Open Innovation on the Borderline of University-Enterprise Cooperation

The European Academic Network on Open Innovation
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Outline

I. The aims and background of study
Janne Lehenkari

II. University-industry cooperation within the scope of open innovation
Antero Kutvonen

III. Survey results
Reetta Muhonen & Mika Kautonen

IV. Policy implications
Janne Lehenkari
I. The aims and background of study

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Project info

- Open-UNIC: “Open innovation on the borderline of university-enterprise cooperation”
- Funded by Tekes
- Timespan: 2013-2014
- Expected results
  - research articles
  - the Finnish handbook of open innovation
  - 7 policy workshops
- Research team: VTT, University of Helsinki, University of Tampere & Lappeenranta University of Technology
Research aims

1. Mapping the status quo of open innovation practices in Finnish universities and polytechnics based on a national survey of key stakeholders

2. Analysing interaction, learning and contractual practices of university-based open innovation platforms on a project level

3. Arranging venues for policy learning by organising a set of workshops that refines the key messages of the study and assures its regional and national policy relevance

From technology transfer to knowledge transfer

- Technology transfer (Bozeman 2000):
  - the movement of know-how, technical knowledge, or technology from one organizational setting to another
- Knowledge transfer (EC 2007):
  - processes for capturing, collecting and sharing explicit and tacit knowledge, including skills and competence; includes both commercial and non-commercial activities
- The legacy of US Bayh-Dole Act of 1980
  - stronger IPR protection for the results of publicly funded R&D would accelerate their commercialization and the realization of economic benefits
- Knowledge transfer offices
  - requirement of IP policy and measures for universities
  - result: 1,400 knowledge transfer offices in Europe (2004)
State of play in Europe and Finland

- Knowledge Transfer Study 2012 (UNU-MERIT):
  - the top 10% of European universities and research institutes earns approximately 85% of all license income (€346 million)
  - 88.8% of the revenue comes from biomedical inventions
  - license income equals 1.5% of the research expenditures of public research performers
- Finland
  - licensing revenues of all universities added up to €1.6 million in 2005 (Kankaala et al.)
  - the amount has not significantly increased in the 2010s

The different spheres of knowledge transfer

Salter & Martin 2001; Perkmann et al. 2013
Turning the tide in knowledge transfer

**TRANSFER CHANNELS**
- Patenting
- Licensing
- Contract research
- Collaborative research
- Consultancy
- Services
- Conferencing
- Publishing
- Networking
- Student placement
- Secondments
- Hiring
- Teaching
- Training
- Facility sharing
- Spin-out
- Other start-up
- Etc.

**BUSINESS & COMMUNITY ACTORS**
- SMEs
- Other firms
- Public bodies
- NGOs
- Non-profits
- Entrepreneurs
- Etc.

**KNOWLEDGE CARRIED IN**
- Patents
- Publications
- People
- Artifacts

Legend for transfer channels:
- **many KTOs have high involvement**
- **some KTOs have high involvement**

EC 2010: Metrics for Knowledge Transfer from Public Research Organisations in Europe.

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**University-industry links** (Albats, 2013)

<table>
<thead>
<tr>
<th>Industry</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic entrepreneurship</td>
<td>$</td>
</tr>
<tr>
<td>Commercialization of Property rights</td>
<td>$</td>
</tr>
<tr>
<td>Research partnership</td>
<td>$</td>
</tr>
<tr>
<td>Research services</td>
<td>$</td>
</tr>
<tr>
<td>Human Resource Transfer</td>
<td>$</td>
</tr>
<tr>
<td>Informal Interaction</td>
<td>$</td>
</tr>
<tr>
<td>Scientific Publications</td>
<td>$</td>
</tr>
<tr>
<td>Knowledge sharing</td>
<td>$</td>
</tr>
<tr>
<td>Meetings, conferences, lecturing, visiting researchers</td>
<td>$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training of industry employees</td>
<td>$</td>
</tr>
<tr>
<td>Intellectual property licensing</td>
<td>$</td>
</tr>
<tr>
<td>Scientific publications</td>
<td>$</td>
</tr>
<tr>
<td>Knowledge sharing</td>
<td>$</td>
</tr>
<tr>
<td>Meetings, conferences, lectures, visiting researchers</td>
<td>$</td>
</tr>
</tbody>
</table>

