



## Science Technology & Innovation: Policy & Management Perspectives

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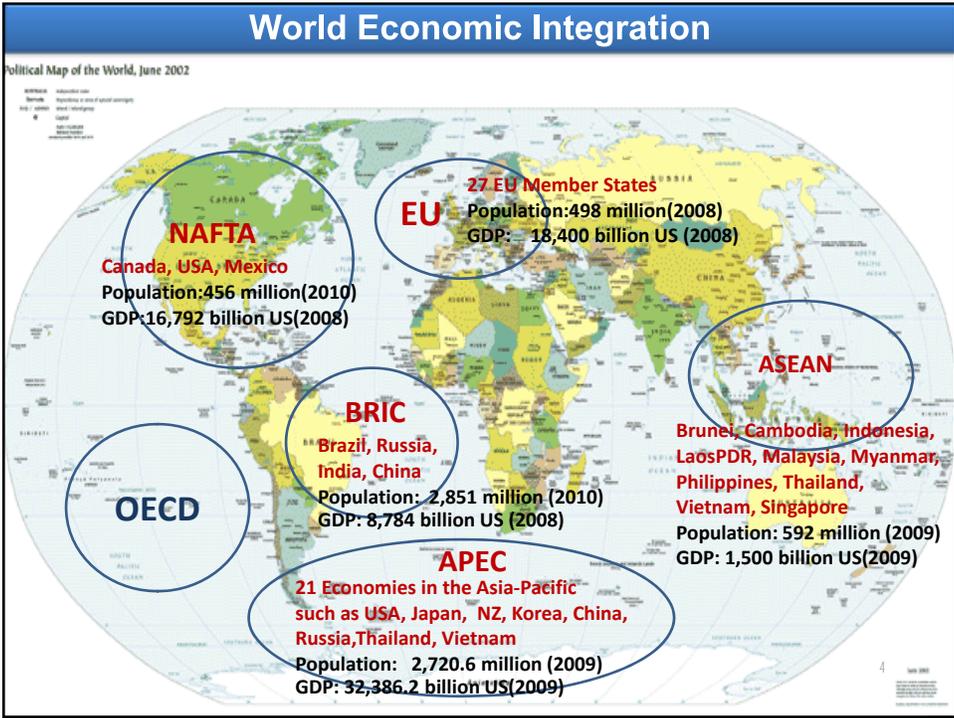
*PICMET'10 Conference*  
*Technology Management for Global Economic Growth*  
*Hilton Phuket Arcadia , Thailand, 18-22 July 2010*

### Thailand at a Glance

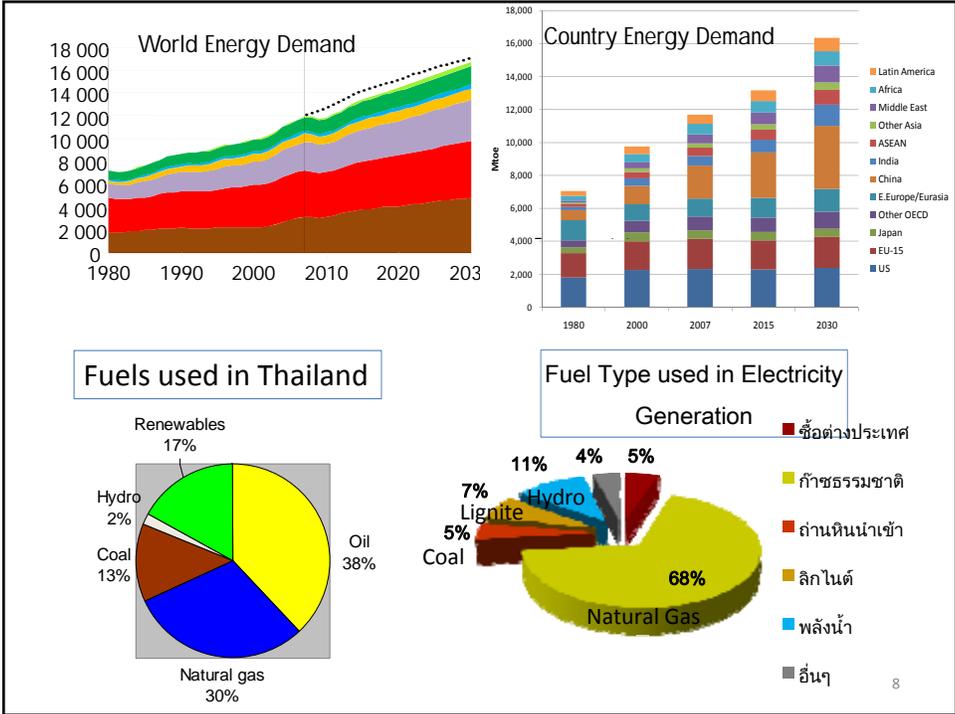
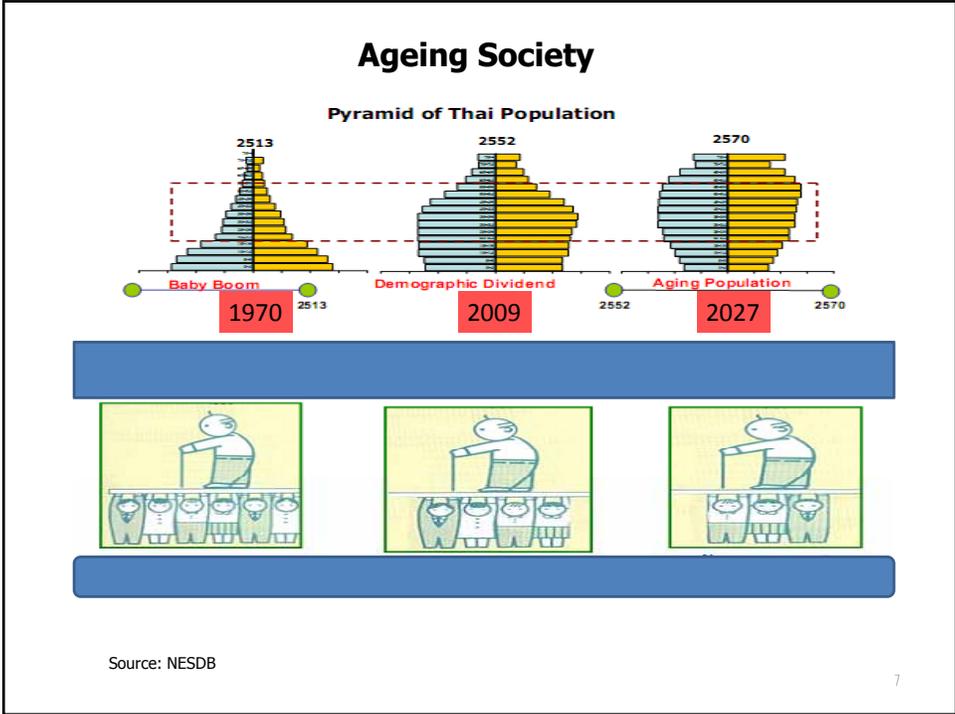


- Population 67.2 million
- GDP: Service 50%, Industry 40%, Agriculture 10%
- Export-led policy
- Strong reserve, relatively low unemployment
- FDI contribute to skills, technology and innovation
- Top rice and rubber export
- Manufacturing of MNCs & Local SMEs in electronics, automotive, jewelry etc.
- Strong service sector: tourism, health care, creative industry
- Logistics network of Greater Mekong Subregion

Thailand Economic and Social Development Plans	Policy Objectives
1 <sup>st</sup> Economic and Social Development Plan (1961-1966)	Raise the standard of living by means of greater <b>agricultural, industrial, and power production</b>
2 <sup>nd</sup> Economic and Social Development Plan (1967-1971)	Agricultural development, highways, irrigation, education, <b>Industrial development</b> in the private sector
3 <sup>rd</sup> Economic and Social Development Plan (1972-1976)	Improvements in the rural infrastructure, Growth in the financial and commercial sectors, Assistance to crop diversification and to <b>import-substitution</b> industries
4 <sup>th</sup> Economic and Social Development Plan (1977-1981)	<b>Decentralization</b> of industry, and economic growth from the capital region to the provinces
5 <sup>th</sup> Economic and Social Development Plan (1982-1986)	Reduce rural poverty and social tensions , <b>Expand employment</b> opportunities in the poorer regions
6 <sup>th</sup> Economic and Social Development Plan (1987-1991)	<b>Export promotion</b> , Less capital-intensive industries, Improve utilization of resources, Promote private sector investment
7 <sup>th</sup> Economic and Social Development Plan (1992-1996)	Redistribute income, Reduce poverty and <b>gap between rich and poor</b> , Develop human resource
8 <sup>th</sup> Economic and Social Development Plan (1997-2001)	Continue economic growth, Develop <b>human resources</b>
9 <sup>th</sup> Economic and Social Development Plan (2002-2006)	<b>Social protection</b> , Competitiveness, Governance, Environmental protection.
10 <sup>th</sup> Economic and Social Development Plan (2007-2011)	People-Centered Development, Balancing between the 3 capitals: economic, social , natural resources and environment, Leading to <b>Green and Happiness Society</b>







