

EUROPEAN POLICY BRIEF



Policy Incentives for the Creation of Knowledge: Methods and Evidence (PICK-ME)

Policy Incentives for the Creation of Knowledge, an EU-funded research project exploring the key role of public demand in innovation policies aimed at fostering the multifaceted dynamics of technological knowledge

January 2012

INTRODUCTION

Demand-driven innovation policies: are European countries all alike?

The bulk of innovation and technology policies has been mainly designed by relying on a supply side perspective while the demand-side has been rather neglected.

In order to develop a useful framework for the analysis and the design of demand-driven innovation it is worth gaining in depth knowledge about the organization of the different national systems of innovations as well as about the role played by demand drivers in different institutional settings.

An analysis based on the biological metaphor of the ecosystem may prove to be effective in this perspective in articulating a synthetic representation of national peculiarities. A biological ecosystem is a complex set of relationships among living people and animals, habitat and resources, whose functional goal is to maintain an equilibrium sustaining state. An innovation ecosystem similarly reflects the relationships among firms, government bodies, universities, researchers, consumers, owners of capital, workers, whose goal is to drive technology development and innovation, with the goal of achieving sustained and sustainable growth and development through innovative products, services and processes. An innovation ecosystem generates increased innovative output in two ways: Through an increase in the quantity of inputs (capital and labor) in the system, and through an improvement in the efficiency with which existing inputs are used to generate innovation.

In this policy brief, we present the initial results that generated the pillars that enable us to draw visual portrayals of those nations' innovation ecosystems in five countries: Israel, Germany, France, Spain and Poland.



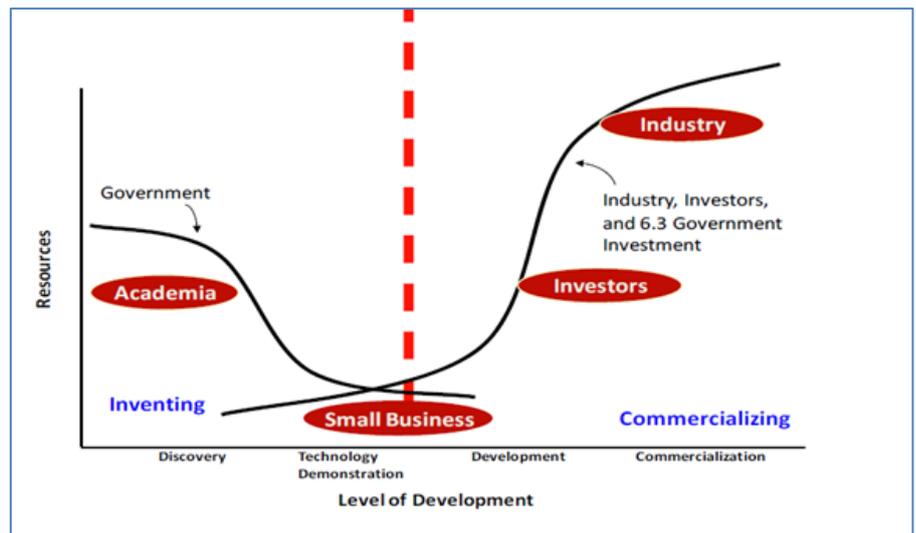
KEY OBSERVATIONS

The analysis of innovation ecosystems

There is growing concern that the world faces a looming global shortage of capital. (Dobbs, Lund and Schreiner, 2011; Batten Institute, 2011). A McKinsey report notes that “Surging [global] demand for capital, led by developing economies, could put upward pressure on interest rates and crowd out some investment” (Dobbs et al. 2011). If this is so, growing importance will attach to those aspects of growth and development that do not require additional capital resources. For this reason alone, innovation policies are of growing importance. It will be vital for nations to use existing “innovation capital” more efficiently.

A key question in this respect is: How can policy-makers strengthen the innovation ecosystem, and improve its efficiency, without hampering the intellectual freedom so vital for innovators, and so crucial to the smooth workings of the ‘invisible hand’? We believe that an accurate innovation ecosystem map can help avoid policy errors, and help identify creative pro-innovation policies that work well both for individual researchers and for society as a whole.

