OECD Reviews of Regional Innovation

Competitive Regional Clusters

NATIONAL POLICY APPROACHES

OECD

OECD Reviews of Regional Innovation

Competitive Regional Clusters

NATIONAL POLICY APPROACHES

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

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

Also available in French under the title:
Examens de l'OCDE sur l'innovation régionale
Vers des pôles d'activités dynamiques
POLITIQUES NATIONALES

Foreword

Nations and regions are struggling to remain competitive and adapt in the context of globalisation. The regional specialisations built up over decades are transforming rapidly. Many regions that were historically production centres are losing out to lower-cost locations and are reorienting their activities to higher value-added non-manufacturing industries or R&D-intensive manufacturing niches. Yet, given that even some of these upstream activities have begun to be off-shored to lower-cost OECD and non-OECD countries, the question for policy is how durable are the competitive strengths on which regional economies are based.

The public sector response has been an increased attention to the importance of linking firms, people and knowledge at a regional level as a way of making regions more innovative and competitive. This new approach is visible across a number of different policy fields. Evolutions in regional policy, science and technology policy and industrial/enterprise policy are converging on the objective of supporting clusters at the regional level.

Why are cluster-based policies popular, again? The report does not seek to engage in a debate about the definition of clusters or related concepts. Furthermore, there are still many unanswered questions regarding the effectiveness of policies to promote clusters in such a diverse range of regions and sectors. Many of the latest programmes do not even use the word cluster but they still share many of the same broad goals. Therefore, the purpose of this report is to identify trends and best practices in cluster-based approaches with respect to programme objectives, targeting, instruments and inter-governmental role sharing.

This report is part of the work by the OECD Territorial Development Policy Committee on competitive and innovative regions. Upcoming publications include a companion volume to this publication focused on regional-level strategies in conjunction with Nutek, the Swedish Agency for Economic and Regional Growth, as well as a series of Regional Innovation Reviews.

Acknowledgements. *This publication was co-ordinated and drafted by Karen Maguire and Andrew Davies of the OECD Secretariat under the supervision of Mario Pezzini, Head of the Regional Competitiveness and Governance Division. Anna Rimmerfeldt of Nutek provided valuable comments. The authors would like to thank the participating countries for their assistance in developing the case studies as well as Nutek, the Swedish Agency for Economic and Regional Growth, for its support of this project. Suzanna Grant and Erin Byrne prepared this report for publication.*

Table of Contents

Part II

Case Studies

List of boxes

List of tables

List of figures

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

Executive Summary

Why are cluster policies still popular?

While the cluster concept is not new and remains subject to debate, national programmes based on a cluster model continue to be prominent and are adapted to an increasingly wide variety of contexts. The goal of the report is not to revisit a theoretical debate regarding definitions but rather to understand why, in practice, there is renewed policy interest in supporting clusters. Programmes use a range of cluster-type definitions and approaches but start from common assumptions about the value of the agglomeration of firms and the importance of linking people, skills and knowledge at a regional level.

A number of basic motivations lie behind support for clusters. There is strong quantitative evidence that many industries remain relatively concentrated in specific regions and those firms and research generators in proximity can outperform their counterparts located in less rich environments. Countries are seeking to strengthen or replicate the success factors that have encouraged the concentration of innovative firms associated with the knowledge economy. They are also looking for instruments that can help maintain employment and promote restructuring and adaptation in other sectors. Furthermore, clusters are a convenient and pragmatic organising principle by which to focus resources and build partnerships. A clear rationale for the public sector to support clusters concerns the transaction costs and co-ordination costs to bring the appropriate actors together.

Nevertheless, there are risks related to the use of a cluster approach generally, as well as with more specific risks relating to the design of these programmes. Insufficient economic diversification, lock-in (in the sense of being tied by long-term investment strategies to supporting specific sectors and being unable subsequently to change track) or over-reliance on key firms are among the dangers that are associated with the cluster approach. Other concerns relate to how effective the public sector can be in identifying instruments that can help firms to react to very rapid changes in global markets and production systems.

What are the programmes trying to achieve?

National and EU level programmes to support clusters and regional specialisation originate from one of three main policy families: regional policy, science and technology (S&T) policy or industrial/enterprise policy. All three policy areas have undergone changes in policy orientation away from a top-down and single-sector approach towards policies that favour co-operative, multi-actor and often more place-based approaches. These trends have supported increased policy interest in programmes to develop or strengthen regional specialisation and cluster development with an ultimate goal of improving competitiveness and innovation capacity.

Cluster policies linked to regional policy often focus on so-called lagging regions, including regions undergoing industrial restructuring and geographically peripheral regions. In addition, several initiatives originating in other policy families have incorporated a clear regional dimension, reflecting the recent emphasis in science and technology as well as enterprise policy on the importance of regions (such as regional innovation system concepts).

Several of the more recent cluster/regional specialisation programmes were born from science and technology policy. They promote collaborative R&D to support growth of the most promising technology sectors in regions where these sectors are concentrated. Albeit in theory spatially neutral, in practice such policies often focus on specific geographic areas where key institutions, researchers and firms are clustered.

Industrial policies with cluster programmes tend to focus either on the drivers of national and regional growth or focus on the needs of SMEs. The cluster approach provides a more transparent, inclusive and potentially less trade-distorting framework for efforts to strengthen strategic sectors than the prior policies of supporting large and often state-owned firms. Programmes to support SMEs started as early as the 1980s and tend to focus on building critical mass for export, access to information and technology absorption. Programmes that focus on disadvantaged regions also tend to be closely linked with SME policy.

Most national programmes in OECD countries link more than one policy stream, either explicitly or implicitly. A notable trend is the emergence of innovation as an objective in policies other than those directly related to S&T policy. A few programmes integrate all three policy streams – regional, S&T and industry/enterprise – in some cases involving considerable resources and registering high on the country's public policy agenda. A key question is whether one programme can address all those objectives simultaneously. Over time, these policies have generally transitioned from SME-based programmes to those supporting national competitiveness clusters and they increasingly focus on technology and innovation.

How do programmes pick participants?

The economic rationale for government intervention serves to define the different choices regarding programme targets. Those targets may be *places* (leading regions, lagging regions, hub areas), *sectors* (dynamic, exposed, strategic, social significance) or *specific actors* or groups of actors (universities, SMEs, multinationals, etc.). They could also be a combination of these different target categories. The targets then need to be clearly identified in order to ensure that the resources available for the programme are adequate and that goals are achievable. There are clear tradeoffs to be made in selecting these different targets.

These choices are not always evident. Focusing on leading regions that drive national growth is arguably an efficient means to boost national economic performance. However lagging regions detract from social cohesion and can be a drag on national growth. Supporting dynamic sectors may give them a competitive edge with important technological spillovers for the wider economy, while refocusing exposed sectors to new opportunities can preserve employment and promote restructuring of regional economies. Improving opportunities for certain priority sectors helps to focus resources but often involves predicting the evolution of volatile and fast-moving product markets. On the other hand, providing a blanket cluster programme for all sectors or regions can dilute available resources and focus.

Identification of clusters can be *top-down, bottom-up* or a *combination* of the two. Countries identify potential programme recipients mainly through two contrasting approaches: either: 1) a statistical method, such as a mapping study; or 2) a process of self-selection, such as a call for proposals. The former is particularly used when the goal is to support national economic drivers. In some instances, national programmes provide only a general framework and rely on regions to identify target clusters within their jurisdictions.

The selection mechanisms used include both *competitive* and *non-competitive* procedures. Competitive selection has the benefit of identifying programmes with the best potential impact given the level of public investment and sends a signal to the market through the label process. Another benefit to this selection mechanism is that groups that come together in a competitive process may build useful relationships even if not selected.

Among the top-down selection procedures, there is a trade-off between *statistical* versus *negotiated* approaches. Policy makers can use statistical mapping or other quantitative measures as strict selection criteria. However, because of methodological issues and definitional problems, these may give results that are contestable. There are also more flexible, even negotiated approaches which take into account a wider range of selection factors but such processes are then subject to other political influences. Several programmes have used a hybrid approach.

What instruments do they use?

In general, the instruments used in these programmes are of three distinct types: 1) engagement of actors; 2) collective services; and 3) larger-scale collaborative R&D. In terms of engaging actors, key issues include: the role of facilitators, the level and type of interaction desired, the existence of a formal cluster initiative, and the spatial considerations of the cluster. For the programmes that emphasise collective services (*e.g.*, business advice, skill development or joint marketing) a key consideration is how to target services in a way that does not substitute for private provision. Finally, collaborative R&D projects through cluster programmes tend to involve more than one research institution or university in co-operation with several firms and often tap into external R&D funding sources and programmes.

In general, the funding patterns of these programmes can be broken down into three basic categories. The first category for instruments to engage actors tend to spend less than EUR 100 000 per cluster per year for three years or less. A second category of spending includes programmes that emphasise service delivery and support for collaborative projects, including "light" R&D, with spending from between EUR 100 000 to approximately EUR 1 million per cluster annually over several years. A third category for "heavy" R&D projects includes projects that spend over EUR 1 million per cluster annually for periods up to ten years. Overall it does appear that the level of funding for the majority of these programmes is relatively modest, although it may be used to leverage additional funding sources.

Which level of government should do what?

