Possibilities and Problems for the Regional Innovation in Japan

February 22nd, 2008

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I. Introduction

Brief self-introduction

- Specialty: Economic geography
  - Theories relating to industrial location and regional economy

- Research topics
  <From 1985 to 1997 at the Seinan Gakuin University>
  Industrial location and regional economy in Kyushu
  in particular semiconductor industry and technopolis regions

  <Since 1997 at the University of Tokyo>
  1) Industrial agglomeration theory
  2) Industrial cluster projects in Japan
  3) Regional economic cyclical model
  4) Regional innovation systems
Figure 1: Regional economic cyclical model

Source: Materials for Study Group on Regional Economic Cycles compiled by Associate Professor Hiroshi Matsubara, Tokyo University.

Source: White paper on international economy and trade 2004
Contents


2) Regional innovation in Japan’s industrial districts
   — A case in Ube, Yamaguchi Prefecture —

3) Research issues on the regional innovation in Japan
II. Summary:

“Spatial Knowledge Flows and Regional Innovation Systems”

1 Contents

- Significance of innovation to competitiveness in cities and industrial districts
- Critical review on regional innovation studies
- Knowledge flows and spaces of innovation
2 Studies on regional innovation system

Figure 2: Main structure of regional innovation system
Source: Tödtling and Trippl(2005) p.1210
Table 1: Regional innovation systems: typology and evolution

<table>
<thead>
<tr>
<th>Type</th>
<th>Region</th>
<th>Region</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassroots</td>
<td>Tuscany</td>
<td>Tampere</td>
<td>Slovenia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Denmark</td>
<td>Tohoku</td>
</tr>
<tr>
<td>Localist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactive</td>
<td>Catalonia</td>
<td>Baden-Württemburg</td>
<td>Gyeonggi</td>
</tr>
<tr>
<td>Globalised</td>
<td>Brabant</td>
<td>North-Rhine Westphalia</td>
<td>Singapore</td>
</tr>
</tbody>
</table>

3 Knowledge flows and Spaces of innovation

Innovation-related knowledge flows in European industry (KNOW) project

Source: Arundel and Constantelou (2006) p.51

Figure 3: The complexity of knowledge flows
New approach for the quantitative measurement of knowledge flows
1) Source of knowledge (individuals, other firms, academic sector, government agencies)
2) Channels of knowledge (written, verbal, electronic, transfer of personnel et al.)
3) Properties of channels (authority structure, internalized, priced, restricted)
4) Types of knowledge acquired (marketing, scientific, technological, strategic)

Table 2: A typology of knowledge flows in an organizational context

<table>
<thead>
<tr>
<th>Channel</th>
<th>Properties</th>
<th>Hierarchical</th>
<th>Non-hierarchical</th>
<th>Non-priced</th>
<th>Internalized</th>
<th>Priced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written</td>
<td>Internal reports</td>
<td>Internal reports</td>
<td>Consultancy report</td>
<td>Limited circulation paper</td>
<td>Patents</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>Internal meetings</td>
<td>RJV reports etc.</td>
<td>Consultation</td>
<td>Closed meeting</td>
<td>Scientific journal</td>
<td></td>
</tr>
<tr>
<td>Electronic</td>
<td>Intra-firm e-mails</td>
<td>Inter-firm e-mails</td>
<td>News alerts</td>
<td>Closed conference</td>
<td>Open conference</td>
<td></td>
</tr>
<tr>
<td>Personnel</td>
<td>Internal staff transfer</td>
<td>Internal staff transfer</td>
<td>Staff poaching</td>
<td>Telephone call</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>In-house training</td>
<td>External staff exchange</td>
<td>Electronic newsgroups</td>
<td>Electronic newsgroups</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RJV single lab</td>
<td>Quits/hires</td>
<td>Internet and web access</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formal training</td>
<td></td>
<td>Informal learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>Internal product exchange</td>
<td>Internal product exchange</td>
<td>Reverse engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint practice</td>
<td>Project meetings</td>
<td>RJV product exchange</td>
<td>Observations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Team work</td>
<td>Observations</td>
<td>Project meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Team work</td>
<td>Team work</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Caloghirou, Constantelou and Vonortas(2006) p.73
Recent studies on knowledge flows
1) Maskell and Malmberug (1999): tacit knowledge and geographical proximity
2) Storper and Venables (2004): local buzz and global pipeline
3) Asheim and Gertler (2005): knowledge base (synthetic, analytical, symbolic)

### Table 3: Synthetic vs. analytic knowledge base

<table>
<thead>
<tr>
<th>Synthetic</th>
<th>Analytic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation by application or novel combination of existing knowledge</td>
<td>Innovation by creation of new knowledge</td>
</tr>
<tr>
<td>Importance of applied, problem related knowledge (engineering) often through inductive processes</td>
<td>Importance of scientific knowledge often based on deductive processes and formal models</td>
</tr>
<tr>
<td>Interactive learning with clients and suppliers</td>
<td>Research collaboration between firms (R&amp;D department) and research organizations</td>
</tr>
<tr>
<td>Dominance of tacit knowledge due to more concrete know-how, craft and practical skill</td>
<td>Dominance of codified knowledge due to documentation in patents and publications</td>
</tr>
<tr>
<td>Mainly incremental innovation</td>
<td>More radical innovation</td>
</tr>
</tbody>
</table>

