Thailand’s Science, Technology and Innovation Policy and Institutional Framework

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Secretary General
National Science Technology and Innovation Policy Office, Thailand

UNCTAD MULTI-YEAR EXPERT MEETING
Innovation for Productive Capacity-building and Sustainable Development:
Policy Frameworks, Instruments and Key Capabilities
19 - 21 March 2014
Thailand Context

- An upper middle income and 2nd largest economy in ASEAN after Indonesia
- Total population 67.4 million in 2013
- Area 513,120 km² (51st in the world)
- Median age 35.1 years, Life expectancy at birth 74.05 years
- Population Growth Rate 0.52% (2013 est.)
- World’s Top 3 rice exporter
- World’s Top 5 sugar exporter
- World’s Top chicken meat exporter
- World’s largest natural rubber producer and exporter
- World’s 2nd largest hard-disk drive exporter after China
- Auto manufacturing hub of Southeast Asia

Competitiveness ranking:

- 18th (from 185) in Ease of Doing Business 2013
- 37th (from 148) in Global Competitiveness Report 2013 by World Economic Forum
- 27th (from 60) in IMD World Competitiveness Rankings 2013
Thailand in the middle income group

GDP per capita at current price (US dollars)

Year 1970
Malaysia $343
Korea $289
Philippines $209
**Thailand $200**
China $114
Indonesia $82

**High income**
$12,476 or more

**Upper middle income**
$4,036 - $12,475

**Lower middle income**
$1,026 - $4,035

**Low income**

Year 2011
Korea $23,067
Malaysia $9,967
China $5,439
Indonesia $3,495
Thailand $5,318
Philippines $2,370

STI Graphics, data from UN Statistics Division and the World Bank

National Science Technology and Innovation Policy Office, Thailand
Social factor is important to sustainable growth

- Poor income distribution has led to social disparity. Thailand’s income inequality remains relatively high compared with other ASEAN countries at similar level of development.
- Social disparity could lead to political and social instability.

Environmental factor also adds to sustainable growth

- Thailand CO2 emissions grew nearly as fast as China, but the economic growth was not as fast.
- Thailand may face difficulty conforming to future global targets of emission reduction.

Change in GDP and carbon emissions, 1992-2006 (Top 25 emitters)

Thailand’s innovation capability in the “Learners” group

**Innovation and GDP per capita**
(bubble size: population)

Source: INSEAD and WIPO (2012)
STI Institutional Framework: A Snap Shot

- Legal & Institutional Infrastructure
- National STI Policy and Master Plan
- STI Ecosystem
  - National policy making level
  - Ministerial policy making level
  - Policy executing level
  - Operation/utilization level (public/private/community)
- STI Infrastructure
  - Physical - National R&D Centers, Science Parks Network, National Research Universities
  - Legal - IP Framework to Enhance Innovation
- Incentives and Supporting Schemes
  - Financial/Tax incentives
  - Industrial Technical Assistance Programme
- STI Human Resource Development
  - Special Programmes/Initiatives - THAIST, talent mobility, STEM education
- International Cooperation
Section 86. The State shall act in compliance with the science, intellectual properties and energy policies as follows:

1. Enhancing the development of science, technology and innovation in all aspects by enacting specific law in so doing, preparing budget for studying and making of researches, establishing institution for research and development, encouraging the use of results emerging from researches and development, the efficient transfer of technology and the appropriate development of researchers, and disseminating science and modern technology knowledge to the public and encouraging the public to apply science into their living;

2. Supporting an invention or excogitation for new wisdom, preserving and developing local wisdom and Thai wisdom, and protecting intellectual properties;

3. Promoting and supporting continuously and systematically of the research, the development and the use of natural alternative energy which is beneficial to the environment.
Science, Technology and Innovation Basic Law (2008)

Sustainable Economic and Social Development

National Target

Science, Technology and Innovation Capability

Driving Force

Organisation & STI Goals

National STI Policy Committee
National STI Policy Office

Unified National STI Policy and Master Plan
Collaborating Mechanisms between Public and Private Sector
STI as a Critical Part of Intellectual Infrastructure
National STI Policy and Master Plan
National Science Technology and Innovation Policy and Plan 2012 - 2021