Governance frameworks and the spatial nature of the benefits of clusters both play a role in the development and implementation of policies to effectively promote regional specialisation and clusters. For such programmes, there are economic rationales for all levels of government (local, regional, national and in some cases supra-national) to support them. These rationales are based on different perspectives on the value of clusters, for example, as the basis for EU competitiveness policy or a national growth programme at a macro-level *versus* as a local employment hub for regions.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

With the blurring of distinctions among objectives, especially since innovation is a core aim for different policy streams, central level co-ordination is becoming increasingly important. Strategies at the central level to ensure co-ordination include inter-ministerial or inter-agency committees that conceptualise, design or even implement programmes jointly. Overarching national plans that include these programmes also serve to co-ordinate efforts at the central level, as do different groups promoting public/private dialogue such as competitiveness councils.

The articulation of national and regional roles in these policies is clearly dependent on the institutional frameworks. The programmes reviewed are embedded in a variety of constitutional frameworks that range from a federal structure with very strong sub-national governments as well as unitary countries in regionalised, decentralised or centralised forms. Unitary countries may simply develop the programme at the national level. Federal countries and certain unitary countries have to rely on financial incentives to engage their more autonomous sub-national governments. Strategies to develop policy coherence across levels of government for cluster-based policies include several common approaches to vertical governmental relations.

What have we learned?

One of the major challenges to clearly identifying what we have learned about cluster policy is that we lack robust tools to measure whether or not a policy or programme was successful. Evaluations are not available for all programmes, although several use some sort of evaluation or monitoring component for on-going funding decisions. Possible evaluation methods concern: 1) the performance of a cluster or cluster initiative; and 2) evaluations of the impact of a particular policy intervention. Both merit stronger analytic frameworks. Despite these challenges, policy learning, even if not through a formal evaluation, has provided some very useful input on programme design and cluster processes. There are also many lessons to be learned in programme design, based on the practices across OECD countries, that could help at least improve the likelihood that the programmes will be successful in their ultimate goals.

A first set of lessons learned concerns the degree to which these programmes are appropriate, realistic and flexible enough to achieve their goals. First, there needs to be a compelling reason for why a cluster policy, as opposed to another policy that may be open to all firms, is the most appropriate to achieve the desired goals. Often the stated goals of these cluster-type programmes are broad or vague, seeking generally to enhance competitiveness or innovation capacity. This lack of clarity in turn makes it difficult to select the right targets and establish programme funding levels and duration that are adequate to meet those goals. Given that these clusters may be in different lifecycle stages, region types or sectors, programmes are more likely to be successful when there is a certain degree of flexibility.

A second set of lessons learned relates to policy coherence within and across levels of government. Because these policies are emanating from at least three policy streams, it becomes even more important for policy makers to have a clear understanding of what other policies exist and how they can work together or in a complementary fashion. Given the importance of clusters to a particular region's economic health, as well as their importance for national competitiveness goals, the policies are developed at different levels of government. The interests of each level, as well as their respective resources and capacity, are important considerations in the articulation of national and regional level programmes.

A third set of lessons learned is about the risks involved in such policies, which are often related to insufficient private sector engagement. The long-term effectiveness of such policies depends on the private sector continuing to act after a programme ends. Even during a programme period, it is the private sector that is best equipped to react in a timely manner to market changes. Several programme evaluations have noted the excessive public sector role and the unsuccessful public sector exit strategy. There are also general risks for supporting clusters. One common problem is the ability of the public sector to "pick winners". Other risks include locking in existing clusters and technologies, making it more difficult for other clusters or technologies to develop. Careful policy design can help mitigate these risks if they are addressed explicitly.

Introduction

While the cluster concept is not new and remains subject to debate, national programmes based on a general cluster model continue to be prominent and are adapted to an increasingly wide variety of contexts. This study assesses different national level strategies and instruments used to promote regional specialisation and clusters. The theoretical concepts are not new and the debates continue about the empirical evidence supporting the benefits of regional specialisation and clusters. The goal of the report is not to revisit a theoretical debate regarding definitions. Rather, it seeks to understand why, in practice, there is renewed policy interest in promoting specialisation and clustering as both a general economic development tool and a means to achieve greater regional and national competitiveness. These national level initiatives have been complemented by numerous programmes at the local level.

The 26 programmes across 14 countries explored in the case studies, as well as other programmes cited in the report, adopt a variety of approaches to the cluster concept. They range from legally sanctioned statistical definitions to self-defined clusters to university-hub innovation systems. The countries also vary in the objectives of their programmes ranging from national competitiveness clusters and strategic high-technology sectors to much smaller scale groupings of co-located firms. The countries studied in North America, Europe and Asia also vary in terms of governance structure between federal, unitary centralised/decentralised and unitary regionalised systems. The focus of the analysis is on national level policies, however because not all countries had a national policy or have delegated that competency to lower levels of government, in some cases a broad regional cluster policy was considered.

The case study countries illustrate that even for different sets of objectives and targets, the programmes share a number of commonalities. They all recognise the benefit of promoting linkages among actors to achieve the theoretical benefits of clusters. This is true not only of interactions among firms but also between firms and research institutions. These programmes share similar tools to address both leading high-technology industries and restructuring industries. A significant number of countries have adopted a strategy of using multiple programmes that in different ways support clusters and regional specialisation. The list in Table 0.1 illustrates some of the most prominent of such policies in each case study country. While this is not an exhaustive list of all policies, it reveals the breadth of policy approaches and tools used by OECD countries.

Table 0.1. **Programmes of case study countries**

	Programme/ policy	Year started	Programme/ policy period	Brief description
Canada	National Research Council (NRC) Technology Cluster Initiatives	2000	5 years, in second cycle	NRC Technology Cluster Initiatives foster the development of innovation-driven clusters in regions across Canada.
Czech Republic	Klastry	2004	3 years, 2004-06 (extension 2007 to 2013)	Klastry (clusters in Czech) supports the development of sectoral competencies and networking, mainly among firms, in all regions outside of Prague and with support from EU structural funds.
Finland	Centres of Expertise	1994	On-going (annual funding)	The Centres of Expertise support the development of expertise, firm creation and innovation in different regional urban hubs, usually in conjunction with technology parks.
	National Cluster Programme	1997	Varied, approximately 3 years	This strategy supported Finland's most prominent sectoral industry clusters as selected by different sectoral ministries through increased R&D financing for collaborative projects.
France	*Pôles de compétitivité*	2005	3 years (2005-07)	This is France's main competitiveness policy and it supports collaborative industry-research projects. It attempts to serve multiple purposes by supporting both "international" and "regional" oriented clusters.
	Local Production Systems (SPL)	Late 1990s	On-going	The SPL programme supports networking among small firms in French industrial districts.
Germany	BioRegio	1995 selection	8 years 1996-2003	BioRegio serves to concentrate research funds in a limited number of regions to support biotechnology, a sector of strategic national interest.
	InnoRegio	1999	7 years through 2006, next phase planned	InnoRegio seeks to improve the innovation capacity of the lagging new Länder in Eastern Germany with support from EU structural funds.
	GA-network initiative (Joint Task)	2005	On-going	The purpose of this funding negotiation tool between the federal level and lagging Länder is to provide funding for projects that improve collaboration among regional actors with a strong research focus.
Italy	Law 317(91)	1991	On-going	This law, and its subsequent revisions to improve flexibility in its application, established a framework for regional governments to support consortia of small firms.
	Technological Districts	2003	4 years, to 2006, next phase expected	Technological Districts have been created in the context of science and technology policy to improve collaboration for the funding, research and application of results in fields with strong commercial interest and social value. EU structural funds were used for Southern Italy districts.

Table 0.1. **Programmes of case study countries** *(cont.)*

	Programme/ policy	Year started	Programme/ policy period	Brief description
Japan	MEXT Knowledge Clusters	2001	5 years, to 2005	These Japanese knowledge clusters are centred around key universities and seek to promote greater university-industry collaboration.
	METI Industrial Clusters	2001	5 years to 2005; Phase 2 2006-10	The Industrial Cluster Programme supports SMEs and research links in a range of regional area types with a strong focus on the triple helix relationship (*i.e.*, effective relationships among industry, university and government), business incubation and support services.
Korea	Innovative Cluster Cities	2004	5 years, 2004-08 (Phase 2 planned)	The Innovative Cluster Cities are large industrial complexes in selected regional centres that need to convert from manufacturing centres to innovation systems.
Netherlands	Peaks in the Delta	2005	Undefined (minimum 5 years)	This nationally sponsored programme seeks to support region-specific opportunities of national significance by reorienting pubic policy to build on the nation's strengths (peaks). Regions covering most of the country identify a spatial economic development strategy, including their own priority clusters for support.
	Key Innovation Areas	2005	Undefined (minimum 5 years)	The Netherlands innovation strategy seeks to focus resources on key innovation areas that have internationally strong performance and commitment of stakeholders.
Norway	Arena Programme	2001/02	On-going (annual funding)	This programme supports innovative networks to strengthen the interaction between the business sector, knowledge providers and the public sector using a flexible approach with respect to sector, region and development stage.
	Centres of Expertise (NCE)	End 2005	On-going (annual competitions: up to 10-year cycles)	The NCE programme seeks to initiate and enhance co-operative innovation and internationalisation processes in a limited number of clusters with potential for innovation-led growth.
Spain; Basque Country	Competitiveness clusters	1991	On–going	This early and on-going cluster policy to develop the Basque Country's competitiveness focuses on the development of cluster initiatives in the largest industries in the region.
Sweden	VINNVÄXT	2002	On-going (cycles of 10-year periods, in third round)	VINNVÄXT is the leading programme of VINNOVA, the Innovation Agency, to support collaborative research with a strong potential for innovation.
	Visanu	2003	3 years, ended 2005	Visanu is a joint programme across three Swedish agencies to support clusters by engaging actors and promoting knowledge sharing across clusters.
	Regional Cluster programme	2005	5 years (ending 2010)	The Regional Cluster programme is a follow-up to the Visanu programme and sponsored by Nutek, the Swedish Agency for Economic and Regional Growth. Its primary focus is to support international competitiveness with market-focused assistance.

