
Innovation in the Global Knowledge Economy

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Schumpeter's definition remains a useful starting-point

= new combinations of existing resources

- New products
- New methods of production
- **New sources of supply**
- **New markets (exploit/develop)**
- **New ways to organize business**

Carriers = entrepreneurs (start-ups; large companies); **organizations; networks**

Global Knowledge Economy → Innovation

Changing economics of innovation

- return-on-investment
- cost, complexity, uncertainty
- shorter PLC
- surging demand for knowledge workers
- slower demand growth in OECD

Globalizing markets for technology/knowledge workers / finance

Resurgence of China & India

- *‘integrated innovation’*
- *IP & standards*
- *‘modular design’*
- *speed-to-market*
- *create new lead markets*
- *cross-border innovation networks*
- *‘social innovations’ to overcome resistance & improve governance*

'Integrated Innovation'

Products & services	Business models	Operations
<ul style="list-style-type: none">■ new/modified■ new ways to bring them to market	<ul style="list-style-type: none">■ restructuring■ finance■ new markets■ collaboration (intra-/inter-firm)	<ul style="list-style-type: none">■ productivity improvements across value chain■ IP managem't

Enablers

talent

R&D

ICT

innovation networks

Innovation

- ***integrates technological, market and organizational change.***
- ***combines ‘hard’ science and engineering with ‘soft’ organizational and management capabilities.***
- ***“is a collective achievement that requires key roles from numerous entrepreneurs in both the public and private sectors” (Van de Ven et al, 1999)***
- ***requires innovation networks (across firms, organizations and geographic boundaries)***
- ***must include “social innovations” (‘bottom-of-the pyramid’ needs; distribution of benefits; human rights; sustainability)***

