



European
Research Area

EUROPEAN POLICY BRIEF



INGINEUS **Impact of Networks, Globalisation, and their Interaction with EU Strategies**

Ongoing project

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SUMMARY

Objectives of the research

During the past decades, large firms and especially multinational firms have been developing innovation networks with a true global reach. In these innovation networks, innovation is created in different locations and shared between different partners in order to open, adapt, maintain or exploit new market opportunities. The objective of this research is to investigate what are global innovation networks and what policy implications these trends pose for Europe.

Scientific approach / methodology

These early steps of the INGINEUS project scientific approach has been based on a literature survey and descriptive statistical data.

New knowledge and/or European added value

Global innovation networks are typically created on the top of pre-existing global production chains. Upstream and downstream interactions in these production networks are now complemented with co-creation of knowledge-intensive innovation-related activities.

Key messages for policy-makers, businesses, trade unions and civil society actors

Europe needs to gear its EU-level and national-level policy efforts to make Europe a true global hub in knowledge-intensive activities, becoming a genuine attraction pole. In particular Europe faces three challenges:

- to stimulate the inward and outward mobility of highly skilled workers;
- to provide a single and cost-effective patent system in Europe; and
- to improve knowledge capabilities within Europe.

Where is Europe in relation to global innovation networks?

The leading research questions are :

- What are global innovation networks and why are they created?
- How are European firms generally performing in terms of creating and participating in these global networks?
- Is Europe an important node within those networks in terms of knowledge competences and knowledge sources?
- And, what can European policy makers do in terms of reaping the benefits and reducing the potential costs and risks associated to the current trends towards global innovation networks?

Scientific approach / methodology

These early steps of the INGINEUS project scientific approach have been based on two different sets of data. Firstly descriptive statistical data collecting the very scarce information about inward R&D investment done by non-national firms. And secondly, on a literature survey about the different policy-related institutional issues that affect global innovation networks.

Setting the scene: off-shoring R&D activities

In February 2009 Novozymes, a Danish world leading firm in enzyme production for biofuels, announced an agreement with a set of large Chinese firms for developing commercial-scale ethanol production from agricultural waste. This will position these companies very strongly in the market of second-generation bioethanol by 2015. Novozymes' R&D centre in the Zhongguancun Science Park in Beijing, established back in 1995, is a central player in this strategy, a strategy involving important research as well as production efforts.

But European companies are not the only ones creating R&D activities outside Europe. Tooltech, an Indian engineering firm with headquarters in Pune, is specialized in automotive 3d modelling. Its Tooltech-Deutschland daughter company develops CAD-analysis about crash, structure strength and pedestrian safety in its R&D centre in Munich. This allows Tooltech to offer high-end knowledge intensive design solutions to European automobile companies, while tapping into the local high skills in Europe and adapting their products to the requirements of European mandatory standards.

The cases above have one important feature in common, namely, they are unambiguous examples of the rapid process of off-shoring R&D activities. This off-shoring is increasingly associated with the development of innovation networks with a truly global reach.

What are global innovation networks and why are they created?

Multinational corporations have long used global production networks to improve the efficiency of their operations and for accessing new markets. In most cases, knowledge intensive activities have been typically performed in their home country, whereas production and assembly became increasingly globalized.

However, the globalisation patterns are changing very rapidly. Today European firms are establishing research centres and invest in the development of research and development capabilities abroad, and are developing strategic knowledge-intensive collaborations at a global scale.

Global lead-firms are not only relocating and re-organizing their production globally, but increasingly their knowledge-intensive competences as well in their efforts to access new markets.

Until recently, most knowledge intensive activities by firms were essentially and almost solely located in the triad countries (US, Japan and the EU). In addition to this, the current globalization of innovation is also expanding to emerging economies in the South such as India, China, and Brazil (Ernst 2002).

Lead-firms from emerging economies are also creating and integrating themselves into the global innovation networks. Good examples here are the Indian conglomerate Tata's purchase of Jaguar and Land Rover; the Chinese company Geely's bid for Volvo.

Why firms are working abroad?

What are the strategic considerations of firms when making such bold movements? To be sure, firms need to keep abreast of changing conditions, not least changing global conditions.