Table 0.1. **Programmes of case study countries** *(cont.)*

	Programme/ policy	Year started	Programme/ policy period	Brief description
United Kingdom	DTI/RDA/DA cluster support programmes	2000	On-going (depending on the region)	The UK Department of Trade and Industry (DTI) supports a range of cluster initiatives designed and implemented by the Regional Development Agencies (RDAs) and the Devolved Administrations (DAs). Programmes vary but have included commissioning regional mapping studies, identifying and building links with important regional clusters and using clusters as the vehicle for wider economic development initiatives.
United States, State of Georgia	Georgia Research Alliance	1990	On-going	GRA is a private sector initiative to channel state R&D funds to industry-research collaborative projects at different stages in the commercialisation process as well as attract top researchers to the state.
United States, State of Oregon	Oregon Cluster Industries	2003	On-going	This strategy is helping to refocus the state's economic development efforts around the identified industry clusters, notably in this first stage by better understanding actual cluster linkages.
	Oregon Cluster Network	2005	On-going	The Network promotes the cluster concept, supports knowledge sharing among cluster initiatives and serves as a nexus for helping to inform public policy to better serve the needs of different clusters.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

PART I

Synthesis Report

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 1

Why Are Cluster Policies Popular, Again?

This chapter discusses four main issues related to the concept of clusters. First, the chapter reviews the variation in definitions of clusters and related concepts. It highlights the theoretical benefits to the clustering of firms and related actors as well as the risks associated with policies to support clusters. It then explores the role of clusters in the context of globalisation, as the changing nature of value chains has an impact on the way clusters and regional economies evolve. Finally, the chapter addresses the challenges of moving from the theory behind clusters to the role that policy can play.

Introduction and key points

The cluster concept spread rapidly through policy circles during the 1990s. Since then, some policy makers and academics have experienced "cluster fatigue" and consider cluster policies as out of fashion. Furthermore, the validity of the evidence to support policy intervention in this field has also been questioned. However, work by the OECD's Territorial Development Policy Committee demonstrates at both the national and regional level that the key concepts that underlie the cluster approach continue to be at the centre of policy formulation. In some cases, the policy interventions are explicitly called cluster policies. In many others, the main features of the cluster concept are present but the term cluster is not used. These programmes have the objective of reinforcing regional specialisation by supporting linked industries in a geographical location and by emphasising stronger interactions among different public and private actors. To better understand why there is renewed interest in clusters, this chapter will review the following four topics:

- *Clusters and related concepts: moving beyond definitions.* The origins of the cluster concept are not new, and there are many variations on the definition of what constitutes a cluster, a regional innovation system and other related concepts. The typology and classifications of clusters are based on a number of different development and structural parameters. Given the complexity of describing different types of clusters, there are many exceptions to these categorisations.
- *Theoretical cluster benefits and risks.* Clusters offer a number of potential positive benefits, beyond lower production costs, that lead to innovation and productivity growth. Such benefits include their role as a useful platform for knowledge sharing, an environment favouring greater specialisation and a heightened level of firm rivalry motivating competition, among other benefits.
- *Globalisation and the nature of clusters.* Globalisation has caused shocks for regions in some specialisations but may reinforce the specialisations in other regions. Policy makers are especially interested in the use of clusters to slow down or otherwise cope with delocalisation. Of course the effectiveness of this strategy depends on the ability of clusters to evolve and fit into useful niches in global value chains.
- *From theory to policy.* Given that the most touted examples of cluster success are market driven, what role can public policy play? There are general justifications for public policy, such as market failures and systemic failures, but the policy context remains more challenging.

Clusters and related concepts: moving beyond definitions

Theoretical origins. Economists have long noted that specific places specialise in particular activities and that firms engaged in the same or related activities tend to cluster together. The concept of Ricardian comparative advantage from the early 19th century developed the notion of national and regional specialisation. The theory assumes that differences in endowments such as geographic location, presence of raw materials and cheaper labour generate economies that enable one place to produce in a given industry more competitively than another and thereby to specialise in that activity. A century later, Alfred Marshall's works elaborated reasons for greater firm productivity when several firms in the same industry are located in proximity to one another, notably labour market pooling, knowledge spillovers and supplier specialisation. Subsequent theories have argued that specialisation in a particular industry brings with it a process of accumulation of assets and advantages (cumulative causation), implying a self-reinforcing nature in this process. Additionally, market forces tend to concentrate investments in prosperous areas which offer better access to infrastructure and human capital, lower risks and better access to markets (Krugman and Venables, 1990).[1]

These basic models have been further elaborated by academic fields such as business economics and economic geography. For example, theories on firm performance emphasise the innovative process, notably the quality of factor inputs such as education, the positive rivalry between firms that drives innovation, and the structures/institutions that support innovation (Porter, 1990). Economic geographers, particularly those favouring the flexible specialisation model, have emphasised the importance of non-tradable inputs to production, including the intangible transaction cost savings that come from networking and co-operative linkages that are embedded locally (Krugman and Venables, 1990). Other schools of thought that address cluster issues include regional science (the impact of industrial organisation on culture), urbanism (the concept that cities have diversity to drive innovation) and economic development (supporting local small firms), among others (Cortright, 2006).

Definitions. Given the diversity of academic approaches to clusters, there are a large number of definitions ranging from relatively broad to highly restrictive. Many analyses take Marshall's SME-dominated industrial district model as the basis for the definition. More recent definitions try to integrate some of the key concepts of this SME-based manufacturing cluster model with a broader field of application. They incorporate, among other concepts, the emergence of clusters in services, the rapid growth and evolution of clusters in high-tech sectors, the increasing prominence of multinational and internationally-networked enterprises in clusters, and the input of public and private institutions. In studies of innovative clusters, the OECD has noted the importance not only of firms but also knowledge-producing agents and customers (OECD, 1999a and 2001). Another frequently used cluster definition includes regional institutions in the equation as well:

> *[Clusters are] geographically close groups of interconnected companies and associated institutions in a particular field, linked by common technologies and skills. They normally exist within a geographic area where ease of communication, logistics and personal interaction is possible. Clusters are normally concentrated in regions and sometimes in a single town* (Porter, 2003).

While Porter's definition has become widely used, there are also a number of other terms that describe similar processes and structures (see Box 1.1). In each definition, the concept of externalities is at the heart of the analysis, notably the ability of firms to profit from improvements generated outside the firm itself and without its own investment. Policy makers are then called on to facilitate the generation of these positive externalities (spillovers).

Box 1.1. **Related terms**

For some authors, the term cluster is derived from the particular case of *industrial districts*, first used in the literature to emphasise the spatial dimension of intense interactions among firms in particular areas (Brusco, 1982). In these districts, it has been observed that critical resources and capabilities are more often spatially determined rather than simply existing within any single firm. Activities are shared across firms and create interdependencies. These interdependencies foster both market and non market factors of competitiveness, which highlight significant issues like the scope of the firm, levels of co-operation and competition, and external resources of firm advantage.

Systems of production is another similar concept associated with the synergies that arise from co-operation and competition. This notion, explained by Michael Storper, focuses on the existence of external economies of scope which not only allow the increase of the scale of production of individual firms, but also of the system as a whole, based on the multiple interconnections among units of a system (Storper, 1997). In certain types of production the external economies of scope complement internal economies of scale and may, under certain circumstances, be more important than the latter. To function in such systems, firms need to be able to demonstrate internal and external flexibility. Units within production systems are companies, either vertically integrated or autonomous, whose interrelations are characterised by trust and stability. The emphasis for policy makers here is to identify the areas of embedded learning and strengthen them within the wider production system.

Box 1.1. **Related terms** *(cont.)*

Regional systems of innovation, based on the concepts previously analysed for the national systems of innovation and the related ideas of innovative milieus, put knowledge rather than the firm in the centre of the process. They emphasise the importance of interaction for knowledge creation and diffusion and they adopt the view that in many cases the regional level is the most appropriate to assure a favourable "diffusive" environment for knowledge. In other words, shared practices, attitudes, expectations, norms and values which facilitate the flow and sharing of tacit and other forms of proprietary knowledge become the cornerstone of the system of innovation. For policy makers, the creation and sustainability of a regional innovation system implies not only creating the necessary nodes of the system but also assuring a continuous flow of ideas and facilitating the right linkages that will favour an interactive environment. These interactions may be user-producer interactions but also shared knowledge among potential competitors or between entities that generate knowledge (researchers) and those that adopt knowledge (firms). When industry, university and government work effectively together in such a system, the term *triple helix* has also become common.

Finally, the broader term *networking*, for example, is sometimes used to describe the essence common to all these systems. In contrast to clusters, networks are not necessarily geographically concentrated and contact between firms can be at a distance. Nonetheless, there is a fuzzy boundary between the two concepts. For example, Roelandt and den Hertog (1999) introduced an OECD study on clusters by defining them as "networks of production of strongly interdependent firms (including specialised suppliers) linked to each other in a value-adding chain, with no necessary element of spatial localisation". In other words, they emphasise the production system dimension while downplaying the geographical proximity aspect.

