THE ROLE OF UNIVERSITIES IN NEW FORMS OF STRATEGIC RESEARCH COLLABORATION WITH INDUSTRY

Presentation at the Jena Economic Research Seminar, 19 June 2013
Knut Koschatzky
Prof. Dr. Knut Koschatzky
Phone +49 721 6809-184
knut.koschatzky@isi.fraunhofer.de

Competence Center "Policy and Regions"
Fraunhofer Institute for Systems and Innovation Research ISI
Breslauer Str. 48
76139 Karlsruhe
Outline / Research issues

- Most prominent forms of regional engagement of German universities

- Evolution of new organisational models in university-industry interaction in the German research and innovation system

- Implications for universities
Underlying papers and projects


- Regional network participation and their implications on the internal governance of universities (BMBF 2010 - 2013)

- Research Campus pro active - Exchange of experiences and integration: Accompanying research to the Research Campus programme (BMBF 2012-2016)
Different forms of regional university engagement

- So far the **orientation of universities concerning their regional environment** has already been subject to many economic or social scientific research projects (Bleaney et al. 1992; Cooke 2002; Gunasekara 2006a; Keane und Allison 1999; Kitagawa 2004; Thanki 1999).

- Many universities **actively engage in their environment in a strategic manner** (Krücken et al. 2009; Krücken and Meier 2006; Nickel 2004).

- In this context the emergence of "**entrepreneurial universities**" (Clark 1998, Gibbs 2001) and the "**boundary-spanning roles**" of new university units (Youtie and Shapira 2008) are discussed, as well as the "**third role of universities**", i.e. their active contribution to regional development through knowledge spillovers from teaching and research (Gunasekara 2004; Westnes et al. 2007).

- In the wake of the **regionalization of RTD policies** the **expectations of policy makers** towards HEIs to engage in regional/local networks, clusters and other initiatives have significantly **increased** (Fritsch et al. 2007).
Different forms of regional university engagement

- Regional governments try to engage universities in joint strategic undertakings of the industry, the science and the public sectors in a region.
- Such initiatives can relate to the initiation of large scale cluster projects, to the formation of public-private-partnerships, as to urban development activities.

## Forms of regional engagement

### Starting point
- No broad empirical basis on the full scope of activities
- Mostly econometric or case studies

### Objectives of the study*
- Establish an empirical basis
- Take an actor based view
- Understand the reasons for researcher’s choice

### Study Details
- Between April and June 2011
- Survey of about 15,000 professors (of ~40,000 German Total)
- 1,929 questionnaires with relevant entries returned, thereof 221 FH

*financed by BMBF within the research programme ‘New governance of science’
Definitions

- **Regional**: Wider environment of the location of a university that can be reached within two hours driving (car or train).

- **Regional activities** of universities: Engagement of university staff or the university in total which is based on regional networking according to the typology of regional engagement.

- **Networking / network**: z.B. „a number of actors who are linked via a number of relationships with a specific content“ (Wald and Jansen 2007: 93).
Scope of activities with regional partners

Frequency of activities in co-operation with regional partners

- Organizing information events and further education courses for diverse groups (e.g. pupils, teachers, pensioners etc.)
- Research cooperations with regional organizations
- Consulting and expert reports for regional organizations
- Supporting or placing students at regional companies and institutions to complete their studies
- Contribution to local communities / social involvement
- Exchanges of staff between university and regional partners (e.g. interns, external teachers etc.)
- Allowing third parties to use university-owned premises or services
- Allowing third parties to use university-owned machines, appliances or laboratories

Source: Own Figure, based on own survey
Different forms of regional engagement of universities in Germany

Research collaboration with regional partners
Advice and expertise for regional organizations
Temporary exchange of personnel between HEI and regional partners (interns, teaching)
Support of final theses conducted by students in regional firms and organizations

Use of machinery, equipment, laboratories in HEIs
Use of rooms, infrastructure and services of HEIs
Information and further education for different groups (e.g. pupils, teachers, elderly people)
Contribution to social life of the region / social engagement in the region