### Agriculture & Food Security



**WORLD'S RICE BOWL**  
Rice exports from ASEAN

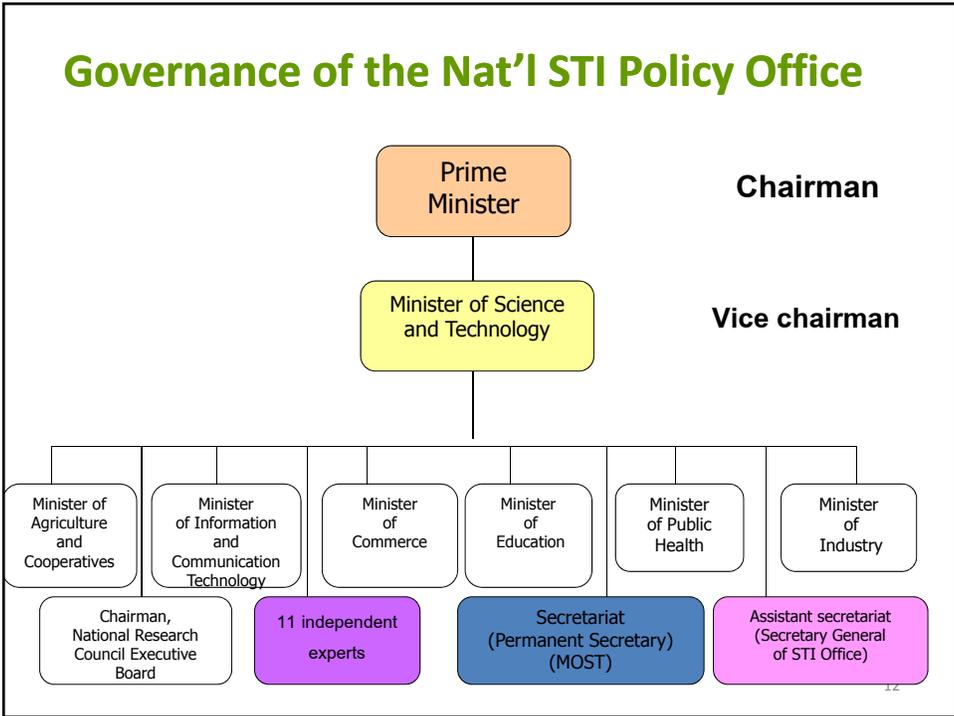
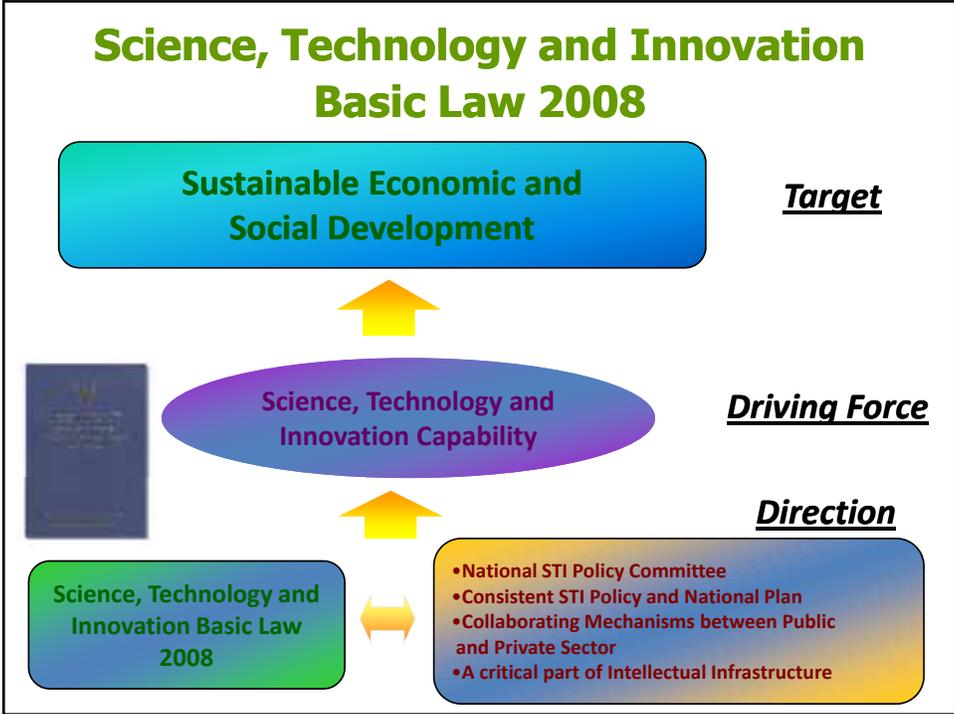
	2005/06	2006/07	2007/08	2008/09	2009/10
Thailand	1,235	1,027	10,598	8,850	10,500
Vietnam	4,735	4,550	4,849	5,660	8,660
Cambodia	350	430	500	400	500
Sumat*	47	38	94	63	1,400

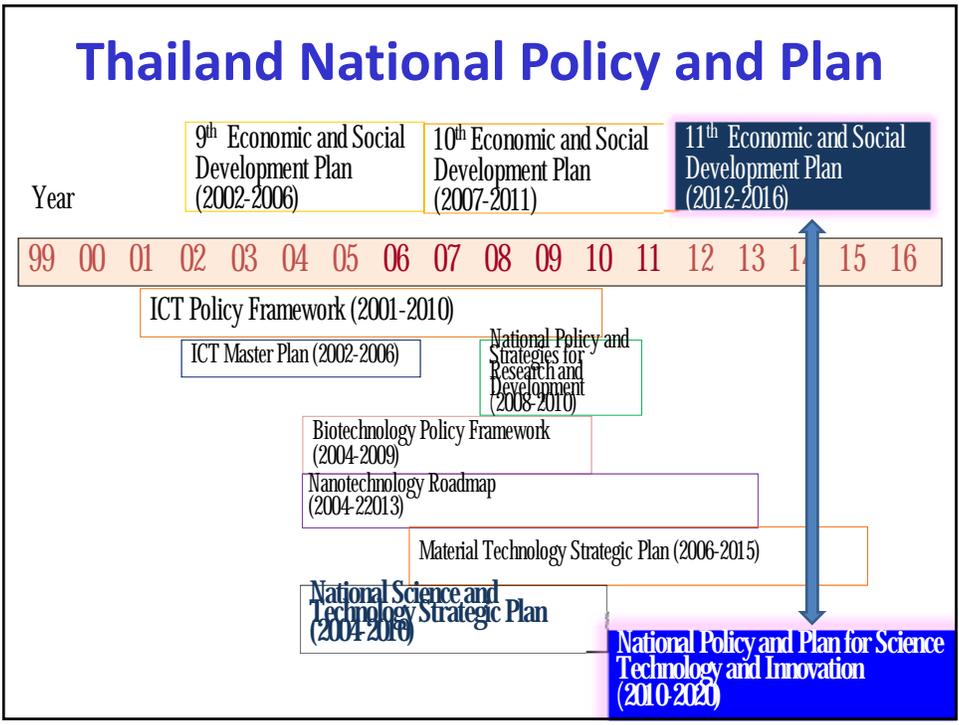
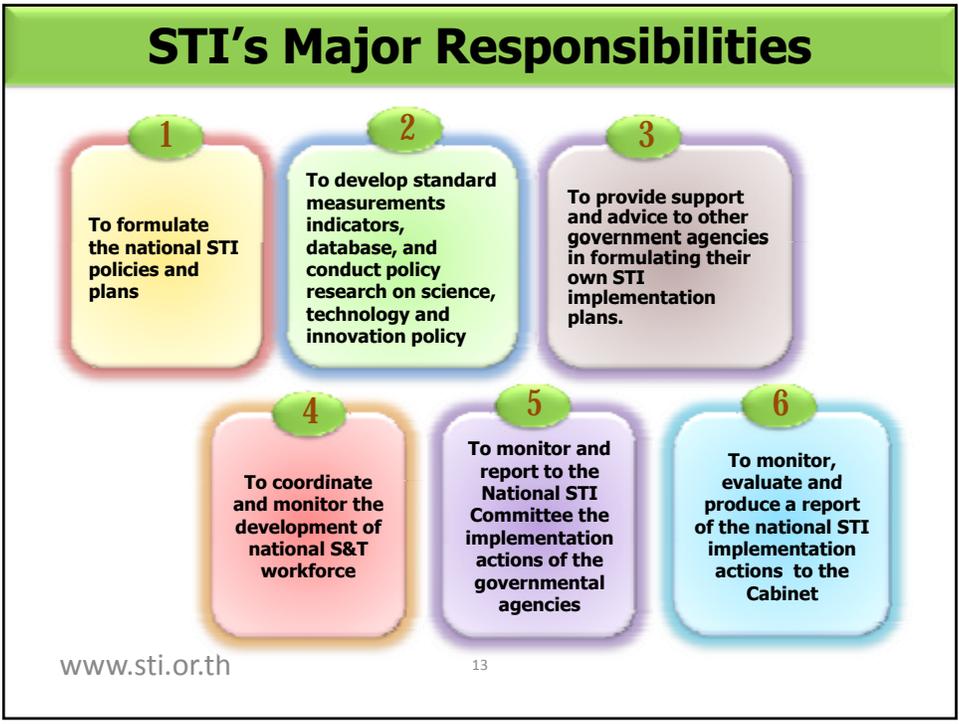
Note: \* Fiscal year is from April to March 31.  
Source: World Market & Trade, USDA, The Rice Exporters Association. (Unit: 1,000 metric tonnes)





Major Challenges on S&T in  
Thailand





## Science and Technology Indicators

### Annual Thailand's S&T Indicator Report



#### Seven groups of indicators related to S&T

1. National Competitiveness on S&T
2. Research and Development (R&D) Activity and Expenditure
3. Science and Technology Personnel
4. Technology Balance of Payment
5. Patents
6. Scientific and Technological Publication
7. Information and Communication Technology

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## Necessary & Sufficient Conditions

### Development of STI

- Research and Development
- Technology Transfer
- Innovation Policy
- S&T Workforce
- Infrastructure Development



### STI for Development

1. Society & Life Style
2. Economics and Trade
3. Geopolitics
4. Decentralization
5. Emerging diseases
6. Agriculture and food security
7. Energy
8. Climate Change
9. Emerging STI issues

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## Big Picture of STI

**System:** STI policy, rules & regulations, technology transfer, research institutes, research universities, intellectual property protection, financial incentive, government procurement

**Technical:** Basic science, applied science engineering technology, hardware, software, databases, labs

**Targets:** new & emerging industries, new businesses, economic growth, social development, quality of life, learning society, knowledge-based society

