Two Models of RTOs in Asia

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Two Models of RTOs in Asia

- Model A: Stimulating and assisting accumulation of technological and innovative capabilities 'within' firms
  - firms = main actors; RTOs = intermediaries
  - Japan (AIST), Taiwan (ITRI), Korea (KIST)
- Model B: Building up technological capabilities 'on behalf' of firms
  - RTOs and universities = main actors (producers of capabilities); firms = users
  - Many developing countries in Asia (and others)

Model A: Characteristics (1)

- Roles: evolved along the level of technological capabilities development of 'latecomer' firms

Engineering → Design → Development → Research

  - initially focused on helping firms increase their 'absorptive capacity' and facilitating learning processes
- Clear-cut mission and high degree of specialisation
- Management: experiences in private sector

Model A: Characteristics (2)

- Considered as ‘technological development arms of key economic ministries (e.g. Japan’s MITI, Taiwan’s MOEA)
- Technological transfer mechanisms: going beyond ‘linear model’ e.g. R&D consortium, spin off, personnel mobilization with industry
- Revenues: increasingly coming from industry and government’s ‘competitive bidding’ projects

ITRI: an Example of Model (A)

Status

- An amalgamation of three Ministry of Economic Affair (MOEA)'s laboratories in 1973
- Non-profit research and technology organisation
- Responsible to and partially funded by MOEA, a key economic ministry