Collaboration and personnel exchange
Supply of resources
Social engagement

n = 1441
= Indicator
*0,57 = estimated factor loading
= latent variable

* The highest of the respective factor loadings are shown;
Fitting of the sample according to Kaiser-Meyer-Olkin criterion = 0.78

Source: Koschatzky et al. (2013)
Differences between scientific disciplines

Profile of engagement according to disciplines

Contribution to local communities / social involvement
Organising information events and further education courses for diverse groups (e.g. pupils, teachers, pensioners etc.)
Supporting or placing students at regional companies and institutions to complete their studies
Exchanges of staff between university and regional partners (e.g. interns, external teachers etc.)
Allowing third parties to use university-owned premises or services
Allowing third parties to use university-owned machines, appliances or laboratories
Consulting and expert reports for regional organisations
Research cooperations with regional organisations

Source: Own Figure, based on own survey
Interim conclusions

- Research collaborations, consulting activities and exchange of human capital via students, graduates and business people are important forms of regional engagement in which spatial and cultural proximity are of high relevance.
- Also important is the supply of resources (infrastructure and services).
- Social engagement (contribution to social life, further education) plays also a role.

Conclusion: The "third role" of German universities is a strong starting point for policy measures.
Distributed innovation processes

- The recent understanding of innovation as an interactive and systemic process can also be interpreted as a **distributed knowledge sourcing and combining process between different agents**.

- Knowledge generation and implementation processes are supposed to result from **social interaction** between economic actors.

- Distributedness of innovation depends on different influential factors: the **modes** of interrelationships between agents (knowledge base and specialization), the **dynamics** in the distribution patterns of the agents (changes in the distribution patterns), and the **scales** which address the levels of innovation (incremental steps \( --> \) fundamental changes) (Coombs et al. 2003, p. 1126).

- The advantages of distributedness depend on the **absorptive capacity** of firms (Cohen/Levinthal 1990) and on a proper **gatekeeper function** in the firm (Tushman/Katz 1980).
Cooperations are *heterogeneous* when actors from different sectors of the research system are involved in R&D cooperations (university-industry, industry-public research institution, industry-public organisation), or when different types of cooperation partners with clear distinctions from one sector collaborate (like competitors, suppliers, or other firms serving different markets).

Source: Koschatzky (2013)
Changes in the industrial sector

- In the course of globalization and the increasing science orientation in technology development, the complexity in technology and product development increases further.
- Own entrepreneurial resources (knowledge, capital) are often insufficient to master this complexity.
- This results in changes in the interface between science and industry in the German innovation system - (large) companies are looking for access to long-term strategic research.
- Universities and non-university research institutions are attractive research partners in this context.
## Transfer Indicators

### Selected indicators of knowledge and technology transfer in international comparison

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DE</th>
<th>FRA</th>
<th>GBR</th>
<th>AUT</th>
<th>JAP</th>
<th>KOR</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contract research</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D activities at universities financed by industry (2009, in %)</td>
<td>14,2</td>
<td>1,6</td>
<td>4,5</td>
<td>5,7</td>
<td>3,0</td>
<td>14,2</td>
<td>5,6</td>
</tr>
<tr>
<td>R&amp;D activities at non-university research institutes financed by industry (2009, in %)</td>
<td>10,8</td>
<td>6,8</td>
<td>9,5</td>
<td>9,3</td>
<td>0,8</td>
<td>4,2</td>
<td>2,7</td>
</tr>
<tr>
<td><strong>Innovation cooperation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of innovative firms which cooperate with universities (2004, in %)</td>
<td>53,2</td>
<td>25,5</td>
<td>32,7</td>
<td>57,6</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Share of innovative firms which cooperate with non-university research institutes (2004, in %)</td>
<td>25,9</td>
<td>18,4</td>
<td>24,7</td>
<td>30,1</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Source: OECD: MSTI 5/2010; Eurostat CIS 2006
Structural changes in industrial R&D spending in Germany

- Since the mid 1990s, total R&D expenditures and the share of external R&D expenditures has increased (outsourcing)
- Other firms and universities profited most
- Most of industrial funded R&D is short-term and market-oriented development
- Only recently, the tendency towards more long-term oriented research increased

Source: Stifterverband Wissenschaftsstatistik, several years
Public support of heterogeneous cooperations in Germany

- In its report 2009, the Expert Commission for Research and Innovation (EFI) suggested that strategic cooperations between industry and research organizations should be encouraged and "active political support should be provided for further partnerships" (EFI Report 2009, p. 41).