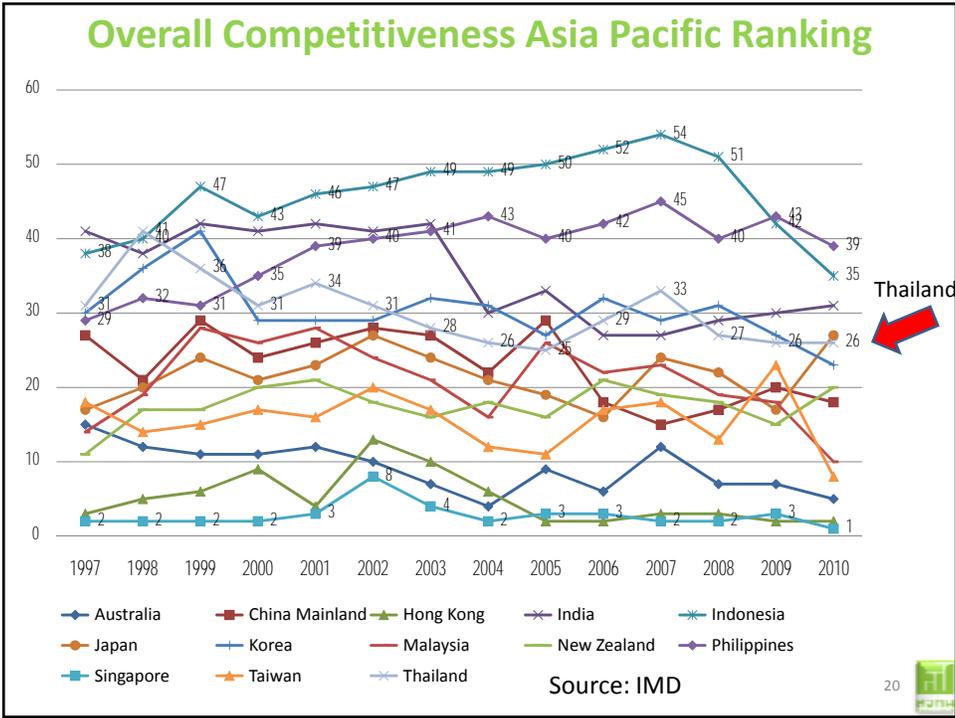
## STI: Policy & Management Perspectives

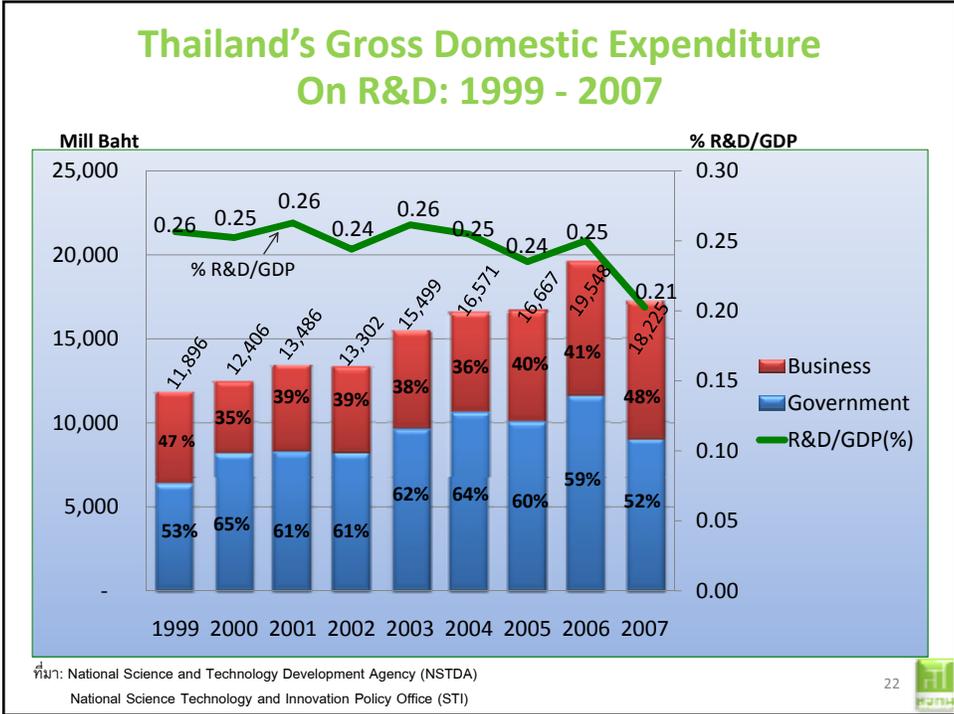
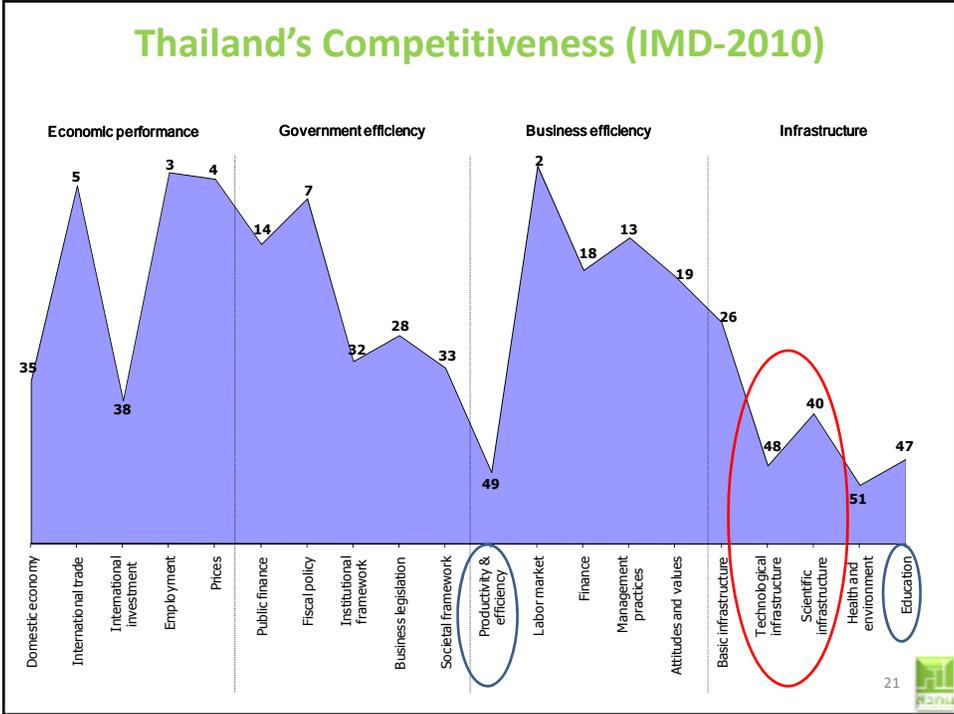
- The 1% R&D Threshold
- Manpower is Key
- STI Integration
- Role of University & Research Institutes
- Role of Private Sector
- Globalization Impact
- STI for the Small Guys
- Policy Focus, Management Installations

