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International aspects of support to innovation

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Introduction

The purpose of the mini-studies is to provide both an input and an analytical base for a consultation document to be published by the Commission by mid October on effectiveness in policy support to innovation. This document addresses two main issues:

- The rationale for public support from EU-level to innovation activities by looking into the various business and innovation aspects that private companies organise on a cross-border basis (providing a view on the scope of possible innovation support services), and by determining where government intervention can legitimately help to overcome obstacles and put in place facilitating institutions/arrangements;
- Identifying (new) options to improve the relevance and effectiveness of respective innovation support mechanisms at EU level by reviewing current practices in EU Member States and other countries. Notably by pointing out what type of innovation support services should be strengthened or re-designed to foster the internationalisation of companies both small and large.

Innovation policy support measures examined in this mini-study take the international dimension of driving business explicitly into account, i.e. focussing on the possibilities to generate, exchange, disseminate or exploit the economically valuable outputs of innovation activities at an international level.

In order to build up to this, the paper is structured as follows: In the present chapter we set the scene by pin-pointing the core concepts involved here: innovation, internationalisation and policy support. In chapter two we deal with the rationale for internationalisation; the benefits and necessity. In chapter three, attention is paid to international Initiatives and programmes for the internationalisation of small and medium-sized enterprises (SMEs). In chapter four we draw up our conclusions and recommendations for policy design.

1.1 Key concepts

For the purpose of this paper there are a number of central concepts. Here we present them, adding a comprehensive definition to each of them:

1.1.1 Innovation

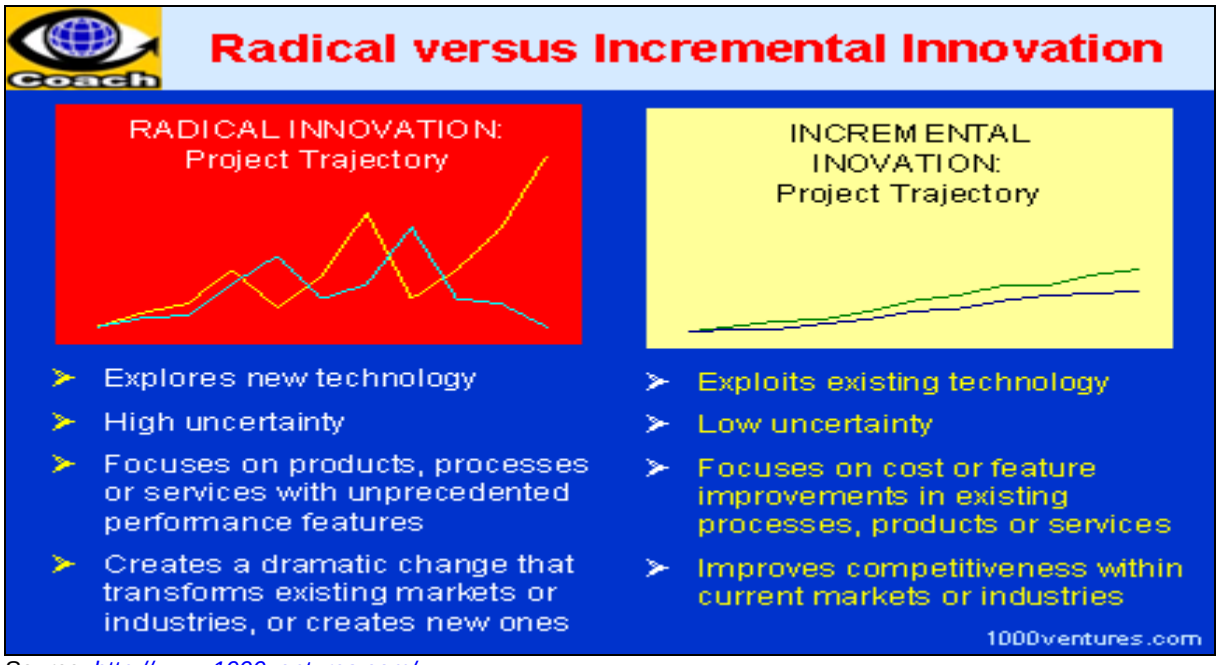
Eric von Hippel (2008), one of the world's leading scholars on innovation, forwards the following definition of innovation: 'An innovation is anything novel that creates value for its users.'[1] This makes sense in that the goal of policymakers is not to promote innovation or invention for its own sake, but rather to promote innovation that creates value for users and for society. This definition has the following implications:

- It defines an innovation in terms of the value provided, rather than the level of technical advance it may embody. Thus, an innovation by this definition need not involve an invention as those are defined in IP law.
- It is not biased towards or against any category of innovation developer: A user-innovator can create value from an innovation by developing it and using it himself and perhaps diffusing it to others; an innovation manufacturer can create benefit by developing an innovation that he then sells to users.

[1] Taken from: http://www.innovationindex.org.uk/forum/topic/show?id=2132323%3ATopic%3A289&page=2&commentId=2132323%3AComment%3A1444&x=1#2132323Comment1444 (visited on the 19th of September 2008).

Further to the latter distinction, innovation may also refer to both radical and incremental changes in thinking, in goods, products, in processes or in services (Mckeown 2008),[2] as portrayed in the following comparison:

Figure 1: Radical versus incremental innovation



Source: http://www.1000ventures.com/

In economic and societal terms, innovations should increase value, be it customer value or producer value for example, and bring about positive change. An important economic rationale behind innovation is that it contributes to increased productivity, which is the fundamental source of increasing wealth in an economy.[3]

1.1.2 Innovation system

Innovation system is a set of relationships and organisations that provide the elements and links to interact in the production, diffusion and use of new, and economically useful, knowledge. Typically, these links and organisations are located within or rooted inside the borders of a nation state or region.[4] The concept of the innovation system stresses that the flow of technology and information among people, enterprises and institutions is key to an innovative process. Also, it recognises the importance of learning processes for innovation to occur. Further to this, the concept of innovation system also leans strongly on the interaction between the actors who are needed in order to turn an idea into a process, product or service on the market.

According to innovation system theory, innovation and technology development are results of a complex set of relationships among actors in the system, which includes enterprises, universities and research institutes. Consequently, the concept of innovation system stresses the importance of innovation not being a single organisation affair, hinting at open innovation processes and (collective or) network-based interactive innovation processes.

[2] McKeown, M., The truth about innovation, Pearson / Financial Times, 2008.
[3] Porter, M.E., The competitive advantage of nations, New York: Free Press, 1990.
[4] Lundvall, B-A., National innovation systems-analytical concept and development tool, industry and innovation, February 2007.

Finally, it should be underlined that whereas the original concept of innovation systems confines to national (or regional) borders, in the current era of globalisation the conceiving of innovation systems on a global scale is a logical alternative.

1.1.3 Internationalisation

Internationalisation refers to the increasing importance of international trade, international relations, treaties, alliances, etc. Traditionally, the basic unit for looking at international relations and trade is the nation. However, in practice it is firms and organisations (as well as individual entrepreneurs) that provide the basis for the relationships that underpin cross-border exchanges. Consequently, internationalisation can be characterised as the process by which firms both raise their awareness of the direct and indirect influence of international transactions and relationships on their future, and establish and entertain transactions and relationships with entities from other countries (Beamish, 1990). This characterisation implies that not only tangible and production-based business functions (logistics, manufacturing, sales) are subject of internationalisation tendencies, but likewise pre-production and sales-stages business functions, like design and R&D and, therefore, innovation activities.

