University/Research Institute-Industry Linkages in Two Chinese Cities: Commercializing Technological Innovation

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Outline

• Theoretical issues
• Historical background
• Current situation
• Beijing and Shenzhen
• Conclusion
Theoretical issues

• Innovation system and economy

• Role of universities and research institutes (URIs)

• URI-industry linkages
Historical background

• Before the 15th century: global leader

• The 15th—1949: China’s decline and the Communist victory

• 1950’s—1978: Socialist period

• Since 1978: Reforms
Reforms

• Market-oriented economy
• “Open door policy”
• Decentralization
• Private ownership
• Linkages between research and production
  --Torch program, high technology cluster, R&D centers
Note: Data compiled from the China Science and Technology Statistics Net
R&D (2003) (RMB100 million)

Source: China Science and Technology Statistics Net
Current situation (2003)

- R&D: RMB154 billion, 1.31% of GDP
- 53 national high-tech zones
  - Revenue: RMB2,094 billion (240 times than 1991)
  - Number of high-tech companies: 32,857 (13 times)
- Publication: Fifth (15th in 1990)
- Patent: Chinese patent applicants more than foreign applicants in China
- Technology contracts: RMB88 billion (9 times)
Things Have Changed in China and No Where More than Shenzhen

1980’s

1990’s

2000’s

Source: Shenzhen Government Net
<table>
<thead>
<tr>
<th>Historical background</th>
<th>Beijing</th>
<th>Shenzhen</th>
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<td>• Had a history as a city for two thousand years.</td>
<td>• GDP in total is No.2 in the country.</td>
<td>• Became a city in 1979.</td>
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<td>• Served as the capital city in several dynasties.</td>
<td>• GDP per capita was $3074 in 2003.</td>
<td>• Special economic zone.</td>
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<td></td>
<td>• Major industry: high-tech and service.</td>
<td>• A successful model of the economic reforms.</td>
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<tr>
<th>City’s Major function</th>
<th>Beijing</th>
<th>Shenzhen</th>
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<td>• Capital city.</td>
<td>• GDP in total is No.2 in the country.</td>
<td>• GDP per capita was $6510 in 2003. It remains the highest in the country.</td>
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<tr>
<td>• Political, cultural and S&amp;T center of the country.</td>
<td>• GDP per capita was $3074 in 2003.</td>
<td>• Major industry: high-tech and manufacturing.</td>
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<th>Economic strength</th>
<th>Beijing</th>
<th>Shenzhen</th>
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<td></td>
<td>• Major industry: high-tech and service.</td>
<td>• Affiliation with Hong Kong</td>
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<td>S&amp;T strength</td>
<td>Beijing</td>
<td>Shenzhen</td>
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<td>Center of the best URIs in the country.</td>
<td>•Lack of URIs before 1990’s.</td>
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<td>•R&amp;D expenditure was RMB 25 billion in 2003.</td>
<td>•Set up the virtual campus and university town in late 1990’s.</td>
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<td>•URIs and MNC/indigenous high-tech enterprises are active in R&amp;D.</td>
<td>•R&amp;D expenditure was RMB 7 billion in 2003.</td>
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<tr>
<td>•R&amp;D, publication, invention patent and technology contract value remain the highest in the country.</td>
<td>•Local high-tech firms are active such as Huawei, ZTE.</td>
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<td>High-tech cluster</td>
<td>Zhongguancun Science Park (ZGC).</td>
<td>Shenzhen High-tech Industrial Park (SHIP).</td>
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<tr>
<td>Beijing</td>
<td>Shenzhen</td>
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<td><strong>URI</strong></td>
<td><strong>Elite URIs in the country such as THU, PKU, CAS.</strong></td>
<td><strong>THU, PKU, CAS started to set up research institutes or graduate schools in the middle and late 1990’s.</strong></td>
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| **URI-industry linkages** | **URIs are concentrated in ZGC.**  
**Technology transfer activities through TLO offices at URIs.**  
**URI-affiliated enterprises such as PKU’s Founder, CAS’s Lenovo, THU’s Tongfang.**  
**University science parks such as THU Science Park, PKU Science Park, BUAA Science Park.**  
**Major mode: spin-off and university science park.** | **The virtual campus and university town are located in SHIP.**  
**URI-affiliated research institutes serve as the bases of R&D, professional education, and technology transfer/industrialization.**  
**Major mode: technology transfer and licensing through cooperation with local companies.** |
Beijing

- Traditional URIs
  - URIs’ spin-offs and university science parks
    - Industrialization and commercialization of technological innovation

Shenzhen

- High-tech industrial growth with no URIs
  - Local high-tech enterprises
    - Industrialization and commercialization of technological innovation

- URIs in other regions
  - URI-affiliated research institutes and virtual campus
Conclusion

• URIs’ contribution to China’s economy
  – Education, research, advising government.
  – Technology commercialization
    • URI-affiliated firms
    • University science parks
    • Joint projects
    • Licensing

• Beijing and Shenzhen with different endowments develop different strategies

• Challenges