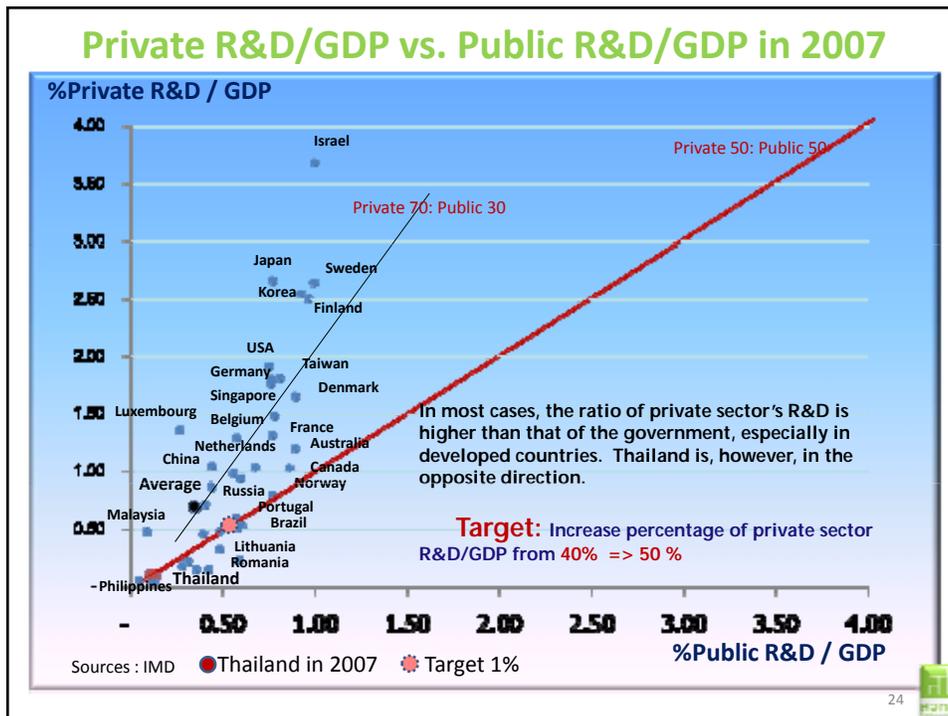
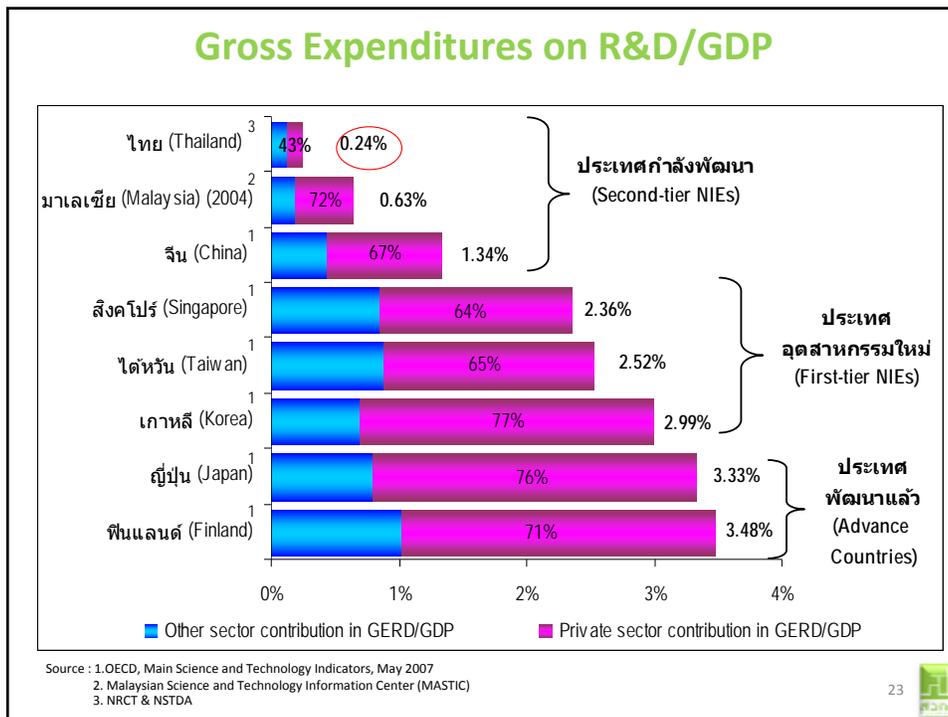
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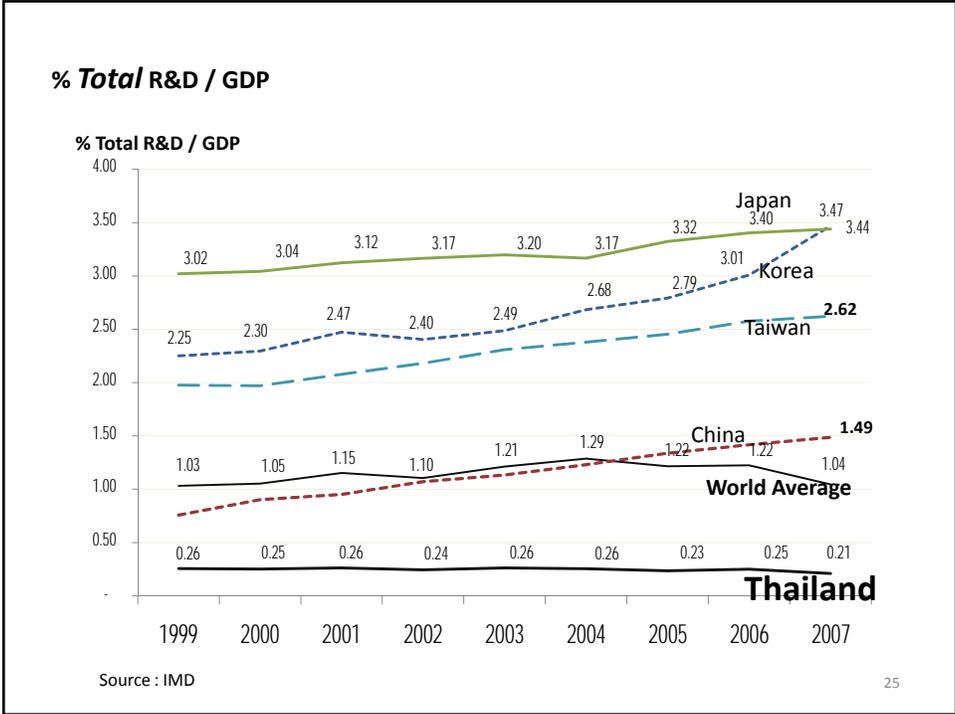
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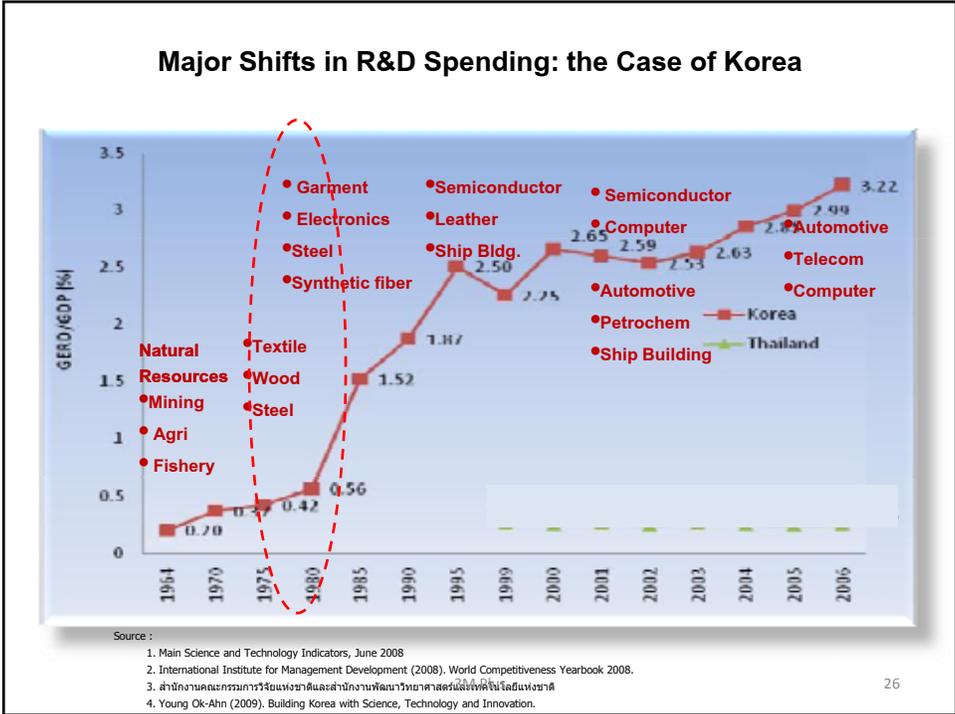






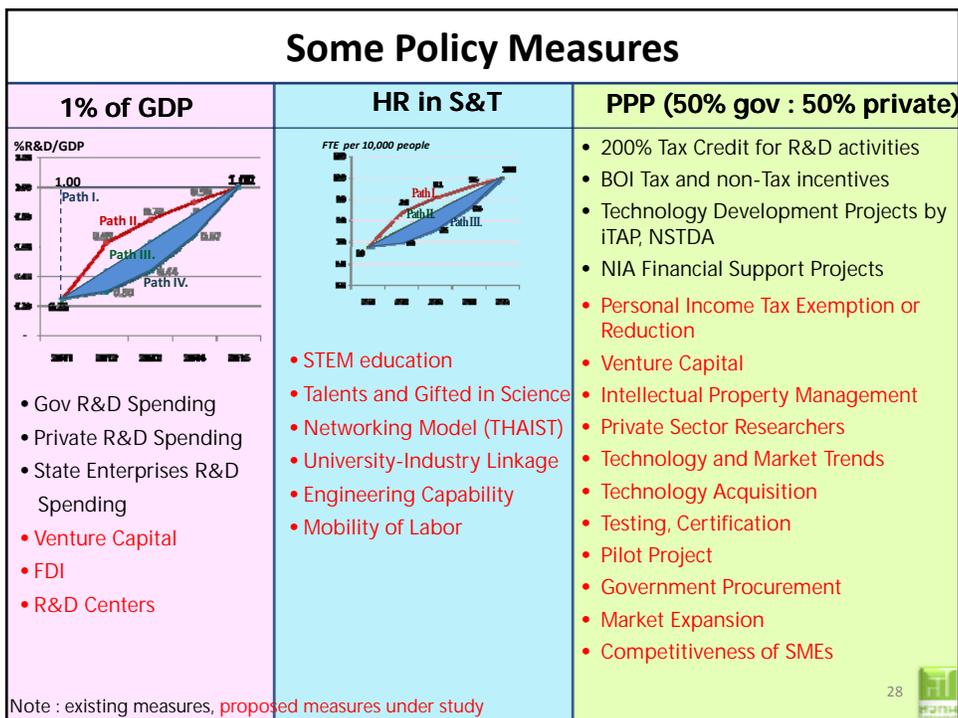


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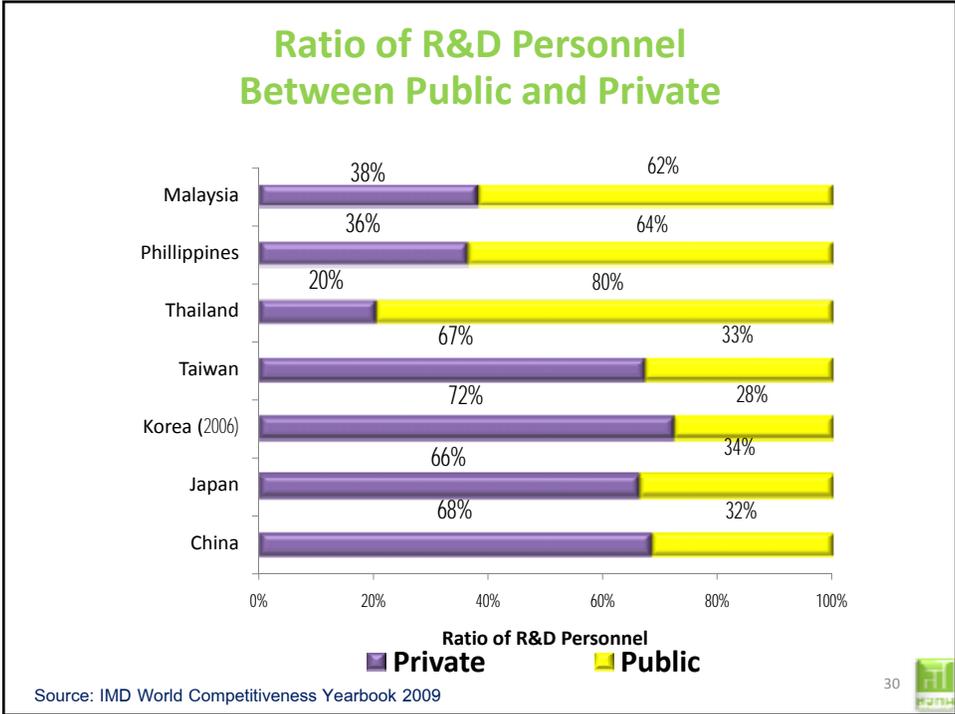
### 3 Main Goals to Increase Thailand's Competitiveness