The cluster definition problem is further complicated by some definitions that lack a spatial dimension. For example, the concept of clusters may be applied to analysis at a national level on industry group linkages in the whole economy (macro), a branch or industry level with a focus on inter and intra-industry linkages (meso) or a firm level focusing on inter-firm linkages (micro) (OECD, 1999a).

Typologies. Moving on from the definition to practical examples, there are numerous ways of categorising clusters. One useful distinction is between the more science-based clusters and the more traditional industry clusters (see Table 1.1). This has certainly been a clear pattern over the past two decades. However, technological advances and the rapid evolution of production systems seem to blur some of the key characteristics of clusters. For example, transactions

Table 1.1. **Characteristics of science-based and traditional clusters**

	Science-based	Traditional
Age	Young industries, new concentrations	Mature industries, established concentrations
Type of relationships/ transaction	Market-based, temporary coalitions for R&D joint ventures	Long-term relationships, market based local supply chains
Innovation activity	Technological innovation	Incremental innovation, technology absorption

Source: Adapted from EC and Enterprise Directorate-General (2002), *Regional Clusters in Europe: Observatory of European SMEs* (No. 3/2002), European Commission, Brussels.

in traditional clusters are based primarily on long-term relationships or they emphasise incremental innovation while for newer science-based clusters these relationships may have a much shorter time horizon. Taking this analysis a step further, a range of typologies has also been developed that characterise clusters according to their main features (firm structure, depth of internal inter-linkages, etc.). Enright (1998) proposes a number of dimensions that can help to characterise clusters as illustrated in Table 1.2.

Using a multi-criteria approach, it is possible to classify clusters into some very general types based on either spatial characteristics, inter-firm linkages or both. The industrial districts of Italy clearly differ from Silicon Valley or the ICT cluster Helsinki. One helpful typology is that of Gordon and McCann (2000) who identify three basic types of clusters: 1) those that are "pure agglomeration" with co-location but no internal links; 2) "industrial-complexes" where firms are linked by internal market relations (supplier-customer) including large-firm dominated systems; and 3) clusters that are centred on "social networks" where firms are linked by more complex and long-term relationships. Of the numerous attempts to create a general typology of clusters, that of Markusen is perhaps the best known. She identifies four main types (Barkley and Henry, 2001):

- *Marshallian clusters* are comprised primarily of locally-owned, small and medium-sized businesses concentrated in craft-based, high-technology, or producer services industries. Substantial trade is transacted between firms. Specialized services, labour markets, and institutions develop to serve firms in the cluster. Firms consciously network to solve problems, and government policy evolves to improve cluster competitiveness.
- *Hub and spoke clusters* are dominated by one or several large firms surrounded by smaller suppliers and related activities. Smaller firms may evolve in the cluster to buy from or sell to an anchor firm or to take advantage of activities attributed to the anchor firm's presence. Co-operation exists between small and large firms (generally on the terms of the hub firm), but noticeably absent is much co-operation among competitor firms to spread risks, stabilize markets and share innovations.

Table 1.2. **Cluster dimensions**

Dimension	Types
Geographical scope	● Localised – tight grouping in small geographic area ● Dispersed – spread across large region or city
Density	● Dense – heavy concentration/large number of firms in cluster ● Sparse – small number of firms, low economic weight
Breadth	● Broad – a variety of products in different but related industries ● Narrow – focused on one or a small number of products or industries
Depth	● Deep – region includes range of supply chain activities ● Shallow – cluster firms rely on external inputs
Activity base	● Activity-rich – cluster firms are involved in a wide range of value-adding activities (including, for example, product development and design) ● Activity-poor – firms are only involved a limited range of activities (*e.g.*, assembly activities)
Growth potential	● Industry context – sunrise industry, "noonday", sunset ● Competitive or non-competitive within each industry
Innovation capacity	● High innovation – the cluster is able to use its structure to generate innovation ● Low innovation – the nature of the cluster inhibits innovation
Industrial organisation	Examples include: ● Large firm-small firm (core and ring) ● Small firms only (ring but no core)
Co-ordinating mechanism	● Spot markets ● Short-term coalitions ● Long-term relationships ● Hierarchies
Development stage	● Working – critical mass of firms, knowledge and resources with dense interaction ● Latent – critical mass of firms but interaction and information flows not sufficient ● Potential – some elements present but a need to be deepened and broadened ● "Wishful thinking" – chosen for government support but lack critical mass or favourable conditions for organic development

Source: Adapted from Enright, Michael (1998), "The Globalisation of Competition and the Localization of Competitive Advantage: Policies toward Regional Clustering", Paper presented at the Workshop on Globalisation of Multinational Enterprise Activity and Economic Development, University of Strathclyde, Glasgow, Scotland, 15-16 May 1998.

- *Satellite platforms* are industry clusters dominated by the branch facilities of externally-based multi-plant firms. These branch plants are large and relatively independent. Minimal trade or networking takes place among the clusters' branch plants, and the incidence of spin-off activities (entrepreneurship and suppliers) is relatively small.
- *State-anchored industry clusters* are regions where the local business structure is dominated by a public or non-profit entity (*e.g.*, military base, university, government offices). Supplier and service sectors develop around these public facilities, but these local firms are relatively unimportant to the development of these clusters.

Economic significance. This diversity can be seen also in the economic significance that is accorded to clusters in national economies. Clearly, the economic importance of clusters depends to a large extent on the definition that

Table 1.3. **The economic weight of clusters: selected countries**
Individual study definitions

	Number of cluster identified	Economic weight (where measured)
Austria	16 defined as internationally competitive	
Denmark	13 regional clusters/16 national industrial clusters	Cluster firms measured to have better than average performance
Finland	9 national clusters	
France	144 local productive systems (plus 82 "emerging") 67 *pôles de compétitivité*	
Italy	199 industrial districts	Over 40% of manufacturing employment; in 1994 firms in districts had significantly higher levels of productivity
Japan	19 industrial clusters	Over 3 000 manufacturing firms
Netherlands	12 large-scale clusters	Accounts for around 30% of industry GDP
Norway	62 clusters (55 of which are manufacturing)	Around 22% of manufacturing employment
Portugal	33 regional clusters in key sectors	
Spain	142 local productive systems	
Sweden	38 clusters	
United Kingdom	154 (potential) regional clusters	Ranging from 40% of regional employment (London) to 15% in the North West region

Source: Principal source EC and Enterprise Directorate-General (2002), *Regional Clusters in Europe: Observatory of European SMEs* (No. 3/2002), European Commission, Brussels.

is used. As shown in Table 1.3, the statistical importance of clustered activities in total manufacturing ranges widely. If we assume that economic structures in most OECD countries are relatively homogenous, then the different weights given to clusters probably reflect different definitions and typologies rather than significant differences in the level of regional specialisation. The wide-ranging claims made for the importance of such agglomerations in the economy and the difficulty of arriving at a single quantifiable definition do represent the major theoretical weaknesses of the cluster approach. The results suggest, nonetheless, that the phenomenon of clustering is a major characteristic of industrial organisation in the OECD countries that have attempted to measure it, and by assumption, important OECD-wide. An EU mapping exercise using a standard methodology already employed in a number of other countries could provide a much needed degree of comparability to the quantification of the cluster dimension of advanced economies.

Theoretical cluster benefits and risks

Firm productivity. The principal reason for policy interest in clusters is that productivity, wages and employment levels appear, in least in some cases, to be higher in these clusters than in the economy as a whole. The greater productivity of firms in clusters was famously documented in the industrial districts in north-east and central Italy, where competitive advantages arose from the environment rather than the capabilities of the firms alone. Statistical studies on these regions of Italy have identified manufacturing clusters and shown their positive results in terms of productivity and employment creation over the 1970s and 1980s. For example, Sforzi (1990) identified over 60 industrial districts and documented their strong performance. A more recent study by the Bank of Italy likewise identified a significant number of recognisable manufacturing clusters in the country and found that firms located in these districts recorded stronger growth than firms in the same sector located outside such clusters. These results have reinforced discussion of the theoretical benefits of clustering and have also helped to promote interest in clusters in other places.

At the same time, other studies have questioned the validity of the cluster hypothesis. They assert that problems of definition and measurement make empirical evaluation of the relative performance of clusters and, in particular, the origins of any difference with non-clustered industries statistically dubious (Martin and Sunley, 2003). What is certain is that much of the evidence to support the view that clusters are more productive is case specific and large scale empirical reviews are extremely rare, with the review of the Bank of Italy standing out as the most extensive research effort. Other researchers have found that clusters tend to be strong in only certain parts of the production process or in particular sectors or sub-sectors, further questioning the assertion that clusters can be a generalisable model of economic organisation or an appropriate target for public policy.

Regional specificities. The idea that productivity gains are generated on the back of region-level interaction is supported by a large body of research beyond Italy. One influential concept has emphasised the vertical disintegration of the Fordist production system and the rise of an alternative production model. This new model is based on small specialised firms, with lower transaction costs and greater flexibility generating productivity gains and incremental innovation. A string of observations in the 1980s supported this hypothesis including not only the robust competitiveness of more traditional industrial districts in Europe but also the clustering of high-tech firms in the United States. Michael Porter was influential in broadening interest in clusters and identifying the factors that promoted their formation and competitive success. According to Porter, "regions compete in providing the most productive environment. It is not the industry that matters but the way the firm competes, its use of the advantages that the local environment brings".[2] The work of Michael Storper was also influential in promoting the view that a basket of "untraded interdependencies" (labour markets, regional conventions, norms and values, public or semi-public institutions, etc.)[3] can foster an environment conducive to innovation (Storper and Venables, 2004).[4]

Greater knowledge circulation. Research into the sources of productivity advantage in clusters has focused principally on the circulation of people and knowledge, the generation of innovative ideas and the development of new products and technologies. In the past, academic work considered knowledge as a public good and technological progress as an exogenous factor to the economic system that affects all companies, regions and countries in the same way. However, more recent "evolutionary" theories have challenged this basic view, recognising that the generation, adoption and diffusion of new technologies is a complex process and therefore endogenous to growth models (Romer, 1990). This change in thinking is visible in the evolution of definitions of what constitutes a cluster and is also visible in the range of public policies in the science and technology field that do not use the term cluster but that have developed a strong geographical and relation-building focus into policy strategies. The circulation of knowledge in the form of an innovation system is therefore one of the key potential benefits of clustering.

