CASE – Center for Social and Economic Research

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WP 8: Demand driven policy designs for knowledge generation and exploitation

Lead participant: CASE

Other participants: CCA, UU, UNS, LSE, CSIC, UHOH, SNI

Presentation prepared for PICK-ME meeting in Nice November 3-4, 2011

This project PICK-ME has received funding from the European Union Seventh Framework Programme FP7/2007-2013 under grant agreement SSH-CT-2010-266959.
Short Background

• Over the past decade we have analysed – through face-to-face interviews and comparable questionnaires - the demand for innovation of more than 5,000 firms in a number of EU and non-EU countries.

• In parallel, a large number of knowledge providers, support agencies and regional policies have been scrutinised.
For companies aspiring to grow, where to compete is just as important as how. To choose the right battlegrounds, they must match their distinctive capabilities with sectors where profitability growth is likely to occur.
A few facts (1)

• The vast majority of firms (especially SMEs) do not understand what “demand for innovation” means!

• Priorities are about profits; competitiveness; new markets; outsourcing; etc.

• Only a minimal number of firms created by R&D players do effectively grow (usually because they are technology focused versus market focused).
A few facts (2)

• The vast majority of managers have no idea about the support services they are entitled to mobilise to increase their competitiveness (*lack of transparency*).

• Only few support agencies are able to cope with complex demands from firms (*lack of high level staff*).

• SMEs are rarely a priority for R&D organisations (*lack of focus*).
Firms do not operate in a vacuum: they are surrounded!
A few facts (3)

• When stimulated through the right policies, R&D staff do get in touch with companies and are able to help them very effectively (UK, Scandinavia with the “Third Priority”).

• Low innovative Firms are an unexploited market for innovation support programmes.
Typology of needs by sectors

Types of innovation / sectors

- Engineering and manufacturing / Production based products and processes
- Food and drink and its associations with agriculture/horticulture, food and brewing
- Biotechnics and associated pharmaceutical, medical, environmental, health and life based sciences and services
- Information and communication technologies-IT, hardware, software, multimedia, print
- Services including road, transport logistics
- Fashion and textiles, clothing and leather
## WP8 Deliverables

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<th>Deliverable Number</th>
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Polish Innovation Ecosystem
Innovation and Innovation Policy in Poland
Overview of Innovation Policy

• It is widely acknowledged that Poland is not one of the most innovative economies in the world.
• However, level of investment in innovation is raising (see Innovation Scoreboard)
• One of the major problems is that Polish companies do not sufficiently invest in innovation. However, here is also a growing recognition within the Polish administration that innovation is important for the future economic growth (e.g.: launch of the innovation portal by the Polish Agency for Enterprises Development)
NATIONAL LEVEL

ENTREPRENEURSHIP POLICY

• Strategic documents:

• Supporting institutions:
  – Ministry of Economy
  – Polish Agency for Enterprise Development
  – National SME Services Network
  – Business Support Organisations

INNOVATION POLICY

• Strategic documents:
  – Directions of improving innovations in the economy for the period 2007-2013

• Supporting institutions
  – Ministry of Economy
  – Ministry of Science and higher Education
  – Polish Agency for Enterprise Development
  – National Innovation Network

• Supporting programmes:
  – Innovative Economy 2007-2013 (European Regional Development Fund – 8,3 bln €)
  – Human Capital 2007-2013 (European Social Fund – 3,5 bln €)
ENTREPRENEURSHIP POLICY
NATIONAL LEVEL

Sources: Entrepreneurship and Innovation in Poland, World Bank, ‘Doing Business’

• No real policy promoting entrepreneurship despite numerous declarations on simplified procedures, tax allowances or preferential loans
• Poor cooperation of R&D units with industry, weak intermediary institutions
• R&D expenditure among the lowest in the EU and OECD and its inappropriate structure
• Low awareness of the role of innovations and entrepreneurship in economic development among business and science representatives
• Domination of financial instruments in support to innovations over other solutions
• Focus on generating new solutions rather than on their implementation
INNOVATION POLICY
NATIONAL LEVEL - DISCUSSION

Source: Polish Ministry of Science and Higher Education,
*Barriers for cooperation between entrepreneurs and research centres*, 2006 report

- **Entrepreneurs complaints:**
  - The lack of public incentives to promote cooperation between science and industry
  - Too high prices offered by scientists for the cooperation with business
  - The lack of research centres offers for entrepreneurs to establish cooperation with business
  - Research centres are unaware of potential benefits from cooperation with business and have poor knowledge in the field of economy, principles of business and current market situation

- **Scientist complaints:**
  - The lack of specialists in the field of technology transfer
  - Business is not interested in financing research process
  - The lack of public incentives to enhance the cooperation between science and industry
  - Low institutionalisation of the cooperation between science and industry
  - Low entrepreneurs awareness of benefits from mutual cooperation
Conclusions

• SNI concludes that “The Polish innovation ecosystem seems to be in its initial stages of development. There is low connectivity and loose ties between the various factor and cluster groups. The demand side interactions in the system are much more significant than the supply-side interactions.”