One such condition is the shortening of product life cycles and of business cycles. New knowledge inputs of very different kinds are constantly required to be able to face such competitive environments. Individual firms lack critical mass or have other difficulties to cope with this on their own. Hence they need to cooperate with those actors, wherever they are, who can potentially enhance their position on those terms.

Another important condition firms are facing is the rising costs of research activities. This is particularly important for research and science-based firms in sectors like biotech, pharmaceuticals, aeronautics, and other high-tech industrial sectors. Cooperation at a global scale provides interesting rewards in this sense, not only for the sharing of the burden, but also for the lower labour costs of highly skilled workers elsewhere. Given that intellectual property rights are becoming increasingly harmonized world-wide, knowledge appropriation within those innovation networks can be dealt with effectively with lower risks of free-riding.

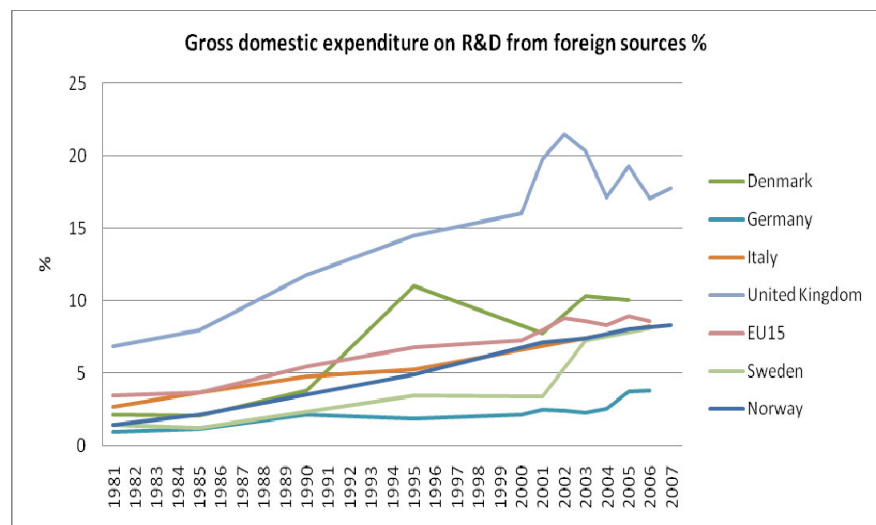
Last but not least, a third very powerful changing condition for global innovation networks is the acute need of firms to get closer to their markets. The rapid opening of new markets is showing that knowledge needs to be generated close to the location where this knowledge is being used, namely, where products are produced. In other words, centralized top-down knowledge generation from their headquarters is not only expensive, but increasingly ineffective in a context where markets change rapidly and with highly diversified features.

Where is Europe in all this? Facts and figures

But, where is Europe in all this? How are European firms generally performing in terms of creating and participating in these global networks? Is Europe an important node within those networks in terms of knowledge competences and knowledge sources? Unfortunately, there is a lack of systematic data about these trends, not only in Europe, but also beyond. National statistics provide limited data sets regarding the national origin of inward R&D activities, and less so about outward R&D activities performed by firms. Indicative data, though, shows that these trends are becoming a non-negligible dimension of innovation-related activities performed by firms.

We know for example that in the IT sector worldwide there has been a very remarkable off-shoring of R&D activities during the past decade, largely associated with access to competitive labour costs of highly skilled personnel. There are good reasons to believe that the European IT sector has followed this trend. For example, 49% of the 45.000 R&D employees in Siemens worked outside Germany in 2004 (UNCTAD, 2005, p. 124).

Existing sources indicate that the overall amount of investment in R&D abroad has almost doubled from USD 12582 billion to USD 22328 billion between 2000-4 (UNCTAD 2005). Similar trends are shown in the figure below, showing the rapid growth of inward R&D FDI into Europe.



Since the mid-1990s there have been at least four clear trends regarding the off-shoring of R&D activities.

Firstly, there seems to be an overall increase of firms' R&D off-shoring activities all in all. This is largely associated with the opening of new markets and with cost reductions, and it is typically conducted in relation to global innovation networks (OECD 2008) (Herstad, Bloch et al. 2008).

Secondly, Europe has seen an important increase of inward R&D-related foreign direct investment during the same period, showing its attractive position worldwide (OECD 2007).

