Emerging Trends in Global Sourcing of Innovation

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Globalization of Knowledge Creation and Innovation in the Context of Emerging Economies

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## Global sourcing

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<td>Offshore outsourcing</td>
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Emerging Themes and Trends in Emerging Economies

1. Global sourcing of innovation in emerging countries – China and India; role of local institutions and policies in developing fast growing service provider industry and domestic innovative capabilities

2. Shortage of talent, the use of platforms for innovation problem solvers and distributed talent problem solving (crowdsourcing)
Cumulative percent of companies offshoring business service functions

Source: The ORN Corporate Client Surveys 2005 - 2010
Global sourcing of Innovation

• Value-chain disaggregation (vertical and horizontal disintegration) of business processes and functions and processes (e.g., Gospel and Sako, 2010)

• Reorganization of innovation processes:
  – Outsourcing support activities which can be handled at high standards by technical workers in low cost countries

• Not just offshore R&D as a whole, but tasks, starting by simpler supporting tasks and then develop capabilities, learning, relations, trust (e.g., Jensen and Pedersen, 2012; Maskell et al., 2007)
# Innovation and Knowledge Services

<table>
<thead>
<tr>
<th>Function</th>
<th>Actual Examples from ORN</th>
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<tr>
<td><strong>Engineering Services</strong></td>
<td>Design automation/CAD&lt;br&gt;Tool design &amp; Simulating&lt;br&gt;Drafting &amp; modeling&lt;br&gt;Engineering analysis (e.g. finite element analysis)&lt;br&gt;Re-engineering</td>
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<td><strong>Research and Development</strong></td>
<td>Research on new materials and processes&lt;br&gt;Code development&lt;br&gt;Development of new technologies</td>
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<td><strong>Product Design</strong></td>
<td>Prototype design&lt;br&gt;Systems design</td>
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<tr>
<td><strong>Software Design</strong></td>
<td>Application development&lt;br&gt;Software architecture &amp; design&lt;br&gt;Database design&lt;br&gt;Gaming and animation</td>
</tr>
<tr>
<td><strong>Analytical Services</strong></td>
<td>Data mining&lt;br&gt;Market analysis&lt;br&gt;Financial planning&lt;br&gt;Performance analysis&lt;br&gt;Forecasting</td>
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Trends

• Large firms have been decreasing internal R&D expenditures since late 1970s, shifting resources to co-development alliances, joint ventures, licensing and acquisitions, and outsourcing

• The share of overseas R&D exp. of total corporate R&D exp. (domestic and overseas) does not change much in the period between 1990 and 2004, fluctuating between 13.6% and 16.3% (NSF)

• But increase of outsourcing of innovation services, though figures from the US Dept of Commerce and US Direct Investment Abroad, Bureau of Economics Analysis, do not take into account of the R&D outsourced both domestically and overseas

  ➢ Problem: FDI data and R&D expend are aggregate, macro data
  ➢ Need for richer disaggregate data: Content of projects/tasks; size: duration and value
Firms Increasingly Decide to Outsource

Change in Captive Choices by Function

Source: The ORN Corporate Client Surveys 2005 - 2010
Emerging Research Themes

1. Global sourcing of innovation in emerging countries – China and India; role of local institutions and policies in developing fast growing service provider industry and domestic innovative capabilities

2. Shortage of talent, the use of platforms for innovation problem solving and distributed innovation talent (crowdsourcing)
Locations of global sourcing of innovation

**R&D**
- India: 33.47%
- China: 20.82%
- U.S.: 13.88%
- Brazil: 6.12%
- Russia: 3.27%
- U.K.: 2.45%
- Canada: 2.86%
- Mexico: 2.45%
- Czech Republic: 1.63%
- U.S.: 2.04%
- Germany: 1.63%
- Poland: 1.63%
- Romania: 1.63%

**Engineering Services**
- India: 37.67%
- China: 24.39%
- U.S.: 19.34%
- Brazil: 19.89%
- Russia: 4.07%
- U.K.: 2.98%
- Canada: 2.17%
- France: 2.17%
- Mexico: 2.17%
- Czech Republic: 2.17%
- Germany: 1.66%

**Product Design**
- India: 32.60%
- China: 19.89%
- Canada: 19.34%
- U.S.: 16.61%
- Mexico: 16.61%
- Poland: 16.61%
- Italy: 16.61%
- Sweden: 16.61%
- Israel: 16.61%
- Pakistan: 16.61%
- Philippines: 16.61%
- Romania: 16.61%
- Ukraine: 16.61%
- U.K.: 16.61%
- r.o.w.: 16.61%

Source: The ORN Corporate Client Surveys 2005 - 2010
# India vs. China

## Evolution of offshoring in India

![Graph showing the evolution of offshoring in India](image)

### Offshoring Innovation India & China - % Innovation projects

<table>
<thead>
<tr>
<th></th>
<th>India</th>
<th>China</th>
<th>t-stat*</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADM</td>
<td>42.03%</td>
<td>21.74%</td>
<td>4.6190</td>
<td>3.85E-06</td>
</tr>
<tr>
<td>Product Des</td>
<td>12.21%</td>
<td>22.36%</td>
<td>-3.1436</td>
<td>0.0016</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>16.97%</td>
<td>21.11%</td>
<td>-1.1840</td>
<td>0.2364</td>
</tr>
<tr>
<td>Eng Services</td>
<td>28.77%</td>
<td>34.78%</td>
<td>-1.4359</td>
<td>0.1510</td>
</tr>
<tr>
<td>Total</td>
<td>100% (483)</td>
<td>100% (161)</td>
<td></td>
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</tr>
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</table>