• We would say that the results confirm what we know about the weaknesses of the Polish innovation system
  – Poor performance of the science sector
  – Poor innovation performance of domestic firms (cf. CIS data)
  – Underperforming R&D institutes, weakly connected to the private sector
  – Underdeveloped financial sector supporting innovative businesses

• We would disagree, however that demand-side interactions are more significant than supply-side ones. In the study this conclusion comes from the analysis of one cluster containing only two processes – and this cluster can be argued to be in fact a supply-side one.
Policy Incentives for the Creation of Knowledge: Methods and Evidence (PICK-ME)

Work Package 7: Evolution of demand, sectoral development and the organization of innovative activities

Draft of working plan and methodological issues

Participants: CCA, UNS, LSE, CSIC (Leader) and SNI

Pablo D´Este, Davide Consoli, Cristian Matti & Rodrigo Martínez Novo
Nice, 4th November 2011

www.ingenio.upv.es
Overview of the objectives and activities involved in this WP

Objectives
- Linking sectoral development to regional evolutionary patterns;
- Analyze the impact of public procurement on the development of local technology-based industries;
- Analysis of the changing governance of innovative activities over the technology lifecycle.

Deliverable
Report on the relationship between the evolution of demand and sectoral development: month 36 (January 2014)

Tasks
7.1 The case of Biofuels (CCA)
7.2 The case of Automotive (CCA)
7.3 The case of Aeolian Energy (CSIC)
7.4 Demand for Inn and location choices of multinationals
  7.4.a LSE
  7.4.b SNI
7.5 Demand for Inn and the dynamics of technological cooperation in knowledge intensive sectors (UNS)
7.6: Scientific support to policy activities (CCA, CSIC, SNI)
Workpage background and general approach

Background
The role of rationale for demand-driven innovation policies is based on the argument that they play a critical role in:

• Rejuvenating mature industries
  Automotive industry
• Fostering the creation, adoption and diffusion of new technologies
  Bio-fuels
  Wind energy
• Shaping firms’ choices in the organisation of innovative activities
  Location of MNCs and impact on local firms’ innovative performance
  Inter-organisational linkages in knowledge intensive industries

Methodological viewpoint – Case study approach

• Combination quantitative and qualitative methods
  Patent data collection, econometric analysis, network properties
  Interviews and archival data
• Longitudinal perspective
  Sector specific policy initiatives, knowledge base and inter-firm collaboration overtime
• Systemic approach
  Collaboration networks (knowledge) and coordination networks (policy)
• Geographical focus
  Geographical specific context (both regional and national) . Inter regional and cross-country comparisons
Aeolian energy

**Two perspectives approach**

**Top-down**, that is, the policy context and initiatives to foster the demand for innovation

**Bottom-up**, that is, the innovative response at firm level and the role these actors play in “shaping” policies

**Key issues**

- Impact of EU directives and R&D programs
- Role and competences among national and regional level
- Interaction between traditional and new sectors, knowledge base, transitions, interactions and complementarities
Aeolian energy case – top down perspective

Top down perspective

Scope:
Policy actions from a multilevel perspective:
1. Supranational
2. National
3. Local

Objective: identify criteria and methods of implementation of policy action aimed at environmental issues in Spain.

Methods:
- Textual content analysis
- Atlas.ti software and qualitative techniques

Expected outcomes:
1. Longitudinal analysis of key policy initiatives;
2. Mapping patterns of relationships between policies and actions at different policy level

Sources:
Preliminary list of policy documents:
- 4 Global Regulatory frameworks
- 9 European policies and initiatives (includes EU directives, and R&D specific programs)
- 7 National plans on energy sector
- 12 regulatory mechanisms (laws and royal decrees)
- 7 R&D national programs
Aeolian energy case – Multilevel approach

Timing of the different policy initiatives at the European, National and Regional level
Aeolian energy case

Bottom up perspective

Sectoral dynamics:
1. The firms
2. The knowledge base

Objective: Understand who are the key actors in the sector, what they do (e.g. what they produce and distribute), how they developed the necessary capabilities (e.g. technological, organizational).