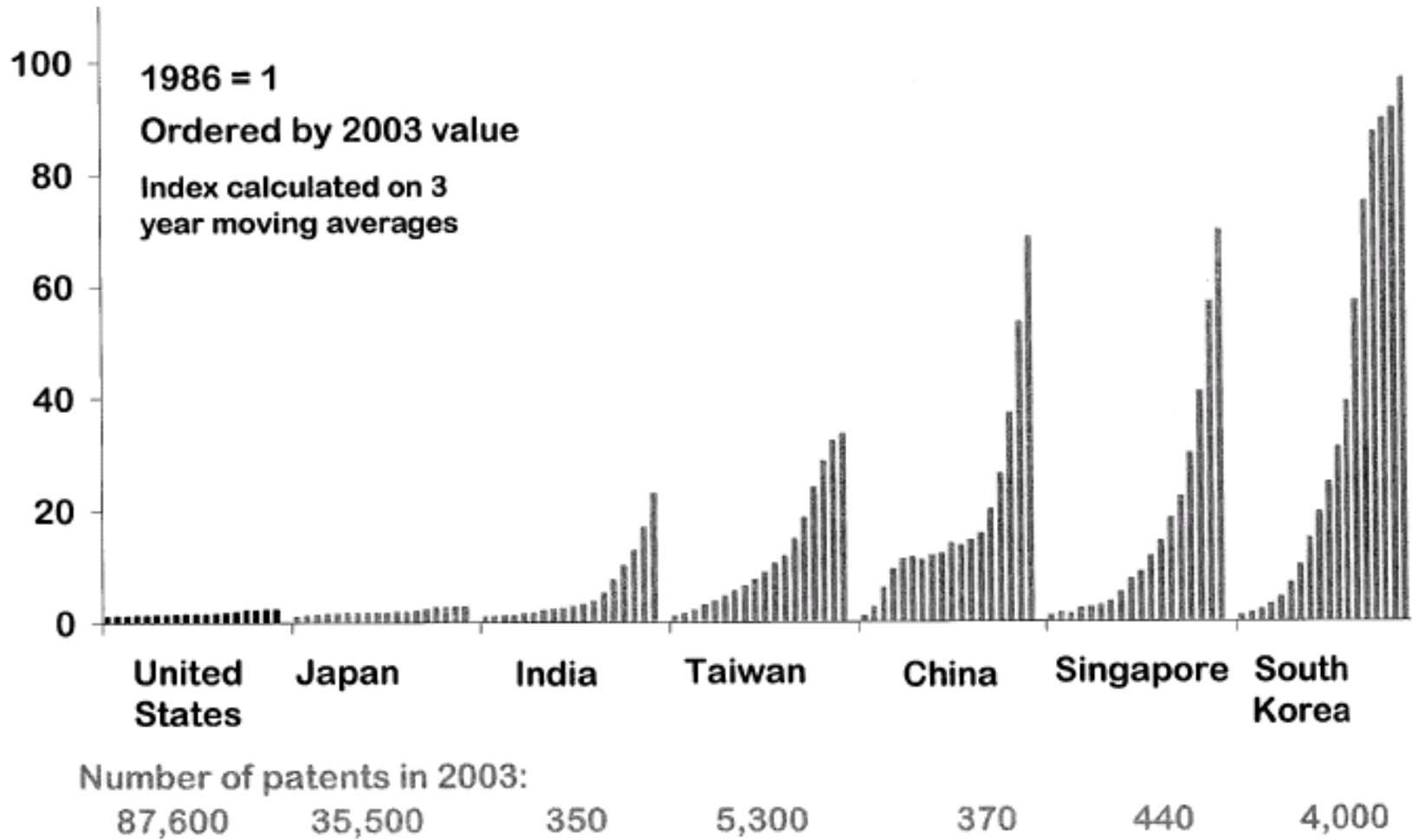
Innovation benefits

- 1. create, change, improve and commercialize products, services and processes for market or social needs**
- 2. increase productivity, profitability, high-wage jobs, economic growth**
- 3. accelerate transition from 'raw growth' to 'equitable & sustainable growth'**
 - **conserve energy, water and resources**
 - **reduce poverty and inequality**
 - **transform and upgrade institutions and development models**

Persistent U.S.-centric concentration of the sources of innovation

- **all 15 leading companies with the best record on patent citations are based in the United States (9 in the IT industry)**
- **The 700 largest R&D spenders (mostly large U.S. firms) account for 50% of the world's total R&D expenditures and >2/3 of the world's business R&D**
- **> 80 percent of the 700 largest R&D spenders come from only five countries (United States dominates, followed by Japan, Germany, United Kingdom, France)**

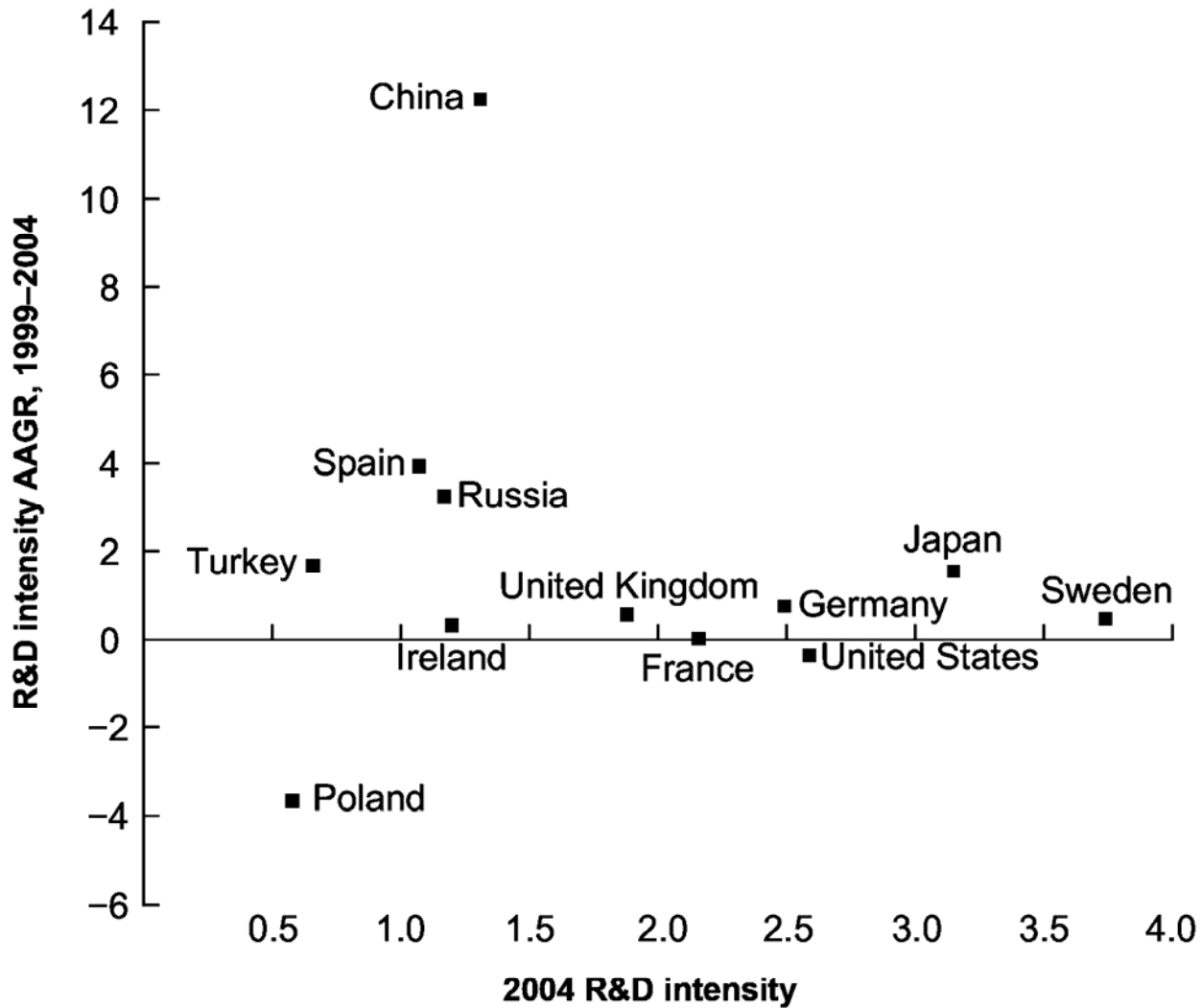
Growth in USPTO patents invented in Asia 1986-2003