At present, there is an intensification of international liaison and trading going on, due to globalisation trends. The former refers to global economic integration processes of formerly national economies or trading blocks into one global economy through free trade processes and mobility of capital and human resources.

Whereas traditionally international transactions concentrated on exchange of goods via cross-border production chains, today innovation is also more and more organised on an international scale (Edler, 2007).

1.1.4 Innovation support policy

A supportive policy measure with regard to innovation can be understood as an action or initiative that aims to maintain, sustain or strengthen the innovation potential and competitiveness of businesses. More formally (ILP Mini Study 1):

> 'an innovation policy measure is any activity that mobilises: resources (finance, human resources, organisations), information (road-mapping, technology diffusion activities, best practice dissemination) and formal and informal institutional processes (legal and regulatory) to achieve public policy objectives in area of innovation. It will do this with some percentage of public funds. Finally, it will predominantly be for the benefit of enterprises'.

Innovation policy can thus be defined as a set of policy actions to raise the quantity, quality and efficiency of innovation activities, whereby:

- The *policy focus* may not only be R&D or technological innovation, but all types of innovation activities and processes in enterprises (including organisational and social innovation);
- The *final* beneficiaries are, first and foremost, enterprises (including entrepreneurs seeking to set up or expand an enterprise), but increasingly also actors from not-for-profit and public sectors. *Intermediary* beneficiaries may be financial organisations (seed capital funds, etc.), innovation and business support services, cluster management partnerships, knowledge transfer structures in universities, public research organisations.

An *innovation support policy measure* can be defined as any action taken or (co-)financed by the public sector with the aim of influencing innovation processes and capacities in enterprises, and thereby enhancing their competitiveness. Three forms of innovation policy measures/mechanisms can be identified based on the types of resources employed (ILP Mini Study 1):

- financial, human and organisational resources - deployed through or on behalf of innovation-oriented programmes and projects, to create a more innovation-friendly context;
- the provision of new information (vision, strategy, coordination, best practice) which is geared towards innovation activities and aims for more innovation prone behaviour;
- new institutions (legal acts, rules) designed to explicitly affect the innovation process.

Similarly, one can distinguish between *direct* innovation support and *indirect* innovation support. *Direct* innovation affects innovation processes in enterprises directly:

- either through the provision of *specific resources*, financial, human or organisational, deployed through or on behalf of innovation-oriented programmes and projects;
- or through the provision of *information* which is geared towards innovation activities (e.g. organising or coordinating information exchange amongst the actors in the innovation system; stimulating awareness of scientific and technological opportunities and the diffusion of knowledge).

Indirect innovation support affects the (legal, economic, social, cultural) framework conditions that influence innovation processes in enterprises. Examples of indirect innovation support measures are:

- Regulations and rules (e.g. on IPR, technical norms, labelling, public procurement, etc.);
- Competition policy (regulation on prices, cooperation, entry barriers, etc.);
- Fiscal incentives (regime of subsidies and tax benefits, etc.).
- Creating or improving overarching structures (clusters, innovation systems) that underpin and embed the innovation activities of individual firms and entrepreneurs e.g. by establishing and developing inter-organisational pathways for the sake of knowledge transfer

As such, also cluster and networking policies can form part of innovation support policies. In fact, setting up transnational networks between firms and clusters is seen as a promising approach to raise the innovation potential of companies and to complement strengths between organisations. This is a major point with regard to internationalisation and the organisation of innovation on a cross-border scale.

2 Rationales behind the internationalisation of innovation activities and policy support to international innovation

2.1 Increasing cross-border character of innovation activities

As a consequence of intensified globalisation, private companies are increasingly locating their exploitation and production activities to areas where the conditions for these activities are best met. Historical and geographical roots have decreased in importance as determinants for the location of value-adding industrial activities.

In line with the globalisation wave, many large and small companies have supplemented their internal R&D efforts with collaboration with external suppliers, competitors, customers, research institutes and universities. As such, they subscribe to the emerging trend of 'open innovation'.[5]

Through such open innovation processes or 'strategic technology partnering' private companies link up with other companies and academic research institutions for example. Such open innovation cooperation helps SMEs to access new technologies and markets, lowering risks and to overcome the high cost of technology development. To the extent that foreign partners are involved or partners have activities in multiple countries, it also enhances access to foreign knowledge and markets.

As a consequence, internationalisation of R&D activities is growing considerably. To illustrate the growing importance of cross-border innovation activities, see the following figures.

OECD data has shown that the internationalisation of industrial research has accelerated since 1997 and constitutes one of the most dynamic components of the process of globalisation. The increase in R&D spending by multinationals is very strong. Between 1997 and 2001, total R&D expenditure by affiliates of foreign companies increased by more than 50% in OECD countries.

Moreover, 16% of total expenditure on R&D in the OECD[6] corresponds to activities carried out abroad by multinational companies in 2004, while confirming that that activity is increasing in the majority of countries and that in several of them – Spain, the United Kingdom, Sweden, the Czech Republic, Hungary, Portugal and Ireland – the multinational companies' activity exceeds 35%.[7]

In a large number of countries, business-sector R&D expenditures have increased, partly largely due to the R&D spending of affiliates under foreign control. Multinational firms dominate R&D. In the United States, for example, US-controlled multinationals in 2002 performed over 70% of the country's industrial research, while local SMEs conducted less than 15%. However, if this reflects the situation of most OECD countries, in some of them like Canada the majority of industrial R&D is performed by SMEs. Surveys to identify the main factors in deciding where to locate R&D laboratories have also shown the importance of the quality of R&D personnel, ready access to university research and the quality of infrastructure.

[5] Chesbrough, H., Open innovation: The new imperative for creating and profiting from technology, Boston, Harvard Business School Press, 2003,
[6] Arthur D Little Ltd, Internationalization of research and development in the UK – a review of the evidence, November 2005.
[7] OECD, Recent Trends in the Internationalization of R&D in the Enterprise Sector, February 2008.

In a similar vein, the volume of cross-border technology transfer, both via technology-intensive trade and via international licensing and patents has increased in recent times. If one observes the annual growth rate of Hi-Tech exports between 1994 and 2003 for major countries, for each major OECD country (with the exception of Japan) the growth in High-Tech exports was higher than that of overall export of manufacturing goods (Edler, 2007).

Also, the joint generation of knowledge across borders has grown considerably. This is testified by the rise in patents for all major OECD countries that came about through international co-operation with foreign co-inventors. From a longitudinal perspective, based on the period between 1931 and 2003, the share of multi-national patenting has increased from 6% to 11% for the US, from 7% to 16% for France and from 12% to 22% for the UK. Among the OECD countries investigated, this share is the lowest for Japan, where it only rose from 2.1% to 2.5% during the period of analysis. In line with the former, strategic technology alliances between companies have almost quadrupled from 1980 to 1995 (Narula, 2003).

Similarly, between 1995 and 2003 the R&D activities of foreign subsidiaries in OECD countries –except for Spain- have outgrown those of indigenous companies (OECD, 2006, p. 125).

Finally, data from MERIT Co-operative Agreements and Technology Indicators (MERIT-CATI) database on R&D partnerships also show effectively that innovation activities are becoming more international, especially in pharmaceuticals and biotechnology. According to the NSF Science and Engineering Indicators 2006, the average annual growth rate of outsourced R&D from 1993 to 2003 was double the growth rate of in-house company-funded R&D (after adjusting for inflation). This clearly indicates an increasing role for external sources of technology. For manufacturing companies, outsourced R&D even grew almost three times as fast as R&D performed internally.