It is now believed that diffusion and spillovers are the mechanisms that link R&D with growth, not simply levels of R&D investment. Therefore, if the research results are not spread around the economy, then public support to research becomes significantly less productive. Some recent studies have suggested that the diffusion of knowledge is most effective if organised as an interactive system, which many countries lack. Technology and innovation are not created in isolated organisations but in favourable environments, where competent organisations and skilled individuals interact in a constructive and complementary way to assimilate existing knowledge and generate new ideas, products and production processes.

Within dynamic high-technology clusters, levels of personal exchanges between firms appear to be higher than in non-clustered locations. This type of cross-pollination of ideas and innovation is put forward as one of the main drivers of the success of the Silicon Valley model (Saxenian, 1994). Some research seems to empirically verify this thesis. For example, the successful Stockholm ICT cluster exhibits higher rates of inter-firm labour mobility than the rest of the labour market and higher rates of intra-firm mobility than other comparable private-sector enterprises (Power and Lundmark, 2004). Recent work by Cooke (2004) on the biosciences industry reveals a close association between proximity and knowledge transfer. The wide range of benefits, including innovation as well as practical production costs savings, is described in Table 1.4.

Risks. A discussion of the benefits to specialisation and clusters would not be complete without mentioning the possible risks associated with a policy strategy in favour of clustering. While specialisation does not necessarily imply putting all one's eggs in the same basket, there can be a risk of vulnerability if the region's portfolio of clusters is too concentrated. Furthermore, many policy

Table 1.4. **Theoretical benefits of clusters**

Concept	Benefit
Marshallian externalities	
Labour market pooling	Labour cost savings due to access to specialised skills, especially in an environment where quick turnaround is important
Greater variety of specialised intermediate goods and services	Access to a local supplier base that has more product variety and a high degree of specialisation
(Tacit) knowledge spillovers	Access to tacit knowledge in geographic proximity by means of both formal processes as well as through such informal channels as knowledge leakages made possible by casual inter-firm interactions
Porter's market conditions	
Demanding customers	Motivational effects due to demands of highly competitive local customers that improve quality, cost, etc.
Rivalry	Motivational effects related to social/peer pressure
Complementarities	Better sales opportunities of firms due to search cost savings for the buyers of complementary products offered in proximity and privileged opportunities for co-operation (sales, marketing, etc.) between nearby suppliers of complementary products
Cost advantages	
Transportation	Transportation cost savings due to geographic proximity, especially in the case of just in time delivery contracts
Trust	Transaction cost savings due to an environment that encourages trust

Source: Adapted from Lublinski, A. (2003), "Does Geographic Proximity Matter? Evidence from Clustered and Non-clustered Aeronautic Firms in Germany", *Regional Studies*, Vol. 37, pp. 453-467.

makers equate competitiveness with cluster support. This link is complicated and policy makers risk simply applying a popular tool when the source of the competitiveness challenges may lie elsewhere.

The notion of risk has many dimensions. With respect to strategy, the appeal of high-growth industries can lead to a cluster approach that attempts, often unrealistically, to generate critical mass in fields such as life sciences and ICT in which competition is particularly fierce and public investment requirements relatively high. This raises the question of whether clusters can be created and, if so, at what cost. There are also risks related to the cluster's structure. Regional economies based on small firms working in the same or related sectors can be vulnerable to market shocks that undermine simultaneously all firms in the cluster. Hub and spoke, platform and state industry clusters can also be seen as vulnerable if the core firm leaves or downsizes. Another form of risk is that firms in a cluster may become too inward looking or rigid, resulting in what are termed lock-in effects (where the major investments to support specific sectors or clusters make it difficult to adjust strategies to new circumstances later) because the cluster is less open to adaptation (Andersson *et al.*, 2004). However this last point is clearly the subject of debate, as other theories identify clusters as a way to generate greater rivalry and complementarities which spur innovation, not complacency.

Globalisation and the nature of clusters

Debate is on-going as to whether globalisation will make clusters more or less important, with the literature leaning towards greater regional importance. Some economists argue that regional specialisation and clustering of related activities are becoming more important features of the world economy as a result of globalisation. This assumption is visible, for example, in the EU's goals for transitioning to a knowledge economy through its Lisbon Agenda. An alternative hypothesis is that regional specialisation and clustering is becoming less robust as a basis for regional economies precisely because many of the drivers of economic change reduce the importance of geographical proximity in business. In many locations, regional specialisations that have been built up over long periods (and that conform to a model of cumulative causation) have declined and in some cases have even disappeared very quickly in the face of international competition. As Enright (1998) points out:

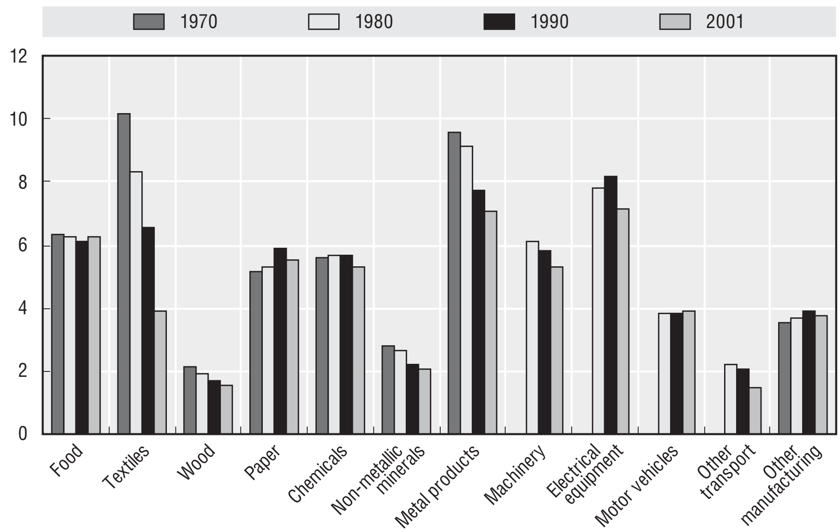
> *Where one stands in terms of whether the globalisation-localisation nexus provides opportunity or threat seems to depend on where one sits. Those who study innovative high technology clusters, industrial districts that have succeeded in international competition, and dynamic metropolitan clusters tend to focus on the advantages of localisation and the opportunities of globalisation. Those who study regions that have declined, have lost branch plants, and have had difficulties in regenerating their economies focus on the loss of local industries, the difficulties in obtaining a position in the global economic hierarchy, and the loss of local economic power and autonomy.*

The location and nature of economic activity in worldwide value chains is therefore one of the most prominent issues for OECD country policy makers. A recent OECD report on the evolution in manufacturing raises provocative questions on this topic. Can prosperity in OECD economies be ensured without a vibrant manufacturing sector? To what extent does the loss of manufacturing threaten innovation and technological progress in OECD economies? It is not simply that the share of manufacturing in total economic activity has fallen, but also that the organisation of production has changed. "The distinction between high-technology and low-technology sectors is becoming less relevant, as certain components of high-technology production can also be carried out in non-OECD countries" (OECD, 2006).

The impact of changes in production patterns varies across sectors and places (see Figure 1.1). For example, OECD countries have a general comparative advantage in some specific sectors such as pharmaceuticals or parts of the automotive industry. In contrast, there are sectors like textiles, which are often regionally concentrated, for which international competition from low-cost countries has played an important role in reducing manufacturing employment. Finally, some other industries, such as food production, are difficult to

Figure 1.1. **Manufacturing employment by key activity: G7 countries, 1970-2001**

Millions of workers



Source: OECD (2006) "The Changing Nature of Manufacturing in OECD Countries", OECD internal document DSTI/IND(2006)1, 13 February 2006, using data from the OECD STAN Structural Analysis Databases: 2005 Edition, OECD, Paris.

internationalise. At the same time, there are examples of OECD countries that have maintained or even increased levels of employment in sectors that are open to off-shoring. For example, employment in ICT equipment actually grew over the 1990s in Ireland, Mexico, Finland and Sweden, while it declined in most other OECD countries (OECD, 2006).

In terms of clusters, many regions that were production centres in a particular sector or sectors are now still specialised in that activity but are no longer involved in production or to a much lesser extent. Car producing regions like Turin, Italy or Gothenburg, Sweden for example, are still present in the automotive sector, but their areas of expertise are increasingly in non-manufacturing or niche activities (GPS technology or safety equipment respectively). Stockholm is still a mobile telephony hub, but phone manufacture, which until only a few years ago was centred in the region, has moved elsewhere and the region is now mainly involved in design, new product development, and network services related to ICT. Regional employment levels in ICT manufacturing are still noticeably high, but a large proportion of those manufacturing workers are in fact engaged in service related activities. This kind of transition has important consequences for regional development, with respect to investment, infrastructure and employment, among other dimensions.

