimburses university*  

* SMEs are exempt from reimbursement through MOST subsidy

**Industry**

**University/Research Institution**

**Talent Mobility Committee**
- Project certification
- Promotion/support

**STI Office coordinating roles:**
- Demand-Supply database keeping
- Pushing for enabling regulations
- Matching events

**Government**

Tax incentives
- BOI STI-tax
- MoL 200% corp. tax
- RD 200% corp. tax

Regulation reforms needed to encourage mobility
- Continuing tenure
- Academic promotion

The Cabinet approved talent mobility to be a key performance indicator of universities and research institutions
Establishment of Network on HRD in Rail Technology

- Partners in education e.g. training and course and curriculum development
- Exchange of researchers

Overseas Educational/Research Inst.

Thailand Advanced Institute of Science and Technology (THAIST)

Domestic Educational/Research Inst.

- Education e.g. training and course and curriculum development
- Exchange of researchers

Industry

- Partner in education e.g. training and course and curriculum development
- Support scholarship

- SRT
- MRTA
- BTS
- BMCL
- Airport Link
- Siemens
- Alstom
- Bombardier

- KMUTT
- KMUTNB
- CU
- SUT
- etc.

- SRT
- MRTA
- BTS
- BMCL
- Airport Link
- Siemens
- Alstom
- Bombardier

- ENSIAME University (France)
- Korean Railroad Research Institute (Korea)
- Aachen University (Germany)
- Railway Technology Research Institute (Japan)
- JR East Company (Japan)
- etc.
Establishment of Network on HRD in Design for Manufacturing

THAIST Affiliated Institutes (Design for Manufacturing)

CMU
KKU
KMUTT
KMITL
KMUTNB
RMUT
SWU
NSTDA

WU
PSU

France

22 leading research laboratories, companies and government institutions in 16 different countries
Establishment of Network on HRD in Rubber Processing

- Partner in education e.g. training and course and curriculum development
- Exchange of researchers

THAIST

- Partner in education e.g. training and course and curriculum development, internship, joint R&D and technology development
- Support scholarship

Domestic Educational/Research Inst.

- Education e.g. training and course and curriculum development
- Exchange of researchers

Overseas Educational/Research Inst.

- Promote/support/facilitate HRD, joint R&D, tech. collaboration between university & industry and Thailand and overseas

J.J. Murphy Research Centre, Rubber Park India

• KMUTNB
• Mahidol U
• NSTDA
• PSU
• KU
• etc.

• Federal of Thai industries
• etc.

Industry
SBTS is national vocational schools for gifted and talented students who have developed skills in invention and technology. The Teaching and Learning of this project use Project-Based approach. The aim of this project is to develop these students to become the technologist or innovator in the future.

- The cabinet approved this project on December 18\textsuperscript{th}, 2007.
- The Ministry of Education and the Ministry of Science and Technology decided to launch the pilot SBTS program. (2008-2012)
- The first SBTS school is located in Science Based Technology Vocational College (Chonburi).
Technical HRD of Vocational Diploma Level – Collaboration with Michelin Siam Co., Ltd.

- Co-develop curriculum and select students to the program
- Provide 2-year financial support
- Allow 10-month placement for students
- Provide salary/payment
- Offer job position to the graduates (must meet requirements)

Austria-Thai Technical College

- VEC: formulate policy/select college
- STI: focal point and drive the project until success
Development of Innovation System through IP Management

**TAX Revenue**

**Financial Support for translational research**

1. Conventional funding for basic and applied research
2. IP Creation, Registration and Licensing
3.1. Write-off mechanism for funding agencies
3.2. Market

**University**

**Research Institute**

**Private Company**

**Private Firm (old and new)**

**TTO** in university or research institute

**Mass production**

New products, New services, New jobs, New companies

**Very risky and costly**

Need supports and tools such as incubation, grants, matching grants, soft loan, loan
### Development of Innovation System through IP Management

<table>
<thead>
<tr>
<th>Policy</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Clear Policy on Gov. funded IP Ownership</strong></td>
<td>• Funding recipient, who proves to have TT capability, is entitled to retain IP ownership of the government sponsored research results.</td>
</tr>
<tr>
<td><strong>2. Reform of IP Registration System</strong></td>
<td>• Department of Intellectual Property (DIP) is entitled to retain IP registration fees as well as to have greater management flexibilities to overcome its backlogs and improve the overall registration system</td>
</tr>
<tr>
<td><strong>3. Financial and tax incentive to promote IP Commercialization</strong></td>
<td>3.1 Financial support for SMEs in the form of grant or matching funds for scaling up of R&amp;D commercialization (From Lab ➔ market)</td>
</tr>
<tr>
<td></td>
<td>3.2 Tax benefit for the company’s expense on royalty fees paid for University’s IP licenses.</td>
</tr>
<tr>
<td><strong>4. Strengthening TT organizations and professionals</strong></td>
<td>• Setting up a TTO Consortium and giving them enough resources to build technology transfer capabilities for TTO personnel</td>
</tr>
</tbody>
</table>
Policy recommendations for Innovation Promotion

- In developing countries, innovation intermediary should be established as a catalyst of technology transfer and innovation development
  - Bridging knowledge providers, support agency and SMEs (mapping & matching supply and demand), stimulating technology transfer
  - Strengthening linkages and creating knowledge sharing between knowledge producing agents, industry (mainly SMEs), and government policy and support organizations
  - Provision of management and support for R&D, innovation and technology transfer
  - Financial support for R&D, innovation and technology transfer
Policy recommendations for Innovation Promotion

• Strengthen universities and research agencies to provide effective services of technology transfer to SMEs
• Improve S&T infrastructure to support private sector investment in research and technological capability development
  - Physical infrastructure (e.g. science park, software park)
  - Non-physical infrastructure (e.g. legal system, tax incentives, financial support)
Policy recommendations for Innovation Promotion

• Talent Management
  - Special scheme for talent
  - Talent mobility

• STI Awareness
  - Promote importance of R&D among executives
  - Create experts in technology and production commercialization
  - Increase STI contents through public media
  - Create STI hero
  - Promote S&T career path