Methods: Analysis of primary and secondary sources
→ Patent data to capture the areas of specialization;
→ Interviews to collect detailed information;
→ Firm-level data on firms drawn from multiple sources;

The Sources that will be consulted are:
1. National registries of firms
3. SABI: Iberian database of Balance sheets
4. CDTI: Centre for Industrial Technological Development
5. DERWENT: patents selected on the basis of firms’ names
6. Amadeus
7. Interviews

Expected outcomes:
→ Mapping of the relevant knowledge bases;
→ Detailed information on the challenges and the opportunities;
## Aeolian energy case

### Bottom up perspective

### Activities developed by firms. Spanish wind energy sector 2011

*Source: own elaboration based on AEE (2011)*

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<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>%</th>
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<td>Developer</td>
<td>43</td>
<td>18,5</td>
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<tr>
<td>Wind turbine Manufacturer</td>
<td>14</td>
<td>6,0</td>
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<tr>
<td>Component Manufacturer</td>
<td>62</td>
<td>26,7</td>
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<tr>
<td>Engineering and Civil Engineering</td>
<td>56</td>
<td>24,1</td>
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<td>Operation and Maintenance</td>
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<td>26,3</td>
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<tr>
<td>Consulting</td>
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<td>27,2</td>
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<td>Finance and Insurance</td>
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<td>Transportation &amp; Logistics</td>
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<td>5,6</td>
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<td>Technology Centre</td>
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<td>Training</td>
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<td>Other</td>
<td>46</td>
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<tr>
<td><strong>Total firms</strong></td>
<td><strong>232</strong></td>
<td><strong>100,0</strong></td>
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### Number of activities developed by firm. Spanish wind energy sector 2011

*Source: own elaboration based on AEE (2011)*

<table>
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<tr>
<th>Total activities</th>
<th>Frequency</th>
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<td>148</td>
<td>63,8</td>
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<tr>
<td>7</td>
<td>1</td>
<td>0,4</td>
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<tr>
<td><strong>Total firms</strong></td>
<td><strong>232</strong></td>
<td><strong>100,0</strong></td>
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Summary of the Partners tasks

CCA - The emergence of a market for electric vehicles (EVs) in the automotive industry, with a special emphasis on the role and effect that public institutions (supranational, national and local governments) play for: a) developing EV market; b) lowering barriers to entry in the EV market for both car-makers and final users.

UNS - Mobilization of knowledge through joint development and R&D partnerships. Analysis of the relationship between demand-driven innovation policies and the formation and dynamics of innovation networks, focusing on R&D partnerships between incumbent firms and new entrants in two knowledge intensive business sectors.

LSE - The role of MNEs and we will start developing it in the near future exploiting the potential synergies with another EU Project in which LSE is involved that is explicitly addressing the role of Multinational Corporations.

SNI - The role of multinational companies in the supply and demand for innovation in Israel: evidence from patent data and multinational-firm survey
Coordination across partners

Preliminary task:

1. Detail concisely the aims and the methodology of individual case studies - this will provide us with a more specific idea, compared to the indications contained in the PICK-ME proposal, of what each team seeks to pursue.

2. Elaborate on the point “What is the common thread across all the studies?”

3. What specific aspect of Demand-driven policy does each case address?
WP 3: Development of an integrated framework
Some general issues

Starting point:

• Previous models of demand neglect active consumers who interact with other consumers as well as the supply side
• Our model explicitly takes into account the heterogeneity of active consumers equipped with limited information and individual preferences
  ➢ **Agent-based model approach** as a natural description of the system, where the macroscopic behavior emerges from the microscopic actions and interactions of agents (consumers, firms etc.)
  ➢ Example: **Flock of birds:**
    • Avoid collisions with objects; Avoid collisions with other entities
    • Match velocity with nearby entities
    • Move toward the center of the flock
Some general issues: idealized steps

1. Definition of the target
2. Designing a model
3. Building a model
4. Verification
5. Validation
6. Sensitivity analysis
Some general issues: idealized steps

- Definition of the target
- Designing a model
- Building a model
- Verification
- Validation
- Sensitivity analysis
Our roadmap:

Implications for our model:

