

Policy Brief

9 - DECEMBER 2009

This Policy Brief has been elaborated under the EU-funded project **PLATON+** (www.platonplus.net) which aims to:

a) communicate socio-economic research results to policy makers, Civil Society Organisations and business communities across Europe, and

b) show ways of collaboration and bring into contact socio-economic researchers and researchers from other disciplines.

PLATON+ Policy Briefs communicate socio-economic relevant research results and key policy recommendations in a concise and non-technical format to policy-decision makers, Civil Society Organisations (CSOs) at European, national and regional level.

This Policy Brief discusses key findings and policy implications provided by the EU project "**Knowledge based entrepreneurship: innovation, networks and systems**" (**KEINS**) funded under Priority 7: "Citizens and Governance in a Knowledge-Based Society" of the 6th Framework Programme (FP6-CITIZENS)

This Policy Brief has been prepared by Donal Smith (donal.smith@esri.ie) and Iulia Siedschlag (iulia.siedschlag@esri.ie), the Economic and Social Research Institute, Dublin, IE (www.esri.ie)

Knowledge Intensive Entrepreneurship

Research context

Since the mid-1990s the patterns of productivity growth between Europe and the United States have changed significantly. For the first time since the 1940's labour productivity growth in Europe fell below the US rate for a sustained period. During the periods 1973-95 and 1995-2006 average labour productivity growth accelerated from 1.2% to 2.3% in the United States, while over the same periods it fell from 2.4% to 1.5% in the EU 15 member states.

This slow down in relative labour productivity cannot be attributed to differences in timing of business cycles between the EU and the US or to trends in the labour market, since the average skill level of the employed labour force in Europe continued to increase over this period. A consensus has emerged that the differences in growth rates can be partly explained by the differing impact of the Information and Communication Technologies (ICT) revolution in the two regions and to the slower emergence of the knowledge economy in Europe during the 1990's. In the US the rapid emergence of the ICT producing industry in the 1990's and the changes and innovations these technologies caused in production processes and organisational practices, caused a surge in multifactor productivity particularly in the market services industries.

The limited impact of new technologies, innovations and structural changes as well as the resultant slower growth and flagging emergence of the knowledge economy, has lead the European Commission to set up an ambitious strategy called the "**Lisbon agenda**", which is intended to make Europe "the most competitive and dynamic knowledge-based economy in the world" with the creation of a European Research Area and the development of a knowledge economy and society.

Research context

What are the main characteristics and drivers of Knowledge intensive entrepreneurship?

What is the relevance of knowledge intensive entrepreneurship for innovation and growth in Europe?

Key policy messages

Further reading

Throughout the process of innovation and increasing productivity, a key element is the innovation system whereby new knowledge and technologies are adopted and used in the production process. It is this element of European economies that was focused on in trying to explain the observed productivity gap, as European firms have not adapted and exploited the newly available ICT to increase their productivity potential.

In trying to identify possible failings in the European innovation system it is important to understand the components of the system and the relationships between them. A key element in this system is the role of entrepreneurship. In a knowledge-based economy these entrepreneurs are seen as knowledge operators, utilising existing knowledge, integrating different knowledge assets and creating new knowledge. In a knowledge economy there must be a positive interplay between advances in science and technology as well as between industrial dynamics and industrial performance. Knowledge entrepreneurs have a strategic role within networks and systems of innovation and in the complex webs of relationships among firms, universities and other organisations that generate and share innovation relevant knowledge. The understanding of these complex networks and the integral role of knowledge entrepreneurship are crucial in understanding Europe's productivity and knowledge economy slowdown and underdevelopment and in understanding the solutions of these problems with a view to meeting the Lisbon criteria.

What are the main characteristics and drivers of Knowledge intensive entrepreneurship?

Knowledge Intensive Entrepreneurship (KIE) involves a) operating within complex innovation networks among firms, universities and other organisations and b) conducting knowledge through this innovation system. Their role is that of knowledge operators, directing the use of existing knowledge, integrating new knowledge assets and creating new knowledge. Their role can also be seen from the perspective of division of labour as a division of knowledge, whereby the knowledge aspect of a firm is divided into knowledge creation and knowledge management done by knowledge based entrepreneurs.