- Based on this recommendation, BMBF formulated and implemented the funding initiative "Research Campus" (Forschungscampus) which is part of the Hightech Strategy 2020.

- Its objective is to promote collaboration between partners from industry and research organizations by combining resources in order to develop new research fields in a middle to long-term perspective in the way of public-private partnerships located at the campus of a university or research institute.

- Strategic pre-competitive research should be strengthened and leverage effects by public funding for an increased private investment be created.
The German research system

Kind of research

- **Basic research**
  - Fed. Gov./"Länder" institutes 0.9
  - Helmholtz Association 3.1
  - Max Planck institutes 1.5
  - Leibniz Association 1.1
  - Universities 11.8

- **Mainly institutional**
  - Institutes associated to a university approx. 0.7*
  - Leibniz Association
  - Fraunhofer 1.6

- **Mainly private**
  - Industrial research institutes (AiF) 0.4
  - Max Planck institutes
  - Leibniz Association

**Transfer bridges**

- Intra- and extramural R&D expenditures of the industrial sector approx. 57

**Funding /Budget (Bill. Euro in 2009/10)**

- Fraunhofer 11.8
- Max Planck institutes 1.1
- Leibniz Association 3.1
- Helmholtz Association
- Federal Government /"Land" institutes

*estimation

Source: BMBF 2012, Stifterverband 2012, other sources
ResearchCampus

Three distinct characteristics:

- **Proximity** – the bundling of research activities and competencies at one location, as possible on a university or public research campus,

- The medium- to long-term adaptation of a specific research topic, ideally in the frame of a research programme,

- A mandatory public-private partnership.

Preparation and main phases will be supported up to altogether 15 years with a maximal amount of 2 mill. Euro per year.

In September 2012, ten ResearchCampus projects were selected.

Development of a technology portfolio which enables a highly-efficient and rapid on site proof of infection agents and microbiological contaminations.
Impacts of regional engagement

Visibility/regional reputation
Offer for students (thesis, internships)
Enrichment of teaching
Visibility/interregional reputation
Networking with other partners
Networking with public actors
Networking with firms
Networking with public research institutes
Funding for Ph.D. students
Basic funding

n = 1,250 professors

Source: Own Figure, based on own survey
Relevance of central coordination

Professors' activities are result of centrally coordinated strategy processes

Source: Own Figure, based on own survey
Implications for universities

**Teaching:**
profits most from regional engagement (e.g. many offers for students)

**Research:**
Thematic enrichment through collaboration with research partners (if regionally available)

**Transfer:**
Many transfer activities with social, sometimes also economic relevance

Conclusions from own survey
Conclusions

- Many German universities interact with their local and regional environment.
- Research collaborations, consulting activities and exchange of human capital via students and graduates are important forms of regional engagement (strong indications for a "third role").
- During the last years the expectations of policy makers and industry towards universities to engage in industry collaborations have significantly increased (e.g. clusters).
- Universities respond to these expectations by manifold activities and also by changing governance modes (involvement of the university administration).
- Politics makes use of this increasing openness by placing universities at the center of strategic innovation supporting programmes (e.g. Research Campus).
- The public responds by questioning the independence of research and professors due to closer linkages to and dependencies on industry.*
- How universities are affected by this development and which role they have to play in future in the German innovation system are open questions.

*e.g., www.hochschulwatch.de
Thank you for your attention!

Contact:
knut.koschatzky@isi.fraunhofer.de