Thirdly, indicative trends show that most off-shored R&D activities are still performed within the Triad countries (US, Japan and Europe), however, there is also an important rise in the share of that R&D off-shoring to other Asian countries and to developing countries, indicating that countries like China, India, Brazil and South Africa are becoming interesting places for firms' R&D and knowledge-intensive investments (Ernst 2006).

Lastly, there are important differences across industrial sectors regarding the trends of internationalizing R&D and other knowledge-intensive activities (Filippaios, Papanastassiou et al. 2009).

KEY MESSAGES FOR POLICY MAKERS

Three key policy challenges for Europe

The dynamics above raise very important questions for Europe, not only for research and development policies and public investments (R&D) in a strict sense, but also and perhaps more importantly for innovation policies in a wider sense. As seen above, there are important differences across countries in the EU regarding their degrees of internationalization of R&D, and their firms' participation in global innovation networks. However, in spite of these differences, Europe as a whole seems to have been losing momentum in relative (but not in absolute) terms. Hence, following the remarks by the Aho report concerning the need to improve Europe's framework conditions for innovative firms (Aho, Cornu et al. 2005), and taking into consideration the broad-based innovation strategy for an innovation-friendly Europe in a global context (Commission 2006), the crucial question is how to improve Europe's position in these trends.

Operating in an open innovation paradigm that is becoming increasingly more globalized means that Europe must not (and cannot afford) to become a 'European research and innovation fortress'. On the contrary, Europe has to gear all its EU-level and national-level policy efforts to make Europe a true global hub in knowledge-intensive activities, becoming a genuine attraction pole to highly specialized, research and innovation-related firm activities, and linking strongly with knowledge sources produced outside Europe.

For this to be the case, there are at least three important challenges that need to be carefully taken up by national and European policy makers alike in their effort to enhance the European firms' positions in global innovation networks, both inward and outward:

Challenge 1: Inward and outward mobility of highly skilled workers.

Global innovation networks and interactions between firms are at the end of the day interactions between people, implying mobility of highly-skilled workers. There are interesting national-level and EU-level programmes stimulating inward and outward mobility. However, there is still in Europe an important deficit in some specific knowledge areas, and immigration laws are not generally open enough, or generous enough (public pension schemes, etc) to make Europe an attractive working place. Following the recent findings of Anna Lee Saxenian, the success of Silicon Valley has been largely related to its ability to stimulate what she calls 'brain circulation', or the constant inward and outward flux of innovators, researchers and entrepreneurs, who have created very strong business and innovative links between their country of origin and the firms located in the Valley (Saxenian 2007). This should be an inspiration for Europe.

Challenge 2: A single and cost-effective patent system in Europe.

A second crucial aspect related to global innovation networks are the regulations concerning intellectual property, and in particular patent regulations. Operating in global innovation networks puts considerable focus on the appropriability and ownership of the knowledge co-produced and/or exchanged within the networks. Surely, not all knowledge is subject to appropriability, as some knowledge is truly tacit and implicit 'know-how'. But the knowledge that is subject to appropriability needs a clear and cost-effective regulatory framework to

reduce legal uncertainties and to maximize the returns of key investments. Unfortunately this is still not the case in Europe. In spite of decades of efforts to simplify and to reduce barriers, the patent system in Europe is still fragmented and very expensive to firms (Borrás and Kahin 2009).

Challenge 3: Improving knowledge capabilities. We know from numerous studies of industrial dynamics that firms' ability to absorb knowledge produced elsewhere is largely associated with the firms' own knowledge capabilities in the first place (Cohen and Levinthal 1990). Recent studies have shown that this is the case for European firms' involvement in innovation networks (Laursen and Salter 2006). This calls for a strong and bold policy effort to enhance the knowledge capabilities of firms in Europe in very different ways. One way is to create a strong venture capital market in Europe. Recent studies show that risk-willing capital availability in Europe is only 20% that of the US.

Other complementary ways are to focus on achieving the objective of 3% of GDP in R&D expenditures (van Pottelsberghe 2008), and to strengthen the resources and the autonomy of research activities conducted at universities. Availability of risk-willing capital and strong research-oriented universities will make European innovation environments more attractive worldwide.

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