

Chapter 4

Policy Implications

Chapter 4 discusses the policy implications of global and open innovation for national and regional innovation systems. The impact on different domains of innovation is discussed, with examples of how countries are responding to the changing innovation environment.

The goal of the third module in the globalisation and open innovation project is to draw out the implications for science, technology and innovation policies that arise from the case studies on open innovation as well as from the analysis of the main drivers behind globalisation and open innovation. This chapter therefore first presents some of the policy issues raised by globalisation and open innovation, discusses the policy implications of the case studies and empirical evidence on open innovation, and, on the basis of the existing evidence and information, reviews the main policy responses.

Policy issues related to globalisation and open innovation

Before discussing some of the potential policy implications of globalisation and open innovation, it is worth recalling some of the related policy concerns. While the phenomena of R&D internationalisation and open innovation are related and raise similar policy issues, the implications vary depending on the policy area and the level of government policy.

While OECD countries are still the most active investors in and performers of R&D, globalisation has reduced barriers to entry and created opportunities for new players in emerging economies – and also at home – to tap into global networks. The emergence of global players such as China and India as new markets but also as platforms for research and talent have raised concerns about the off-shoring of R&D and related high-skill jobs and/or erosion of existing national R&D infrastructure and capacity. For smaller and catching-up OECD economies, the emergence of global players increases competition for R&D-related foreign direct investment (FDI) and for research talent, making the catching-up process more difficult.¹

The emergence of open innovation also raises policy issues. While open innovation is essentially business-driven, it has implications for science, technology and innovation policies. Insofar as open innovation is about “open” business models for innovation, countries’ framework conditions (i.e. product and labour markets, IPR and competition policies, a strong public research base, etc.) are extremely important policy levers. At the same time, because open innovation involves going beyond firms’ and nations’ boundaries, it may create issues for government research and innovation policies. Most OECD countries’ S&T policies are predominately national in

Box 4.1. Policy lessons from the case studies on globalisation and open innovation

The case studies on open innovation have provided a better understanding of the impact of globalisation and open innovation at the level of firms. This understanding is critical to improve the design of innovation policies and instruments. Among the policy-relevant findings that emerged are the following:

- **The technology life cycle matters.** The case studies on firms in a broad range of sectors and industries have shown that the incidence of open innovation is related not only to the size of the company but also to its position in the technology life cycle. When the technology is rather new and explorative, companies and other research organisations actively collaborate to find solutions in the market. This has implications for public research institutes.
- **Open innovation requires a differentiated approach to knowledge sourcing and development.** The emphasis on external co-operation and in-house knowledge diffusion varies. With regard to external linkages, the nature of knowledge and customer bases is important for shaping structure and strategy. Consequently, openness towards various external actors also varies.
- **University knowledge plays a key role in the exploration phase of open innovation.** Large firms in the case studies were especially concerned by access to public research upstream. CIS-4 data on collaboration show that collaboration between universities and small firms remains weak.
- **A pro-active strategy towards management and use of intellectual property rights (IPR) is important** for open innovation. Universities tend to be less well equipped in this area, however, making collaboration with firms difficult.
- **Trust matters.** The case study exercise identified trust and commitment as especially important for the success of open innovation strategies.
- **There are organisational limitations to open innovation** and there are often trade-offs between different approaches, resulting in experimentation through trial and error. Increased networking also generates greater costs.
- **Building a culture of open innovation in companies requires rewarding teamwork and organisational changes that foster internal and external collaboration.** This requires work arrangements that encourage and reward risk taking.
- **Small firms' participation in open innovation is limited owing to internal resource constraints.**
- **Technology markets matter in helping foster open innovation.** The ability to use inside-out and outside-in strategies is facilitated by frameworks that allow for the purchase or sale of intellectual assets that can create value and opportunities for firms inside or outside their core businesses.

scope, but it is becoming clear that policies designed for geographically circumscribed knowledge-based activities or for vertically integrated value chains of firms need to be reviewed.

