Knowledge intensive service activities that matter for industry innovation: evidences from a peripheral region

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Available at: https://works.bepress.com/manuel_fernandez_esquinas/25/
Knowledge Intensive Service Activities that Matter for Industry Innovation: evidences from a peripheral region

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Overview

1. The project
2. The region
3. The ‘elusive’ university-industry research collaboration
4. The ‘ubiquitous’ KISA
5. Research methods
6. Preliminary results
7. Preliminary Conclusions
8. Policy lessons for innovation and regional development
The Project: Conditions for enhancing the capacities of a regional innovation system

Region: Andalusia (Spain) (Southernmost reg. of Europe)

Main goals of the project:
- mapping interactions of key actors
- study of expectations, strategies and experiences
- detecting impacts of universities and public research organizations (PRO) on innovation

Main components of the project:
- policy analysis
- survey to firms (n=737)
- survey to research teams in universities (n=786)
- case studies on cooperative research (n=25)
The Region: location and basic facts

Maria is doing a map with some basic features for you to explain a little about Andalucia – this map should be ready by Thursday.
The Region: main features

- Importance of traditional industry and service sectors
- Small and medium size firms
  - some innovative clusters and industrial districts
  - shortage of innovative firms
- R&D capabilities concentrated in universities and public research centres (9 public univ. 3 PRO networks)
- Policy change: toward a more interactive model of innovation polices
The ‘elusive’ university-industry research collaboration

A typology of research partnerships

• ‘Research support’ – financial equipment contributions made to researchers and universities by industries.

• ‘Cooperative research’ – includes contract research, consulting by researchers, and certain group arrangements that can specifically address immediate industry problems (NSF, 1982a cited in Belkhodja and Landry, 2005), or government agency problems.

• ‘Knowledge transfer’ – can take place through the recruitment of recent cooperative education programs (Phillips, 1991), through co-authoring of research papers, especially by researchers and industrial form members (NSB, 2000; NSF, 1982b cited in Belkhodja and Landry, 2005).

• ‘Technology transfer’ – focusing on addressing industry issues by leveraging university-driven research with industry expertise and translating these contributions into technologies needed by the market place (NSB, 2000; Teece, 1987 cited by Belkhodja and Landry, 2005).

Table 2: A typology of university-Industry links

<table>
<thead>
<tr>
<th>Extent of relational involvement</th>
<th>High: relationships</th>
<th>Medium: mobility</th>
<th>Low: transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research partnerships</td>
<td>Academic entrepreneurship</td>
<td>Commercialisation of intellectual property (e.g. licensing)</td>
<td></td>
</tr>
<tr>
<td>Research services</td>
<td>Human resource transfer</td>
<td>Use of scientific publications, conferences &amp; networking</td>
<td></td>
</tr>
</tbody>
</table>

Perkmann and Walsh (2007)
The ‘ubiquitous’ KISA

- Informal relationships and informal linkages gaining importance in establishing long-term partnerships
- Co-production of knowledge largely being produced by Knowledge Intensive Service Activities (KISA)
- KISA occurs in both high-tech, KIBS and low-tech, traditional industries
- KISA – research/consultancy activities to provide new or improved solutions / new or improved information that leads to new ideas and/or co-production of knowledge. Involves HR both from universities and industry. Activities that provide a pathway for innovation to occur.
- Contractual or Informal
- KISA-innovation (product development / service improvement) / KISA-skills (training/skills upgrade)
Our operative definition of KISA

**KIBS: Services usually provided by other specialized firms.**
- Some of them can be labeled as ‘high level outsourcing’ because they require specialized knowledge.
- Ex: legal assistance, accounting, marketing research and IT related consultancy, among others.

**KISA Innovation: activities related to R&D, or innovation closed to R&D.**
- In-house R&D, implementation of processes and design related to innovation, acquisition of specialized equipment
- Several kind of services provided by universities and PRO

**KISA Skills: activities related to human resources training and specialization, both in formal and informal fashion.**
- Specialized external courses (such as ad-hoc courses, corporative masters, etc.)
- Training provided by Universities and PRO on demand from the firm, and temporary exchange of personnel.
Research Methods: Field work

Data source: registry of business located in Andalusia (regional government)
It comprises 1844 firms which have received some type of public aid for innovation from 1999 to 2005.