These evolutions do not appear to have come to the end of their ride: on the contrary. In fact, a number of surveys, e.g. on off-shoring R&D have shown that decision makers intend to further internationalise R&D in the years to come (Salmi, 2006; Ernst and Young, 2007). Also, 69% of all companies responding to a recent survey intend to increase their activity in locations abroad (UNCTAD, 2005, p. 152).

2.2 Reasons for internationalisation of innovation

With regard to the multiple reasons that exist for internationalisation of innovation, one can apply the following overarching dichotomy of motivations: attempts to exploit knowledge and innovatory capacity (adaptation of knowledge and innovations) versus attempts to augment knowledge and innovatory capacity (generation of knowledge and innovations). While the first refers to firms performing (some) R&D in foreign markets in order to adapt to local tastes and requirements, the latter implies that firms intend to tap into competitive research conditions abroad, be it based on human talent on site or centres of excellence, like specialized laboratories or research institutes.

Historically, companies performed (minor) R&D activities abroad mainly to adapt products to local customer tastes and needs. Also for the purpose of adapting processes to local resource availabilities and production conditions, R&D was done on site. In recent times, however, R&D outside the home country of firms has gained in importance for more creative and strategic purposes. That is, to generate new technology in accordance with the comparative resource strengths that a foreign country may host has become a major explanatory factor behind off-shoring R&D and or exploring the world for location-bound innovative advantages. Further to this trend, companies try to tap increasingly into poles of

innovatory capacity (be they low cost engineers or highly specialised institutions) from around the world, which can bring a competitive (cost and or quality) advantage.

As a consequence, at present it appears that the augmentation of knowledge and innovatory capacity, via the obtainment of access to private companies' technological riches, to (public) research structures, to world class talent, as well as to the networking base and skills of foreign companies and institutes (Cantwell and Piscitello 2005) is clearly gaining relative importance vis-à-vis the market adaptation mode. The access to talent and integration with local (public) research institutes for reasons of knowledge generation is increasingly a reason for companies to relocate or open up R&D subsidiaries abroad. This has been confirmed in a number of studies, see e.g. Arthur D. Little (2005), Cantwell and Piscitello (2003, 2005); Ambos (2005), DIHK (2005), EIU (2004), Gulbrandson and Godoe (2007) and Thursby and Thursby (2006). Not only is this the case of large multinationals, but also increasingly for SMEs.[8]

Furthermore, in addition to the move towards the augmenting mode, reducing the cost of innovation has also become an increasingly important reason for global decisions on first-time or re-location of R&D assets. In this regard, Sachwald (2007) shows how cost-driven R&D location decisions are becoming more important. In fact, he argues that in addition to the two established business models based on knowledge exploitation and knowledge augmentation, a third motivation is on the rise, i.e. the cost-efficiency rationale.

As such, different localities around the world are sought after for distinct innovation off-shoring motives. E.g. tapping into highly educated academic staff and cost-efficient research environments, through embedding in an innovation-friendly and innovation-inducing environment with all kinds of (innovation) agglomeration advantages (like access to financing and access to the North-American market) is a reason why companies move (their R&D facilities) to foreign places, like Silicon Valley. Companies likewise move to places like Bangalore (India) to conduct R&D in a cheaper way, whilst making use of highly skilled personnel. What such places like Silicon Valley and Bangalore have in common is that, through their particular sources for spurring innovation, these places render competitive advantage to companies wanting to undertake R&D for global purposes and, as a consequence, they attract R&D activities of companies of foreign origin. This is often achieved by ongoing investment in the local education and science base and by continuous innovation and growth of production of indigenous firms. As such, agglomeration advantages can be brought about that offer the ground for a flourishing innovatory environment. To a certain extent, this reasoning is in line with the creative economies discourse, as developed by authors like Saxenian (1999) and Florida (2002), who argue that innovation takes place where talent is and talent goes where the environment is innovation-friendly.

In this regard, the term "brain circulation" (as well as "brain drain") has been coined to describe the increasing mobility of the global research workforce. They both refer to mobility of qualified workforces, albeit with brain circulation having a more positive connotation. In the case of the EU-15 the "circulation" is not random – the largest inflow of science and technology personnel into the EU was from other European countries whereas the largest outflow was clearly transatlantic, and there is a net loss of brains. The aim should, therefore, be that the "brain drain" should be pro-actively transformed into a 'regain' of brains or at least taking advantage of those that leave by means of learning from their experiences in order to improve the innovative climate in the EU.

By all means, companies and individuals wandering off to areas in the world where they can excel better should not be viewed upon with a zero sum perspective. Such companies and

[8] See for instance recent versions of the Observatory of European SMEs, like 2003 No.4 "Internationalization of SMEs" (2004, p. 28, Luxembourg).

individuals can spill back knowledge and ideas to their home bases, either immediately (those that remain rooted in their home markets) or in the future (like expatriates that come home after a period). As such, by being abroad their potential to contribute to the vitality and competitiveness of domestic innovation systems may even increase.

To conclude, the technology and product adaptation mode is still relevant across the globe, as far as products are not homogeneous throughout the global market and market responsiveness can only be assured on a local basis.

2.3 Reasons for policy assistance to the internationalisation of innovation

2.3.1 Overcoming market and network failures

The role of public policy support with regard to the internationalisation of innovation is to help economic agents to optimise and implement their knowledge augmentation, exploitation and cost-reduction strategies with a view to enhancing their innovation potential and market competitiveness. That is, as far as private market actors are unable to provide the necessary resources and services for this themselves and or provided public forces can do this better (additionality of support policies). In other words, policy action should help to overcome eventual market and network failures that prevent companies from establishing economically and societally beneficial internationalisation of innovation. In this regard, not all companies are the same and especially SMEs appear to be a legitimate subject of support policies towards the internationalisation of innovation, since they are the most vulnerable to market and network failures at stake. For example, there is evidence that innovative SMEs are far less often engaged in international cooperation than innovative MNEs (EUROSTAT 2004). In a synthesized form, failures that obstruct the successful internationalisation of companies (especially SMEs), and their possibilities to organise innovation (creation and exploitation) activities in a more international manner, are notably the following:

- SMEs often lack the resources and market power to pursue an international strategy on their own and make their mark on foreign grounds, leading to either reduced cross-border activity or underperformance on international markets.
- Transaction costs to establish international cooperation are relatively higher for SMEs as the internal specialisation of their workforces is comparatively less developed. This is a structural disadvantage in comparison to MNEs.

Consequently, only a small number of SMEs can seize the opportunities that globalisation has to offer (or defend against the threats it causes). Often, SMEs are very innovative, but only have limited access to outside resources and markets or lack the financial means to contract assistance.

- Similarly, they are the most vulnerable to information shortages with regard to foreign markets. First of all, because they lack the means to engage in intelligence activities to overcome this problem. Similarly, they often lack the resources to contract market services for this. Often, they are also vulnerable in terms of protecting their proprietary knowledge and as a consequence, knowledge may leak away and give way to development of production and innovation activity by 3rd parties.

When SMEs pursue an international strategy, they may suffer from a lack of market power and from information asymmetries, which are detrimental to conquering foreign markets, or encounter difficulties in defending their Intellectual Property Rights leading to either reduced cross-border activity or underperformance on international markets.

In fact, innovative firms, certainly small ones, are highly vulnerable to counterfeiting, copying and industrial espionage. Lesser transparency of international markets and calculated trust with foreign partners increases these risks and provides a case for trust-building arrangements (e.g. via clusters) or solid protection schemes (like for IPSs).