Vision

- To become a leading resource of industrial development

- To be a world-class industrial technology research institute

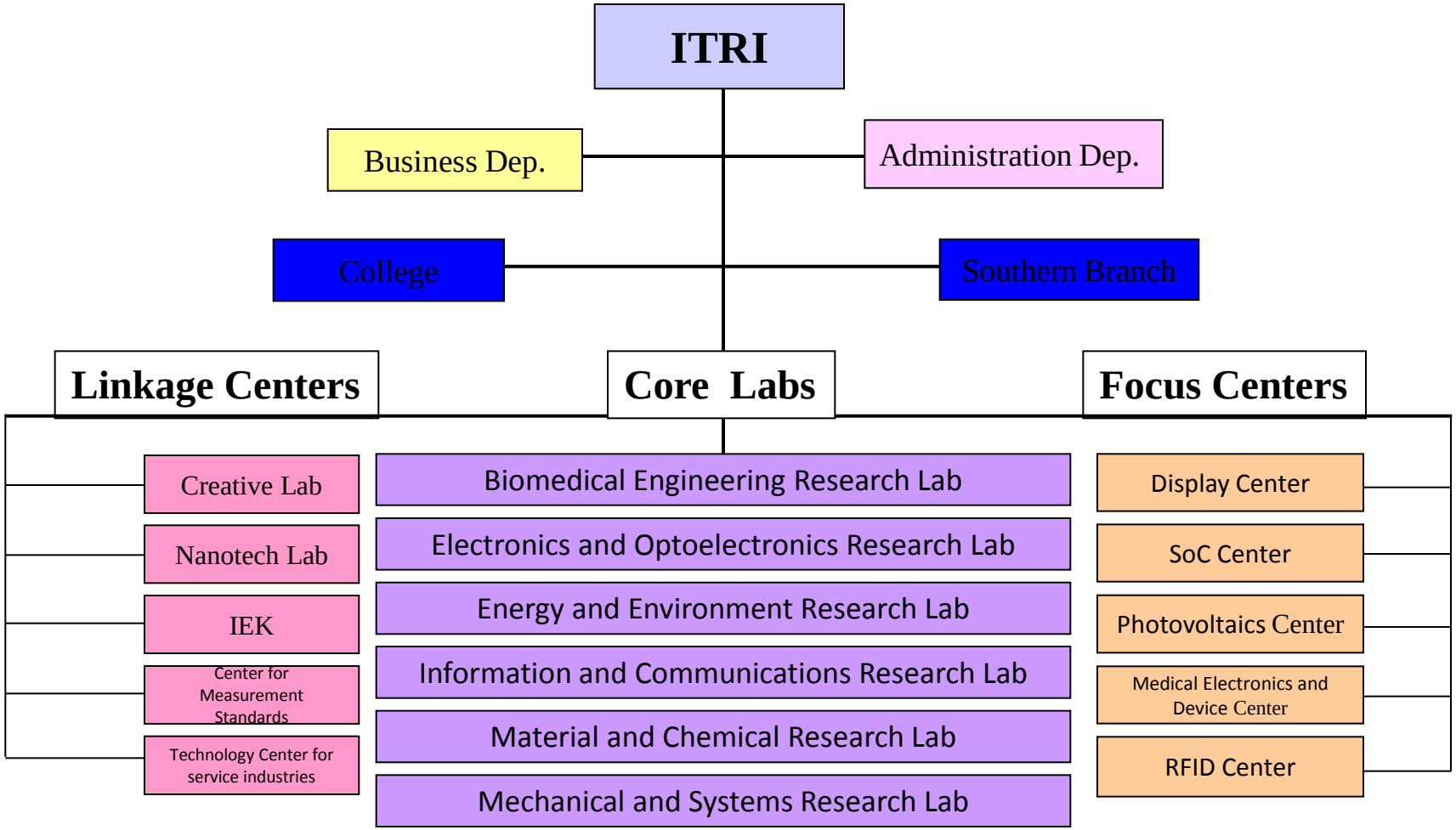
Mission

- To engage in **applied research and technical services** to accelerate the industrial development of Taiwan
- To develop key, compatible, forward-looking **technologies to meet industrial needs** and strengthen industrial competitiveness
- To **disseminate research results to the industrial sector** in a timely and appropriate manner, in accordance with the principles of fairness and openness
- To foster the **technology development of SMEs** and cultivating industrial technology human resources for the benefit of the nation

ITRI's Changing Focuses

- Change according to needs and capability levels of local industries
- during1970s-early 1990s focused on diffusing leading *foreign* technologies, especially in manufacturing, via R&D consortium and spin-off
- From late 1990s: more on helping local firms build up R&D capabilities and develop leading-edge products via ITRI's incubation open lab and venture capital programs

ITRI Organization



Finance

- Aim to have half of income from government and half from research and service contracts with the private sector
- After 23 years (in 1995), 20 % of ITRI's income was from the private sector
- Total income was US$ 475 in 2002 (50% government research projects, and 50% industrial contract services)

Management Strength

- Several board directors and executives have worked extensively in the private sector
- Some worked for world-class firms abroad and still maintain close links
- Has foreign offices in San Jose, Tokyo and Moscow

Major Achievements

- Establishing new high-tech industries such as semiconductors, ICT, Optoelectronics
- Upgrading traditional industries e.g. automotive, precision machinery, textile
- HR mobility is a key knowledge transfer
- 15,000 ITRI employees left ITRI and brought their talents into industrial fields in 30 years
- 5,000 former ITRI’s employees are now working for private companies in Hsinchu Park