One-directional activity (University-Industry/Industry-University)

Bi-directional interaction
II. University-industry cooperation within the scope of open innovation

“The role of universities as knowledge utilizers as well as the bidirectional relationship between universities and firms, are brought to the research agenda simultaneously with the use of the analytical concepts of open innovation literature”

Systematic literature review

Initial search: "open innovation" AND "university"

Filter by topic (exclude natural sciences)

Manual assessment of fit and quality

Final sample

Publication analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Knowledge supplier</th>
<th>Bi-directional collaboration</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-2007</td>
<td>5</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>2008-2013</td>
<td>25</td>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>
Findings

• Universities represent a special case of OI → coupled modes of open innovation highlighted
• The few studies coupling OI and UII emphasize relational links (Perkmann & Walsh, 2007, Levy et al., 2009)
• Research focused on transferring university knowledge to firms, although reciprocity is acknowledged & seems higher in informal links
• Emphasis on bidirectional knowledge transfer and use of open innovation concept increased strongly in the last five years

III. Survey results
Survey – aim and main features

New industrial collaboration of the Finnish higher education institutions

• Conducted in spring 2013
• Covers most of the universities (14) and polytechnics (23) in Finland
• Telephone interviews (N=140) enabled a use of an extensive questionnaire (6 pages) and open questions
• Target group people in charge of R&D management. In polytechnics, R&D Directors and Managers; in universities Vice Rectors, Deans, Heads of Departments and research services staff
• Aim to map the status quo of open innovation (and related) practices in Finnish universities and polytechnics based on a national survey of key stakeholders
• Response rate 30.4 %.

Selected descriptive statistics

Statements with high share of those agreeing (Likert 4-5)

• Industrial partners represent various sectors and sizes of firms more often than before (55%)
• There are more scientific disciplines involved in industrial collaboration (54%)
• Students have become more interested than before to establish their own businesses (52%)
• Our HEI has activated to commercialize its inventions and technology by promoting a birth of new spin-offs and businesses (49%)
• Researchers’ direct contacts to firms are an important precondition to launch co-financed R&D projects or other activities subject to charge together with firms (68%)
• Our HEI has actively organized or sponsored idea competitions etc. among students in order to generate innovative ideas or to solve problems (50%)
Selected descriptive statistics (cont'd)

Statements with high share of those agreeing (Likert 4-5)

- Our HEI is active in participating to or promoting business incubation activities (55%)
- Our former or present researchers or students have established successful spin-off firms (for which knowledge has to a great extent been generated in our HEI) (59%)
- From industrial collaboration, our researchers have received significant ideas and knowledge that are further developed as a part of our own research activities (61%)
- As part of our curriculum, there are courses related to innovation management (51%)
- Various kind of industrial collaboration has become a permanent part of our curriculum (55%)
- *Industrial collaboration has too much impact on our HEI’s educational or research activities* (56% disagree)

NEW FORMS OF HEI–INDUSTRY COLLABORATION

typical for universities

(*p<0.05, ** p< 0.01)

- More often than before, our HEI invest in commercial exploitation of IPR (e.g. patents)**
- Our HEI has developed a permanent practice that enables monitoring the exploitation of created IPR*
- Our HEI has activated to commercialize its inventions and technology by selling and licensing it**
- Our HEI has activated to commercialize its inventions and technology by promoting a birth of new spin-offs and businesses**
- More often than before, industrial partners source knowledge and technology by commissioning R&D or other projects from us**
NEW FORMS OF HEI–INDUSTRY COLLABORATION

typical for polytechnics

(*p< 0.05 = , ** p< 0.01)