- A final failure that hampers many SMEs from being successful abroad, is the fact that they tend to display a tendency towards going-it-alone strategies for control reasons. This is strengthened by the fact that they often do not have a network in place to work their way into a foreign market and a lack of means to trace interesting partners abroad. And even if (technically) suitable partners are detected, lack of acquaintance with one another may lead to high agency costs due to a lack of trust. This problem can exponentially grow if partners with different socio-economic and business culture backgrounds are concerned.

It has been shown that SMEs are better able to innovate when they are part of networks, clusters or cluster initiatives, because it is through the networking process and the management of externalities that they develop new products, processes and services in a quicker, more efficient and cost-competitive way.

The mere existence of market and network failures (as indicated above) justifies policy action. Nevertheless, so as not to take this for granted and in order to put the legitimacy of policy action into perspective, the following establishments apply.

As SMEs can miss out on survival and profitable chances when they do not orient their innovation and market projects internationally, there is a case for incentivising or supporting them in this direction. As employment, competitiveness and prosperity of economy and society are general concerns, to educate and facilitate international exposure of SMEs and their innovation activities, is a legitimate ground for government intervention. Thus, to provide support to SMEs in overcoming a going-it-alone mentality, information and resource shortages, and to establish relationships and protocols to install trust and operational routines between distant partners is an action of public interest. Especially in an ever more global world and as technologies evolve and mature at a high speed, putting in place (domestic) institutions and structures that enable firms to innovate and act in relation to globalization[9] appears an important ingredient for the competitiveness of firms.

Furthermore, there are also geo-economic and geo-political arguments involved (cfr. the Lisbon Agenda). If Europe loses out on innovation competition with other parts of the world, the fundaments for its prosperity (and its prestige, as a region in the forefront of industrial progress) may be at stake. So either by hosting a buoyant innovation environment at home or by making sure that Europe-based companies take profit of (elements of) such environments elsewhere –or by ensuring both, innovation is a priority for Europe's economic and political agenda.

The former hints at the (continuing) relevance of policy back-up vis-à-vis private firms' necessities and efforts with regard to organising innovation activities in a cross-border manner. It also stresses the importance of innovation systems, either from a national or an international perspective.[10] Consequently, hereafter we categorise policy actions that are meant to support the internationalisation of innovation activities:

[9] Not only in a reactive (exploiting) but also a proactive (augmenting) manner.

[10] Various sources point at the internationalization of innovation systems, see e.g. Carlsson, Bo (2006), "Internationalization of innovation systems: A survey of the literature", Research Policy, volume 35, pp. 56-67; The Internationalization of Business R&D Evidence, Impacts and Implications, OECD Publishing 2008.

- Improving the access to knowledge enhancing resources abroad: foreign (public) research institutions, talented human resources, education centres etc, and to lead markets abroad for a specific product or service. That is by getting a foothold in the most competitive markets, companies are forced to be at the cutting edge of innovation, and they also become attractive partners for actors from their own home country as they can transfer knowledge[11] and provide access to lead markets ("piggy-backing")[12].
- Improving the access to more efficient and/or lower cost resources and structures abroad to conduct innovation activities in a more competitive way: in search of off-shoring possibilities towards cost-competitive innovation hotspots.
- Improving the networking capabilities of companies and institutes to find complementary partners abroad (partnering with upstream, downstream or peer companies, clusters, centres of excellence , low cost innovation professionals, etc).
- Improving the mobility of those involved in innovation activities: mobility and circulation of researchers increases interaction with other environments and increases the absorption of new knowledge and methods, and makes human resources more suitable for world class innovation and assistance to private business. As such, foreign traineeships etc. also make researchers more interesting for domestic industries as it allows them to bring in new knowledge. Take note that to this end both expatriating European researchers abroad and welcoming overseas researchers in Europe is a worthwhile action
- Improving the attraction of Europe-based innovation agents on the global market by raising the visibility of European innovation actors to attract global talent and by setting up cross-border cooperation with foreign innovation agents (better marketing of European R&D capacities in third countries and regions).
- Increasing the attraction of Europe as a *Standort* for R&D e.g. in the form of attracting and hosting innovation activities of foreign companies inside Europe.

Schematically, the support actions can be characterized as follows:

Table 1: Typology of policy support actions towards internationalisation of innovation

	Absorption / inside-out orientation	Attraction / outside-in orientation
Focus on efficiency	Tapping into low cost innovation spots abroad Improving networking capabilities of European innovation actors around the world	Offering foreign traineeships in Europe
Focus on excellence	Foreign lead market search Tapping into world class innovation resources Expatriating European talent to vanguard innovation sites	Attracting world class innovation actors to Europe Enhancing the visibility of Europe's innovation capacity

Source: own elaboration.

[11] On the individual level, not as regards companies, this is a phenomenon that is also characteristic among expatriates from specific countries. In this regard, many persons from e.g. India or Pakistan take the knowledge and experience they build up while living in countries like the US or England back home after a while and valorise it for their own well-being while likewise boosting the national economy by bringing in novel resources.

[12] In line with this motivation one could also mention the desire to go abroad for funding, and access those markets where finance possibilities are most abundantly and innovatively available.

Most of the above action lines deal with the absorptive and networking capacities of domestic innovation systems (e.g. Criscuolo 2004). It also illustrates the importance of both inside-out (outward) and outside-in (inward) oriented policies. In this regard, it may be highly detrimental to a national—or regional—economy if its major companies are not willing or able to tap into knowledge generation possibilities abroad. Therefore, a policy to promote indigenous companies of staying at home completely for their innovation affairs (cfr. national championing) may be counterproductive for competitiveness. Furthermore, the beneficial and long term consequences of foreign companies' R&D activities within a given country should not be underestimated either. In general, the more a national or regional innovation system is able to embed foreign-owned agents with local R&D activities into the system and to absorb knowledge generated abroad, the higher the innovation potential of such a system is.

In addition to the previous action lines, and perhaps more from an idealistic viewpoint than from a business or economic viewpoint, support of internationalisation of innovation can also form part of development and environmental policies. In fact, a large number of international problems today have a scientific or technological dimension. For example: sustainable development, energy policy, climate change or the spread of infectious diseases. Science and technological innovation policies have key roles in these areas and can function as tools for influencing policy at the international level. Consequently, innovation transfer can contribute to raising the standard of living in (underdeveloped) receiving countries. Similarly, it can contribute to lowering e.g. emission levels in countries when getting access to technologies that would otherwise be out of reach to them.

3 Public support initiatives and programmes with regard to the internationalisation of SMEs

In view of the emerging trends, opportunities and requirements in relation to the internationalisation of innovation, many public support initiatives have been designed throughout the world. However, there have been few systematic methods to ensure that the support for innovation and internationalisation is coherent and that companies get long-term and effective support across different government funding organisations and programmes.

In fact, internationalisation goals are built into most Member States' R&D programmes for basic research (fundamental research) and applied research (needs-driven/business related research). There are also some dedicated programmes and instruments addressing internationalisation of services. However, integrated policy approaches towards internationalisation of industrial and public R&D are rare.

In the following we present a (non-exhaustive) range of areas where public policy has a role to play with regard to the internationalisation of innovation, followed by real life examples of corresponding policy actions.

3.1 Examples of policy actions in support of internationalisation of innovation

This section identifies examples of policy actions that aim to support the internationalisation of innovation. In line with the previously forwarded categorisation, we distinguish the following action lines:

Actions to increase the absorptive capacity of European innovation systems (outward orientation)
Under this heading one can classify initiatives that aim to:

- improve access to knowledge enhancing resources abroad: state-of-the-art institutions and lead markets;
- improve access to more efficient and or lower cost resources and structures abroad;
- improve networking capabilities of companies and institutes;
- improve mobility of human resources involved in innovation;
- improve the protection of absorbed and patented knowledge.