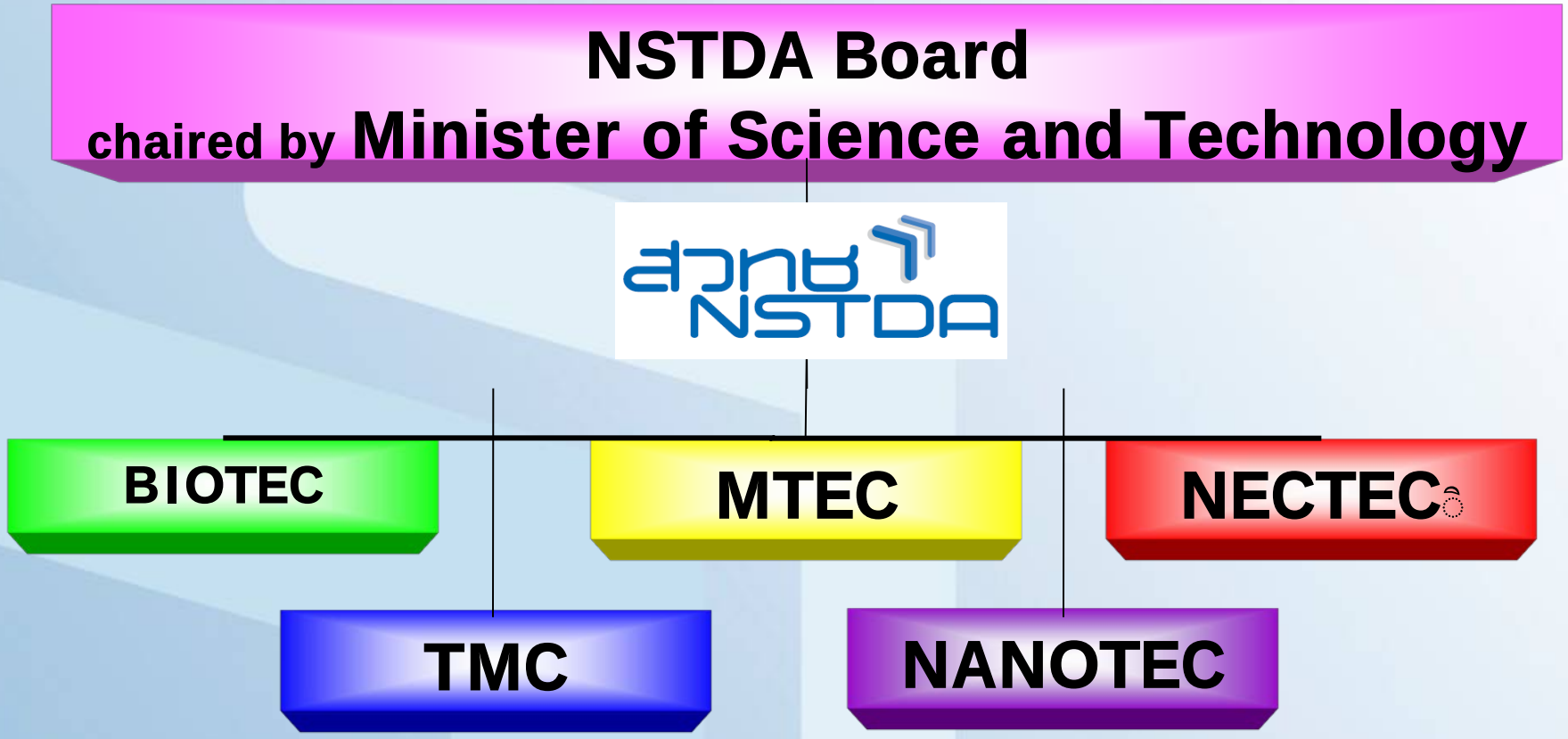
Period	Level of Technological Capabilities of Local Firms	Roles of ITRI	Supporting Instruments
1970s - early 1980s	Only basic operation capabilities but not design and engineering. Insufficient absorptive capacity.	Acquiring foreign technology through licensing in. Then carrying out R&D to understand, assimilate and adapt such technology. Then setting up new companies through spinning off	Spinning-off to create start-ups such as United Microelectronics Corporation (UMC) and Taiwan Semiconductor Manufacturing Company (TSMC), which later became world-class companies
1980s -early 1990s	Gaining design and engineering capabilities.	Acting as an intermediary to set up R&D consortium with local companies. The consortium conducted joint research leading to prototypes which were subsequently developed further to be commercial products by each participating firms.	R&D consortium such as R&D consortia of notebook producers and R&D consortia of High Definition TV (HDTV) producers
late 1990s- present	Having R&D capabilities. Emerging of techno-preneurs interested in	Strengthening R&D capability and R&D management of firms.	'Open Lab' allowing SMEs to use incubator to nurture start-

Model B: Characteristics

- Role: mainly focused on R&D with little industrial relevant. Not responding to changing needs of industry
- No specialisation (Jack of all trade but master of none)
- Management: by scientists with very limited industrial experience
- Not under or closely related to key economic ministries
- Linear model technology transfer
- Limited HR mobility with the industry
- Relying on annual government budget

NSTDA: An Example of Model B

(established by a special law in 1991)