A key element of innovation ecosystems involves Type I and Type II errors. In Type II errors, technologies that should rightly ‘die’ in fact are heavily funded, futilely; and in Type I errors, technologies that should develop instead unjustly ‘die’, owing to lack of funds. Jackson terms type I errors the ‘*valley of death*’ – the gap between basic research funded largely by government and commercial development funded by industry. The ability of an innovation ecosystem to avoid both Type I and Type II errors is crucial. Often, success in navigating through the Valley of Death relates to how supply-side and demand-side innovation are integrated.



To address at least some of these key issues and dilemmas, we have developed an empirical evidence-based method that generates a visual tool useful for creating a common foundation for policy debate. Without this foundation, all too often innovation policy discussions become dialogues of the deaf, featuring individual agendas and personal interests, with no common agreement on a set of innovation ecosystem facts.

A methodological detour

The process for gathering basic data on each nation's innovation ecosystem, and then analyzing them, followed the following steps:

A. Experts Workshop

The objective of the experts workshop is to identify fundamental “anchors” and “processes” that comprise the main elements of a country's innovation ecosystem.

B. Linking Anchors and Processes

This stage involves two complementary analyses. The first comprises “cross impact” analysis where the research teams evaluate the relationship between the anchors and the processes, that were identified in the earlier stage on a bipolar five-point Likert scale ranging from strong negative link (1) to strong positive link (5).

C. Literature Review

Once each country's innovation ecosystem has been mapped, it is vital to examine the body of existing knowledge on innovation, to map what we know. This survey will also reveal, more importantly, what we do not know about the innovation ecosystem. A survey of existing research will be conducted in the framework of the ecosystem map, using the map to structure the literature search and survey.

An overview of the results

The maps generated by the analysis (see the working paper on the PICK-ME website for details) show visually a) innovation anchors, essentially ‘stocks’ of capabilities that drive innovation, and b) innovation ‘processes’, or flows.

Based on these maps and related factor analyses and interaction analyses, we constructed a comparison among these countries, based on three layers of examination. The first layer refers to the list of key anchors identified in each of the participant countries based on four key innovation dimensions:

- Culture (shared values)
- Context (scientific and technological infrastructure, structure of the economy)
- Markets (demand, preferences)
- Institutions (system of laws & regulations, written & unwritten ‘rules of the game’)

We now proceed to describe similarities and differences among the five innovation ecosystems.

1. “Like All....”

Each of the five innovation ecosystems had ‘anchors’ in each of the four key dimensions listed above. The exceptions were Poland that lacked a market-based anchor and Spain that lacked a market-based anchor and Institutional anchors as well.

All five have significant anchors that fall under “Context”, reflecting scientific and technological infrastructure, human capital, governance, transparency and accountability and technological structure that support innovation. Similarly most of them (with the exception of Spain) have anchors that belong to the “institutions” dimension, reflecting availability of capital to foster entrepreneurship and R&D, economic institutions, trade agreements etc.

On the other hand it is significant to note that the “Markets” dimension was among the weakest of the four dimensions, overall.

One of our most unexpected results was related to “culture”. Though the expert workshops were largely comprised of those with

management and technology or science backgrounds, the cultural aspect of innovation features prominently in all the five of the innovation ecosystems. In the end, it appears, it is the individual energy of entrepreneurs and innovators that drives the innovative ecosystem, which in turn flows from the culture and history of their nation.

Each of the five innovation ecosystems had key processes representing the demand or the supply side of innovation. More than half of the key processes purely fall under the supply side while only five key processes depict purely the demand side; none of them belong to Spain. In regard to the mixed aspect of innovation, the data reveal that of the 12 innovation processes linked with demand, fully seven combine aspects of both supply and demand (such as “joint public-private initiatives, and ‘public-private cooperation’”).