Actions to increase the attractive capacity of European innovation systems (inward orientation)
Under this heading one can classify initiatives that aim to:

- increase visibility and exposure of Europe-based innovation agents on the global market;
- increase attraction of non-European R&D activities into Europe.

Actions to use European innovation potential to upgrade the innovation capacity of non-European innovation systems (outward orientation)
Under this heading one can classify initiatives that aim to:

- disseminate innovation capacity in support of sustainable development (e.g. meet international standards on emissions), political stability and to upgrade living and or environmental standards in back-warded countries;
- use innovation to underpin foreign policy.

Take note that several of the services offered by the cited examples can be classified under separate headings used in this chapter. To avoid duplication we only present them once.

The sources on which the examples are based, were obtained mainly from an overview article in the British Global Science and Innovation Forum (2006) and from desk research performed by VINNOVA of Sweden.

3.1.1 Policy actions increasing the absorptive capacity of European innovation systems

3.1.1.1 Austrian schemes to access and embrace foreign innovation resources

A publicly supported funding society (Christian Doppler Gesellschaft) finances research laboratories at Universities abroad, which are co-funded by Austrian companies. That way they absorb excellence abroad and are able to insert it into the domestic innovation system.

3.1.1.2 German schemes to access and embrace foreign innovation resources

The Fraunhofer Society has developed a China strategy, setting up research structures in China. Through that they get better access to the local knowledge and innovation base and develop new research markets. The outcome is not only a broadening of (and a better feeling with a contextualized) knowledge base. It also serves to become more attractive to research partners for companies from the home base. In fact, by embedding itself in generation of knowledge in multiple places, it becomes better prepared for international (innovation) activities in general (be it in its home base or with clients abroad). Also, through this they can serve as a transmission belt to those companies that can not or do not want to go abroad themselves or to co-operate internationally as much as they would need. Knowing that a public research partner is integrated in international knowledge networks, is an asset for any local company which may reap benefits from internationalisation at low costs[13].

Finally, the Fraunhofer society brings new knowledge into the national innovation system, and serves to keep it vital that way.

3.1.1.3 UK schemes to access and embrace foreign innovation resources

The UK Global Watch Service facilitates access by UK companies to leading-edge technology wherever it occurs in the world. It does this principally through part-funding technology fact-finding missions by groups of business experts who then disseminate their findings to others in their sector; and through its network of 23 International Technology Promoters (ITPs) who work with UK firms to facilitate inward technology transfer to UK from the leading R&D investor countries of the world. They are based in the UK but spend 25% of their time overseas. Eight of the ITPs cover North America, six cover Europe and the remaining nine cover Russia, China, Japan, South Korea, Australasia and Israel.

3.1.1.4 Finnish schemes to access and embrace foreign innovation resources

FinNode is a consortium of different innovation actors from Finland. It supports Finnish actors to link to leading international centres of innovation. The innovation centres also relay observations about the development of the innovation environment in the country of location, and establish contacts with key actors.

There are now FinNode innovation centres in Silicon Valley, California, in Shanghai and in St. Petersburg.

As a matter of example, FinNode Innovation Centre opened in Silicon Valley in January 2007 as a one-stop-shop for Finnish companies and researchers. It helps Finnish companies enter

[13] Edler, J., Creative internationalization: widening the perspectives on analysis and policy regarding international R&D activities, In: Journal of Technology Transfer, 33, 2008, p. 346.

the US market, enhance research cooperation and researcher mobility between Finland and the US, and to promote Finland abroad.

In the US, FinNode is part of the network for Finnish export promotion and internationalisation (the EPI actors). Besides FinNode, it includes other Finpro offices, Tekes USA East Coast office and delegations from Finland's Ministry of Foreign Affairs.

Finland-China Innovation Center, Shanghai (FinChi) is a non profit organisation for commercialising Finnish technology in China, which was established in May 2005.

FinChi offers office facilities and services to Finnish SMEs. It also provides Finnish and Chinese firms with contacts to R&D experts, science and technology parks, companies and local authorities in both countries. In addition, it helps Finnish companies and researchers to access large scale projects in China.

Furthermore, FinChi monitors trends in China and detects at an early stage new and innovative business opportunities attractive to both sides. The centre also helps clients to recognise business potentials, help business start ups and provide information on new market environments ("soft landing" type of services).

3.1.1.5 Danish schemes to access and embrace foreign innovation resources

Innovation Center Denmark in Silicon Valley is one of the direct results of the globalisation strategy designed by the Danish government and the Danish Globalization Council. The mission is to "build bridges" between research institutions, companies and capital in Denmark and Silicon Valley in order to accelerate the entry of Danish companies into Silicon Valley, promote US investments in Denmark, facilitate research cooperation and provide inspiration to help drive innovation in Denmark.

Innovation Center Denmark helps SMEs to access lead markets and set up relationships with competitive actors.

3.1.1.6 UK schemes to promote international collaboration in science

The UK government encourages scientific relationships (with China, India, Brazil, South Africa and South Korea) through bilateral networking schemes. These schemes aim to overcome specific hurdles that exist with regard to cooperation with these countries. For instance, through the provision of a governmental "badge" to the individuals and groups involved and by providing funding to cover the logistical costs of networking.

The hurdles in question refer to cultural or administrative barriers. E.g. countries like China or India have very centralised science systems in which (i) central government plays an important role and (ii) scientific collaborations are facilitated by government-to-government interaction. Moreover, in such potential partner countries, scientists and scientific institutes (particularly where they are newly established commercial laboratories) can easily be less visible for outsiders.

In addition, there is the Prime Minister's Initiative (PMI) for International Education. It seeks to encourage universities and colleges to collaborate and to forge longer-term strategic partnerships with universities overseas. The key strands are:

- marketing and communications strategies to sustain the managed growth of UK international education delivered both in the UK and overseas;
- ensuring the quality of the student experience;
- building strategic, sustainable partnerships and alliances between UK and overseas institutions; and
- diversifying into new markets and consolidating existing markets.

The Science Bridges programme with the US has been established to strengthen joint approaches to research and innovation between the UK and the US. Four joint projects are being funded:

(i) University of Manchester working with the University of Washington in the area of composite materials for use in aircraft design.

(ii) Imperial College London working with the University of Texas, Oak Ridge National Laboratory and the Georgia Institute of Technology on the treatment of cancer and energy research.

(iii) The University of Cambridge continuing its productive partnership with the Massachusetts Institute of Technology.

(iv) A consortium of the Universities of Bath, Bristol , Southampton and Surrey working with the University of California in the areas of wireless technology, life sciences, the environment and advanced materials.

3.1.1.7 German schemes to promote international collaboration in science

The BMBF (Federal Ministry of Education and Research), has earmarked a considerable budget (+200 million euros) for international collaboration in basic research in the physical sciences. In addition, it has earmarked approximately EUR 25 million for collaboration with European and international science institutions.

3.1.1.8 Dutch schemes to promote international collaboration in science

Since the Netherlands is the home-base of a number of significant MNEs, for some time, there have been concerns that corporate R&D might migrate out of the country. Accordingly, a major policy challenge is seen in improving the climate for innovation, and therefore in enhancing international networking. One approach contributing to make the Dutch economy more dynamic is the establishment of the Twinning Centres, a sophisticated cluster approach that combines a local competence centre and an incubator model with strategic networking with global lead markets. For this purpose, existing networks of local companies have been activated and additionally, leading foreign companies and universities integrated into already existing local networks. Public incentives include funding, coaching as well as networking. There is strong emphasis on international exchanges between competence clusters.