Globalisation and the spread of new ICT technologies seem to make possible a shift from local to global systems of production that can in theory preserve knowledge flows without the need for clustering. Rather than emphasising proximity-based transfers of knowledge, an alternative model is emerging that assumes that knowledge can be spread throughout the production system across large distances. This has led some observers to argue that locally derived advantages are no longer as relevant as they were in the past. They accept that economies *of scale* can still be achieved in certain regions through highly localised concentrations of specific knowledge, skills and expertise. Concentration of technological advantages creates economies of scale in particular technologies that in turn provide employment and generate economic outputs within similar high-technology industries (*e.g.*, biotech industries in the Boston area). Also, economies of *scope* can exist if these regions are able to reap the intangible benefits of learning and the co-operative atmosphere embedded in these agglomerations (spillover effects). However, they argue that "economies of scale and scope embedded within specific regions are only advantageous to those regions and bring about regional development insofar as these region-specific economies can complement the strategic needs of trans-local actors situated within global production networks" (Coe *et al.*, 2004).

From theory to policy

This chapter underlines the possible tension between the theoretical benefits associated with clustering and changes in the organisation of production in OECD countries. These changes seem to suggest that clustering remains an important phenomenon in OECD and non-OECD economies, but that the nature and location of the most successful and dynamic clusters is evolving.

The basic motivation for policy remains the strong quantitative evidence that many industries remain relatively concentrated in specific regions in OECD countries. Added to this, there is some, though probably less robust, evidence that firms in these geographic concentrations can out-perform firms that are located elsewhere that lack less immediate access to the resources offered by proximity to suppliers, customers, research generators and other key actors. Over the last few years, a further impulse to policy has come from the observation that many of the leading firms in new-economy industries have tended to cluster together. Moreover, it is clear that some successful regions have in just a few years acquired pools of skilled labour, specialised supplier networks, and peer pressure or rivalry conditions to sustain increasing clustering of dynamic firms. Thus, one justification for cluster policy is to strengthen or to replicate the success factors that have encouraged the emergence of these concentrations of innovative firms. It should be noted, however, that most if not all of these innovative clusters, such as those related to the Internet or biotechnology, have emerged without specific policies to promote networking or cluster behaviour. Nonetheless, there is no specific reason why policies cannot either strengthen existing clusters or even develop new ones (though there are very few examples of the latter).

While the focus of cluster policies has shifted to research intensive and new-economy activities, there are still solid reasons to support small manufacturing firms in more traditional industries. Small firms can still use their cluster advantages to create new opportunities. Despite the decline of manufacturing employment in many traditional sectors, there are countless examples of regional concentrations of SMEs that have managed to reorient their production in order to take advantage of niche markets without necessarily being involved in global networks led by multinationals. The cluster initiatives of the United Kingdom Regional Development Agency Yorkshire Forward have included an upgrading of the fishing and bakery industries of the region so as to develop higher value added products and then enhance transport links to get the products to market quickly. Such examples offer some encouragement to the artisan-based or traditional manufacturing-based cluster initiatives. It is clear, however, that firms have the option of substituting their local collaborators with external networks. This can be individualized, but has also been co-ordinated. For example, public policies have helped many firms in Veneto, Italy to decentralise some operations to nearby but less expensive Romania.

The challenge for policy makers at the national level is thus to design programmes that accommodate the broad range of cluster types or that focus on those clusters that can help achieve specified objectives. The concept of clusters may be used in advanced and lagging regions, for SME-based or multi-firm size systems, to serve new and mature industries, to target existing concentrations or to generate new ones. The common assumption is that some advantages can be derived in each situation from the processes of interaction and collaboration that are present, albeit in different degrees in each type of place. The following chapters look at the range of policies that have been introduced by member countries, highlighting the different objectives (such as to increase innovation in lagging regions, maximise outcomes from R&D in key sectors, to help SMEs internationalise, and so on) and how these different objectives shape programme design.

Notes

1. Regional specialisation in areas of comparative advantage in the production of tradable goods and services will generate complementarities rather than competition and cross-border trade will increase. In addition, capital and labour will migrate across the open border from areas of relatively over-supply to where they are more scarce, leading to an equalisation of factor prices.

2. Porter's much-cited development diamond structure contains four principal factors: 1) a supportive context for firm strategy and rivalry (*i.e.*, policies/regulations that encourage investment and technical upgrading); 2) robust demand conditions (a core of advanced, competitive and demanding customers); 3) related and supporting industries (capable local suppliers, preferably organised in clusters); and 4) good factor/input conditions (human resources, physical infrastructure, etc.). The system should be animated by dynamic, open competition among locally based rivals (Porter, 1994 and 1990).
3. These interdependencies are similar to the concept of social capital, which is a set of intangible factors such as trust, social mores and networks that contribute to the overall capital stock.
4. The same concept of locational advantage has been used by other theorists to focus attention on the crucial role of "geographical cumulative causation" and "positive feed-backs" (Kaldor and others, including Krugman), "knowledge workers" (Reich, 1991) and "systems of innovation" (Lundvall and Johnson, 1994) as well as the embeddedness of investment in generating competitive advantages (Dunning, 1992).

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 2

Where Do the Programmes Originate?

This chapter explores the origins of the numerous policies with a cluster-based approach, either implicit or explicit. It reviews the nature of shifting priorities in regional policy, science and technology (S&T)/ innovation policy and industrial/enterprise policy that all lead to such policies. It then illustrates how case study programmes fit into these policy frameworks. Finally, it considers how the objectives of these programmes are converging across policy streams and changing over time.

Introduction and key points

Policies that support regional specialisation and clusters are at the intersection of several different policy families, which helps explain the increased policy interest. These policy families include: regional policy, science and technology (S&T) or innovation policy and industrial/enterprise policy. The goals, programmes and instruments used in these policy areas may serve to support regional specialisation by favouring greater linkages among firms and research institutions. The orientation of the policy family behind the cluster policy serves to frame the objectives, targets and scope of the policy (see Table 2.1). In some cases, the policy may be clearly flowing from only one policy source within the country, but in most cases it is integral to one policy strand but clearly related to others. Analysing the various strategies to support regional specialisation and clusters reveals the following trends that will be discussed in this chapter:

- *Regional policy: capitalising on local assets.* Cluster policies linked to regional policy usually focus on so-called lagging regions, including regions undergoing industrial restructuring and geographically peripheral regions. Such programmes often use EU Structural Funds. In addition, several initiatives originating in other policy families have incorporated a clear regional dimension, indicating the recent emphasis in science and technology and enterprise policy on regions, such as regional innovation system concepts.
- *S&T and innovation policy: from research to economic growth.* Several of the more recent cluster/regional specialisation programmes were born from science and technology policy. They promote collaborative R&D to support growth of the most promising technology sectors in regions where key institutions, researchers and firms are concentrated.
- *Industrial and enterprise policies: supporting groups not firms.* Industrial policies with cluster programmes tend to support those clusters that drive national growth, with business linkages taking priority over research initiatives. These trends illustrate an evolution from prior industrial policies to support strategic sectors and work with individual large firms. The cluster approach provides a more transparent and less trade-distorting framework for efforts to strengthen strategic sectors. Programmes that originate from an enterprise policy tend to focus more on SME clusters. These include a number of programmes started as early as the 1980s that emphasise the industrial

Table 2.1. **Policy trends supporting clusters and regional innovation systems**

Policy stream	Old approach	New approach	Cluster programme focus
Regional policy	Redistribution from leading to lagging regions	Building competitive regions by bringing local actors and assets together	• Target or often include lagging regions • Focus on smaller firms as opposed to larger firms, if not explicitly than *de facto* • Broad approach to sector and innovation targets • Emphasis on engagement of actors
Science and technology policy	Financing of individual, single-sector projects in basic research	Financing of collaborative research involving networks with industry and links with commercialisation	• Usually a high-technology focus • Both take advantage of and reinforce the spatial impacts of R&D investment • Promote collaborative R&D instruments to support commercialisation • Include both large and small firms; can emphasise support for spin-offs and start-ups
Industrial and enterprise policy	Subsidies to firms; national champions	Supporting common needs of firm groups and technology absorption (especially SMEs)	Programmes often adopt one of the following approaches: • Target the drivers of national growth • Support industries undergoing transition and shedding jobs • Help small firms overcome obstacles to technology absorption and growth • Create competitive advantages to attract inward investment and branding for exports

district model of cluster policies. Programmes that focus on disadvantaged regions also tend to be closely linked with SME policy, emphasising the widely-held policy objective of building critical mass (for export, for access to information, etc.) among SMEs.

- *Linking objectives and changing objectives.* It is more common than not that policies to promote clusters link multiple objectives. Furthermore, the objectives of these programmes appear to change over time within a given country depending on economic needs and changes in the popularity of the policy approach. Over time, these policies have generally transitioned from SME-based programmes to those supporting national competitiveness clusters and they increasingly focus on technology and innovation.

Regional policy: capitalising on local assets

Introduction

The reorientation of regional policy in many countries has led to a more sophisticated awareness of regional innovation systems and their components. The new approach to regional policy in mature economies is now mainly focused on making domestic firms more competitive, emphasising innovation and better use of knowledge and technology in the region. At the same time, science and technology policy makers are taking increasing account of the importance of region-specific factors, in particular the role of proximity, in the innovation process.