For example, policies to promote (national) networking and clusters may have to be adapted to take account of the globalisation of R&D and production networks. Clusters are not necessarily constrained by geography or technology. For example, the Biovalley is a cluster of biotechnology companies that straddled the borders of France, Germany and Switzerland. Policy measures to promote in-house R&D and innovation are important but may no longer be adapted to firms' innovation practices (*e.g.* insourcing or outsourcing R&D and innovation processes through corporate venturing strategies). Policies to foster industry-science relations are also affected by the cross-border linkages of public research institutes and firms. One may ask, to what extent are measures to promote internal R&D capacity still relevant or are they in fact more important given the complementarities needed to use external R&D? Should networking initiatives be strengthened, and if so how? Can and should governments target innovation support at specific points in the value chain?

The globalisation of R&D and the emergence of open innovation strategies in firms clearly raise intellectual property issues. The shift towards "IPR sharing" in open innovation strategies may require different kinds of management tools in universities and public research organisations. Indeed, open does not mean "free". The case studies have shown that a pro-active strategy towards management and use of IPR is important for open innovation but that universities tend to be less well equipped in this area. Universities have learned the value of protecting IP generated with public research funds but the management of IP in an open innovation context – as opposed to the technology transfer approach of licensing patents – remains a challenge, especially in their interactions with firms. Universities may also tend to overvalue or undervalue their IP, which can lead to difficulties in collaborating with industry.

IPR issues also play a role in the location decisions of multinational firms. While strong IP protection can attract R&D-related FDI, excessively strong protection can act as a barrier to open innovation strategies that rely on knowledge sharing and access. It can lead to abuses, block access to public and private research and ultimately stifle innovation. Access to IP allows innovators to create new IP that can in turn be made available to other users. This requires platforms and repositories for the "intellectual commons" which can be facilitated by government regulations and investment in a strong ICT infrastructure.

Policy responses

Findings from OECD questionnaires on the internationalisation of R&D

How are OECD countries responding to the policy concerns or challenges raised by globalisation and open innovation? Three main sources of information were used to gather information on policy responses: the OECD 2005 questionnaire on national policies on the internationalisation of R&D; the responses to the 2006 *OECD Science, Technology and Industry Outlook* questionnaire; and country responses to the request for updates in the form of “policy notes” for the project on globalisation and open innovation.

The responses indicate that OECD countries have been reviewing their internationalisation strategies by bringing them in line with more general policies to strengthen economic competitiveness, and by adopting policies to address certain key aspects of the globalisation of R&D. Countries such as Denmark have explicitly developed an integrated strategy by considering internationalisation as a central dimension of all elements of an innovation system. Four broad categories of policies are identified:

- General economic framework conditions including those that play a role in the attractiveness of foreign R&D.
- R&D and innovation policies, including instruments to support business R&D and to promote linkages between industry and the public research sector.
- IPR and related policies.
- Human resource capacity building, including policies to promote the mobility of human resources.

Science and technology policies aimed at attracting R&D activities from abroad closely follow policies to attract FDI in general, notably by improving economic framework conditions. Crucial to attracting R&D investments is the establishment of a world-class science system including high-performance research units, a highly developed infrastructure and a supply of excellent human resources. Given that countries are not able to excel in all technological domains, a quality domestic knowledge base goes hand in hand with specialisation. In order to foster clusters and networks and enhance research and learning, industry-science linkages around centres of competence are being reinforced. In addition, more specific S&T policy instruments and measures are applied in (some) countries. Examples are public support for (new) investment in R&D, often involving the regional level of governments; opening up national public (support) programmes in the area of S&T according to the non-discrimination principle for foreign-owned domiciled firms; and facilitating the mobility of S&T personnel. For the second of these, the concept of reciprocity is an important consideration in order to demonstrate that national benefits can

flow back to the taxpayers that fund public programmes. For mobility, policies will have to balance brain drain with brain circulation.