We believe that the ‘valley of death’ identified by Jackson, where basic research crosses the ‘desert’ of resource scarcity toward commercial exploitation, exists in all five countries under study, because it is market forces that ‘pull’ innovative ideas through this barren territory toward full implementation and global scale-up. The five innovation ecosystems indicate that *this ‘demand pull’ force can fruitfully be strengthened in each of the five nations under study, in particular in Spain but also in France.*

2. “Like Some...”

There are aspects of the innovation ecosystems that exist in some, though not all, of the five countries. All five systems are complex, as one might anticipate, though the French, Polish and Spanish ecosystems appear rather simpler than those of Israel and Germany. Poland’s ecosystem is simple because it is in its early stages. France’s is simple, perhaps because it is dominated by the role of the public sector. Poland’s system features growing “awareness” of the vital importance of innovation. It seems that for Poland, the experts’ workshop identified a clear need to create a culture of innovation, which we believe is quite typical of a transition economy shifting from state planning to market-driven economy based on private initiative. Spain features ‘local and regional initiatives’. Israel’s culture of “empowerment” and “out-of-the-box” thinking is vital, while Germany features “cluster strategies”. France’s system stresses the key role played by government procurement policies.

3. “...and Like None...”

Each innovation ecosystem has unique features found only in that country. Through the process of best-practice benchmarking, it is useful for nations to explore these special innovation drivers, and to find ways to adapt them to their own innovation systems. Here are a few of the more significant features in each of the five countries we analyzed:

- **Israel:** A variety of institutions exist that leverage defense-related R&D into civilian innovation, especially indirect ones, for example, young engineers who develop technology-intensive projects within the military use their knowledge and experience later to launch startup companies. The Office of the Chief Scientist (OCS), within the Ministry of Industry, plays a key role in R&D by leveraging a large budget to

support technology-intensive projects. The OCS also supports a) Magnet, in which commercial firms and at least one research institution collaborate on developing generic technologies; b) Magneton, which funds 2/3 of the R&D cost of an existing partnership between a company and an academic institution; and c) Nofar, which funds 90 per cent of later-stage applied academic research, in bio- and nano-technologies, to bring the research to sufficient maturity to interest a business partner in investing in it. An extensive Public Incubator Program at its peak had some 30 gov.-sponsored incubators spread throughout Israel, each with 10-15 projects, offering basic funding for two years for each (See Dumanis et al., 2008).

- **Germany:** This country has important industrial ‘clusters’, specifically the automotive cluster surrounding the city of Stuttgart, with major installations of Bosch, Mercedes and Porsche. Such clusters comprise agglomerations of complementary capabilities and are actively supported by tax and subsidy policies. Germany’s vocational training schools provide valuable skills that support its mittelstand SME’s that produce precision machinery. Germany also has a unique chain of R&D labs, the Fraunhofer Institutes, that provide fast and efficient technology transfer.
- **Poland:** As a country still in transition to market-based economics, Poland is in the process of creating an innovation system, and an innovation culture. Part of its innovation processes include a focus on self-reliance (ranked #7 in importance), success stories of innovators (ranked #1), attracting foreign students to Poland (#9) and attraction of Poles abroad to return home (#4).
- **Spain:** This country has a number of local and regional incentives for innovation worthy of further study, especially those surrounding Valencia and Andalusia. Spain also has a number of “acronym” programs that are of interest, including PROFIT (university-industry research), and two other public-private initiatives (CENIT, CDTI).
- **France:** This country has several venerable schools of science, engineering and technology (Ecole des Ponts et Chausees, Ecole des Mines), some of which date back to 1747. While not unique, France does have a singular system for selecting top students and channeling them toward its elite schools, a system that has made French engineering and French engineers among the best in the world. If it is believed that world-class science and technology universities can be the core of national innovation systems, France’s universities and system of technological education are worth careful study.

There is great untapped potential here, for best-practice benchmarking – a process in which countries adapt and import ideas that have been successful in other countries in strengthening innovation.