The activity of KIE is defined more broadly than the individualistic idea of traditional entrepreneurship. It is related broadly to the exploitation of new technologies to commercial applications in a range of organisations, these can be start up, corporate or academic entrepreneurship or by activating social, financial or expertise networks within and across organisations.

This type of entrepreneurship is not individualistic and its success is dependent on structural factors and the context in which entrepreneurs operate such as the networks within which they function and to the broader sectoral, regional and then national innovation system that this network is located in. These networks allow entrepreneurs to share information and assessments on market technologies. Regions with a large amount of knowledge intensive entrepreneurship activity generally boast a wide array of formal and informal networking structures.

The knowledge/learning environment within which firms and entrepreneurs operate is often referred to as the "regions' knowledge base" and is an important

driver of knowledge based entrepreneurship as it greatly affects the rate of innovations and the relevance of large and persistent innovators and it determines whether innovation will be pursued by new small firms or by large innovators. The strength of intellectual property rights also plays a part in the decision of the firm to either sell their ideas on the international market or attempt independent exploitation.

An important characteristic of knowledge based entrepreneurship is the development of the idea of **academic entrepreneurship**. This has been driven by the significant financial success some universities have had in this area. This is a particular feature of the US system with a number of “star scientists” present. In such activities, **researchers and universities both generate new ideas and also employ entrepreneurial skills to commercialise and exploit the full potential of the new idea**.

A particular characteristic of knowledge entrepreneurship development is that it has been on an increasingly divergent path in transition and developed countries in terms of performance. This is believed to be due to the effect of different country characteristics such as the economic environment, role of the state, business owner characteristics, cultural perspectives of entrepreneurship and state of the economy.

The main drivers of KIE in Europe are:

- **The fact that the proportion of the workforce that is scientifically educated has increased continuously over the past three decades**. This has generated an additional supply of highly qualified human capital that cannot be absorbed by the existing commercial research and development labour market. In this situation of over supply, self-employed entrepreneurial activity has become more important and significant.
- **The increase in and the relevance of new disciplines at the knowledge/technology level and the connections between different scientific areas which has generated multi-technology products with more components and functions**. This creates an organisational problem as these increasingly complex products are developed within networks of specialised firms and institutions. Thus, the need for knowledge based entrepreneurship becomes increasingly important within this development, as these agents are vital in integrating and coordinating these different components of networks.
- **The present structure of industrial innovation, whereby only a small number of firms now conduct a complete innovation process in isolation**. Most innovations now involve a number of organisations, and the number involved seems to be increasing in the value of and how knowledge intensive the good is. In the past few decades this trend has been reflected in the rapid increase in the number of corporate agreements involving firms, universities and other research institutes. This process again creates complex linkages characterised by diverse forms of contact both formal and informal. This again creates a situation where knowledge base entrepreneurship is important, as these agents regulate the system and maintain productive linkages across the system of agents.

What is the relevance of knowledge intensive entrepreneurship for innovation and growth in Europe?

Knowledge intensive entrepreneurship is relevant for innovation and growth in Europe as Europe's recent growth performance relative to the US has been attributed to Europe's failure to benefit from the ICT revolution. The innovation system is the foundation on which knowledge and technology moves through an economic system. Europe's failure to translate advanced research activity and the ICT revolution into an increase in productivity may signal a fault in the innovation system as knowledge intensive entrepreneurs are the conductors and managers of flows of knowledge between the different agents that constitute an innovation system. Vibrant KIE is essential to a successful innovation system that will allow economic agents to exploit new knowledge and technology and thus enhance growth. An important link in the innovation system is the link between university research and its application in business. *The transfer of knowledge from university to business is an inherently entrepreneurial process.* In the case of an entrepreneurial start up, the knowledge transfer is accomplished by the entrepreneurs who embody the necessary technological knowledge when setting up the business. KIE between universities and businesses in the case of large established firms takes the form of technological expertise that is complementary to the organisational capabilities already existing in the firm and is acquired on the labour market. Through migrating from an academic setting to the private sector the commercial value of acquired knowledge can be realised.

