Global ICT Industry: Changing Landscape
- The Future of European ICT R&D -

The Policy Challenges of ICT R&D
Globalization: A Taiwanese Perspective

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The Position of the Taiwanese ICT Industry

- Hidden center of the global economy (in ICT terms)
  - “Why Taiwan Matters”, by Bruce Einhorn, Business Week, May 16, 2005

- Etched into the back of every iPhone are the words “Designed by Apple in California. Assembled in China.” Apple might as well have added “Made in Taiwan.”
  - “Silent Hands Behind the iPhone TAIPEI, Taiwan”, the New York Times, by Ken Belson, July 18, 2007
Patterns & Essence of ICT R&D

Globalization

- R&D offshoring, technology sourcing, offshore collaboration (esp. global innovation networks; GINs)
  - Particularly regarding developing host countries
  - Going beyond technology transfer and adaptive R&D
- R&D offshoring, technology sourcing
  - Software, basic research, new market insights
  - Possibility of “enclave”, due to the absence of local linkages
- Offshore collaboration and GIN
  - Inter-organizational, cross-border collaboration for innovation, facilitated by modularization of products and R&D projects
  - Flagship firms capitalizing on the host countries “external economies”, in terms of industrial networking
## Two Sides of The Coin

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Conditions required in the host countries</th>
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<tbody>
<tr>
<td>R&amp;D offshoring technology sourcing</td>
<td><img src="https://example.com" alt="Cost/technology-driven" /></td>
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<tr>
<td></td>
<td>Abundant supply of R&amp;D workers</td>
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<td>Strong science base &amp; achievements</td>
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<td></td>
<td><img src="https://example.com" alt="Market/application-driven" /></td>
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<td></td>
<td>Sheer size of market potentials</td>
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<td>Lead market, <strong>demanding needs as an innovation trigger</strong></td>
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<td>Appropriate conditions as a <strong>test-bed</strong></td>
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<td>Offshore collaboration/GIN</td>
<td>Specialized and accumulated capabilities for commercialization of innovation</td>
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<td><strong>Complementary assets</strong> for innovation in terms of industrial ecosystem</td>
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New Rules of the Game (in Relative Terms)

- Delinking of R&D and manufacturing in terms of location
  - Unlike the case of technology transfer & adaptive R&D
  - Such new products as iPhones & iPads made in China & ASEAN right from the beginning
- Some of developing countries as a source of R&D and innovation
  - Not just technology recipient and late-adopter
  - Taiwan and certain part of Asia together as a King Maker
- Players in the developing world as a partner of cross-border collective innovation
  - Involvement at the early stage of the product life cycle
  - Near market R&D (vertical linkages) rather than pre-competitive R&D
The Role of the Taiwanese ICT Firms for the Top Three Brand Marketers in Notebook Computers

<table>
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<tr>
<th>The role of the Taiwanese ICT firms</th>
<th>Innovator of key components (Share by production value)</th>
<th>Resource integrator (Major system integrators) (Efficiency of global logistics)</th>
<th>Logistics hub (Share of total shipments)</th>
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<tbody>
<tr>
<td>Dell</td>
<td>65%</td>
<td>Compal, Wistron</td>
<td>95%</td>
</tr>
<tr>
<td>Apple</td>
<td>50%</td>
<td>Quanta, Hon Hai</td>
<td>100%</td>
</tr>
<tr>
<td>HP</td>
<td>65%</td>
<td>Quanta, Inventec</td>
<td>95%</td>
</tr>
</tbody>
</table>

Source: Based on information provided by MIC, III (2009).
Platforms and High-Growth SMEs

- The development of Taiwan’s IC industry driven by organizational innovation, with *foundry services* pioneered by TSMC as a market niche to specialize in *production for external customers*
  - Facilitating the proliferation of SMEs engaged in the other market segments, *IC design (fabless)* in particular
- Venture Capitals (VCs), initially specialized VCs and more recently *corporation-based VCs* serving as an important facilitator
  - Leading players like UMC and TSMC cultivating affiliated firms (mostly IC design start-ups) through *external equity investments, intra-corporate ventures and corporation-based VCs*
- With setting their own design rules, UMC’s and TSMC’s external investments helping them to *expand their customer base*, leading to further vertical disintegration of Taiwan’s IC industry
  - Corporation-based VCs serving a *vehicle for diversification*
TSMC’s VCs and External Equity Investment Relationships and Networking