An “operative population”:
- Firms with differing innovative capabilities
- A wide range of activity areas and a diversity of sizes
- Urban & rural

Sample: 737 firms (randomly selected)
- Proportional distribution between strata
- Strata: sector by activity and province where the firm is located
- Face to face interviews at the firms’ offices: two waves of field work: 72-75% response rate for each wave.
- Respondents: owner of the firm, executive director, R&D or innovation department manager
### Research methods: Firms in the sample

<table>
<thead>
<tr>
<th>Belongs to a corporate group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>168</td>
<td>22.8</td>
</tr>
<tr>
<td>No</td>
<td>567</td>
<td>76.9</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of workers</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 1 to 5</td>
<td>225</td>
<td>30.5</td>
</tr>
<tr>
<td>From 6 to 10</td>
<td>162</td>
<td>22.0</td>
</tr>
<tr>
<td>From 11 to 25</td>
<td>174</td>
<td>23.6</td>
</tr>
<tr>
<td>From 26 to 50</td>
<td>73</td>
<td>9.9</td>
</tr>
<tr>
<td>More than 50</td>
<td>101</td>
<td>13.7</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Minimum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>5800</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>56</td>
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</tr>
<tr>
<td>Std. Deviation</td>
<td>239</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer than 7 years</td>
<td>133</td>
<td>18.0</td>
</tr>
<tr>
<td>More than 7 years</td>
<td>599</td>
<td>81.3</td>
</tr>
<tr>
<td>Do not know / No answer</td>
<td>5</td>
<td>0.7</td>
</tr>
<tr>
<td>Minimum</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>338</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity sector (PITEC)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, livestock farming, forestry and fishing</td>
<td>46</td>
<td>6.2</td>
</tr>
<tr>
<td>Oil industry</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>Manufacture industry</td>
<td>196</td>
<td>26.6</td>
</tr>
<tr>
<td>Energy and water</td>
<td>26</td>
<td>3.5</td>
</tr>
<tr>
<td>Building industry</td>
<td>47</td>
<td>6.4</td>
</tr>
<tr>
<td>Services</td>
<td>419</td>
<td>56.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geographic environment</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science or technology park</td>
<td>61</td>
<td>8.3</td>
</tr>
<tr>
<td>Industrial park</td>
<td>209</td>
<td>28.4</td>
</tr>
<tr>
<td>Urban area</td>
<td>398</td>
<td>54.0</td>
</tr>
<tr>
<td>Rural area</td>
<td>60</td>
<td>8.1</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>0.8</td>
</tr>
<tr>
<td>Do not know / No answer</td>
<td>3</td>
<td>0.4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>R&amp;D department</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, in this location</td>
<td>157</td>
<td>21.3</td>
</tr>
<tr>
<td>Yes, in a different location</td>
<td>28</td>
<td>3.8</td>
</tr>
<tr>
<td>No</td>
<td>551</td>
<td>74.8</td>
</tr>
<tr>
<td>No Answer</td>
<td>1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Num. of workers at the R&amp;D department</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer than 5 workers</td>
<td>102</td>
<td>55.1</td>
</tr>
<tr>
<td>From 5 to 9 workers</td>
<td>34</td>
<td>18.4</td>
</tr>
<tr>
<td>10 or more workers</td>
<td>38</td>
<td>20.5</td>
</tr>
<tr>
<td>Do not know / No answer</td>
<td>11</td>
<td>5.9</td>
</tr>
<tr>
<td>Non applicable</td>
<td>552</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**                             | 737       |         |
Research Methods: Analysis

Variables

→ 3 sets of activities: KIBS - KISA innovation - KISA skills
→ % of firms involved en each actitivy

Step 1: Descriptive results
→ Basic profile of the firms

Step 2: Identifying the innovative firms
→ Product innovation and process innovation

Step 3: Multivariate analysis: logistic regression
→ Ind. variables: KIBs – KISA Innov – KISA Skills + control variables
→ Dep. variables: firms with both product and process innovation
Descriptive Results: KIBS

Graph 1: KIBS: % of firms involved in each activity

1. Business development advise
2. Planning advise
3. Marketing & promotion advise
4. Marketing & product research
5. Accounting & financial advise
6. IT services
7. Recruitment
8. Accreditation
9. Legal services
10. E-commerce
A basic profile of firms involved in KIBS

SIZE: firms with > 20 workers → 8 activities (of 10)
   development and planning advise: only > 250 workers

SECTOR: manufacture, energy, R&D, some services → 5 activities

LOCATION: Tech. Parks → 4 activities
   Marketing and product, IT advise, accreditation, legal serv.