- Address development of STI & STI for development
- First time “Innovation” is systematically introduced
- Provide national direction for the next 10 years with periodic adjustments
- Identify priorities and balance between economic and social development and context for Thailand
- Prepare for changes that will have major impacts to the society
- Plan derived from widespread participatory process with implementation strategies
National Science Technology and Innovation Policy and Plan 2012 - 2021
Strategic & Implementation Plans

- Green Innovation for Quality Society and Sustainable Economic Growth
  - 1. Empowering Society and Local Communities
  - 2. Enhancing Economic Competitiveness and Flexibility
  - 3. Ensuring Energy, Resource and Environment Security
  - 4. Developing and Enhancing STI Human Capital
  - 5. Promoting and Supporting the Development of STI Infrastructure and Enabling Factors

National Science Technology and Innovation Policy Office, Thailand
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

Source: National Science Technology and Innovation Policy Office
STI Policy Framework to Enhance Innovation

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

Systems:
- Financial/Fiscal 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
- Industrial MS/PhD
- Thailand Advanced Institute of S&T
- R&D Tax Incentive
- Reform of IP Management
- Government-Funded Science/Technology Parks
- Private Innovation Districts
- Private R&D Centers

Government-Funded Science/Technology Parks
Private Innovation Districts
Private R&D Centers
STI Plan fits in nicely with the Country’s New Growth Model

**Vision**
Enhance national competitiveness and develop a happy society with equity, fairness and resilience

**Objective and Principle**

1. **Growth and competitiveness:** maintain economic growth and increase per capita income, strengthen the existing industries and develop future industries as a new source of income

2. **Inclusive growth:** Lower poverty, create greater economic distribution, lessen economic gap

3. **Promote green growth:** reduce Green House Gas Emission and natural resource and water management

4. **Internal Process:** align strategies at all levels to achieve the determined development targets, prepare government manpower and modernize rules and regulations

Source: National Economic and Social Development Board (NESDB), 2013
STI Ecosystem
Thailand’s STI Ecosystem: A Variety of Institutional Complementarities

Organizational Structure for Science Technology and Innovation policy system in Thailand

Level I
(National policy-making)

Level II
(Ministerial policy-making)

Level III
(Policy-executing)

Level IV
(Operational/Utilization)

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STI = National Science Technology and Innovation Policy Office
PM = Prime Minister
STIPC = National Science Technology and Innovation Policy Committee
NESDB = National Economic and Social Development Board
NRCT = National Research Council of Thailand
NITC = National Information Technology Committee
MOE = Ministry of Education
MOAC = Ministry of Agriculture and Cooperatives
MOI = Ministry of Industry
MICT = Ministry of Information and Communication Technology
MOC = Ministry of Commerce
MOPH = Ministry of Public Health
MOST = Ministry of Science and Technology
MOF = Ministry of Finance
MSTDA = National Science and Technology Development Agency
NISTDA = National Information Technology Development Agency
SIPA = IP Protection Agency
TRF = Thailand Research Fund
ARDF = Agricultural Research and Development Fund
HSRI = Health Systems Research Fund
DIP = Department of Intellectual Property

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Private sector
Firms and farms

Office of NRCT

Fiscal R&D incentives

R&D and extension institutes

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National Science Technology and Innovation Policy Office, Thailand
Agencies under Ministry of Science and Technology

Ministry of Science and Technology

Office of the Minister
Office of the Permanent Secretary
National Science Museum (NSM)
National Institute Of Metrology Thailand (NIMT)
Thailand Institute of Nuclear Technology (TINT)
Hydro and Agro Informatics Institute (HAIII)
National Synchrotron Research Center (NSRC)
Thailand Center of Excellence for Life Sciences (TCELS)

National Science and Technology Development Agency (NSTDA)
Thailand Institute of Scientific and Technological Research (TISTR)
National Innovation Agency (NIA)
National Astronomical Research Institute of Thailand (NARIT)
Geo-Informatics and Space Technology Development Agency (GISTDA)
Office of Atoms for Peace (OAP)
Department of Science Service (DSS)

National Science Technology and Innovation Policy Office (STI)
Top 10 Private Sector R&D Investment, 2013

Major Business Groups:
Federation of Thai Industries/Board of Trade/Bankers Association