Our HEI has actively organized or sponsored idea competitions etc. among students in order to generate innovative ideas or to solve problems**

More often than before, our researchers and students make intensive use of ideas coming from industry in planning research and development projects*

Our HEI have intentionally recruited experts from the industry to strengthen a certain strategically important field of research*

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Three factors on university–industry relations

<table>
<thead>
<tr>
<th>Collaboration, open innovation &amp; knowledge creation</th>
<th>Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>More often than before, industrial partners source knowledge and technology by commissioning R&amp;D or other projects from us</td>
<td>Our HEI has activated to commercialize its inventions and technology by selling and licensing it</td>
</tr>
<tr>
<td>Industrial partners make some of their resources available for our researchers or students without immediate reward</td>
<td>Our HEI has activated to commercialize its inventions and technology by promoting a birth of new spin-offs and businesses</td>
</tr>
<tr>
<td>More often than before, our researchers and students make intensive use of ideas coming from industry in planning research and development projects</td>
<td>More often than before, our HEI invest in commercial exploitation of IPR (e.g. patents)</td>
</tr>
<tr>
<td>Researchers and students share same premises or infrastructure (e.g. laboratory) with firms</td>
<td>Our HEI has clear rules how to spread the economic benefits and risks in industrial collaborative projects</td>
</tr>
<tr>
<td>Our HEI has actively organized or sponsored idea competitions etc. among students in order to generate innovative ideas or to solve problems</td>
<td>Our HEI have intentionally recruited experts from the industry to strengthen a certain strategically important field of research</td>
</tr>
<tr>
<td>Our HEI has clear rules how to spread the economic benefits and risks in industrial collaborative projects</td>
<td></td>
</tr>
</tbody>
</table>

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Our HEI have intentionally recruited experts from the industry to strengthen a certain strategically important field of research*
Three factors on university–industry relations by HEI type

<table>
<thead>
<tr>
<th>IMPACTS OF HEI–INDUSTRY COLLABORATION</th>
<th>Agree, total (%)</th>
<th>HEI orientation (3 factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on research and education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From industrial collaboration, our researchers have received significant ideas and knowledge that are further developed as parts of our own research activities</td>
<td>61</td>
<td>Strategic recruitment</td>
</tr>
<tr>
<td>Various kind of industrial collaboration has become a permanent part of our curriculum</td>
<td>55</td>
<td>Collaboration, open innovation &amp; knowledge creation</td>
</tr>
<tr>
<td>Impacts on HEI operating environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our former or present researchers or students have established successful spin-off firms (for which knowledge has to a great extent been generated in our HEI)</td>
<td>59</td>
<td>No significant differences</td>
</tr>
<tr>
<td>In our region, a new industry has emerged for which our HEI has significantly contributed to through education or R&amp;D activities</td>
<td>45</td>
<td>No significant differences</td>
</tr>
<tr>
<td>Direct economic impacts to HEIs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incomes from selling our IPR have increased considerably</td>
<td>13</td>
<td>Commercialization</td>
</tr>
</tbody>
</table>
Statement: In our region, a new industry has emerged for which our HEI has significantly contributed to through education or R&D activities (%)

<table>
<thead>
<tr>
<th>Regional category</th>
<th>Capital city region</th>
<th>Other regions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>25,0</td>
<td>15,7</td>
<td>18,0</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>39,3</td>
<td>20,5</td>
<td>25,2</td>
</tr>
<tr>
<td>Agree</td>
<td>35,7</td>
<td>63,9</td>
<td>56,8</td>
</tr>
<tr>
<td>Total</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
</tr>
</tbody>
</table>

(N=111)

p=,032

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**Problems in university-enterprise cooperation**