Source: Asheim and Gertler (2005)
Spaces of innovation
1) global (global sourcing of knowledge by multinational companies)
2) national (spatial structure and regional disparity of innovation)
3) sub-national (locality, innovative cities, creativity)

Table 4: Typology of knowledge bases and flows

<table>
<thead>
<tr>
<th>Knowledge base</th>
<th>Geography of knowledge</th>
<th>flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthetic</td>
<td>Strong global sources</td>
<td>Global and local sources</td>
</tr>
<tr>
<td></td>
<td>Oklahoma steel</td>
<td></td>
</tr>
<tr>
<td>Hybrid</td>
<td>Montreal aerospace</td>
<td>Okanagan wine, Niagara wine, Toronto specialty food</td>
</tr>
<tr>
<td>Analytical</td>
<td>Saskatoon agri-biotech</td>
<td>Montreal, Toronto, Vancouver bio-tech, Ottawa telecom photonics</td>
</tr>
</tbody>
</table>

Regional innovation policy

Figure 4: RIS deficiencies and types of problem regions
Source: Tödtling and Trippl(2005)

4 Concluding remarks
- perspectives on Japan’s regional innovation systems-
Ⅲ. Regional innovation in Japan’s industrial districts  
— A case in Ube, Yamaguchi Prefecture —

1 Overview: Ube City

- Population: 178,952 in 2005
- Social economic history
  1 (pre-WWII): Emerging of Coal mining industry and major companies
    * specialty of regional culture and society
  2 (1960s, 70s): Decline of coal mining industry and restructuring of major companies
    * petrochemical industry, job loss and fine chemical products, transfer of head office
  3 (1980s, 90s): Ube Phoenix Technopolis Project
    * Newly establishment of some universities and R&D facilities
  4 (late 1990s～): Industry-Academy-Government Collaboration
Figure 5: Population change in Ube City

Figure 6: Changes in industrial structure in Ube City
Figure 7: Distribution of major factories in Ube region

- Ube City
- Sanyo-Onoda City
- NEC Yamaguchi
- Asa Sta.
- Onoda Sta.
- Ube Sta.
- Sanyo Exp.Way
- Ube-Shinkawa Sta.
- Ube I.C.
- Kyowa Hakko
- UBE Industries
- Central Glass

Legend:
- 100-299
- 300-999
- 1000-
- Central Urban Areas

Figure 7: Distribution of major factories in Ube region
Figure 8: Distribution of establishments in Ube Industries Ltd.

Number of employees
- 0-99
- 100-999
- 1000-

Functions
- Head and branch office
- Factory and R&D
- Factory
- Retreat, Closure

Locations:
- Sapporo Branch (Close 2002)
- Tohoku Branch (Close 2002)
- Niigata Branch (Close 1993)
- Hiroshima Branch (Close 2002)
- Osaka Branch
- Hirakata Lab. (Close 1995)
- Kyushu Branch (Close 2002)
- Isd Factory
- Nagoya Branch
- Tokyo Head Office
- Chiba Factory
- Ube Head Office
- Sakai Factory
- Kanda Factory
- Ube Head Office

Figure 8: Distribution of establishments in Ube Industries Ltd.
2 Industry-Academy-Government Collaboration in Ube City

Pre History
1938: Ube Higher Technical School (→ Dept. of Technology Yamaguchi Univ.)
1944: Yamaguchi Prefectural Medical School (→ MD. Yamaguchi Univ.)
1950s: Anti-air pollution by Industry-Academy-Government collaboration “Ube Model”
1984-2000: Technopolis Project

Advance of Industry-Academy-Government Collaboration
1997: Study Group of Collaborative Research Center (CRC), Yamaguchi Univ.
1997: Chamber of Ube Industrial Vision (Supported by Chamber of Commerce)
2001: “Tech & Business Collaborate (T&B)” Ube National College of Technology
2002: Speed networking event “C-UBE”

Figure 9: Number of collaborative companies

Study Group of CRC (104)
3 Development of collaboration around Yamaguchi University

Yamaguchi University

Education & Research
Graduate School
Faculty

Organization for Academic-Industry-Public Cooperation and Entrepreneur Support

Collaborate Research Center (CRC)