The transition in regional policy towards capitalising upon local assets argues logically in favour of policies that strengthen existing regional specialisations. These specialisations are often based on accumulated skills and practices embedded in the local labour force or draw on specific local resources or infrastructures. Developing strategies that will have an impact on the competitiveness of a given region involves identifying the sources or potential sources of the region's competitive advantage. In many regions, collective characteristics pertaining to groups of firms or sectors provide a source of productivity gain. These collective advantages – often found in clusters or productive systems – stem from the historical development of local sectors and links with the region. They are also contingent upon factors such as firm size and structure, the level of specialisation (agglomeration effects related to specialisation of industrial production, and any spillovers such as high innovation capacity and concentration of specialised workers), use of advanced technologies, and the use of networking as a business practice.

Regional policy instruments with competitiveness rather than equity or other objectives use cluster approaches as a means of aggregating key economic actors in regions. This geographic focus results in policies to promote greater linkages among actors in proximity or to reap the benefits in the region of the knowledge produced there. Innovation is very prominent as an objective in programmes to support specialisation, even in regions where the industry or industries concerned are not those most closely associated with research-based innovation. One of the reasons behind the effort to network actors is to generate innovation, including small-scale, incremental and process innovation.

One appealing feature of the approach in the context of regional policy is that it seems to be applied in both advanced regions with dense knowledge infrastructures and in non-core or former industrial regions. For example, in leading regions with a portfolio of economic activities, the policy goal is often to support specialisation in a subset of these sectors or clusters. In other regions, those where traditional manufacturing industries are strongly embedded, cluster policies are designed to help the region diversify into new activities or change the value structure of current specialisations. This shift in regional policy approaches acknowledges that the industrial base in both leading and lagging regions is undergoing transformation and the policies offer one way to improve the linkages and facilitate the transformation.

Discussion

Lagging regions. Cluster programmes emanating primarily from regional policies usually include, if not target exclusively, lagging regions. When a policy or programme targets the clusters that drive national growth, this is usually done out of an enterprise or innovation policy. For example, Germany's InnoRegio is targeted only to the Eastern *Länder*. The objective of the initiative, which is supported by the EU Structural Funds, is to help resolve the significant economic performance gap between the Eastern and Western parts of the country. Korea's Innovative Cluster Cities programme is part of a Plan for National Balanced Development to promote economic growth outside of the congested capital city metropolitan area. Sweden's Visanu programme, Norway's Arena programme and Finland's Centres of Expertise seek to promote regional growth throughout the country, not only in the leading centres. Finally, while the cluster approach is common in Italy's central and north-east regions, the model underlies a number of initiatives in southern Italy that are designed to create synergies and improve the diffusion of technology in lagging regions.

Smaller firms. Given the orientation, instruments and limited funding levels of regional policy-based cluster programmes, they tend to be more suited to small firms than to large firms. This SME focus is partly at least a result of the theoretical underpinnings of a number of programmes. Many of the earlier initiatives were based mainly on industrial district or local productive system models. The French SPL programme, for example, is designed exclusively for groups of small firms. It has a strong regional policy influence because most of the targeted local labour markets are outside the major urban centres. Many of these regions are strongly specialised in one or a limited number of products and industries that are now faced with increasing international competition (*i.e.*, exposed local labour markets). While Visanu in Sweden is open to all firm sizes and does include large firms, the role of large firms in the cluster is more like that of a mentor. Evaluations of the Finnish Centres of Expertise noted that the programme was more attractive to small firms, albeit larger firms have begun to participate more actively.

Broad innovation and sector approach. Many of these regional policy programmes have included an innovation focus, with Finland's Centres of Expertise being an early example. The programme design is consistent with the country's strong R&D and innovation focus generally. Started in 1994, the first Centres began as part of an urban policy; therefore the first round participants were located in the country's largest urban centres. That vision expanded so as to be open to all regional city hubs. To account for the diversity in needs and capabilities of region types, the various Centres have emphasised different instruments. The new Norwegian Centres of Expertise, at the initiative of the Ministry of Local Government and Regional Development but implemented by agencies under other ministries, is another example of a programme initiated through regional policy with a strong accent on innovation at the outset.

The regional policy cluster programmes are open to a wider range of sectors and embody a more broad approach to innovation than programmes out of S&T and industry/enterprise policy. For example, Sweden's Visanu programme has funded several clusters in the creative and experience industries. This was a conscious choice to ensure that clusters in fields not typically identified in regions as the primary drivers of economic growth, but nevertheless valuable to promote, were able to participate. The programme therefore has supported innovation in a wide range of sectors. The Finnish Centres of Expertise Programme has also adopted a broad approach to innovation. For example, one of the Centres has a field of expertise in chamber music and another Centre is dedicated to innovation in tourism, as illustrated in Figure 2.1.

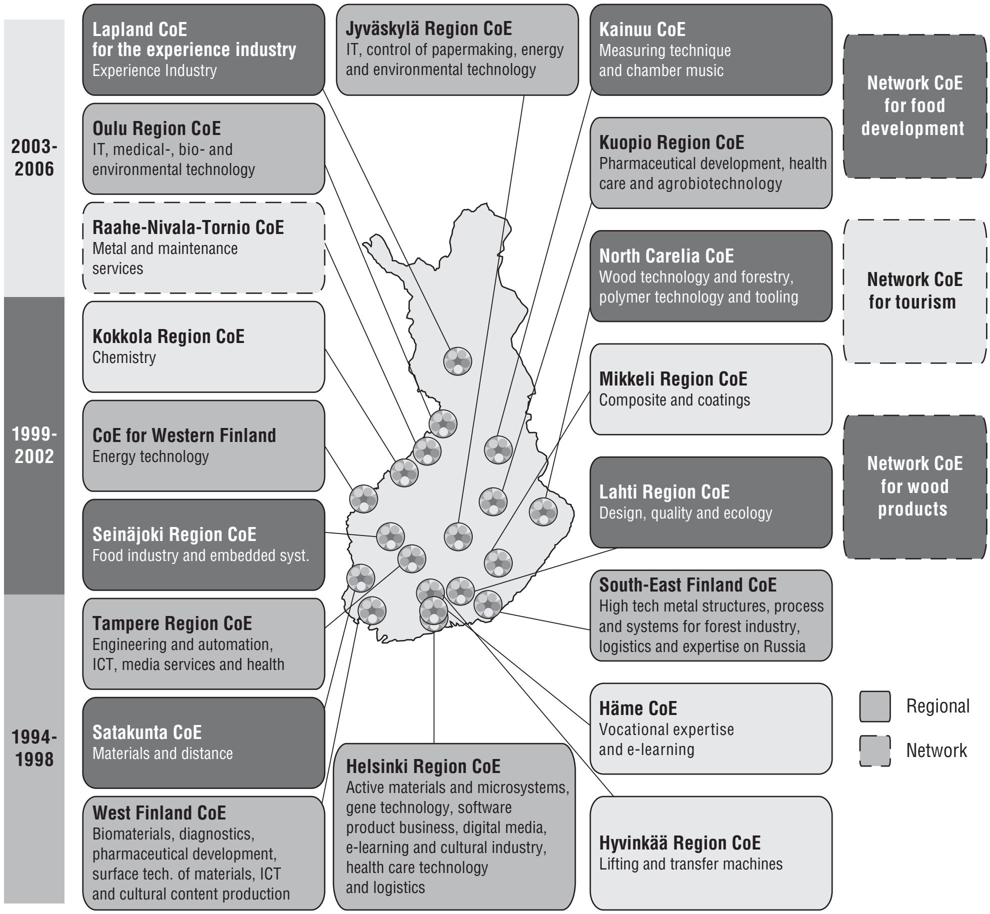
Regional dimension. There are several programmes that were not born out of regional policy *per se* but do incorporate a clear regional dimension. Canada's National Research Council began efforts in the 1990s to be present across Canada, rather than be concentrated in the nation's capital of Ottawa. The current Technology Cluster Initiative therefore is secondarily a means of supporting a form of regional policy. Japan's Industrial Cluster programme, an industrial policy initiative, seeks to support clusters around the country and has taken into account the different region types. The clusters supported include metropolitan areas, smaller regional agglomerations and thin industrial agglomerations (METI, 2005). The cluster initiatives in larger urban centres tend to be more R&D-based and involve larger firms as well as SMEs, while those in less populated regions focus more on network-building and supporting SMEs. It is not clear whether this was anticipated in the structure of the programme, but it has certainly evolved as an important feature of the programme over time.

While the French *Pôles de compétitivité* programme was not designed with a regional focus, it ultimately has become integral to the country's regional policy. Initially the programme was expected to support the top 10 to 15 leading clusters that drive national growth. When the government received 105 responses for the call for proposals, it selected not only 15 "international" clusters, but also an additional 52 that are inter-regional or regional in focus. The selection of so many additional clusters was motivated in part by political pressure to support a larger number of regions. The financing of these regional clusters, however, is expected to be significantly less than the international clusters. The programme is an addition to the existing SPL programme that is already part of France's regional policy.

The German BioRegio programme was designed to serve the nation's leading biotechnology regions but was broadened to encompass less advanced regions. Given the strong national strategic focus of the programme, key selection criteria

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Figure 2.1. **Finland's Centres of Expertise**



Source: Government of Finland, Ministry of Interior's Department for the Development of Regions.

were the strength of the existing science base, evidence of prior collaboration, particularly in biotech fields, and the strong presence of private actors and private sector investment. The city of Jena in Eastern Germany was also included because it has a strong industrial tradition and was a target for economic development in the Eastern *Länder*. The subsequent extension of the programme to 14 additional sites through the BioProfile programme was seen as a sign that other German regions were becoming more active and successful in developing business in the biotech field and that this kind of policy intervention could catalyse growth in regions with some potential but less obvious capacity. In other words, the national champions approach has evolved into a programme with an additional regional development/promotion function.