1. Dysfunctional or lacking structures that would enable collaboration (43)
2. Different operational practices and cultures (38)
3. Scarce resources (38)
4. Different goals or missions (23)
5. I do not know (8)
6. Obstacles related to disciplinary profile (7)
7. No obstacles (6)
8. Other reasons (5)
Problems in university-enterprise cooperation - universities

- Dysfunctional or lacking structures that would enable collaboration: 34%
- Different goals or missions: 19%
- Different operational practices and cultures: 18%
- Scarce resources: 17%
- I do not know: 10%
- Obstacles related to disciplinary profile: 9%
- No obstacles: 4%
- Other reasons: 3%

Problems in university-enterprise cooperation - polytechnics

- Scarce resources: 40%
- Different operational practices and cultures: 38%
- Dysfunctional or lacking structures that would enable collaboration: 27%
- Different goals or missions: 13%
- No obstacles: 5%
- Other reasons: 5%
- Obstacles related to disciplinary profile: 0%
- I do not know: 0%
Survey conclusions

- University–industry collaboration increased during the last three years; also expanded to cover new sectors, SMEs and disciplines
- Industrial collaboration more tied to curricula
- Increased interest in entrepreneurship among students
- Intensified or new forms of engagement with the industry (idea competitions, incubation, shared facilities)
- However, considerable differences between HEIs especially between universities and polytechnics....

Survey conclusions (cont’d)

- Universities interested in commercializing their IPRs (outbound) while polytechnics more oriented to develop collaboration, open innovation & knowledge creation (both outbound and inbound processes)
- Basic research in universities generates commercially viable IPRs while more applied R&D is conducted in polytechnics where IPRs mostly owned by firms
- Significant difference between HEIs’ role in the capital city region vs. other regions where the role is more pronounced in facilitating emergence of new industries
- However, no significant difference concerning facilitation of spin-offs
- In case of universities obstacles of collaboration are more related to structures and practices while in polytechnics more to resources
IV. Policy implications

From protection to sharing and exchange

• The “myopia” of knowledge transfer policy
  – focus on commercialisation activities (patents etc.)
  – quest for pharma and biotech applications
  – knowledge transfer as a unidirectional activity from universities to firms

• New rationality for knowledge transfer
  – other forms of collaboration outweigh the economic significance of commercialisation activities
  – knowledge transfer take place in every discipline, even in humanities
  – knowledge transfer is hardly ever a one-way road
Why is open innovation approach needed to address knowledge transfer?

- The prevalence of bidirectional relations between industry and universities is often acknowledged but seldom understood.
- Knowledge transfer research and policy has little to say about why firms collaborate with universities and open their assets in the first place.
- The concepts of open innovation literature are often referred to when the role of universities as knowledge utilizers is focused on.
- Especially, the OI approach is called for understanding strategic decision-making of firms entering bidirectional relationships with universities.

Policy opportunities

- Industrial collaboration is more versatile than before in Finland (more sectors involved and more SME partners).
- Students and researchers are more interested in establishing own businesses.
- The Finnish HEIs share the view that researchers have obtained significant ideas and knowledge from industrial collaboration.
- Industrial collaboration does not seem to disturb performing the basic tasks of universities – research and teaching.
Policy challenges

• Very little is known about researchers’ direct contacts with firms, which is a precondition of industrial R&D projects in Finland and abroad
• Polytechnics seem to be more aware of open innovation practices than universities but their proportion of total R&D investments is small
• It’s probable that universities have not yet encountered the problems that polytechnics are already facing in industrial collaboration (different operational practices and cultures)
• The role of HEIs in capital area of Finland is different to the rest of the country due to the larger size and number of actors

Further measures

• Questions to be addressed in case studies
  – How are tasks and duties shared between teaching stuff, students and contact persons of firms in open innovation platforms and projects?
  – What is the role of contractual means in project management and exits?
  – How do open innovation projects support learning concerning research and professional expertise, collaboration skills and capabilities, and student graduation?
  – What factors support/hinder successful project completion and to what extent are they dependent on institutional or project setup?