Venture Business Laboratory

Business Incubation Square

TLO Support

MOT

Yamaguchi TLO

Intellectual Property Center

Source: “Inter Lab” 08/2005
Figure 11: Characteristics of collaborative companies

a. Location of head office

b. Company size

Number of collaborations

### 4 Knowledge Cluster Initiative Project in Ube

#### Figure 12 Participating companies and academia

<table>
<thead>
<tr>
<th>Industry</th>
<th>Name</th>
<th>Place of Head Office</th>
<th>Capital (¥)</th>
<th>Employee Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloka</td>
<td>Mitaka City, Tokyo</td>
<td>6.4billion</td>
<td>1,113</td>
<td></td>
</tr>
<tr>
<td>NTT Advance Technology</td>
<td>Shinjuku City, Tokyo</td>
<td>5billion</td>
<td>1,539</td>
<td></td>
</tr>
<tr>
<td>Toyobo</td>
<td>Osaka City, Osaka</td>
<td>43.3billion</td>
<td>3,183</td>
<td></td>
</tr>
<tr>
<td>Hitachi Software Engineering</td>
<td>Shinagawa City, Tokyo</td>
<td>34.1billion</td>
<td>5,406</td>
<td></td>
</tr>
<tr>
<td>Fujinon</td>
<td>Saitama City, Saitama</td>
<td>500million</td>
<td>1,237</td>
<td></td>
</tr>
<tr>
<td>Matsushita Electric Works</td>
<td>Kadoma City, Osaka</td>
<td>138.3billion</td>
<td>13,991</td>
<td></td>
</tr>
<tr>
<td>Daiyaredo</td>
<td>Chiyoda City, Tokyo</td>
<td>150million</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Yokogawa Electric Corp.</td>
<td>Mitaka City, Tokyo</td>
<td>32.3billion</td>
<td>5,112</td>
<td></td>
</tr>
<tr>
<td>Wako Pure Chemical Industries</td>
<td>Osaka City, Osaka</td>
<td>2.3billion</td>
<td>1,400</td>
<td></td>
</tr>
<tr>
<td>Almould</td>
<td>Ube City</td>
<td>40million</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>UBE Indutrires</td>
<td>Ube City</td>
<td>48.5billion</td>
<td>3,361</td>
<td></td>
</tr>
<tr>
<td>Ecomas</td>
<td>Ube City</td>
<td>3million</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Entech</td>
<td>Ube City</td>
<td>10million</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Sanjo Seiki</td>
<td>Mine City</td>
<td>60million</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>Sunyo HighTech</td>
<td>Ube City</td>
<td>10million</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Chosu Industry</td>
<td>Sanyo–Onoda City</td>
<td>360million</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Fujii Dengyosha</td>
<td>Ube City</td>
<td>30million</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Yuki Engineering</td>
<td>Shimonoseki City</td>
<td>15million</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Yoshimi Electronics</td>
<td>Shimonoseki City</td>
<td>10million</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Institution</th>
<th>Name</th>
<th>Place of Head Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD, Yamaguchi Univ.</td>
<td>Ube City</td>
<td></td>
</tr>
<tr>
<td>Dept. of Technology Yamaguchi Univ.</td>
<td>Ube City</td>
<td></td>
</tr>
<tr>
<td>Dept. of Science Yamaguchi Univ.</td>
<td>Yamaguchi City</td>
<td></td>
</tr>
<tr>
<td>Applied Medical Engineering Science Yamaguchi Univ.</td>
<td>Ube City</td>
<td></td>
</tr>
<tr>
<td>Yamaguchi Univ. Others</td>
<td>Yamaguchi City</td>
<td></td>
</tr>
<tr>
<td>Dept. of Technology Nagoya Univ.</td>
<td>Nagoya City, Aichi</td>
<td></td>
</tr>
</tbody>
</table>

| Public Institution | Name | |
|--------------------|------| |
| National Institute of Advanced Industrial Science and Technology | |

| Employee Number | |
|----------------| |
5 Changing organizational relationships in Ube

Figure 13 Changing relationships among actors in Ube
IV Concluding remarks

Case Study implications

① Significance of regional history, culture and society

② Adjustment between global location strategy of core company and regional innovation system

③ Changing relationships between actors (from subcontract system to industry-academy-government collaboration)

④ Gap of innovation seeds between core company and university

⑤ Revitalizing central urban areas and urban space renovation

⑥ Fostering human resources and recruiting personnel for R&D

⑦ Reconsideration on objectives: global competitiveness or revitalization of local economy
Changes in Regional Economic and Industrial Policy

■ Retreat from promoting decentralization
  - Industrial Relocation Promotion Law (1972) → (repealed in 2006)
  - High-tech Industrial Zone Promotion Act (1983) → (repealed in 1999)

■ Supporting development of regional competitive industries and enterprises
  - Industrial Cluster Program (since 2001)
  - The Law Concerning Establishing Regional Industrial Clusters (since 2007)

■ Regional innovation policy
  - Industrial Cluster Policy (Ministry of Economy, Trade and Industry)
  - Knowledge Cluster Policy (Ministry of Education, Culture, Sports, Science and Technology)
Research issues and method

- Intensive empirical survey on regional innovation systems

- Typical research area
  Metropolitan area: Kyoto
  Local city: Hamamatsu, Yonezawa
  Company town: Hitachi, Ube
  Planned R&D city: Tsukuba

- Strengthen quantitative and qualitative assessment methods considering experiences in EU regions
Bibliography