Private GERD in million Baht

- Textile: 423
- Transport and Logistics: 449
- Electronics: 722
- Minerals: 794
- Automobile: 920
- Electricity, Gas & Water Services: 970
- Rubber and Plastic: 1,125
- Machinery: 1,361
- Petroleum: 1,553
- Food: 2,375
- Chemicals: 3,630
- Others: 1,862

National Research Universities

- Chiang Mai University
- Prince of Songkla University
- Khon Kaen University
- Chulalongkorn University
- King Mongkut’s University of Technology Thonburi
- Mahidol University
- Suranaree University of Technology
- Kasetsart University
- Thammasat University

Source: Office of the Higher Education Commission
STI Infrastructure
National R&D Centers at Thailand Science Park

- Residential Area
- Pilot Plants
- Innovation Cluster 1 (Multi-Tenants Unit)
- Convention Center
- Innovation Cluster 2
- Garden of Innovation
- FUTURE DEVELOPMENT

Source: National Science and Technology Development Agency (NSTDA)
Regional Science Parks Network

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

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, Cosmetics
IP Legal Framework to Enhance Innovation

**Government Budget**

- Funding Agency

**Conventional funding for basic and applied research**

- University
- Research Institute
- Private Company

**Legal enabler for IP utilization**

**Research Technology Organization (RTO)**

**Market**

- New products
- New services
- New jobs
- New companies

**Mass production**

**1. Financial support for SMEs’ R&D**

**2. Streamlining IP process**

**3. Capacity Building of TTO**

**4. Translational Research Fund**

**TTO in university or research institute**

**Royalty income**

- **Private Firm (old and new)**
Incentives and Supporting Schemes
Existing Financial Incentives

• Grants / Matching Grants
  – Innovation Coupon, NIA
  – Industrial Technology Assistant Program (ITAP), NSTDA

• Loans
  – Company Directed Technology Development Program (CD), NSTDA
  – Good Innovation Zero Interest, NIA

• Tax Incentives
  – STI (Skills, Technology, Innovation) Program and Tax Incentives for University-Industry Research Collaboration, BOI
  – 200% tax incentive for R&D expenditures and accelerated depreciation rate for R&D equipment, Revenue Department
ITAP as a Tool for Technology Transfer

Source: National Science and Technology Development Agency (NSTDA)
STI Human Resource Development
STI HR Development Programmes

- DPST (IPST)
- JSTP (NSTDA)
  - SCiUS (MOST)
  - Technology Curriculum (IPST)
  - S&M Talent (IPST)
  - MWIT
  - Chulabhorn
  - Olympiad (OBEC, IPST., POSN.)

STEM Education (STI, IPST)
- EBL (IPST)
- Gifted Classroom (IPST)
- SBTS (OVEC)
- WiL
- Children’s University (NSTDA)
- Science Classroom (OBEC/IPST/MOST/POSN)
- EBL (IPST)

Brain-based Learning (OKMD)
- Little Scientist House (HRH Sirindhorn Foundation, OBEC, NSTDA, IPST., NSM., Nanmee)

Learning Method
- Formal Education/Others
- Life-long Learning/Training
- Enrichment/Mentoring
- Specialty Schools
- Class in School
- Scholarship Programme
- Enabling System

Talent Mobility (STI)
- STOU
- NFE
- On the job training
- Promotion tie in with mastery
- Commercial Package Training
- Employer Approval

Coaching (TYSA)
- Training (OKMD)
- UBI (OHEC)
- KNIT

RGI,
RRI.
(TRF)

Science Scholars (MOST, OHEC)

Technology Teacher Curriculum (IPST)

odos (MoE)

YSSTP (NSTDA)

Graduate Program (TISTR+Uni)

WiL (OHEC, STI, KMUTNB, KMUTT, OVEC)

Co-STRD (MOST)

TGIST (NSTDA)

JSTP (NSTDA)

EBL (IPST)

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Thailand STEM Education

Proportion of new enrolment in S&T subject compared with social science subject in 2011