3.1.1.9 US schemes to promote international collaboration in science

The National Science Foundation Partnerships for International Research and Education enables institutions to establish collaborative relationships with foreign groups or institutions in order to advance specific research and education objectives and to make possible a research effort that neither side could accomplish on its own. This Foundation also strongly encourages international collaborations of a public/private nature.

3.1.1.10 Canadian schemes to promote international collaboration in science

The Government of Canada offers an International Science and Technology Partnerships Program (ISTPP) to promote collaborative research and development between Canadian and foreign scientists and technologists. This five-year programme is aimed at building science and technology relationships with selected partner countries. The programme will foster and support bilateral research projects between Canada and other countries and stimulate bilateral science and technology networking and matchmaking activities to further new partnerships and accelerate the commercialisation of R&D.

3.1.1.11 Australian schemes to promote international collaboration in science

In Australia the International Science Linkages Programme was launched. This programme supports Australian scientists, from both the public and private sectors, to collaborate with international partners on leading edge science and technology to increase the country's capacity to attract overseas R&D investment, promote innovation, and increase the economic and social impact of its research.

3.1.1.12 Multilateral schemes to promote international collaboration in science

The EC Framework Programme was established in 1983 to strengthen the scientific and technological bases of industry and encourage its international competitiveness while promoting research activities in support of other European Union (EU) policies. The proposed Seventh Framework Programme (2007-13) (FP7) will devote more than 60% of the budget to support international collaborative R&D projects. A new aspect of the next Framework Programme will be a limited number of "Joint Technology Initiatives", large-scale public-private partnerships to deliver priority research agendas essential to the competitiveness of European businesses. The Framework Programme allows for collaboration with third countries that are not EU or associated countries, and in FP7 this activity is to be underpinned by an international strategy.

Eureka is an inter-governmental initiative that exists to raise the productivity and competitiveness of European industry. The Eureka initiative was established in 1985 and has since invested EUR 23 billion in collaborative European projects to develop technology-based innovative products, processes and services.

3.1.1.13 UK schemes to foster international mobility of students and researchers

In the UK there is a large amount of activity designed to promote the international mobility of scientists at all levels. There are, for example, schemes that fund incoming research students or support their stay in the UK. These international studentship and fellowship schemes assist researchers at different stages of their careers, and help UK researchers to travel abroad and foreign researchers to travel to the UK.

3.1.1.14 Irish schemes to foster international mobility of students and researchers

The Science Foundation Ireland offers large grants to foreign-based researchers willing to move to Ireland and establish research groups. Other incentives include inward mobility schemes for individual researchers and those with key skills, and reduced fees for non-EU postgraduate students. There is also an innovation support programme aimed especially at strengthening the capabilities of Irish plants.

3.1.1.15 Finnish schemes to foster international mobility of students and researchers

A recent government decision has been taken in Finland to prepare a new national strategy for the internationalisation of universities in 2008. The objective is to increase the international mobility of researchers, teachers and students. In particular, there is an emphasis on increasing the attractiveness of Finnish universities for foreign researchers and students.

3.1.1.16 US schemes to foster international mobility of students and researchers

The US offers various studentships and schemes. Each year some 800 faculty and professionals from around the world receive Fulbright Scholar grants for advanced research and university lecturing in the United States. The Edmund S. Muskie Graduate Fellowship Programme confers fellowships for Master's degree-level study in the US from Eurasian applicants in the fields of business administration, economics, education, environmental policy and management, as well as other fields.

3.1.1.17 Multilateral schemes to foster international mobility of students and researchers

At the international level, there are fellowship schemes to which researchers from EU-countries are eligible, such as the Human Frontiers Science Programme, the NATO International Fellowships and the Marie Curie scheme run by the European Commission, which is the largest of these.

3.1.2 Policy actions increasing the attractive capacity of European innovation systems

3.1.2.1 Austrian schemes to attract foreign innovation activity

The Austrian Headquarters Strategy subsidises the relocation of R&D Headquarters of foreign companies into Austria under the condition of doing R&D activities and R&D cooperation in the country. The innovation programme 'CIRCE' funds the cooperation of Austrian companies with foreign actors in east and central Europe, including direct funds to foreign actors outside the country.

3.1.2.2 Asian schemes to attract foreign innovation activity

Singapore has successfully attracted inward R&D investment from major multinational pharmaceutical companies by offering ready built shell facilities. This gives a company that is establishing a brand new research facility the possibility of doing so in weeks rather than the years it may take to gain permission in some other countries.

Similar measures are being taken in Hong Kong – the key objective of the Hong Kong Science and Technology Parks Corporation is to provide high-tech facilities at lower cost and shorter set-up times for tenants establishing operations.

The Indian government has implemented a number of measures to make it easy for foreign companies to set up R&D centres. Any required regulatory approvals are easily given for wholly owned foreign subsidiaries or joint ventures. Several development centres have been established which enjoy specific concessions. For example, most software development centres operate under the Software Technology Park scheme and are entitled to a plethora of concessions such as duty free imports.

South Korea merges clusters of research activity, financial incentives and provision of infrastructure in its system of free economic zones which is one of the most developed in the world. Companies located in the zones are fully exempted from various taxes, including income tax and corporation tax, for three years, and receive 50% reductions for the following two years.

3.1.2.3 Swedish schemes to protect intellectual property rights

VINNOVA support SMEs with knowledge in building up Intellectual Property Strategies outside the EU, especially in the US.

A special legal division has been created in VINNOVA targeted towards how to protect IPR for SMEs. The team includes US and Swedish legal expertise, involved in the protection of Swedish intellectual property in the US.

Swedish universities, with certain exceptions, are not allowed to control ownership of patents, except through university-affiliated holding companies. Swedish universities, small research companies, researchers and individual entrepreneurs with strong patents, lack the financial resources and often the knowledge of how to protect themselves against patent infringements by large companies, especially in the US where litigation is common. The United States represents a crucial market as Sweden's largest trading partner, where Swedish companies must compete for valuable market share. Enforcement of patent rights is

a challenging process, particularly so in the United States where large companies annually spend millions of dollars on litigation costs. Given the dependence of the Swedish economy on the successful growth of small innovative companies, Swedish innovators must become better at effectively navigating the US patenting and legal systems.

The goal is to develop solutions and increase the knowledge on how to protect IPR for SMEs, researchers, and individual entrepreneurs on how to more effectively protect their intellectual property. It is also hoped that the results of this research will improve the general awareness of the importance of proper handling of intellectual property in Sweden.

3.1.2.4 Multilateral schemes to protect intellectual property rights

In the context of the Lisbon goal to establish a knowledge-based society, the IP-BASE project[14] aims to address the needs of the European industry in the area of IPR use and enforcement issues, especially for SMEs and specific sectors of industry. The main objective of the project is to raise awareness on and knowledge of IPR -in particular among SMEs- in view to:

1. raise the SMEs' understanding of the need to integrate IP in their innovation strategies and their business planning;
2. improve the protection of the SMEs' IP rights through the increased registration of rights EU-wide as well as globally and increase the use of non-registered protection methods through the effective promotion of these methods;
3. improve protection and enforcement by SMEs of their IP rights from infringement whether this originates from within or outside the EU;
4. raise the SMEs ability to fight counterfeiting and increase knowledge on the methodologies available to detect it;
5. develop actions to promote awareness on IPR protection to educate the fashion and design industries (textiles, leather, footwear and furniture) on the risks counterfeiting poses and on the existing means and procedures to combat it;
6. promote and support the use of IP rights in international research, development and technology transfer activities, providing an IP rights support service to actual and potential beneficiaries of CIP and Research Framework Programme actions, especially high-tech SMEs and Public Research Organisations.