Knowledge intensive entrepreneurship is particularly relevant in the European Union in relation to the Eastern European Accession Candidate Countries. These countries are significantly less developed than the EU economies. Their Gross Domestic Product (GDP) per capita is only 42% of the average of the EU15 countries. In terms of innovation there is a large gap between the education levels of the labour force and the number of employees in the R&D system as well as low levels of productivity and very poor commercialisation of technology in these countries. These characteristics make these countries particularly important in achieving the Lisbon objectives. It is important to understand the factors that drive knowledge intensive entrepreneurship as these countries are qualitatively different to the EU15 group of countries and factors such as networking development, physical and information infrastructure will be very different across these regions. KIE is important for future growth as during the 1990's growth in these countries was driven by reallocation of resources between sectors and firms. Current growth is based on foreign direct investment in services; this is to such an extent that the dynamic productivity catch up of these regions is now highly dependent on it. Growth from this source is slowing down and unless structural progress is made these nations may face following the path of the cohesion countries; Greece, Spain and Portugal where initial spectacular productivity advance fizzled out in this group with a gap remaining with the productivity levels of the technology leaders, this gap remained constant.

This situation is likely, as the innovation system is essential in translating technological advance into productivity gains and there are significant weaknesses in the systems of innovation in these countries, a weak demand for local technology and research and development, a negative relationship between research and devel-

opment and GDP growth. New supply side constraints to innovation of access to technology and skilled workers have emerged.

Knowledge based entrepreneurship is very limited in these regions and where it does occur, case studies have shown that international networks are used as a substitute for deficient conditions in their home economies. This may be a problem for future innovation and entrepreneurship as research on international industrial networks in East European Countries has shown that Eastern European domestic firms constitute the weakest link in international networks. Knowledge based entrepreneurship could be important in strengthening these networks and so allowing firms in these economies to maintain access to an important source of start up entrepreneurship. These aspects are important not only for growth but also for future convergence to the EU 15 level of productivity.

Key Policy Messages

There should be more support given to basic research as will directly and indirectly foster knowledge based entrepreneurship. Current policies tend to be too focused on applied research. This type of research is favoured by policy makers as the returns on public money spent can be identified more easily. The results in the form of new technologies and products often turn out to be commercially successful over a shorter time frame and so result in gains in employment and economic growth in the short term. There is evidence that basic research can have a substantial commercially valuable aspect but this is often overlooked by policy makers as it is seen as part of the educational services of universities.

Much of the commercial potential of basic research is realised by research scientists migrating into the commercial sphere. Policies should then not complicate scientific migration as this is the only way that largely tacit scientific knowledge can be transferred to the commercial sector. High quality commercial sector research and development relies on attracting an influx of new scientists from basic research institutions. Within this sector commercial application of the latest scientific developments can be found. The prerequisite for this transfer to occur is properly funded internationally competitive basic research run in domestic research institutions so that on the job basic research capabilities can be acquired.

There should be a programme of managerial skills and training education as a complement to scientific education. That the longevity of firms with a university background is lower than that of all other entrants indicates that these firms, relative to other entrants have a lack of market and customer related capabilities. There may be a need for an ethical committee within the technology transfer office of universities as data indicates misattribution of invention may be a problem with it being based on research seniority rather than the degree of creative contribution. This may reduce the incentives for researchers to work on new inventions.

Policies that obstruct the spin-off process should be reconsidered. These should be seen as targets for policies supporting entrepreneurial activities. They tend to be successful firms based on employee learning and knowledge transfer. They increase product variety, help to overcome organisational inertia, re-utilise capabilities of failed firms and give rise to regional clustering.

There is a need to support knowledge based entrepreneurship in accession countries as limited domestic demand is the most important constraint on growth for these firms. Technology focused public procurement, expansion of supportive cooperative programmes at EU level and links with large foreign or domestic firms are critical for development.

The local and national innovation system is important for firms in accession countries. Firms are highly dependent on these systems as sources of information for innovation, links between firms and the national innovation system should be enhanced. Given the importance and dependence of some firms on foreign value chain partners in terms of access to knowledge and markets policy should assist knowledge based entrepreneurship in accession countries to overcome threshold level barriers to establishing as a technology based exporter rather than remaining in local markets.