- Sequential design: Building the model step by step
- Starting with the most simple model and systematically adding model characteristics

Important characteristics for the first model:

Firms:
- Heterogeneous products

Consumers:
- Individual but limited knowledge about products and their characteristics
- Individual preferences
- Simple decision routine to select the “best” product
1. Basis model: Simple buying, based on individual preferences and limited information from firms

Firms: Individual product $[c_1, c_2, \ldots, c_n]$

Sending product characteristics: $[p_i, F_i, c_1 \ldots c_n]$

Customers: Individual preferences $[c_2 > c_1 > c_3]$

Buying the product which fits best with preferences
1. Basis model: Simple buying, based on individual preferences and limited information from firms
1. Basis model: additional information from ‘friends’

Firms: Individual product
\[c_1, c_2, \ldots, c_n\]

Sending product characteristics
\[p_i, F_i, c_1 \ldots c_n\]

Buying the product which fits best with preferences

Customers: Individual preferences
\[c_2 > c_1 > c_3\]

Sending product characteristics
\[p_i, F_i, c_1 \ldots c_n\]
1. Basis model: additional information from ‘friends´ (2)

Regular; $p = 0$

Small World; $p = 0,2$

Random; $p = 1$
1. Basis model: additional information from ‘friends´ (3)

1 product characteristic

% of customers with the highest product satisfaction

- regular lattice
- random lattice

time
1. Basis model: additional information from ‘friends´ (4)
1. Basis model: additional information from ‘friends’ (5)

![Graph showing the percentage of customers with the highest product satisfaction over time for 4 product characteristics with different network models: regular lattice, small world, and random lattice.](image-url)
1. **Basis model:** preferences are variable and customers can be convinced by preferences of ‘friends’.

**Firms:**
- Individual product
  
  \[c_1, c_2, \ldots, c_n\]

**Sending** product characteristics
- \([p_i, F_i, c_1 \ldots c_n]\)

**Customers:**
- Individual preferences
  
  \([c_2 > c_1 > c_3]\)

**Buying** the product which fits best with preferences

**Sending** product characteristics
- \([p_i, F_i, c_1 \ldots c_n]\)

**Adapting** preferences
- \([c_2 > c_1 > c_3]\)
1. Basis model: preferences are variable and customers can be convinced by preferences of ‘friends’
1. Basis model: preferences are variable and customers can be convinced by preferences of ‘friends’ (2)
1. Basis model: firms engage in R&D to innovate

Firms: Individual product
\[c_1, c_2, \ldots, c_n\]

Sending product characteristics
\[p_i, F_i, c_1 \ldots c_n\]

Sending product characteristics
\[p_i, F_i, c_1 \ldots c_n\]

Buying the product which fits best with preferences

Customers: Individual preferences
\[c_2 > c_1 > c_3\]

Adapting preferences
\[c_2 > c_1 > c_3\]

R&D
(incremental / radical innovation)
1. Basis model: firms engage in R&D to innovate

![Graph showing concentration over time with and without innovation. The graph is labeled with concentration on the vertical axis, time on the horizontal axis, and two lines indicating 'without Innovation' and 'with Innovation'.]
1. Basis model: firms act in a technological landscape and adapt to customers preferences

**Firms:**
Individually knowledge:

\[ K_i = \left( \begin{array}{c} C_1 \\ A_1 \\ E_1 \\ c_1, c_2, \ldots, c_n \end{array} \right) \]

**Sending** product characteristics

\[ [p_i, F_i, c_1...c_n] \]

**Buying** the product which fits best with preferences

**Customers:**
Individually preferences

\[ [c_2 > c_1 > c_3] \]

**R&D**
(incremental / radical innovation)

**Sending** product characteristics

\[ [p_i, F_i, c_1...c_n] \]

**Adapting** preferences

\[ [c_2 > c_1 > c_3] \]
2. Basis model: ....

Firms: Individual knowledge:
\[ K_i = (A_1, A_2, A_3, \ldots, A_n) \]
\[ (E_1, E_2, E_3, \ldots, E_n) \]
\[ [c_1, c_2, \ldots, c_n] \]

Sending product characteristics 
\[ [p_i, F_i, c_1 \ldots c_n] \]

Customers: Individual preferences
\[ [c_2 > c_1 > c_3] \]

Buying the product which fits best with preferences

R&D (incremental / radical innovation)

Adapting preferences
\[ [c_2 > c_1 > c_3] \]