A second broad category of policy measures envisages linking domestic firms with foreign knowledge and stimulating spillovers from foreign sources of R&D to local R&D units and the local economy at large. This is done by increasing the absorptive capacity of local firms, by raising the educational level of the local labour force and by stimulating the development of own technological and innovative capacities. The creation of platforms for co-operation and linkages between companies and public research organisations through cluster and network initiatives, competence centres and their transfer offices also aims to maximise spillovers. Countries also implement more direct and active policies for linking to “international” knowledge by providing information and consultancy services, by supporting participation in international R&D programmes and in international S&T co-operation in general.

Third, many countries have made substantial efforts to lower barriers to the mobility of highly skilled personnel through more favourable immigration regimes and the simplification of immigration procedures. Immigration policy targeted towards highly skilled and temporary immigrant workers/students provides incentives, such as preferential income taxation for certain groups among the highly skilled. In some countries specific policies for repatriation (of nationals working abroad), retention and networking of talent have been set up.

Policy responses in general appear to be adapting to the challenges of open innovation and globalisation. However, some gaps remain:

- **Globalisation is putting pressure on upgrading framework conditions (including competition and fiscal policies).** Many countries recognise the importance of framework conditions but upgrading takes time and governments encounter political and public resistance to accelerating reforms in difficult areas (*e.g.* labour market policies).
- **Open innovation and global value chains drive efforts to improve framework conditions that affect the location of production (FDI) as well as costs (production, labour, tax).** Common responses include reforms to reduce corporate and/or labour social tax rates (France, Japan, the Netherlands) as well as helping to link firms to global production networks (*e.g.* industry productivity centres in Australia for trade-exposed small and medium-sized enterprises [SMEs]).
- **Globalisation and open innovation also require changes in the governance of S&T policies.** This is reflected in new national plans; national strategies that involve a cross-government approach (*e.g.* Denmark’s Globalisation Strategy), as well as greater involvement of industry in public research priorities and policy development (the Netherlands).

- **A broader definition of innovation is necessary – innovation is more than R&D and more than technological innovation.** This is increasingly recognised, as seen in changes to existing support instruments such as R&D tax credit schemes which include service firms as well as incentives for collaboration with public research.
- **Upgrading and internationalising public research organisations.** Enhancing the ability of public research organisations to compete at world level as well as to join research and innovation networks and supply chains is reflected in efforts to renew infrastructure, to reform university systems and to foster critical mass in research fields. However, most universities continue to seek their collaboration partners nationally. Changes to regulations and new incentive mechanisms may be needed to encourage more internationalisation of research at universities and public research organisations.
- **Networks and clusters remain important** but globalisation and open innovation have created a trend towards focusing and rationalising cluster initiatives to create world-class “nodes” in global innovation networks. Some countries are increasing support to intermediaries that can help link public and private research (France, Ireland, the Netherlands, Spain).
- **Evaluation of innovation policy is also becoming important**, not only in a national context (*e.g.* across the EU).
- **New initiatives for human resources in science and technology (HRST).** Strengthening domestic human capital as well as attracting foreign talent and return migration are policies pursued to support human capital for innovation. However, beyond stimulating supply, attracting and retaining quality HRST in companies and public research institutes will require changes in training and in employment/workplace conditions that foster autonomy and teamwork and that reward entrepreneurial risk taking.
- **Reforms to intellectual property rights (IPR) to support open innovation.** Efforts to promote knowledge sharing involve legal changes such as clarification of the research exemption for patented inventions (Australia); or extension of the protection of non-exclusive licensees (Japan) and limits on “evergreening” patent strategies (Canada). Another trend is the simplification of patent procedures (France) and use of the tax system to promote IPR (*e.g.* reduced taxation on royalties in the Netherlands). Outreach to public research and SMEs is also important for encouraging their participation in open innovation networks.