PRODUCT CYCLE: Growth phase → 2 activities
   Planning advise, Marketing and product research

EDUCATION: > 25% of workers with HE → 7 activities

R&D DEPARTMENT: in-house department → 7 activities
Descriptive results: KISA Innovation

Graph 2: KISA-Innovation: % of firms involved in each activity

1. In-house R&D
2. Outsourced R&D
3. Acquisition of specialized equipment
4. Implementation of/design for innovation
5. Consultancy from university
6. Contract project from university
7. Joint project with university
8. Use of university facilities
9. University patent exploitation
10. Participation in a joint centre
11. Informal relations with university personnel
A basic profile of firms involved in KISA innovation

SIZE: > 20 workers → 11 activities (of 11)
  Implementation of inn.: only > 250 workers
  Univ. patents exploitation: only 50-250 workers
LOCATION: Tech. Parks → 10 activities
PRODUCT CYCLE:
  Growth phase → 4 activities: in-house R&D, implem. of innov, use of univ. facilities, relationships with univ.
  Birth phase → 2 activities: in house R&D, implem. of inn.
EDUCATION: > 25% of workers with HE → 9 activities
  Relationships with univ: only > 50% of workers with HE
R&D DEPARTMENT: in-house department → 11 activities
Descriptive results: KISA Skills

Graph 2: KISA-Skills: % of firms involved in each activity

1. Courses on Management
2. Courses related to productive process of the firm
3. Temporary stay of workers in other firms
4. Congress or professional meeting
5. Other training
6. Internships of university postgraduates
7. Temporary exchange of workers with university
8. Specific training provided by university
A basic profile of firms involved in KISA Skills

**SIZE:** firms with > 20 workers → 6 activities (of 8)
  - Courses on productive processes: only firms > 250 workers

**LOCATION:** Tech. Parks → 5 activities
  - Most of them with universities

**PRODUCT CYCLE:** Growth phase → 2 activities
  - Attendance to congress, exchanges with universities

**EDUCATION:** > 25% of workers with HE → 6 activities
  - Only > 50 of workers with HE: relationships with universities

**R&D DEPARTMENT:** in-house department → 8 activities
## Innovation performance of the firms

<table>
<thead>
<tr>
<th>Product Innovation</th>
<th>Process Innovation</th>
<th>Yes</th>
<th>No</th>
<th>No answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Count</td>
<td>256</td>
<td>159</td>
<td>2</td>
<td>417</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>34,7%</td>
<td>21,6%</td>
<td>.3%</td>
<td>56,6%</td>
</tr>
<tr>
<td>No</td>
<td>Count</td>
<td>82</td>
<td>236</td>
<td>2</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>11,1%</td>
<td>32,0%</td>
<td>.3%</td>
<td>43,4%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>338</td>
<td>395</td>
<td>4</td>
<td>737</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>45,9%</td>
<td>53,6%</td>
<td>.5%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>
Building the dependent variable

1. Firms with product and process innovation (34.7%)
2. Firms with only product innovation (21.6%)
3. Firms with only process innovation (11.1%)
4. Firms with no innovation (32%)

→ VALUE FOR OBSERVATION: 1

INDEPENDENT VARIABLES:
- KIBS, KISA Innovation, KISA Skills
PRELIMINARY RESULTS

Firms with more probabilities of PxP innovation are:

**KIBS:** Marketing and product research
   Accounting and financial advise
   Accreditation, business development advise

**K-Inn:** Design for innovation
   Informal relationships with univ.
   Acquisition of equipment
   Use of univ. facilities
   Outsourced and in-house R&D
   Contract projects with univ.

**K-Sk:** In-house training
   Congress or meetings
   Courses on management
   Exchange of workers with univ.

Red: more than 50%
Blue: more than 30%
Conclusions

The more ‘absorptive capacities’ the firm has, the more knowledge intensive activities the firm involve in

Some KISA are related to innovation performance: most of them are related to R&D, but not all of them.

Next step of the analysis: finding the interactions

→ It is possible that some of these activities go together: Most innovative firms are the ones who recombine different kinds of knowledge
Policy Lessons

Cath up regions have a firm structure with difficulties for withdraw R&D capacities directly from universities or other companies

Capacities for innovation can be enhanced by:

- Facilitating broad range of services from universities
  ‘Not only patent exploitation or R&D projects’
- Facilitating high level consulting and advise
- Facilitating skills upgrade and circulation of workers

Key process: pool of diversified sources → recombination of knowledge