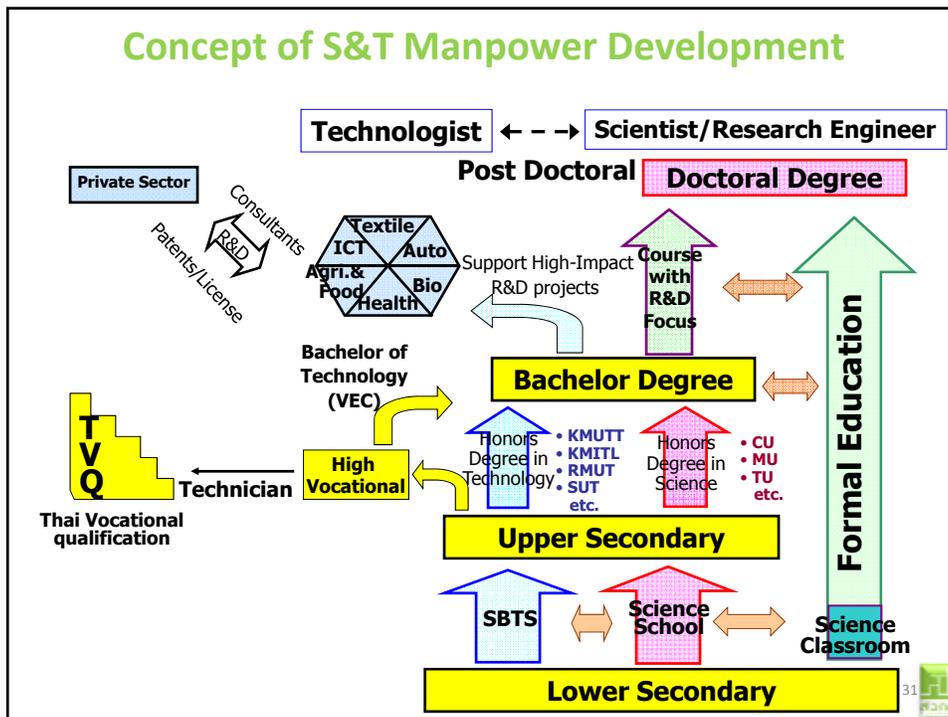


# Outline

- The 1% R&D Threshold
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- ### Examples of S&T Talents/Outstanding S&T Students Program
- Science Classroom in University-Affiliate Schools
  - Science-Based Technology School (SBTS)
  - Ministry of Science and Technology Scholarship Scheme
  - The Royal Golden Jubilee Ph.D. Program

## Concept of Science Classroom in University- Affiliate Schools

- To utilize a university S&T faculty capacity to help its affiliated school to develop a high quality S&T curriculum at the secondary level
- MOST supported budget to 4 universities to run a science classroom in its affiliated school, first batch (30 students per each school) start from May 2008 onwards.
- The support covers all necessary expenses such as tuition fees, extracurricular activities, etc.

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## Science Classroom in University-Affiliate Schools: University Support

- 1. Management:** policy direction
- 2. Academic:** develop curriculum, mentors, teaching, development of 'honors program' at graduate level, activities to enrich R&D skill, etc.
- 3. Infrastructure:** lab, classroom, dormitory

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## Science-Based Technology School

- Incubate talented vocational students in inventing technology by encouraging them to develop abilities and creativities in order to become [technology innovators](#) or [technologists](#)
- Collaborate with Vocational Education Commission (VEC), universities, industries and STI. Panthong Industrial and Community Education College was selected as the first pilot project of SBTS. All students stay in the dormitory.
- 
- Funded by VEC and STI. Tuition is free of charge for all students.
- Provide opportunity for further education in affiliated universities or in higher vocational educations.



## Goals of Science-Based Technology School

To produce graduates with academic background and high technology skills by [project-based teaching and learning](#) methodology. Students are to discover their selfness and capable of applying their technology inventing skills on their careers or higher education. Thus, promote the innovative technology of Thailand.

## Ministry of Science and Technology Scholarship Scheme

### 1. Scholarship Award (Overseas)

- Phase 1 (Year 1990-1995): 789 scholarships
- Phase 2 (Year 1996-2004): 1,199 scholarships
- Phase 3 (Year 2004-2009): 1,400 scholarships
- Phase 3+ (Year 2009-2013): 1,000 scholarships

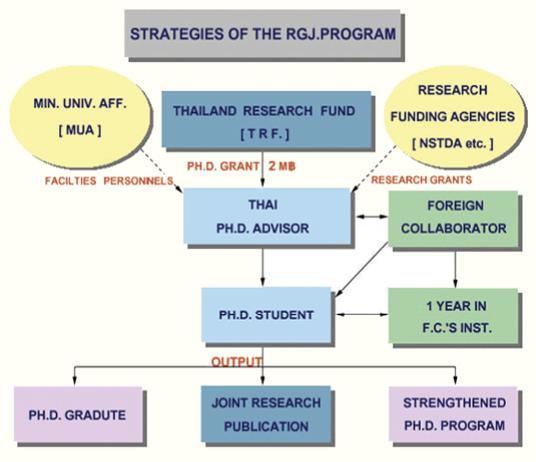
**Field of Study for Scholarship:** Metal and Material & Energy, Electronics and Computer, Biotechnology and Environment, Basic Science, Technology Management, Nanotechnology

### 2. Scholarship Award (Thailand)

- Phase 2 (Year 1996-2004): 100 scholarships
- Phase 3 (Year 2004-2009): 100 scholarships
- Phase 3+ (Year 2009-2013): 100 scholarships

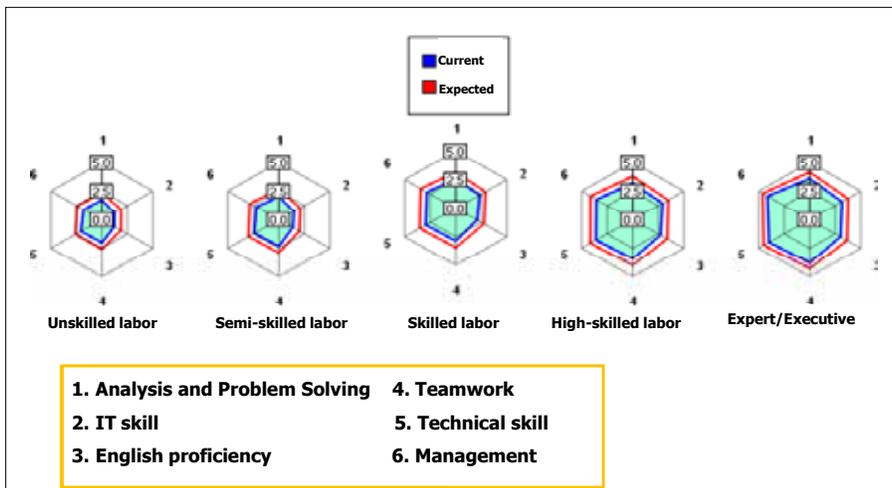
**Field of Study for Scholarship:** Metal and Material & Energy, Electronics and Computer, Biotechnology and Environment, Basic Science, Technology Management, Nanotechnology

## The Royal Golden Jubilee Ph.D. Program



- To attract talented students, the grants cover most essential items and there is no obligation to work for government agencies after completion of doctoral studies
- For the first ten years of the project (1998-2009), RGJ granted 2,436 Ph.D. scholarships (covering engineering, technology and environmental science, physical science, biological science, health science, agriculture, social science and humanities) and there were 1,224 Ph.D. graduates (data as of 31 January 2009).

## Labor Competency: Overall



Source: Thailand Development Research Institute

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## Major Integration Dimensions:

### Technology

- Multidisciplinary approach in R&D e.g. Clustering
- Innovation brings effectiveness into S&T
- Technology must reach out to society & environment

### Organization

- MOST as catalyst but all ministries must be involved, sometimes leading to national agenda setting
- Research Funding Agencies >> National Research System

### Management

- Universities-Industries Linkages
- R&D management, IP Management, Marketing, Commercialization, Rural Development & STI

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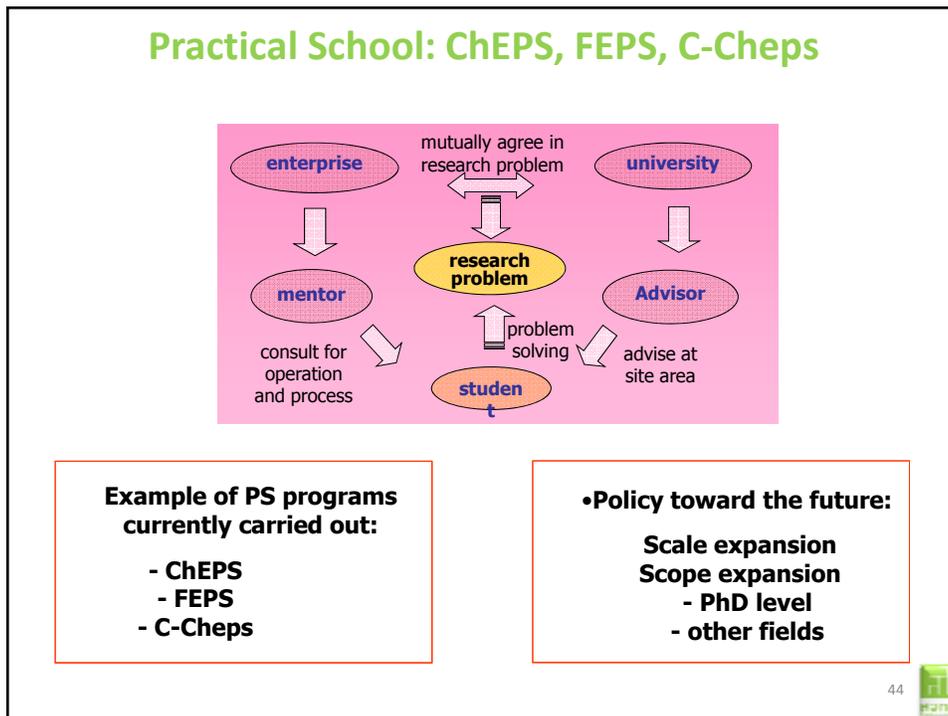
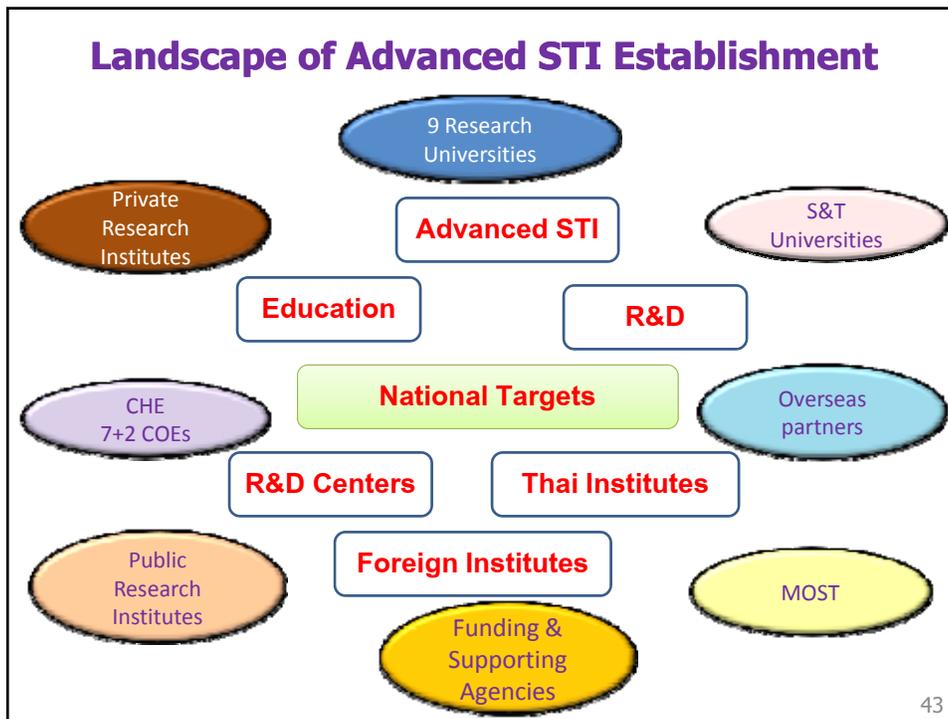
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## Cooperative Education: RMUTT

- The students have to do the internship according to their field of study in the organizations (6 credit-course lasted for 16 weeks).
- Graduates from this program will be well-qualified to suit the need of the industrial sectors
- Since year 2001, there were 3,000 students and 1,200 firms participating this program.