Implications for government support to R&D and innovation

As the preceding shows, traditional policies and instruments for stimulating research and innovation are under pressure to adapt to the global context for innovation. For one, the globalisation of R&D implies that the

leverage effect of public instruments may become less effective if national firms can readily shift R&D or expand it in offshore markets with greater growth potential. Another possible implication is the need for greater coherence in policy making across government ministries and departments to increase the leverage of existing mechanisms. However, this is often not the case, and considerable overlap and duplication persist. Against the background of globalisation many OECD countries are adapting their institutions for the governance of research and innovation policy, and this can go a long way towards ensuring that public support schemes meet their targets. In EU countries, greater policy coherence is also being achieved by the effect of the Framework Programmes on the design and implementation of national research policies in member states.

At the same time, while it is clear that national innovation policies must look beyond geographically circumscribed knowledge-based activities and vertically integrated value chains, it is not altogether clear that the effects are the same for large countries with large internal markets for R&D and innovation as for small countries that are more dependent on international flows of knowledge and capital. For larger countries, nationally focused innovation policies may still matter and they may not necessarily be at odds with globalisation. Indeed, for larger countries it may be more important to ensure that regional and local initiatives have a global dimension. Similarly, “policy coherence” is becoming more important, but it is arguably more so – and easier – for smaller countries. It is therefore not surprising that smaller economies have taken the lead in opening up national programmes for R&D to firms across the borders irrespective of the location of their production capacities. The Nordic countries, owing in part to the regional integration of their economies and labour markets, have adopted “globalisation strategies” to ensure that policy making across the whole of government is responsive to the challenges of globalisation. Some policy implications for government support to R&D and innovation include:

- **Integrating the global dimension in business R&D and innovation schemes.** Public schemes to support business R&D and innovation, whether via grants or indirect schemes (*e.g.* R&D tax credits, networks) may need to be adjusted to encourage greater participation by firms whose main production base is located abroad.
- **Streamlining and simplifying access to business R&D and innovation schemes.** Another implication of globalisation and open innovation is that firms, especially large firms, can “forum shop” for the best conditions and schemes available in different countries. For them, but also for SMEs which are less internationalised, improving access to and “ease of use” of government support becomes more important.

- **Promoting open innovation practices in the public sector.** Government can also become an enabler of open innovation by promoting open source platforms and practices in its procurement strategies as well as for government services.
- **Fostering technology foresight and road-mapping.** Working with firms to set priorities for research, but also to help companies identify and scout technology trends can help bridge the information gaps inherent in knowledge markets.
- **Networks and clusters.** As open innovation requires the flow and exchange of knowledge between the public and private sectors, governments have a role in ensuring that the market and non-market sectors can facilitate knowledge flows through regulation but also through infrastructure. Networking with public research allows firms to internalise knowledge spillovers. Consequently, many countries have fostered research and innovation clusters and networks. As networks proliferate, however, there is growing demand for integrating different networks across fields, sectors and technologies. This requires very different types of skills, management and organisational structures from those currently found in many universities and public research organisations.
- **Linking national and regional/local policies for R&D and innovation.** For R&D, agglomeration economies are now often more important than economies of scale. As a result, regional or local initiatives may play a greater role in helping central governments influence innovation performance of firms at home and abroad. Strengthening the ability of public research institutes and smaller firms to internationalise through national or regional innovation policies will be critical to helping OECD countries compete globally.

Implications for public research organisations

The OECD project has focused mainly on businesses and their use of open innovation strategies in a global context. It has highlighted as well the important role of universities and public research organisations in firms' knowledge sourcing and innovation strategies. This "sourcing role" is driven by the development of global innovation networks, in which companies tap into knowledge sources worldwide in the wake of the globalisation of production networks, but it is also a response to changes in the ways firms innovate in house. Anecdotal evidence has shown that in response to competition and shorter product cycles, firms have reduced their focus on longer-term and basic research. This increases the need for basic research in public labs and in universities, whether or not the results from basic research are channelled directly into the value chain (as in biotechnology) or into the