The IPR Helpdesk offers basic guidance and advice on intellectual property issues and its services are free of charge. The website of the initiative provides key information and explanations about IPR, with a special emphasis on issues related to European research, while the Helpdesk's legal specialists respond to individual legal questions via a helpline, and can also check legal documents.

The actions the measure contains aim to improve the SMEs' understanding of the need to integrate IP into their innovation strategies and business planning.

3.1.3 Policy actions enhancing foreign innovation capacity building and sustainable development

3.1.3.1 UK schemes

Apart from several more generic foreign development policy packages, the British Council has science programmes in 70 countries, including all countries where the UK Science and

[14] The IP-BASE project brings together two existing important Europe-wide initiatives under one umbrella action: the IPR-Helpdesk. Helpline and training mechanism for current and potential contractors in EC-funded RTD Framework Programme projects and InnovAccess, a web portal created by the National Patent Offices offer information on their services for the end user.

Innovation Network operates. It is uniquely represented in Bulgaria, Croatia, Cuba, Egypt, Georgia, Iran, Kazakhstan, Libya, Romania, Serbia & Montenegro, Slovakia, Slovenia and Ukraine. Through this network, the British Council builds partnerships and encourages links and networking between scientists, engineers and research managers to encourage innovation. The Council promotes UK culture and creativity, and has a unique role to play in sustaining communications for and about the UK system of innovation as a whole, acting to support both wealth creation and social well being. It has two main programmes worldwide: to engage and influence scientific communities, and to spread awareness and appreciation of the UK with wider international audiences.

3.1.3.2 Multilateral schemes

An example of EU action towards promoting Technology transfer is Medibtikar. According to the open consultation on the Small Business Act for Europe; i) Networks among SMEs and among SMEs and large companies and ii) financing for going abroad, are among the specific suggestions for helping SMEs to go global. The results in fact show that the neighbouring countries (in the Mediterranean and eastern Europe), Asia and South America are considered the most interesting markets followed by Africa and the US. In particular, the so-called BRIC countries (Brazil, Russia, India and China) are mentioned most frequently. Moreover projects like Medibtikar are relevant as it focuses on innovation support, knowledge and technology transfer, and most of the countries in the concerned region are developing countries.

Medibtikar is an EU-funded Regional and Communication Project on the European and Mediterranean Partnership. The Programme's budget is EUR 7.3 m, and it will run till 30 March 2009. The beneficiary countries are: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Syria, the Palestinian Authority, Tunisia, and Turkey. The beneficiary organisations are public and private enterprises concerned with increasing the competitiveness of SMEs.

The Medibtikar project provides the MEDA countries with new and improved instruments to stimulate innovation at firm and country level. The project also simulates networking across the MEDA region, and between the region and the countries of the European Union.

The objectives of the programme are to:

- encourage good practice in technology and knowledge transfer by administrations, enterprises, industry federations, chambers of commerce, etc
- support the creation and/or improvement of intermediary organisations in charge of implementing support policies for SMEs (Innovation and Technology Centers, TechnoParks, Incubators)
- support innovation management, from the development of a national innovation strategy to the identification of services to provide to SMEs
- provide support to specific sectors facing common challenges in the MEDA region
- develop national and regional networks supporting innovation stakeholders and connecting key players across the Euro-Mediterranean countries.

The final beneficiaries are Mediterranean public and private enterprises, which require appropriate infrastructures that support innovation and technology.

4 Policy implications and recommendations

Chapter 2 explained the scope for actions at the disposal of policy makers to support the internationalisation of innovation.

From chapter 3 it follows that many national and multilateral governments have already undertaken relevant policy attempts to support the internationalisation of innovation. As such, it provides an overview of how governments for example, assist firms and institutions in entering foreign markets and knowledge bases and protect their own; how they assist them into bonding with complementary innovation partners and innovation systems abroad; how to attract talent to the proper turf and how to support capacity building of foreign innovation systems. Consequently, it comes down to identifying the gaps and points for improvement in the existing policy landscape and where European action can provide additionality.

For the sake of innovation capacity building at firm and system level, it is highly important to raise the awareness of organisations to network across borders, notably by connecting to organisations in countries that are at the cutting edge of innovation and technology in a certain domain. Similarly, it is important to realise that it may be more profitable, time- and cost-efficient and fruitful for domestic innovation systems to tap into knowledge bases abroad that are front-runners in certain innovation fields, than to invest in R&D at home. Moreover, in particular, one can point at the following issues:

4.1 Enlarge the scope of innovation programmes

4.1.1 Broaden thematical coverage

International co-operation is for many private and public actors a very important instrument for internationalisation. If Europe wants to make the most out of international co-operation and tapping into foreign knowledge bases for the well-being of Europe's innovation systems, the present funding schemes available in Europe offer room for improvement. First of all, Framework Programmes offer principally funding possibilities to European actors -partly also of actors from developing countries- within the thematic corridors of the individual schemes. Secondly, national funding programmes provide for international cooperation only to a limited extent (probably due to policy externalities). Also, in most European countries, programmes for co-operation outside of established topics under EU Framework Programmes, are missing.

4.1.2 Deepen thematical coverage

Targeted programmes, focused on competitiveness in a given technological area, can help to create critical mass and visibility that would make Europe more attractive as a trans-national research location[15].

To give relief to the former, the set up of long term discourse and technology platforms, in which users and producers of spearhead technologies exchange views, can provide assistance to this and are likely to give an advantage to locations for long term market oriented research and innovation activities in particular fields.

4.1.3 Broaden geographical inclusion

There are very few possibilities for funding of co-operation between developed countries within the EU and outside the EU. This is a systematic gap in international funding schemes,

[15] Creating an Innovative Europe, Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit, EUR 22005, ISBN 92-79-00964-8, http://europa.eu.int/invest-in-research/

which is also highlighted by INNO-Net responsibles who point out the need to be able to include overseas actors into partnering or cluster structures.

In particular, participation opportunities for entities in third countries like the US; India or China in the innovation actions supported under CIP are much more restricted than under the Sixth or Seventh Research Framework Programme. Article 4 of the CIP decision provides, regarding the possibilities of third countries to participate in CIP that a) EEA, b) accession and candidate countries and c) Western Balkan countries might participate and (d) other third countries, when Agreements and procedures so allow.

As absorption of knowledge and innovatory capacity starts with permeability and entrance or connection, such limits put a mortgage on learning effects. In fact, one should work towards multilateral, flexible funding schemes that allow the pooling of complementary national assets among (non-)European countries.

To that end, Art 21.5 of the CIP decision allows partners in third countries to benefit from the 'network infrastructure established' (like the Enterprise Europe Network) without being entitled to receive financial support from the CIP. Originally, this served to allow the continuation of the work of Euro Info Correspondence Centre (EICCs). Other drivers behind allowing third countries to apply for cooperation are inducing technology transfers and connecting to third country innovation actors. As of the end of September 2008, proposals for cooperation from national technology transfer networks in the following countries are accepted: Russia, USA, Chile, and Egypt. Innovation aspects were also taken on board by former EICCs from China (a regional project covering three provinces), Syria and Armenia.