* equality of proportions between 2 samples

## Evolution of offshoring in China

![Graph showing the evolution of offshoring in China](image)

### Offshoring Innovation to India & China - % of ALL projects

<table>
<thead>
<tr>
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<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADM</td>
<td>13.28%</td>
<td>10.11%</td>
<td>1.5989</td>
<td>0.1098</td>
</tr>
<tr>
<td>Product Des</td>
<td>3.86%</td>
<td>10.40%</td>
<td>-5.0099</td>
<td>5.444e-07</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>5.36%</td>
<td>9.82%</td>
<td>-3.1088</td>
<td>0.0019</td>
</tr>
<tr>
<td>Eng Services</td>
<td>9.09%</td>
<td>16.18%</td>
<td>-3.8992</td>
<td>9.652e-05</td>
</tr>
<tr>
<td>Total</td>
<td>31,61%(483)</td>
<td>46,53%(161)</td>
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* all projects 1528 346
Preference for India for sourcing IT and innovation and knowledge services has been eroded by other emerging destinations.

Geographical distribution of innovation and IT projects in different time periods

Is India becoming Less Attractive?

- India down by 53 places on Global Innovation Index from 23rd position in 2007 to 76th position in 2014 (Global Innovation Index, 2014)
- Only 0.2% of Indian graduate students go for doctoral studies while the completion rate is 50% (Kurup & Arora, 2010)
- IIT Delhi (2010) reasons for a general unwillingness to pursue PhD in India: *Poor research environment*; *Low market value and remuneration after PhD*
- India’s GDP growth per year dropped from 9.8% in 2007 to 5.0% in 2014 (World Bank Report, 2014)
- No Indian university in the top 200 Research University rankings by Times Higher Education (2014) and QS University Ranking (2014)
- India was granted 4,328 patents in 2012, far behind China 21,7105 patents
IP in China?

• Traditionally IP rights are against public ownership and Confucianism in PRC

• Early 1990s Uruguay Round of GATT: establishment of WTO

• Important change in the level of interest in IP because of its links with trade issues
  
  ➢ Trade Related Intellectual Property Rights (TRIPs) for dispute settlement procedure – major innovation in international trade law generally, not just for intellectual property

  ➢ More disputes have occurred since the introduction of WTO and TRIPs – more efficient mechanisms in place for their resolution

• Chinese government’s promotion of “indigenous innovation”: “By 2020, the quantity of patents for every one million people and the quantity of patent applications abroad will quadruple” (National Patent Development Strategy, 2010)
Technology Creation in China and India: Dependence or Indigenous Innovation?

(% of patents owned by foreign residents)

Source: OECD Stat; Science, Technology and Patents – International co-operations in patents
Emerging Research Themes

1. Global sourcing of innovation in emerging countries – China and India; role of local institutions and policies in developing fast growing service provider industry and domestic innovative capabilities

2. Shortage of talent, the use of platforms for innovation problem solving and distributed innovation talent (crowdsourcing)
Rapid growth in engineering and computer science graduates in China and India

Problem of Quality of Talent

- Shortage of STEM talent in Western Countries (e.g., Lewin et al., 2009)
- Fast growing domestic economy absorbs most of those who could be hired (Farrell et al. 2005; Schaaf, 2005) but lower quality?
  - Only 10-20% of graduates in China have requisite to work for MNEs
  - Low English competence of Chinese graduates
  - A-level graduates preference for post grad education in Western universities
- Failure of National Reverse Brain Policies to attract students who receive advanced degrees in STEM back home
Shortage of STEM Talent and Distributed Talent

• Platforms for innovation problem solving (P&G C&D, Eli Lilly Innocentive.com, NineSigma)

• Emergence of new Web-Based Brokerage Platforms for identifying and recruiting qualified and cheaper innovation talent around the World

• ORN: 140 platforms, 50 Million registered free lancers

• Distributed online problem solving (“crowdsourcing”) (Maskell, 2014)
Challenges for Future Research

1. Need to understand how firms disintegrate innovation processes and balance internal core activities and external peripheral ones
   - More nuanced empirical research on the extent and nature of global sourcing of innovation

2. Knowledge based service providers:
   - Specialized on advanced customized business services, eager to be involved in high value adding tasks for R&D projects

3. Organizational aspects: decomposition of R&D processes both in terms of organizational structure and knowledge content
   - Challenge: integration of internal processes, using distributed talent
Research Questions

1. Global sourcing of innovation and open innovation
   - How can firms maintain proprietary knowledge which is at the root of competitive advantage if they increasingly rely on open innovation?

2. IP in global innovation processes
   - Who is the real IP owner in the case of globally outsourced innovation processes?

3. Distributed innovation talent and absorptive capacity
   - How can firms continue to develop AC if they respond to shortage of talent by increasingly making use of distributed talent?
Thank you!