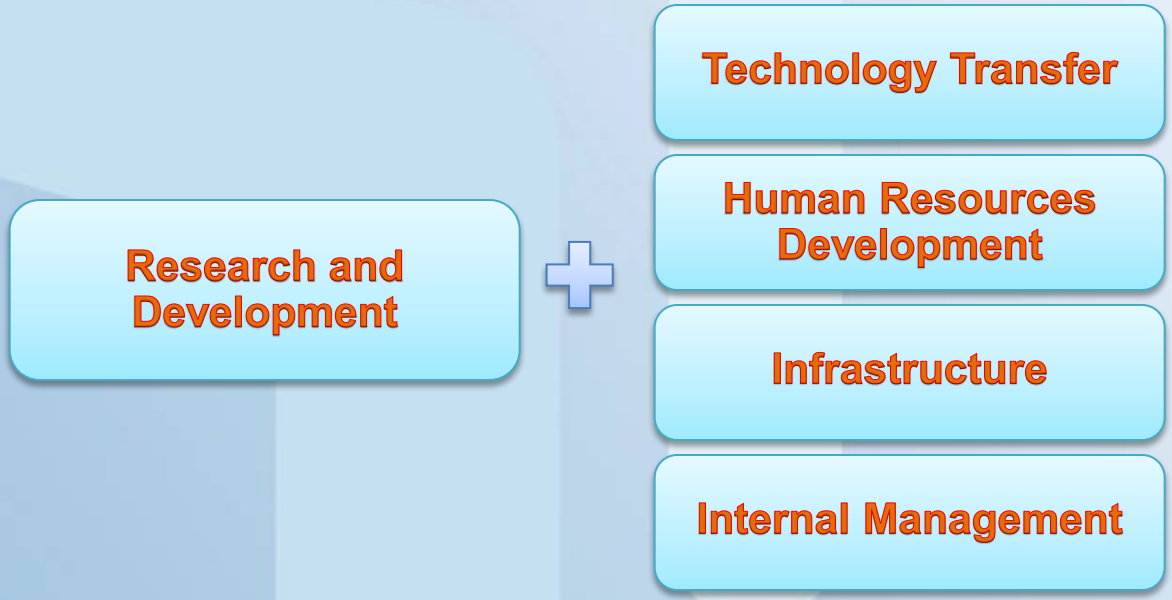
BIOTEC : National Center for Genetic Engineering and Biotechnology
MTEC : National Metal and Materials Technology Center
NECTEC : National Electronics and Computer Technology Center
NANOTEC: National Nanotechnology Center
TMC : Technology Management Center

Vision

NSTDA: A Key Partner for a Knowledge-based Society through Science and Technology

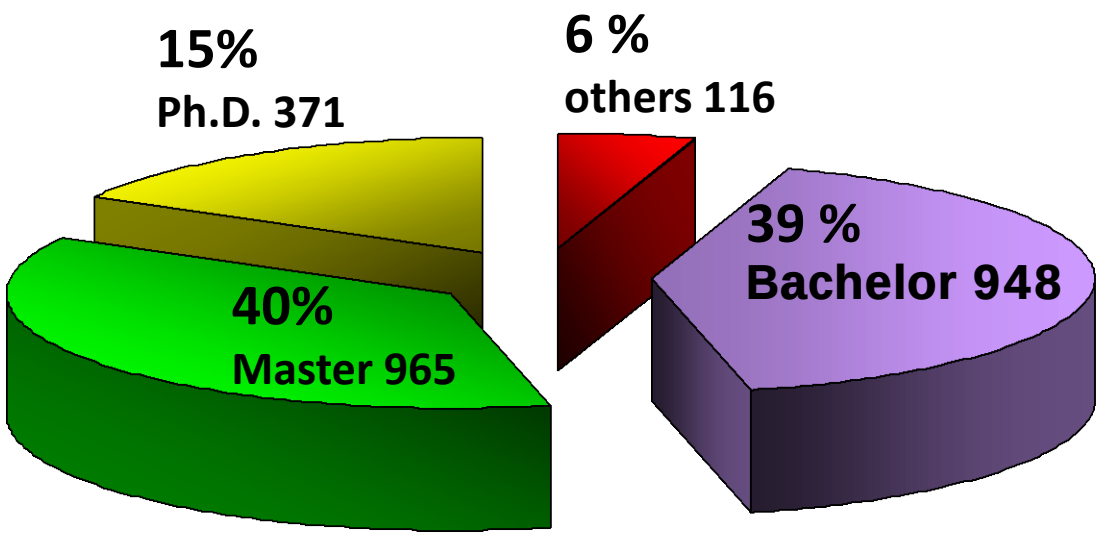
Mission

NSTDA's main mission is research and development to strengthen Thailand's sustainable competitiveness, complemented with the technology transfer and development of human resources and infrastructure in science and technology with the outcomes that have impacts on the society and economy.