Virtual Integration of the IC Sector

- Systems On Silicon Manufacturing Co.
- VIS
- Xintec
- VisEra
- Global Unichip
- LandMark

TSMC

- Horizon Ventures Fund
- Emerging Alliance Fund
- VTAF
- Motech
- Bridgelux

App Store and cloud computing platforms as a seedbed of high-growth SMEs?

Note: The information contained in this figure may not be comprehensive. Source: Chen, Wen and Chen (2010).
The “China Factor”

- Escalating scale of China’s own R&D: 2nd in the world in PPP terms
  - Along with flocking-in of MNCs’ R&D facilities; some beyond adaptive R&D & technology transfer
- From made in China towards “made-based on Chinese knowledge”
  - Indigenous innovation and own industrial standards
    - To anchor MNCs’ R&D facilities, via facilitating the formation of local linkages
- From a later-tier recipient towards “direct transfer” from the original sources
  - Technology, upstream supply chain
- Leapfrogging: China to develop emerging industries, with only few steps behind the developed world
  - New energy, electric vehicles, cloud computing, smart grid, Photo Voltaic (PV) …
MNCs’ offshore R&D not necessarily leading to the creation of a new industrial segment for the host country
- limited spillover effects?

MNCs’ offshore R&D as an “enclave”, without significant local linkages with the host country
- Similar to the “branch plant syndrome” in manufacturing
- IPR simply taken back to the HQs, though local R&D personnel trained

“R” better than “D”? Host country perspective
- Depending on local linkages, spillover effects, esp. in terms of local wealth creation
Policy Challenges: A Taiwanese Perspective

- How to come to terms with the “China Factor”
  - Selected engagement with China
    - The Building Bridges Project: Establishing platforms for a number of industrial sectors, based upon which constructive dialogues between the two sides of the Taiwan Strait have taken place
  - Multilateral, instead of just bilateral relationships
    - Not a trade-off between Taiwan & China for MNCs
    - Taiwan as a testbed and valuable partner to exploit the Chinese market
  - Nobuyuki Idei, former Chairman and CEO of Sony: The new economic situation across the Taiwan Strait may make Taiwan a valuable partner for Japanese firms to tap the Chinese market.

- Changes in the policy regime: Cross-strait FTA (Economic Cooperation Framework Agreement; ECFA) and collaboration in industrial standards not enough
  - Changes in other part of the Taiwanese policy regimes also needed; ex. Technology neutral licenses for 4G
Final Remarks: A Revisit to the EU and US Gap in ICT R&D (1/2)


Source: The 2011 Report on R&D in ICT in the European Union

Note: Nominal terms, not adjusted for inflation.

A Wider gap in ICT R&D?

Source: The 2011 Report on R&D in ICT in the European Union
Thank you for your attention

Source: The 2011 Report on R&D in ICT in the European Union
R&D investments by ICT Scoreboard firms per country of registered headquarters in the EU and the Asia & RoW, in millions of € (2005-2008)

Note: Nominal terms, not adjusted for inflation.
A Strategic View of ECFA: Change

- Change Taiwan’s perspective towards the world economy.
  - Economic wane and wax of the north and south
  - China: more than a low-cost manufacturing powerhouse

- Change the world’s view towards Taiwan
  - “Chaiwan” coined by Korean
  - Resuming talks on FTA between Singapore and Taiwan

- Change the way in which Taiwan interacts with the world economy.
  - Partnership with the rest of the world to access the growing Chinese market
    - Hon Hai deploying channels within China in collaboration with German Metro Group in order to access the end market and exploit the booming domestic market in China
  - Cross-strait partnership to gain a stronger market foothold in the international market

- Change Taiwan’s developmental model and economic momentum.
  - To overcome Taiwan’s bottlenecks of economic development
  - A chance to benefit from a larger “home market”, facilitating restructuring needed