Box 4.2. **France's Passerelle programme**

France maintains a range of policies to foster open innovation and networking, ranging from clusters to promoting collaboration between industry and public research. One example is the “SME pact” to mobilise large entities (private or public) to promote the development of innovative SMEs. Large entities (*i.e.* firms) agree with government agencies (based more on willingness than on obligation) to strengthen relations with innovative SMEs through procurement and research and industrial development contracts. Under the SME pact, the Passerelle programme fosters R&D collaboration between innovative SMEs and large enterprises. If a large enterprise is interested in an SME's innovative products or services that require further development, the Passerelle programme supports the R&D projects for testing and adaptation of the products and services to the specific needs of the large enterprise. One-third of the funding comes from the large enterprise (cash and/or in-kind contributions), one-third from public subsidies (Oseo Innovation grant) and one-third from the SME. The intellectual property stays with the SME but the large enterprise has privileged access to the results for application in its specific business domain.

public domain via scientific publications. Another trend that is making open innovation more relevant and necessary is the growing convergence of technologies (nanotechnology, biotechnology, ICT) which generates new fields for research and innovation at the interface of existing fields and requires cross-functional, multidisciplinary approaches to research and innovation.

The OECD project on open innovation highlighted the importance of collaborating upstream in the research and innovation process. This points to the need for public research organisations to develop interfaces for linking up with business. At the same time, public research cannot simply react to business strategies or act merely as a provider of knowledge on demand. Indeed, changes in the governance of public research over the past decade – in particular the move towards greater autonomy, the shift towards competitive funding and in some cases privatisation, and the deregulation of academic labour markets – have allowed universities and public research organisations to play a more active and central role in the innovation process itself. In some cases, public research organisations have become “knowledge hubs” that help firms, small and large, source and jointly develop new knowledge.

The following are policy areas in which globalisation and open innovation may be affecting universities and public research organisations and their ability to respond to new demands, but also to play a more central role:

- **Public research.** As the business sectors has less time and fewer resources for carrying out longer-term research, continued support for basic research is of the utmost importance, even if the boundary between basic and applied research is ever more blurred. A key issue is not only to promote research but also to improve its diffusion and accessibility to firms and to society at large. Here, changes in the mission, priorities and governance of public research and new platforms (*e.g.* the development of competence centres) may be needed to encourage the production and diffusion of high-quality research. Open science initiatives and ICT-enabled platforms can also help improve the quality and diffusion of public research across sectors and borders.
- **Joint knowledge development.** Efforts to strengthen links between universities/public research organisations and firms have long been based on a knowledge-transfer or “technology push” model. One implication of open innovation is that the public research sector must be better equipped to develop knowledge jointly with firms. This may sometimes imply changing the mission of technology transfer offices and enabling them to expand into different areas.
- **Knowledge exploitation.** IPR and their management have been identified as crucial in open innovation strategies, especially in the upstream phase. The shift towards “IPR sharing” in open innovation strategies may require different kinds of management tools in universities and public research organisations. The case studies have shown that a proactive strategy towards the management and use of IPR is important for open innovation but that universities tend to be less well equipped in this respect. Universities may also overvalue or undervalue their IP, which can lead to difficulties in collaborations with industry.
- **Mobility of the highly skilled.** In spite of reforms in many countries, mobility between the public and private research sectors remains a challenge. In some cases, the university sector in particular lacks the legal and regulatory framework and the financial incentives to encourage the mobility of highly skilled personnel between universities and the private sector as well as to other parts of the public research sector (*e.g.* government labs).

Implications for the broader environment: getting the framework conditions right

Governments influence the broader business environment for innovation through macroeconomic as well as structural policies (labour policy, fiscal policy, capital markets). In addition, framework conditions (competition policy, antitrust rules, IPR regime) and the public infrastructure

Box 4.3. The Holst Centre and Point One in the Netherlands

The Dutch government stresses specialisation for innovation in order to become a front runner in an economy in which R&D internationalisation and open innovation are increasingly important. Innovation involves not only R&D, but also SME policy, human capital, etc. Implementation of these project- or programme-oriented policies requires a clear commitment from industry. The Holst Centre and Point One are two new initiatives.