Resources

Personnel



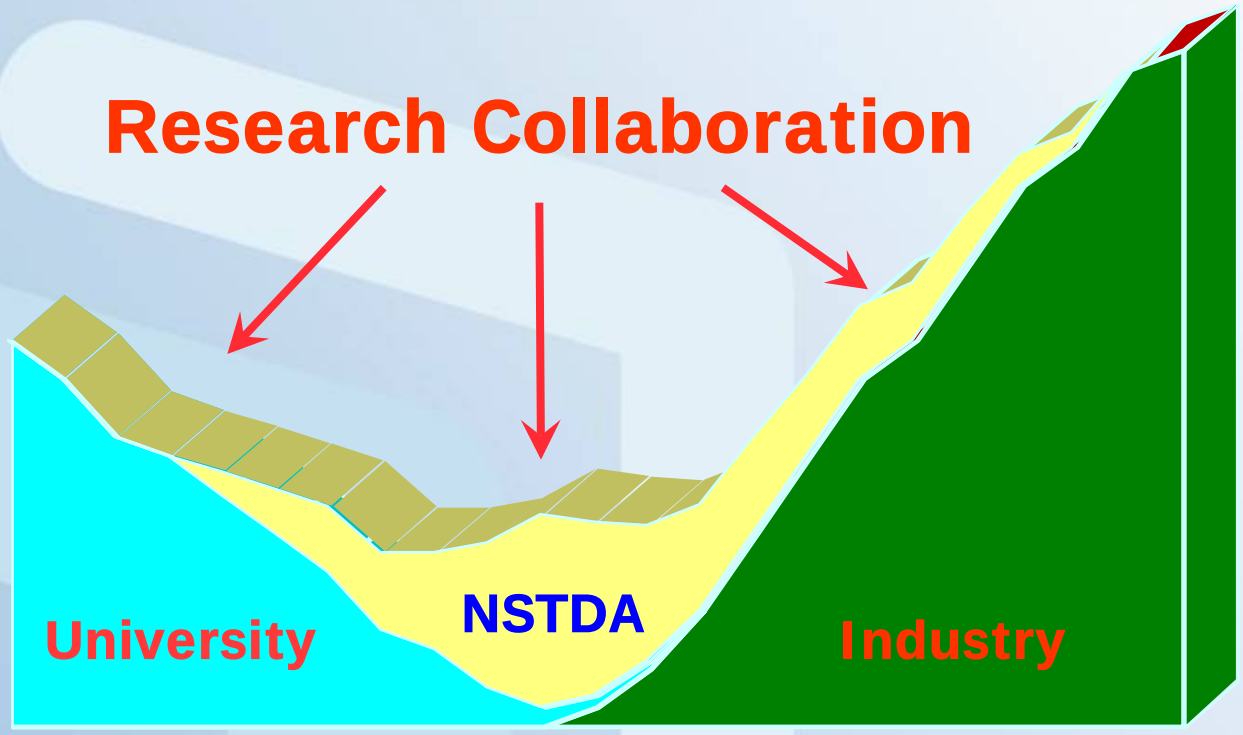
Total 2,420

(as of May2, 2008)

Government Budget

Year	Baht (Million)
2003	1,700.90
2004	2,201.78
2005	2,174.82
2006	3,021.42
2007	3,495.32
2008	3,606.00

NSTDA Position



Basic Research

R & d

R & D

r & D

Technology Development

Organisational Behaviour

- Strong path dependency:
  - focusing on R&D with limited industrial relevance
  - with a smaller interest in supporting advancement of technological capability development of private firms.
  - Ignoring the roles on strengthening technological ccapabilities ‘within’ firms especially abilities to absorb borrowed technologies, design and engineering (the main threshold of most local firms)

Not-yet Successful reform

- Attempted to be more specialised (more sectoral specific), performance-oriented, more emphasis on helping firms through creation of TMC
- However, facing core rigidities i.e., main function on R&D do not adequately relate to industry
- Industry support part: much smaller in budget and personnel
- Linear technology transfer: limited role as an intermediary in firms' innovation process (diffusing foreign technology, R&D consortium, spin off, HR mobility to industry)

Model A vs. Model B

- Model A: RTO is an important actor of ‘intensive-learning’ NIS by helping latecomer firms succeed in technological catching up

- Model B: RTO is a part of weak and fragmented NIS which is a laggard in technological catching up