RECOMMENDATIONS FOR POLICY-MAKERS

The need for a complexity-based approach to a demand-driven technology policy

If a country is a business, then like a business, a country requires strategic direction and vision, that provide a clear answer to the question, what does our country do better than other countries, in which products and industries can we excel, so that we can produce and export, in order to generate jobs, income, wealth, exports and dynamic sustained growth, even in the face of weak global markets? Such strategic planning is normally regarded as “top down”, driven by the country’s political and business leadership. But our analysis of national innovation ecosystems has revealed, we believe, the crucial importance of combining ‘top down’ strategic innovation policies with ‘bottom up’ policies driven by the infrastructure of existing capabilities. These capabilities find expression in the innovation ‘anchors’, in our analysis, which differ widely across countries in their impact on the evolution of innovation ecosystems and their ability to implement national strategic goals. These anchors, and the dimensions to which they belong, comprise the foundation on which nations can build their strategic innovation policies, by strengthening innovation-fostering processes that are closely linked to national objectives. Each nation, therefore, must design its own unique, specific national innovation policy, according to the strengths and weaknesses identified in its innovation ecosystem -- its innovation accelerators, that help the country achieve its goals for improving the wellbeing of its citizens.

It is the combination of effective top-down innovation policies, integrated closely with bottom-up market-driven initiatives and energy, that create effective innovation ecosystems. It is an oversimplification to assign top-down policies to ‘supply side’, and bottom-up initiatives to ‘demand side’, yet, it is probably true in general that market forces are more of a ‘bottom up’ nature.

The importance of constructing visual innovation ecosystems goes well beyond their specific content. Effective consensual innovation policies rest crucially on an economy-wide understanding of the innovation system and its drivers. We envisage a two-stage process, in which experts from all parts of society meet to engage and interact on understanding and mapping the ecosystem, and only after reaching consensual agreement on how the system works (and why perhaps it does not), debating how policy interventions can be most effective. By achieving a deep understanding of national innovation ecosystems, and by studying those of other nations, we hope that European innovation policies will be both more innovative, more effective in their national impact and more integrative in their Europe-wide design. A widely-employed slogan in global corporate strategy is “think global, act local”. We believe this slogan is applicable to national strategic innovation policy as well.

RESEARCH PARAMETERS

Specific Objectives

The PICK-ME research project will be aimed at undertaking following tasks:

- To develop a taxonomy of policies to foster innovation, with a particular focus on demand-driven innovation initiatives.
- To develop new databases and elaborate new indicators for analyzing and assessing the impact of demand-driven innovation policies at different government levels;
- To analyse the influence that demand has on the introduction of technological innovations when and if the generation of knowledge can actually take place, both from a quantitative and a qualitative viewpoint;
- To investigate the interplay between demand-driven knowledge activities and the dynamics of both pure and pecuniary knowledge externalities, and how these affect local performances in Europe and the diffusion of knowledge;
- To assess the relationship between the evolution of demand and the dynamics of knowledge-base in knowledge intensive sectors, with a particular emphasis on development and the organization of innovative activities;
- To extract policy guidelines for public administrations practitioners in order to support them in the future design and implementation of innovation strategies at different levels;

Operative Objectives

These tasks will be pursued by implementing the following activities:

- Detailed modelisation of the impact of both direct and catalytic funding schemes on the rate and direction of innovation activities at the regional, national and European level;
- To develop a public database including detailed information about already implemented demand-oriented innovation policies so as to measure and monitor their influence on innovation activities;
- To develop a comprehensive database concerning knowledge indicators, like patents, publications, skilled labour force, suitable for advanced analyses in terms of research topics and technological fields at various levels of aggregation;
- To provide decision makers with policy recommendations in order to support them in the future design and implementation of regional, national and European demand-oriented innovation strategies. Specifically, best practices and scientific support to policy activities will be provided.
- To disseminate the policy implications to practitioners and policymakers at different government levels (local/regional/national/European), in order to provide them with tools to develop improved innovation policies in the future.

PROJECT IDENTITY

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| Funding Scheme | EU 7th Framework Programme THEME [SSH-2010-1.1-1] [Demand-driven research and innovation policies for growth, welfare and wellbeing] |
| Duration | January 2011 – December 2014 |
| Budget | EU Contribution: EUR 1.838.817 |
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