The rapid growth of China's R&D

R&D (CAGR, 1999-2006, %)	> 20
R&D/GDP (%)	0.7 (1999) 1.4 (2006) 2.0 (2010)
December 2006	China has become the world's second largest R&D investor (after the US, but ahead of Japan)

*R&D Intensity in 2004 and Annual Average
Growth Rate (AAGR) of R&D Intensity, 1999–2004**



Source: Eurostat, "R&D expenditure in Europe," *Statistics in Focus*, European Communities, June, 2006.

* R&D intensity is R&D expenditure as a percentage of GDP.

Weak industrial innovation capabilities

- Chinese manufacturing companies spend just 1.9 % on R&D (against 7 to 11% in France, Germany, Japan, US and Korea)
- For hi-tech manufacturing companies, China's ratio is 4.6% (Korea; 20%; up to 30% in the US and Japan)
- Only 0.03 % of Chinese firms own the core intellectual property in their products
- Home-grown technology accounts for just 4 percent of China's exports
- Only 6 % of China's total R&D is spent on basic research (14% in Korea and Russia)

China's achievements

1. Integration into global production networks

- foreign-invested enterprises produced 58 per cent of China's total exports (88 per cent of high-technology exports) (2005)
- Taiwan-owned firms produced 60 per cent of China's exports of computers and handsets.

2. Pragmatic innovation strategy

- avoid 'technology leadership' strategies, to compete head-on with global technology leaders through 'radical' innovations.
- Instead, develop products that are less over-engineered and expensive than those of global market leaders.

Areas of excellence - China

1. **Materials science, esp. nano-science**

- China ranks 3rd (after US and Japan) in the # of nanotech publications
- CAS is ranked 4th for nano-science citations (after UC Berkeley, MIT and IBM)

2. **Analytical chemistry**

3. **Rice genomics**

4. **Stem cell biology**

A strong innovation system requires

- **lead customers ('demand pull')**
- **funding for high-risk innovation**
- **business-friendly investment climate**
- **social capital**
- **incentives to innovate (SMEs; academia; knowledge workers)**
- **talent pool (required skills, experience, motivation)**
- **strong intellectual property regime & patent system (reform 'broken' US patent system)**
- **collection of and access to policy-relevant data**
- **policies to compensate losers and to reduce inequality and environmental costs**

Key issues for innovation research

- **Allocation of resources (innovation finance)**
- **Learning (cross-border networks among diverse knowledge communities)**
- **Location-specific innovation barriers**
- **Innovation systems (national, regional, sector, transnational)**
- **Distribution of benefits/costs**
- **IPR and standards**
- **Cost of weak governance regime to support order and avoid ‘systemic friction’ in the global knowledge economy.**

EWC Innovation Research

- 1. Innovation System Dynamics in the Global Knowledge Economy - A Comparative Analysis of Leading Asian Export Economies**
 - 2. Globalization of Knowledge Work - Why is chip design moving to Asia ?**
 - 3. Governing the Global Knowledge Economy: Mind the Gap! (with David M. Hart, George Mason University)**
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EWC innovation publications(1)

- Ernst, D., 2007, “Beyond the ‘Global Factory’ Model: Innovative Capabilities for Upgrading China’s IT Industry, *International Journal of Technology and Globalisation (MIT)*”
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 - -, 2007, “Innovation Offshoring - Root Causes of Asia’s Rise and Policy Implications”, in : *Multinational Corporations and the Emerging Network Economy in the Pacific Rim* (Palacios, Juan J., ed.), London: Routledge. Co-published with the Pacific Trade and Development Conference (PAFTAD)
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- Ernst, D., 2006, **INNOVATION OFFSHORING: Asia's Emerging Role in Global Innovation Networks**, *East-West Center Special Report*, in cooperation with the U.S. Asia-Pacific Council, July
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- -., 2005, "[Limits to Modularity - Reflections on Recent Developments in Chip Design](#)," [Industry and Innovation](#), Vol. 12, No.3: 303-335
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