The Holst Centre at the Eindhoven Campus is an Open Innovation Centre for Autonomous Microsystems and Systems-in-Foil created in 2005. This joint centre of TNO (Netherlands) and IMEC (Belgium) is funded by government as well as industry, and has clearly international ambition with partners worldwide and employment involving 18 nationalities. The Holst Centre creates generic technologies with a time to market of between three and ten years, co-operates with industry and universities through pre-competitive shared programmes (creating focus and mass), with the results shared among the partners. Industrial partners of Holst Centre take part in the research programmes to enable rapid transfer of results to industrial partners. In the case of co-invention, industrial partners become co-owners of IP.

Point One is a pole of innovative technology in nano-electronics and embedded systems which began in 2006. It has an ambitious and coherent strategic agenda and the key success factors are considered to be its international recognition, (scientific) strengths, commitment of key industry players and an integrated approach (human capital, SMEs). A range of public incentives are foreseen: grants, feasibility studies, vouchers, brokerages (national and international), trade missions, knowledge transfer activities, education (vocational training), stimulation of spin-off companies, joint research institutes, exchange of researchers, R&D subsidies, etc.

for education and public research also play a major role. The OECD project has highlighted the importance of “building trust” in the marketplace as well as at the interface between the public and private sectors. Stable framework conditions and government policies therefore seem to be important. Many countries recognise their importance for innovation and for economic growth more generally, but reform takes time and governments can encounter political and public resistance to reforms in difficult areas (*e.g.* labour market policies). Other areas in which governments can act are:

- **Competition policy.** Insofar as competition between firms has put pressure on firms to innovate, competition policy is a key framework condition.

However, co-operation is also part of open innovation. Designing competition policy that does not preclude co-operation is an important challenge, especially in industries where excessive competition can slow innovation.

- **Infrastructure for ICT.** Open innovation and global value chains rely on information and telecommunications networks, especially in certain industries or sectors. Public investment but also regulations and standards are important for the development of a communications infrastructure that allows firms, consumers, users and other players to collaborate on user-driven and open innovation.
- **Services and innovation.** Services are part of global value chains. Policies to foster competition and innovation in services can expand opportunities for firms and countries to participate in the global production and trade of services.
- **Dynamic capital markets.** Insofar as corporate venturing is one channel through which firms add value internally and externally, capital markets that allow for corporate venturing and exit to secondary markets are important for open innovation strategies.
- **Business regulations and corporate tax policies,** including those on initial public offerings and mergers and acquisitions, can facilitate corporate venturing strategies.
- **Entrepreneurship and firm start-ups.** Many countries encourage entrepreneurship and firm creation by reducing barriers to entry and regulations on start-ups. In public research, too, academic entrepreneurship can be promoted through regulations that foster faculty exchange and mobility.
- **Consumer policy.** User-driven innovation is an important element of open innovation. Consumer policy therefore plays a role in providing a framework through which consumers, users and suppliers can participate in the innovation process.
- **Technology markets.** Most companies source knowledge in various ways but licensing and purchasing technology and knowledge embodied in patents or other forms of IP are important. Creating rules and conditions that facilitate the development of technology can facilitate open innovation.

Ultimately, however, open innovation and the globalisation of R&D are, in the first place, business strategies of firms in response to market opportunities and challenges raised by the globalisation process itself and by technological change. Globalisation creates new market opportunities which imply new innovation strategies in response to (new or unmet) market

needs. The response builds on technological progress and international trade, including global value chains, generating further acceleration of the internationalisation of R&D and globalisation more generally.