4.2 Coordinate innovation policies with and embeddedness into wider policy landscape

Innovation is a cross cutting theme that is related to many different policy objectives. Therefore, there is a challenge to coordinate internationalisation policies and align them with other policy domains. In fact, currently, only a very limited set of countries think about the formulation and implementation of comprehensive policies towards internationalisation of industrial—and public—R&D. The same problem applies at the level of the European institutions. This implies that the policy approaches and regulations of various ministries or DGs that affect international innovation need to be coordinated. For example, mobility of researchers is one way to promote knowledge transfer and to embed institutions and companies in a host innovation system. But to achieve such mobility, also wages policies and social security schemes (horizontal alignment) and coherence with policies from state, region and multilateral level should be sought after (vertical alignment). In this regard, the same goes e.g. for attracting innovative companies. This not only depends on the availability of fertile market and research conditions in Europe, but likewise on FDI policies and international regulations. Also, the policy landscape in Europe offers room for more transparency and simplification.

In line with the former, innovation needs to be taken up in a more systematic and integrated way into international agreements. In bilateral cooperation agreements, e.g. with the USA, the MEDA countries, India and the ACP countries, different references to innovation are made. However, the interests of European companies should be taken into account more rigorously. Whereas the technology aspects of innovation and mutual policy learning are generally well reflected in the dialogues and cooperation agreements, more advanced innovation related topics like cluster cooperation, SME internationalisation or access to financing are not yet taken up in these dialogues. Therefore, there is scope for a more thorough identification of European interests in international innovation cooperation.

4.3 *Valorise the role of public research actors in internationalisation of innovation*

Public institutes setting up assets abroad can serve as a vehicle for private initiative to internationalise, and public policy makers can far more easily co-decide on the acts and moves of public research institutes. Consequently, it can use this decision power to influence the location, sourcing and partnering agenda of such institutes[16].

Consequently, the role that public research organisations can play for the internationalisation of industrial R&D and enhancing the capacity building of innovation systems deserves more attention. Through going abroad, they are not only able to pave the way for private companies. In doing so they assist diversification strategies of national companies and they serve as a transfer mechanism of knowledge about new developments abroad back into their home systems. I.e., by tapping into foreign knowledge and relationship bases, they can bring back knowledge into the domestic innovation system and enhance the attractiveness of the home base for foreign actors as well.

International diversification of public research institutions may thus lead to spill-back processes beneficial for the domestic innovation systems and serve as transmission belts to those companies that cannot or do not want to afford to go abroad themselves or to co-operate internationally.

Also, given that the quality and accessibility to public researchers increases as a location advantage for companies, this is an issue that can be exploited further via policy actions.. In fact, improving the international position of research institutes is also an important recipe in helping them to retain and attract internationally mobile talent in their home base. In addition to this, schemes to attract talented researchers to such institutes in Europe can be expanded, this can include exchange schemes with institutes and universities elsewhere.

In sum, if public research institutes are internationalised in terms of personnel (mobility), cooperation or even physical presence abroad, they can be the pipeline for global knowledge for local SMEs, monitoring and re-transferring knowledge from abroad and thus contributing significantly to increasing the overall effects of internationalisation for a system.

Consequently, public policy may have a large leverage if it takes care of the conditions under which public research institutes can internationalize their activities and their staff, in both directions. To set incentives and to dismantle barriers to achieve this is an important assignment when aiming for internationalisation innovation.

To facilitate these kinds of operations, national and multilateral governments can set up preferred relationships or open up possibilities to selected countries (see § 4.2) to pave the way for public and private organisations (individual as well as in cluster formation) to initiate relationships, set up physical facilities in each others territories and to initiate joint innovation projects. Especially since some of the upcoming and most promising economies have rather closed and centralized economic systems, intergovernmental setting the scene seems required.

4.4 *Valorise the role of overseas affiliates of innovation agencies*

In line with the former, there is also room for valorisation of the different assets that respective Member States have throughout the world and promote their use not only for organisations from the founding nation. Instead, a more network-wise way of deploying these

[16] As far as private companies' internationalisation acts are co-funded with public money, this influence extends of course also to private actors, although the control mechanisms are perhaps less powerful.

assets can multiply and cross-fertilize benefits for multiple actors and countries. In this regard, the EU can support the establishment of networks between the various national initiatives from Member States' innovation and internationalisation agencies initially in fast growing countries, like China and India, Asian countries in general, and South America (Brazil) and Russia.

A proposal would, thus be that the agencies try to liaison in order to use already available structures of others and not duplicate structures. Coordination and synergies with all the actors involved (Member States, business organisations, chambers) and existing centres/networks should be a key element in such a strategy, and is crucial to avoid duplications with market based service providers.

To 'cross-finance' such structures, it can be decided that companies making use of such facilities pay royalties and fees for the use of the services. This could be an important step towards a more effective use of external antennas. It can also lead to a further specialisation of the different services between the established structures of Member States. Whether such a network should be a states affair or can be left to Chambers of Commerce or to the market is another debate.

4.5 *Enhance trust building between partners and provide knowledge protection in international innovation ventures*

Cooperation with foreign companies or research institutes increases commercial risks as knowledge and business is exchanged with less well-known and less controllable partners.

As a result, innovative SMEs are particularly reluctant to enter into cross-border business cooperation. To overcome this barrier and to prevent SMEs from suffering from a no-go decision that is counterproductive to their own business prospects, the creation of business frameworks and (IPR) safety mechanisms from public side of countries and regions involved, can make a difference. In fact, all political agreements on international cooperation in the field of innovation have to take these business concerns seriously into account.

It can be expected that strengthening IPR protection will promote more innovation globally, thereby generating economic growth. Even if the bulk of innovation occurs in the advanced countries, stronger IPR protection will accelerate the technology transfer among all nations, resulting in mutual benefits.

Actions are, therefore, indicated to increase the quality of expertise in handling of intellectual property. To that end, the EU can set up knowledge centres or promote building up knowledge and insight in IPR strategies, especially in licensing knowledge and technology. This is especially useful for universities, small research companies, researchers and individual entrepreneurs that lack the financial resources and often the knowledge of how to protect themselves against patent infringements by large companies. Take note that especially in the US litigation costs are very high.

There are already a number of institutions, such as the Commission-funded IPR-Helpdesk and the WIPO SME Division, which have been established with the specific aim of helping SMEs to better understand the importance and benefits of IP rights. Thus, there may not be so much a need for new programmes, but rather a broader access to and exposure of existing ones. Also, there is scope for unification and harmonisation of Member States'

intellectual-property laws, and to provide industry with the means to protect their IPRs through one single action via a one-stop-shop within the EU[17].

4.6 *Inform on good policy practices and strategic intelligence*

Many interesting initiatives to support the internationalisation of innovation can be detected throughout Europe and abroad. However, it seems that providing this kind of policy assistance only occurs on a fragmented basis. Not all countries are with it. In this context, the EU could encourage the lagging Member States to also set up internationalisation support schemes and to disseminate the good practices available.

It is likewise indicated to foresee in the provision of road maps and 'how-to' guides, written/on-line case studies and support from experienced international SMEs to organisations new to internationalisation and setting up cross-border innovation networks.

A topic that is related to information on good practices is the provision of relevant data for actors to base international innovation decisions upon. Observatories and supply of strategic intelligence is, therefore, of paramount importance. However, certainly for the smaller actors this intelligence is often not accessible or to costly. The public sector can assist in gathering data for public exposure that can feed decision support systems.

[17] The European Commission has already taken steps in this direction. I.e., by bringing together under the IP-BASE project the IPR-Helpdesk (which continues to provide the Helpline and training mechanisms for current and potential contractors in EC-funded RTD projects) and InnovAccess (which is created by 20 European National Patent Offices to provide information on services). This represents a novel perspective for several Member States. In particular for New Member States since currently there are many differences between the Member States with regard to IPR support.

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