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## Early Recruitment: Hard Disk Company

### Objective

- To recruit qualified engineers (knowledge and skill meet needs of industry) who are capable to work once they graduate.
- To get research projects on hard disk drive from scholarship students.

### What scholarship students must do

- Enroll the subjects as identified by faculty and industry
- Attend training on site during school holidays.
- Do senior projects on hard disk drive.

### Opportunities after graduation

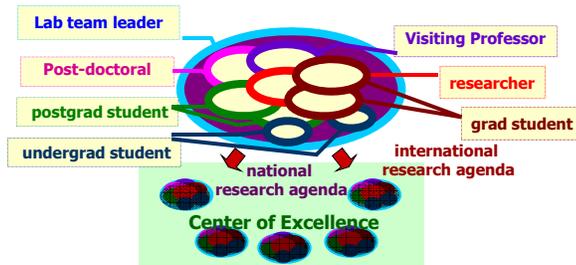
- Scholarship students will get job offers with company after graduation.

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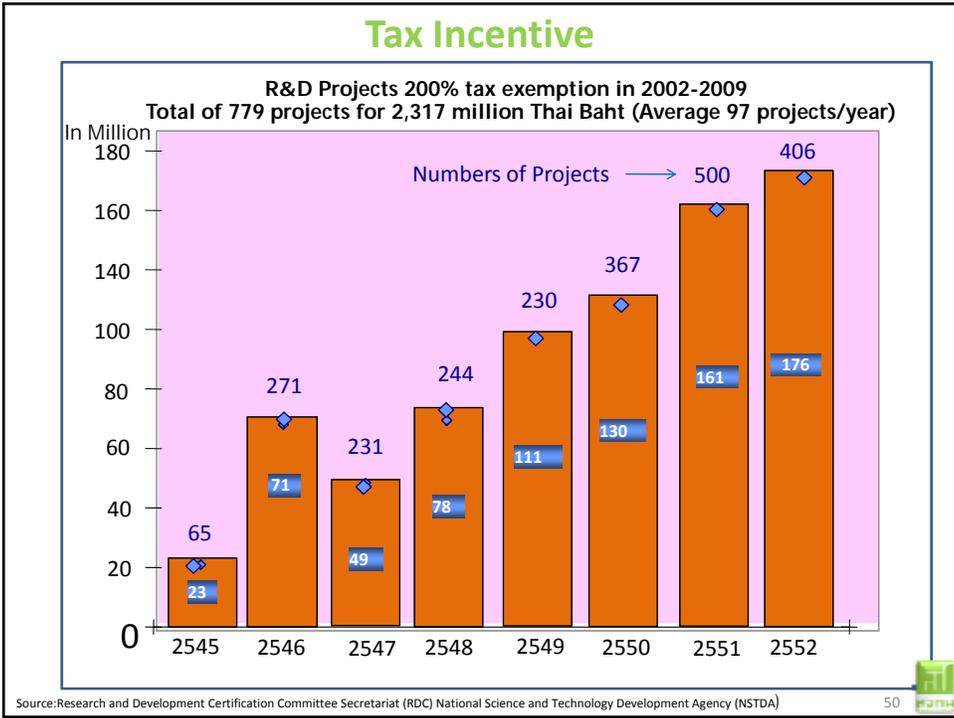
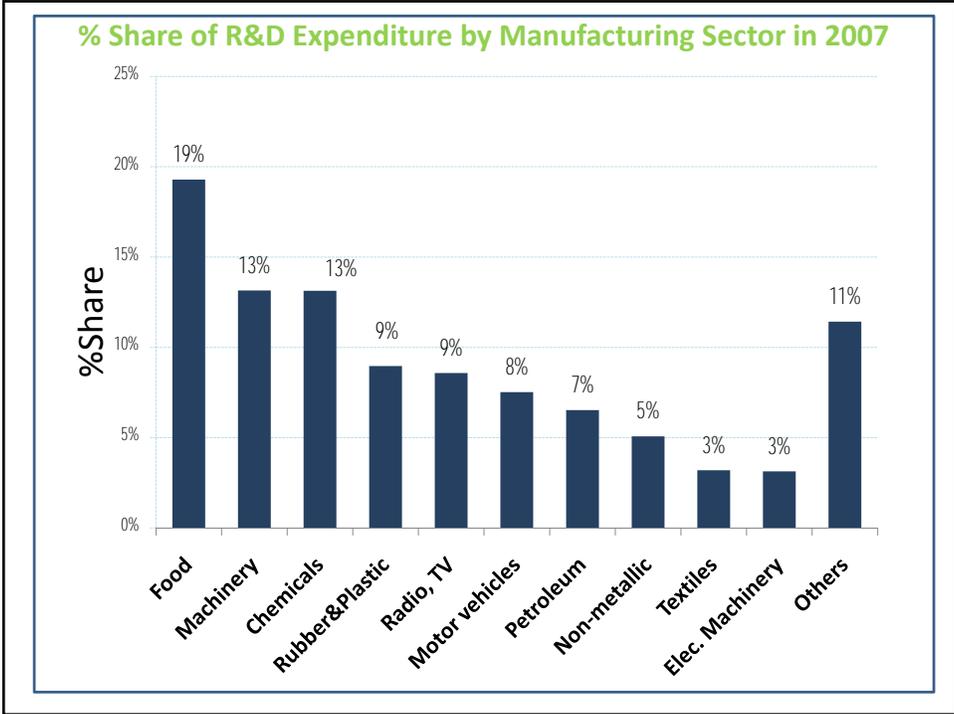
## Center of Excellence (COE)

- to increase R&D capability in productive sectors through consortium of S&T researchers
- to ensure sufficient supply of quality S&T researchers
- to develop graduate and postgraduate program focusing on research activities
- to culture industry-university-link tradition in Thailand and stimulate emergence of spin-off companies



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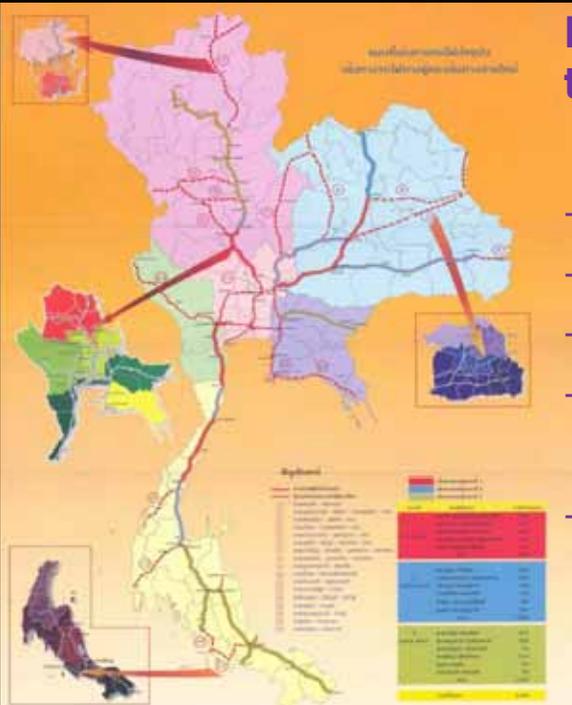
## Private Sector-Led STI: Requirements

- Incentive system
- National targets: industries, mega projects
- Government procurement
- Professional researchers in private enterprises
- Capacity building for SMEs
- Pilot plants, Testing facilities, Demonstration projects