The challenge for governments is to help firms adjust their innovation strategies to a changing environment. As mentioned, framework conditions are a clear area for policy action, but there are other areas in which policies have a role to play. However, if they are isolated from other measures, they may not succeed in encouraging innovative behaviour. For example, extending networking policies or improving industry-science relationships alone may not be enough to attract foreign R&D or to promote more collaborative research and open innovation. However, if such initiatives are integrated with other policy measures such as those to promote entrepreneurship and new firm creation, they may stimulate capacity in the overall innovation system.

Towards a different innovation policy?

Policy responses in OECD countries appear to be gradually addressing the challenges posed by open innovation and globalisation. However, among those still to be addressed are the need for a “coherent” cross-government approach to policies for research and innovation, the importance of non-technological forms of innovation, especially in services, the need to internationalise science-industry relations, in particular in public research; and the issue of how to open up access to national R&D programmes to foreign firms and institutions while ensuring that benefits flow to the host country.

A question on the minds of policy makers is whether new or radically different policies are needed to meet these challenges. The answer is probably somewhere in the middle but there is no single recipe. As countries have different economic structures and resource endowments, policies will have to be differentiated according to the national context. Small countries with a weak research base will need to focus on strengthening research in order to participate in global innovation networks. Other countries may need to focus on improving policy coherence. In sectors in which global value chains are extremely fragmented, the ICT infrastructure will be especially important. And in countries where multinationals play a large role, the focus may need to be on designing policies to help local firms capture spillovers from global innovation networks.

Some of the policies areas of particular relevance in light of our current understanding of the effects of globalisation and open innovation are:

- Reinforcing framework conditions, including a strong education and research infrastructure.
- Strengthening policy coherence and co-ordination at national and at supranational levels to avoid duplication of efforts.

- Financing of networks instead of individual companies.
- Integrating support for non-technological and technological innovation.
- Opening up access to the national public research and innovation infrastructure through cost sharing and reciprocity agreements but also joint development and public/private partnerships.
- Finding a balance in IPR between protection and dissemination.
- Balancing stronger competition with co-operation.
- Investing in human resources in S&T, and encouraging cross-disciplinary, cross-functional and entrepreneurial research and innovation.

Ultimately however, policy making must be guided to the extent possible by evidence and facts. Much of our understanding of how innovation works and how policies can affect performance is constrained by a statistical infrastructure based more on traditional R&D activities and more on inputs than on outputs, outcomes or impacts. Building a strong knowledge base will be necessary to identify policy implications and develop a new generation of innovation policies and best practices. The OECD work over the coming years will seek to address these issues.

Note

1. There is also a north-south dimension: globalisation and open innovation provide opportunities for developing countries to access research and innovation networks to accelerate their own development but it also creates a risk that national resources may be shifted away from country needs to meet the short-term objectives of foreign-based platforms.

Table of Contents

Executive Summary	9
Introduction	15
Chapter 1. Open Innovation in Global Networks	17
The concept of open innovation	18
Applications of open innovation: user innovation, lead markets and open source	22
Open innovation in the innovation literature	24
Drivers of open innovation: demand and supply factors	27
Global networks and innovation ecosystems	31
Open innovation across industries	35
Modes of open innovation	37
The advantages and disadvantages of global innovation networks	40
Global innovation networks and intellectual property	41
Notes	45
References	46
Chapter 2. Empirical Measures of Open Innovation	49
Case studies and surveys	50
Trends in R&D collaboration	51
Innovation surveys: the role of networks and collaboration	54
Patents: co-inventions and co-applications	59
Trends in licensing	70
Some tentative conclusions	73
Notes	74
References	74
Chapter 3. Insights from the Company Case Studies	77
General overview	78
Quantitative findings on the globalisation of innovation	81
Qualitative findings: open innovation on a global scale	87
Towards an integrated model of open innovation	105

