Possibilities and Problems for the Regional Innovation in Japan

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The University of Tokyo
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>
<thead>
<tr>
<th>Typology</th>
<th>Grassroots</th>
<th>Network</th>
<th>Dirigiste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localist</td>
<td>Tuscany</td>
<td>Tampere, Denmark</td>
<td>Slovenia, Tohoku</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

Figure 3: The complexity of knowledge flows
Source: Arundel and Constantelou (2006) p.51
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>Internalized</th>
<th>Unpriced</th>
<th>Restricted</th>
<th>Priced</th>
<th>Unrestricted</th>
<th>Properties</th>
<th>School</th>
<th>Unpriced</th>
<th>Restricted</th>
<th>Priced</th>
<th>Unrestricted</th>
<th>Properties</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>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td>Verbal</td>
<td>Internal meetings</td>
<td>RJV reports etc., Internal meeting</td>
<td>Consultation</td>
<td>Closed meeting</td>
<td>Closed conference</td>
<td>Telephone call</td>
<td>Electronic newsgroups</td>
<td>Internet and web access</td>
<td>Informal learning processes</td>
<td></td>
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<tr>
<td>Electronic Personnel</td>
<td>Intra-firm e-mails</td>
<td>Inter-firm e-mails</td>
<td>News alerts</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td></td>
<td>Internal staff</td>
<td>Internal staff transfer</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td></td>
<td>transfer</td>
<td>External staff exchange</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<td></td>
<td>In-house training</td>
<td>RJV single lab</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td>Product</td>
<td>Internal product</td>
<td>Internal product exchange</td>
<td>Reverse engineering</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td></td>
<td>exchange</td>
<td>RJV product exchange</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td>Joint practice</td>
<td>Project meetings</td>
<td>Observations</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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<tr>
<td></td>
<td>Team work</td>
<td>Project meetings</td>
<td>Patents</td>
<td>Scientific journal</td>
<td>Open conference</td>
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</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>Ontario steel</td>
<td>Sudbury mining, Windsor auto parts</td>
</tr>
<tr>
<td>Hybrid</td>
<td>Montreal aerospace</td>
<td>Toronto medical technologies</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-
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

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

Number of employees:
- 100-299
- 300-999
- 1000-

Central Urban Areas

0 2km
Figure 8: Distribution of establishments in Ube Industries Ltd.
2 Industry-Academy-Government Collaboration in Ube City

■ Pre History
① 1938: Ube Higher Technical School (→ Dept. of Technology Yamaguchi Univ.)
    1944: Yamaguchi Prefectural Medical School (→ MD. Yamaguchi Univ.)
② 1950s: Anti-air pollution by Industry-Academy-Government collaboration
    “Ube Model”
③ 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)
    Ube National College of Technology
2002: Speed networking event “C-UBE”

Study Group of CRC (104)
Study Group of CRC (84)
Chamber of Ube Industrial Vision (56)
Figure 9: Number of collaborative companies
3 Development of collaboration around Yamaguchi University

Figure 10 Collaborative organization of Yamaguchi University

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>Mtaka 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 Indutries</td>
<td>Ube City</td>
<td>48.5billion</td>
<td>3,361</td>
<td></td>
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<tr>
<td>Ecomas</td>
<td>Ube City</td>
<td>3million</td>
<td>8</td>
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<tr>
<td>Emtech</td>
<td>Ube City</td>
<td>10million</td>
<td>4</td>
<td></td>
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<tr>
<td>Sanjo Seiki</td>
<td>Mine City</td>
<td>60million</td>
<td>170</td>
<td></td>
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<tr>
<td>Sunyo HighTech</td>
<td>Ube City</td>
<td>10million</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Choshu 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>
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<tr>
<td>Yoshini Electronics</td>
<td>Shimonoseki City</td>
<td>10million</td>
<td>20</td>
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<table>
<thead>
<tr>
<th>Academic Institution</th>
<th>Name</th>
<th>Place of Head Office</th>
</tr>
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<tbody>
<tr>
<td>MD, Yamaguchi Univ.</td>
<td>Ube City</td>
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<tr>
<td>Dept. of Technology</td>
<td>Yamaguchi City</td>
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<td>Yamaguchi Univ.</td>
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<tr>
<td>Dept. of Science</td>
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<tr>
<td>Yamaguchi City</td>
<td></td>
<td></td>
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<tr>
<td>Applied Medical</td>
<td></td>
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<tr>
<td>Yamaguchi Univ.</td>
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<tr>
<td>Yamaguchi Univ. Others</td>
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<tr>
<td>Dept. of Technology</td>
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<tr>
<td>Nagoya Univ.</td>
<td></td>
<td></td>
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<tr>
<td>Nagoya City, Aichi</td>
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## Public Institution

<table>
<thead>
<tr>
<th>Name</th>
<th>Place of Head Office</th>
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<tr>
<td>National Institute of Advanced</td>
<td>Ube City</td>
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<tr>
<td>Industrial Science and Technology</td>
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</tbody>
</table>
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