## Rail System Technology and Human Resource Development





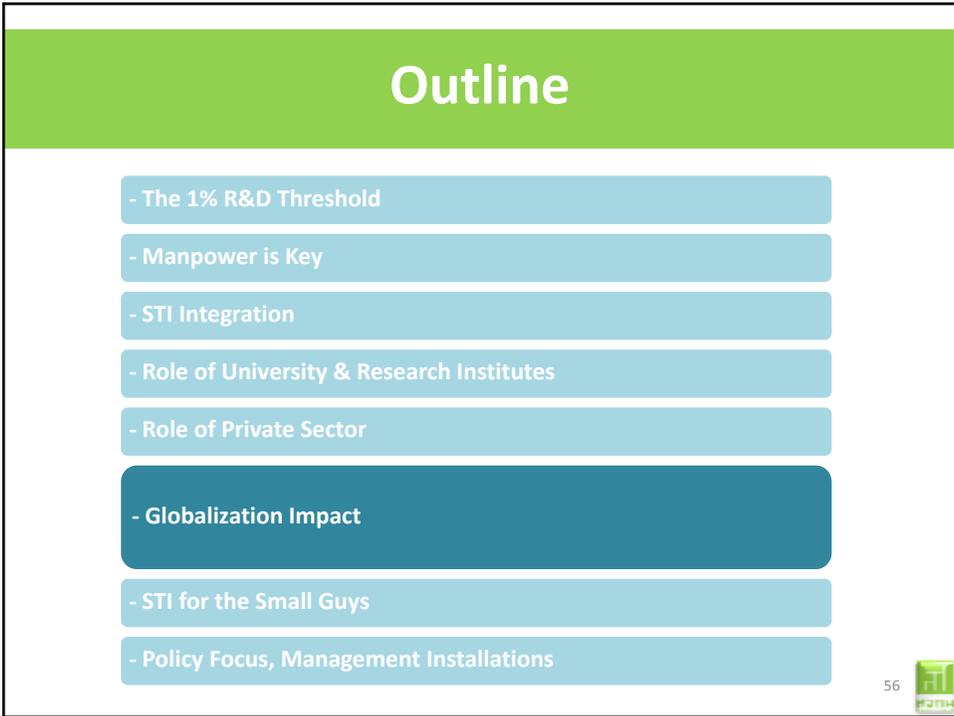
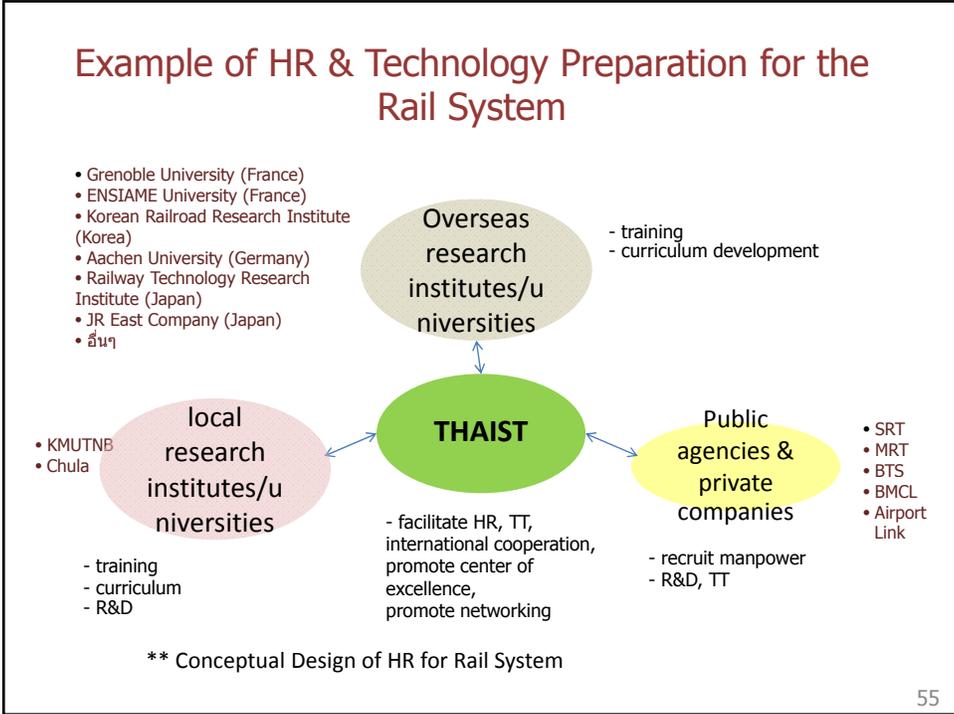
**Rail system of the future**

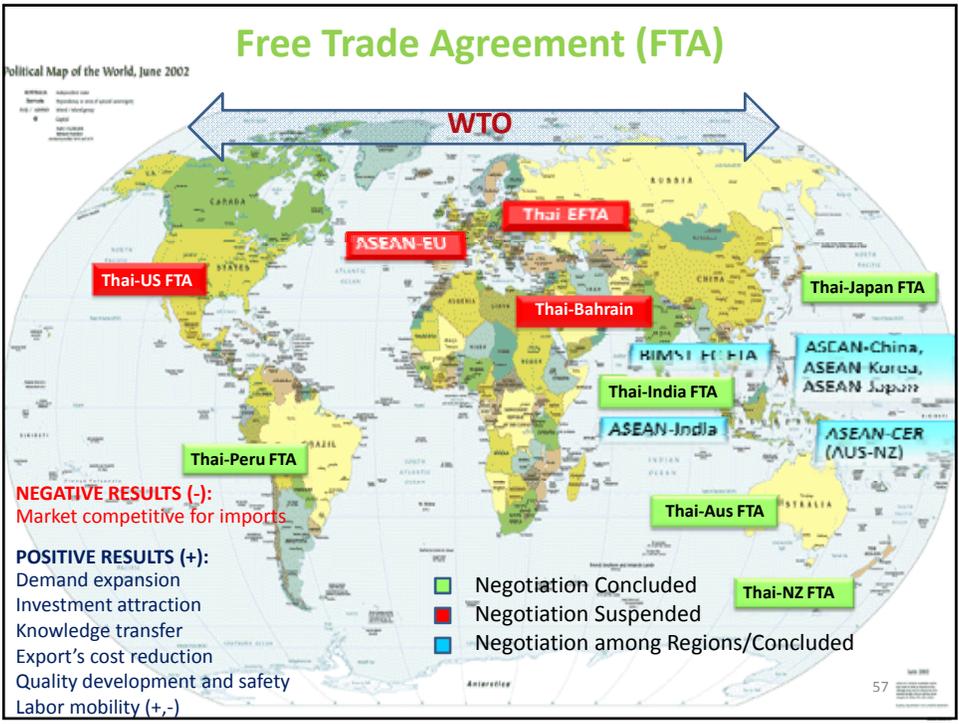
- Logistics cost
- Energy conservation
- Green Environment
- Efficient transport system
- Investment, industry, employment

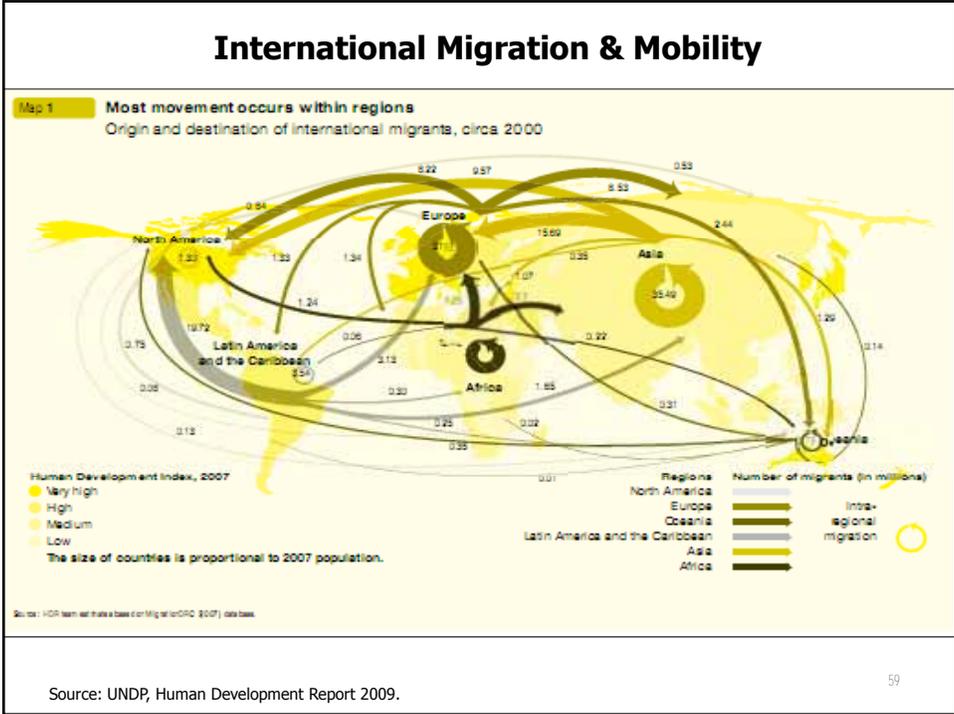
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### Rail System Development

- Plan is to invest & construct electric train in metropolitan Bangkok and improve the rail system nationwide
- Duration 10-20 years
- Investment \$30b
- Technology involved: rolling stock / signaling / track work / electrification / civil work / air-conditioning / lighting



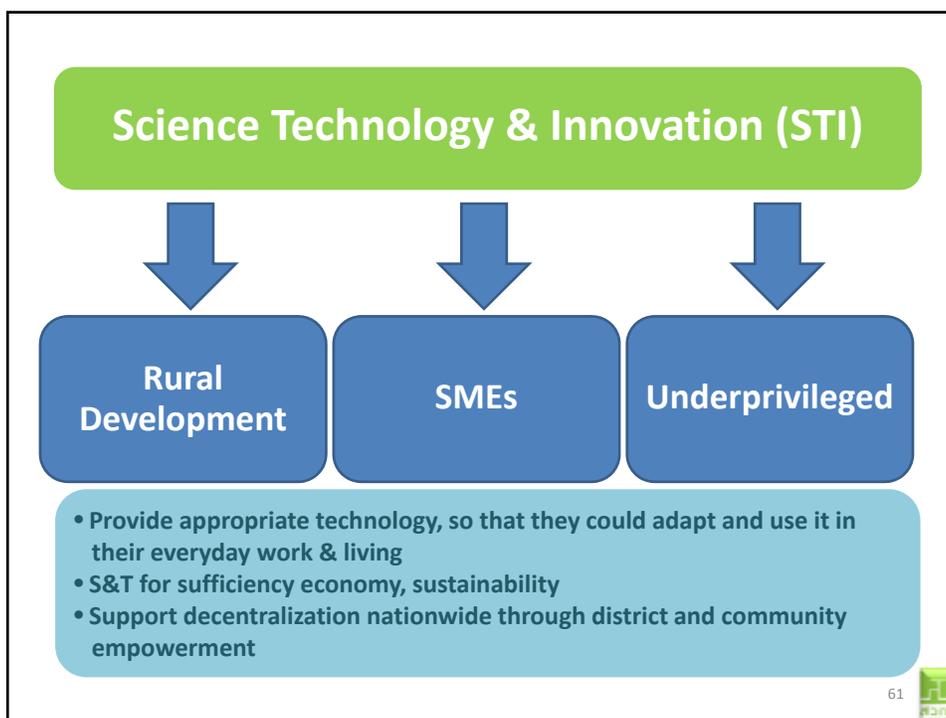




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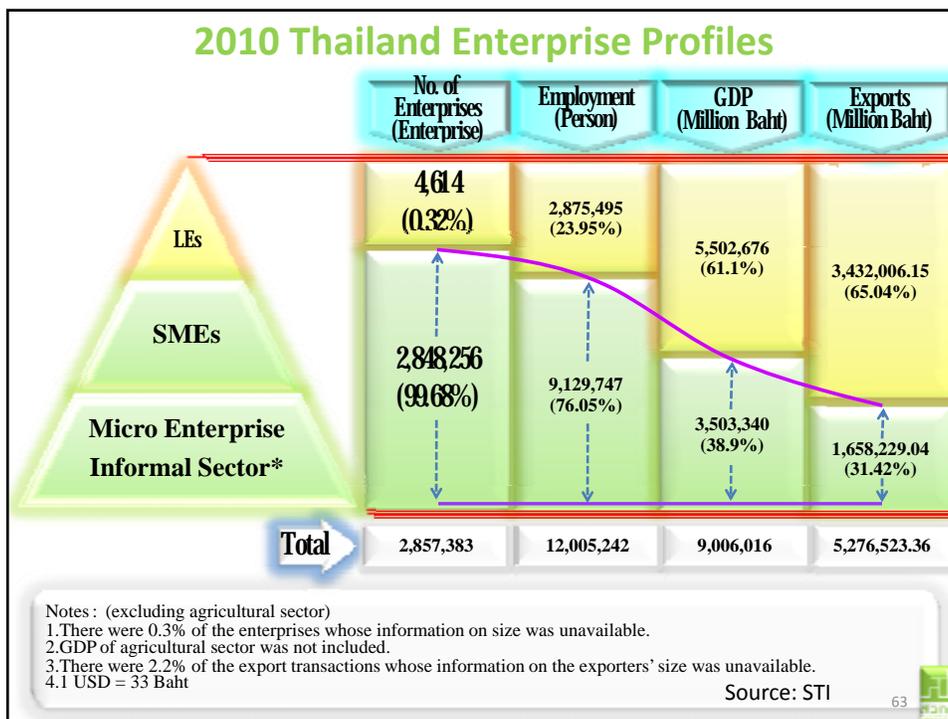
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**Rural Development**