Notes	110
References	110
Chapter 4. Policy Implications	113
Policy issues related to globalisation and open innovation	114
Policy responses	117
Towards a different innovation policy?	126
Note	127
 List of boxes	
3.1. Saint-Gobain	89
3.2. Quilts of Denmark	90
3.3. Philips: High-technology Campus Eindhoven	91
3.4. Omron: Kyo-So	92
3.5. PERA: Innovation portals	93
3.6. UBS: Looking for new partners	93
3.7. P&G: Connect + Develop	94
3.8. Aker: spinning off	95
3.9. ODIS and Thinkplace	97
3.10. Nestlé's venture capital fund	98
3.11. Novartis Venture Fund	98
3.12. VCI: spinning in	99
3.13. Nokia: open source software	100
3.14. IBM: InnovationJam	101
3.15. Credo of J&J	102
3.16. Alcatel-Lucent: open standards	104
3.17. IBM: licensing out	104
4.1. Policy lessons from the case studies on globalisation and open innovation	115
4.2. France's Passerelle programme	122
4.3. The Holst Centre and Point One in the Netherlands	124
 List of tables	
1.1. Definitions of open innovation	19
1.2. Rothwell's five generations of innovation models	25
1.3. Reasons for patenting product innovation	43
2.1. Companies collaborating on innovation activities, by industry, selected EU countries, 2002-04	56
2.2. Companies collaborating on innovation activities, by partner, 2002-04	57
2.3. EPO applications with multiple applicants and at least one from United States, Japan and Germany, priority years 1980-2003	63

2.4. EPO applications with multiple applicants, by institutional sector, priority years 1980-2003	64
3.1. Company case studies	79

List of figures

1.1. Closed versus open innovation	19
1.2. Towards greater sourcing of innovation	26
1.3. The changed business environment: closed versus open innovation	28
1.4. Global supply of S&T capabilities	29
1.5. Different types of innovation networks	32
1.6. Open innovation modes: strategic autonomy versus time	38
1.7. Open innovation modes: technology and markets	39
1.8. Risks of global innovation networks	42
2.1. Public-private cross funding of R&D	52
2.2. Funds from abroad	53
2.3. Funding from foreign companies	54
2.4. Companies collaborating on innovation activities, by size, 2002-04	55
2.5. Collaboration with public research organisations by companies ..	58
2.6. Companies with foreign co-operation on innovation, 2002-04	59
2.7. International co-invention in patents	61
2.8. EPO patent applications, single and multiple applicants, priority years 1980-2003	62
2.9. EPO applications with multiple applicants from the business sector, priority years 1980-2003	65
2.10. EPO applications with multiple applicants, by technology area, priority years: 1980, 1990, 2003	66
2.11. EPO applications with multiple applicants (at least one from the business sector), by institutional sector and technology class, priority years: 1980, 1990, 2003	67
2.12. EPO applications with multiple applicants by 1 433 MNEs in Europe, priority years 1980-2003	68
2.13. EPO-applications with multiple applicants by 1 433 MNEs in Europe, by institutional sector, priority years 1980-2003	69
2.14. EPO applications with multiple applicants by 1 433 MNEs in Europe, by technology class, priority years: 1980, 1990, 2003	70
2.15. Receipts from international licensing in major OECD regions	73
3.1. Number of company case studies, by industry	79
3.2. Number of company case studies, by employment	80
3.3. Number of company case studies, by industry and employment ..	80
3.4. Number of company case studies, manufacturing and services, by employment	81
3.5. Importance of in-house innovation activities	82

3.6. Importance of research in public research organisations and companies	83
3.7. Activities other than R&D that are important in innovation	84
3.8. Importance of different aspects of globalisation	84
3.9. Location of R&D facilities	85
3.10. Critically important reasons for the location of R&D facilities	87
3.11. Open innovation: exploration and exploitation phases	105
3.12. Creating technology innovation within NEC	107
3.13. Open innovation and technological regimes	109



From:
Open Innovation in Global Networks

Access the complete publication at:
<https://doi.org/10.1787/9789264047693-en>

Please cite this chapter as:

OECD (2008), "Policy Implications", in *Open Innovation in Global Networks*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264047693-7-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.