<table>
<thead>
<tr>
<th>Level</th>
<th>Science &amp; Technology</th>
<th>Social science &amp; Humanity</th>
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<tbody>
<tr>
<td>Higher than Bachelor</td>
<td>26% 15,788</td>
<td>74% 46,022</td>
</tr>
<tr>
<td>Bachelor</td>
<td>32% 169,538</td>
<td>68% 353,999</td>
</tr>
<tr>
<td>Lower than Bachelor*</td>
<td>57% 169,277</td>
<td>43% 129,631</td>
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</tbody>
</table>

* Vocational Certificate and High Vocational Certificate

Source
1. Office of the Higher Education Commission, Thailand
2. Office of the Education Council, Thailand
3. Office of the Vocational Education Commission, Thailand

Summarised by STI
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 18th, 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

Michelin

VEC STI
Talent Mobility Programme

To facilitate the mobility of researchers in governmental agencies and higher education institutions to industrial sector.

- **Industry** reimburses university
- **University/Research Institution**

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

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

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

**Government**

- **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**

* SMEs are exempt from reimbursement through MOST subsidy
International Cooperation
ASEAN Community 2015

10 nations
600 million people
Combined GDP of US$1.8 trillion
### The ASEAN Krabi Initiative

Science, Technology and Innovation (STI) for a Competitive, Sustainable and Inclusive ASEAN

Endorsed by ASEAN S&T Ministers at the 6th IAMMST as a policy framework for STI cooperation in ASEAN, December 2010

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<td>ASEAN 2015 – Vision of ASEAN Leaders</td>
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<td>Roles of STI – A Balance between Competitiveness and Human Development (People-oriented STI)</td>
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<tr>
<td>Reinventing ASEAN Scientific Community for a Meaningful Delivery of STI Agenda in ASEAN</td>
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<th>Thematic Tracks</th>
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<td>ASEAN Innovation for Global Market</td>
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<td>Digital Economy, New Media &amp; Social Network</td>
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<td>Green Technology</td>
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<td>Food Security</td>
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<td>Energy Security</td>
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<td>Water Resource Management</td>
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<td>Biodiversity for Health &amp; Wealth</td>
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<td>Science and Innovation for Life</td>
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<th>Paradigm Shift</th>
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<td>STI Enculturation</td>
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<td>Bottom-of-the-Pyramid (BOP) Focus</td>
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<td>Youth-focused Innovation</td>
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<td>STI for Green Society</td>
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<td>Public-Private Partnership Platform</td>
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<td>Organisational restructure for a meaningful delivery of STI agenda in ASEAN</td>
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<td>Develop mechanisms to pursue partnerships and cooperation with other stakeholders in STI</td>
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<td>Enhance ASEAN Plan of Action on S&amp;T for 2012-2015 and leverage the recommendations of the Krabi Retreat for development of future APAST beyond 2015</td>
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<td>Implement monitoring and evaluation mechanism for the implementation of STI thematic tracks</td>
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Endorsed by ASEAN S&T Ministers at the 6th IAMMST as a policy framework for STI cooperation in ASEAN, December 2010

Courses of Action

Organisational restructure for a meaningful delivery of STI agenda in ASEAN

Develop mechanisms to pursue partnerships and cooperation with other stakeholders in STI

Enhance ASEAN Plan of Action on S&T for 2012-2015 and leverage the recommendations of the Krabi Retreat for development of future APAST beyond 2015

Implement monitoring and evaluation mechanism for the implementation of STI thematic tracks
ASEAN and Dialogue Partners

- ASEAN-EU
- ASEAN-Russia
- ASEAN-US
- ASEAN-....

- 22% World GDP
- 18% World GDP
- 2% World GDP
- 9% World Population
- 31% World Population
- 50% World Population

ASEAN + 3
(China, Japan, South Korea)

ASEAN + 6
(China, Japan, South Korea, India, Australia, New Zealand) & International Organizations

Objectives:
• exchange views and experiences on talent management and development of STI human resources
• discuss policies and mechanisms to promote talent mobility in ASEAN and international brain circulation
• explore the potential of developing “ASEAN Talent Mobility (ATM)” Program as a platform for talent mobility among ASEAN and their partners

Participants
• Representatives from ASEAN COST
• Representatives from the private sector and universities
• ASEAN dialogue partners

Expected Outcome
A set of recommendations and plan of action for the ASEAN Talent Mobility (ATM) Program
Thank you for your attention.