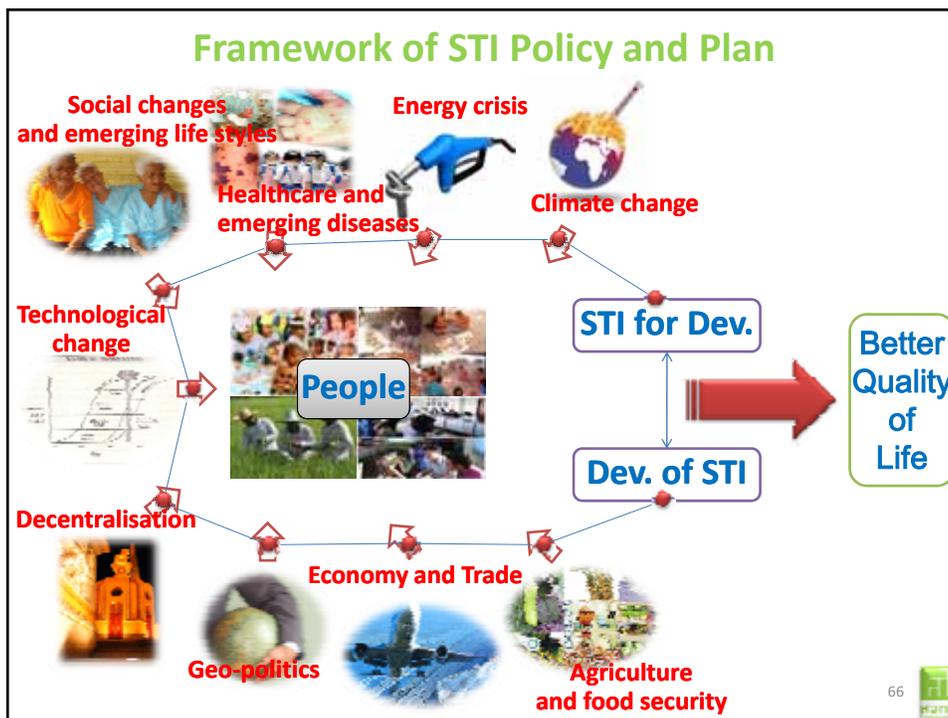
- Science & Technology @ Village Level
  - STI policy to encourage R&D projects in rural areas.
  - Implemented R&D projects will increase employment, financial needs, quality of life, and possibly commercialization.
  - Self-reliance & sufficiency economy is crucial for sustainability.
  - Tripartite cooperation & arrangement:
    - Central govt/agencies;
    - Local Universities;
    - Local Administration

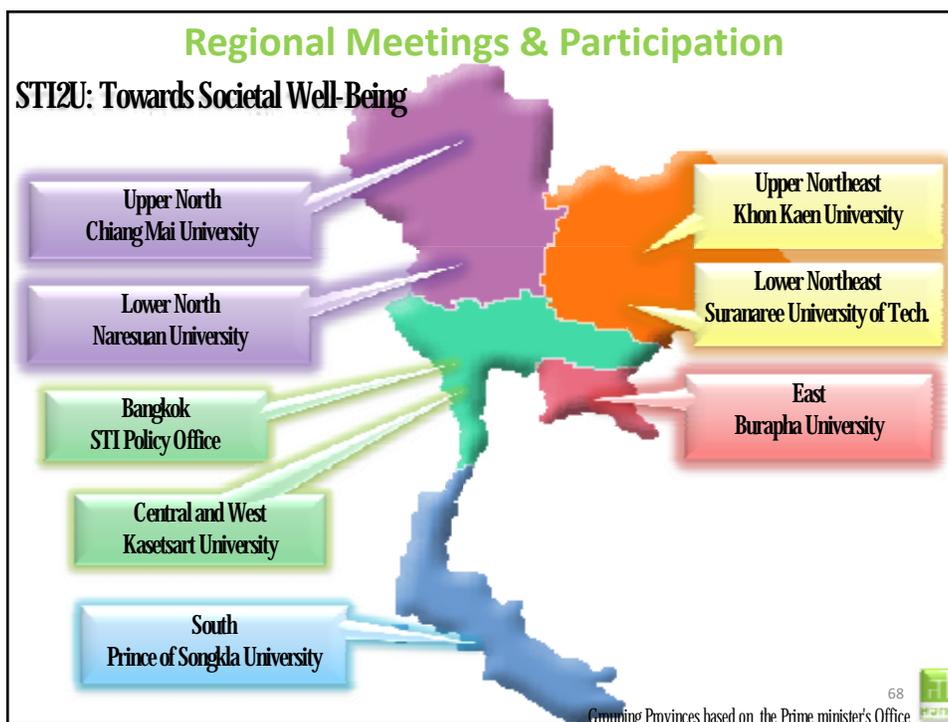
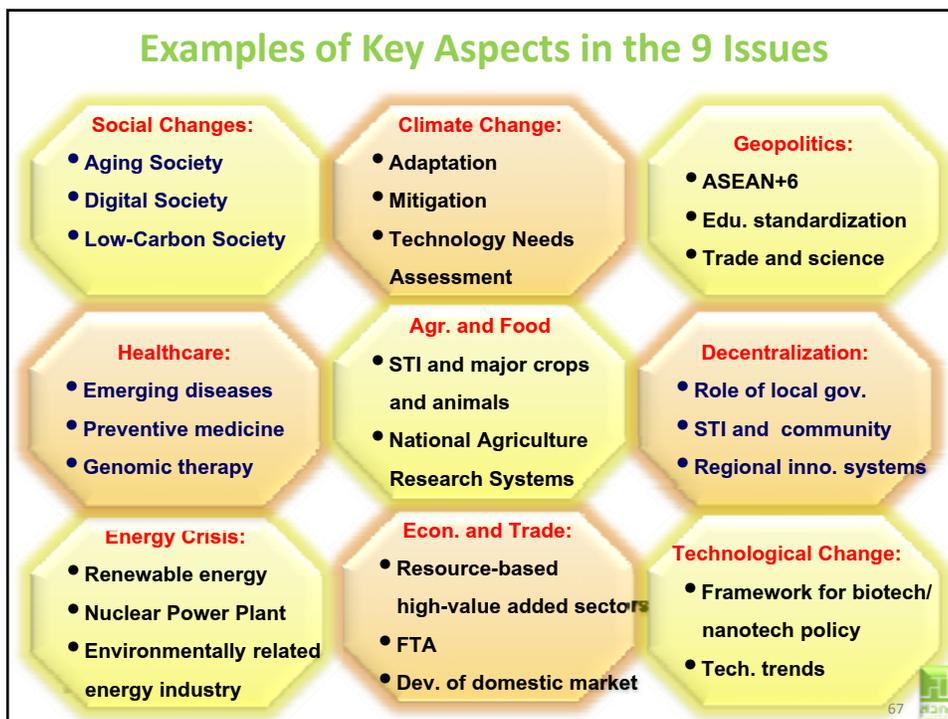
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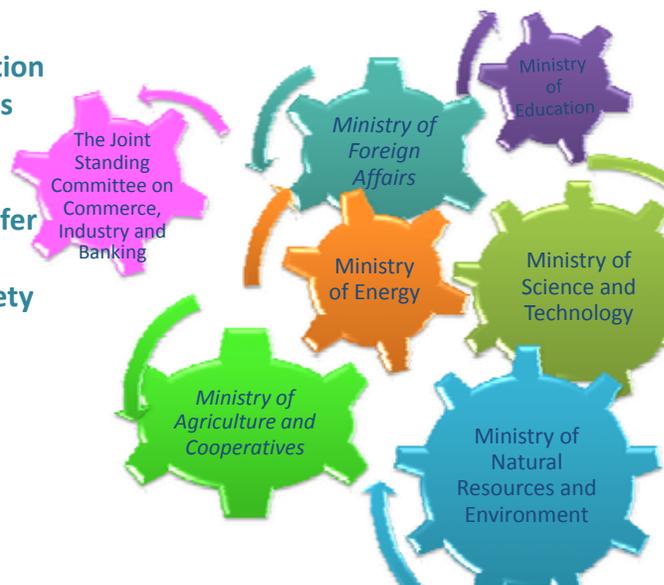
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## Cross-Ministry Policy and Management on Climate Change and Energy Security

- UNFCCC Negotiation
- Technology Needs Assessment for Thailand
- Technology Transfer and Development
- Low Carbon Society Scenario Building



## STI: Policy & Management Perspectives

- The 1% R&D Threshold : **Investment**
- Manpower is Key : **Human Resources**
- STI Integration : **Management**
- Role of University & Research Institutes : **Organization**
- Role of Private Sector : **Key Stakeholders**
- Globalization Impact : **Environment**
- STI for the Small Guys : **Social Equity or STI for All**
- Policy Focus, Management Installations : **Strategy & Action**

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## THANK YOU

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