Past policy has tended to place too much focus on intermediary organisations in the innovation system at the expense of technology transfer functions. An example of this would be the failure to provide new technology based firms with business support assistance.

Venture capital should be available to more firms as in accession countries it tends to be available only for larger less risky projects that are established operations. Lack of finance stifles entrepreneurial development and prevents knowledge based ventures from reaching their full potential. Policy making needs to ensure that external sources of finance are available and viable for entrepreneurs by encouraging a range of financial packages for small and medium sized enterprises to include micro credits and venture capital. Accession governments should avoid supporting the establishment of state owned and state managed venture capital funds as they are prone to failure. Instead a system of mini grants, matching grants and passive investment in privately managed funds should be supported.

Current policies on university-industry technology transfer may have limited impact in Europe as European universities have much less financial autonomy than their US counterparts. European university staff see themselves as civil servants and generally don't place a major importance on generating financial resources in progressing their careers. Central government is seen as the key actor that regulates academics careers and economic incentives. This in many European Union countries leaves little scope for universities to behave like employers and to profit from employee's research.

Further reading

- Malerba, F. (2008), "Knowledge Based Entrepreneurship: Innovation, Networks and Systems", Bocconi University (http://portale.unibocconi.it/wps/allegatiCTP/Final_Scientific_Report.pdf), Project no. CT2-CT-2004-506022
- Van Ark, B., M. O'Mahony, M. Timmer (2008), "The Productivity Gap between Europe and the United States: Trends and Causes", *Journal of Economic Perspectives* 22(1): 25-44.

KEINS at a glance

Title	"Knowledge based entrepreneurship: innovation, networks and systems"
Research Objectives	<p>Entrepreneurs are seen as knowledge operators, dedicated to the integration of different knowledge assets and the creation of new ones. They may perform this function either by setting up new companies, or by activating social, financial, and expertise networks from within existing companies, universities or other organizations.</p> <p>Within this context, the KEINS project purported to examine the relevance and features of knowledge-based entrepreneurship (KBE) in Europe. It looked at three types of KBE: a) start-up entrepreneurship, b) corporate entrepreneurship and c) academic entrepreneurship.</p> <p>KEINS integrated different methodologies and approaches, ranging from appreciative and formal theorizing to case studies and quantitative empirical work. Special care was devoted to include different industries and countries, with an extensive coverage of Accession Countries.</p> <p>The project pursued five objectives:</p> <ol style="list-style-type: none"> 1. to discuss and refine current concepts of KBE; 2. to explore the relationship between KBE and innovation; 3. to define the role of networks of alliances, information, finance and social ties; 4. to assess KBE in different sectoral and national systems of innovation; and 5. to produce policy recommendations
Duration	01 September 2004 – 28 February 2008
Website	http://www.cespri.unibocconi.it/keins
Scientific Co-ordinator	Prof. Franco Malerba (franco.malerba@unibocconi.it) CESPRI, Bocconi University
Research Consortium	<ul style="list-style-type: none"> • Centro di Ricerca sui Processi di Innovazione e Internazionalizzazione - CESPRI (Italy) http://www.cespri.unibocconi.it • University Louis Pasteur, Bureau D' Economie Theorique et Appliquee – BETA (France) http://www-ulp.u-strasbg.fr • Centre for Social and Economic Research - CASE FOUNDATION (Poland) http://www.case.com.pl • Centro de Investigacao Sobre Economia Portuguesa – CISEP (Portugal) http://www.iseg.utl.pt • Max Planck Institute of Economics – MPI (Germany) http://www.econ.mpg.de • Institute for management of Innovation and Technology - RIDE/IMIT (Sweden) http://www.chalmers.se/tme

- University College London – UCL (United Kingdom)
<http://www.ssees.ucl.ac.uk>

Funding Scheme

Specific Targeted Research Projects (STReP), 6th Framework Programme, Priority 7: "Citizens and Governance in a Knowledge-Based Society" (FP6-CITIZENS)

EU Financial Contribution

€1,000,000