The Italian Technological Districts programme includes both regions traditionally strong in technology in north and central Italy as well as regions traditionally lagging with respect to innovation in the south. Overall the aim of the districts is to create an effective relationship between funding, research and practical application in fields where there is both a strong private sector/ commercial interest and technological content is high. In addition, the Italian government is taking the opportunity to re-launch research and innovation in southern Italy. The region that will benefit most from the program is Sicily, with funding destined for the creation of a biotechnology district applied to agri-food and fishing. A materials engineering technology district located in the Campania region will also be strengthened with high profile companies and other leading actors coming together to enhance their work in the field of polymers and composite materials.

S&T/innovation policy: from research to economic growth

Introduction

The transition from a focus on basic research exclusively to an emphasis on innovation and commercialisation of research supports place-based collaboration among a range of stakeholders. The general change in orientation can be summarized as: 1) a shift from scientific to innovation goals (with evaluation based on strategic and structural criteria, as opposed to purely scientific criteria); 2) less funding of individual R&D projects run by specific institutions and more emphasis on joint projects and research themes; and 3) stronger marketing of linked competencies across actors (business, research, governance) (OECD, 1999a, 2001). All of these changes have promoted an approach to programme design that emphasizes network building. Germany's R&D policy exemplifies such shifts and the new approach is expected to improve outcomes in a number of areas where current performance is considered to be inadequate, notably:

- Co-operation between industry and the research/university sector.
- Co-ordination of research support activities.
- Concentration of innovative activities in a small number of urban centres.
- Transfer of knowledge across economic actors and across the national territory (EC, 2004b).

Within this general shift there is an implicit assumption that regional innovation systems can be implicitly or explicitly based on strong regional specialisations. While science and technology policy in most countries fulfils national level goals, the impact of such policies is not spatially neutral. The allocation of R&D funding is often targeted at universities with the largest facilities and the best track record. In most countries, universities with strong

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

research capacities are located in a limited number of areas. In the United States, the ability of different states to capture federal research funds is a measure of success and actively tracked at both federal and state levels. The leading recipient states, such as California and Massachusetts, are those that possess a high number of leading research universities. To support R&D in US states that do not succeed in the competitive allocation process, the EPSCoR programme (Experimental Program to Stimulate Competitive Research) and the IDeA programme (Institutional Development Award) seek to broaden the geographic distribution of certain R&D funding to states that under-perform in capturing federal R&D funds.

The effectiveness of these R&D investments is based not only on the university or research institution in isolation, but also its embeddedness in a regional milieu with strong firm linkages. Research excellence can cultivate strong links with business, including spin-offs from university research and the appearance of innovative start-ups in areas adjacent to the university (often on business park premises managed by the university). The effectiveness of the R&D investment is therefore contingent on clustering processes. The United Kingdom's selection process has clearly accounted for research/industry relationships in its fund allocation process, with the success of Cambridge and Oxford in generating innovative new firms around their respective campuses being rewarded with higher allocations. For example, Cambridge University's research block grant from the central government is larger than that destined for any of the metropolitan areas outside London, such as Manchester or Birmingham, even though in most cases these cities have four or five major universities.

Discussion

Technology, an OECD country priority. Given the prominence of technology to OECD country competitiveness, the vast majority of the cluster programmes have a strong R&D/science and technology link. Several of the highlighted programmes are very prominent in the overall innovation strategy of the country and therefore involve more substantial funding than other programmes to promote regional specialisation, such as those targeting SMEs or those aimed at disadvantaged regions. In some cases, the framework for a more cluster/networking approach has been set out in new science or R&D laws or plans (for example in Germany, Italy, Japan and the Netherlands) that have identified how cluster approaches can help achieve better outcomes.

Many programmes have also been developed in conjunction with the creation of innovation plans and/or innovation agencies that have placed the issue of innovation as a central objective of science and technology investment. For example, VINNVÄXT was developed as the flagship programme after the 2001 creation of VINNOVA, the Innovation Agency in Sweden. France's *Pôles* *de compétitivité* programme was developed at the same time as the creation of the new National Research Agency and National Agency for Industrial Innovation as all are viewed as a means to boost France's strength in technology capabilities. NRC Technology Cluster Initiatives emerged from Canada's S&T priorities and the development of Canada's 2002 Innovation Strategy. The sectors selected in the context of some of these programmes are highlighted in Table 2.2.

Table 2.2. **Targeted sectors: Sweden, France, Italy and Canada**

Sweden: VINNVÄXT	France: International *Pôles de compétitivité*	Italy: Technological Districts	Canada: NRC Technology Cluster Initiatives
• ProcessIT Innovations (ICT with manufacturing companies) • Biotechnology • Triple Steelix • Fiber Optic Valley • The New Tools of Life • Uppsala Bio (biotechnology) • Food Innovation • Robot Valley	• Software and complex systems • Health, cancer, infectious diseases • Multimedia and images • Railroad construction • Alternative use of agricultural products • Molecules and therapeutic innovations • Sea, security and safety • Communications materials and logistics • Nanotechnology • Aeronautics, cancer and bio health • Telecommunications and electronics • Sea • Plant related products • Virology • Chemicals	• *Piedmont Region:* telecommunications, multimedia technologies, wireless, new optical and electronic devices • *Emilia-Romagna Region:* mechanic engineering, sensors, materials, surfaces nanofabrication, nanomechanics • *Veneto Region:* nanotechnologies and new materials • *Campania Region:* polymeric materials • *Lombardy Region:* biotechnology, ICT, new materials • *Sicily Region:* micro and nanosystems • *Lazio Region:* aerospace, aeronautical technologies, airports management systems	• Nanotechnologies • Ocean technologies • IT and e-business • Life sciences • Nustrisciences and health • Functional foods and nutraceuticals • Photonics technologies • Aluminium technologies • Biomedical technologies • Sustainable urban infrastructure technologies • Fuel cell and hydrogen technologies

Resource prioritisation and spatial/sectoral impacts. The programmes also recognise the importance of developing clear priorities in terms of resource allocation. The idea that all regions and all research institutes and universities can support a wide range of high-technology specialisations is unrealistic. Research in several high-technology fields is increasingly expensive and for strategic and cost reasons priorities must become more explicit. There has been a proliferation of various types of Centres of Excellence in research and other strategies to better concentrate such resources. While these programmes are not the focus of the case studies, there are cluster programmes with the same orientation. For example, the Georgia Research Alliance seeks to target investments to locations in the state that make the most sense strategically in terms of economic impact and actors involved, including established specialty centres. The Japanese Knowledge Clusters were selected based on the different research hub specialties of the universities and research institutions involved so as to reinforce capacities in the different research priorities that had been set out in the overall national science and technology plan.

This resource allocation prioritisation can go so far as to be focused on a single strategic sector. For example, Germany's BioRegio programme supports an overall biotechnology initiative of the German government to improve the strength of that sector. Biotechnology was selected based on its strategic importance to the chemicals and pharmaceuticals industries, which are traditional strengths of German industry, as well as its importance as an enabling technology for other sectors. The initiative was designed to help Germany catch up with the commercial successes that US and UK biotech firms were enjoying by building stronger links between key research institutions, large chemicals and drugs companies, and innovative biotech SMEs (see Table 2.3).

Table 2.3. **Characteristics of BioRegio winning regions (initial round)**

	Research base	Firm structure
Munich	Two universities and large research institutions	Roche Diagnostics, a large biotech production site, plus around 34 biotech companies
Rhineland	Highest density of research institutions in Europe, including several in biotech	Bayer plus several medium-sized pharmaceutical companies (around 20 in 1994)
Rhine-Neckar	One university and several research institutes	Large pharmaceutical/chemicals companies (Roche, BASF) plus several biotech companies
Jena	One university and three research institutes	One medium-sized pharmaceutical company and five biotech companies

Source: Ernst, Holger and Nils Omland (2004), "Vitalisation of Industry through the Promotion of Knowledge Intensive New firms: The Case of German Biotechnology", Presentation made at the Japan Institute for Labour Policy and Training, Tokyo, Japan, 26 March 2004.

The strategic sector approach has been used in a large number of countries and regions, with biotech standing out as the target sector in many cases, perhaps too many. A significant number of US states have specific biotech strategies, most of which use the cluster model. The state of Arizona, for example, has designated biotechnology as a priority and has established a cluster policy to trigger expansion of the sector. It has developed a roadmap to mobilise numerous resources around this sector to: 1) build the state's research infrastructure; 2) build a critical mass of bioscience firms; 3) offer a supportive business climate for bioscience enterprises of all sizes; and 4) encourage young people to explore and pursue scientific and technical careers. Significant direct and indirect resources are being channelled into this initiative. Other states with similar strategies include Michigan, Ohio and Kansas. In 2001, 41 US states had some programme aimed at spurring development of the life sciences industry according to a survey by the Biotechnology Industry Organization (Cortright and Mayer, 2002).

The risks of trying to achieve sustainable competitive advantage in a highly sought after strategic sector can be costly. First, there are clear and entrenched leader regions in biotech. Five metropolitan areas – Boston, San Francisco, San Diego, Seattle, and Raleigh-Durham – accounted for 75% of the new venture capital in biopharmaceuticals between 1995 and 2001, for 74% of the value of research contracts from pharmaceutical firms, and for 56% of the new biotech businesses formed during the 1990s. Catching up with regions like these requires significant and long-term investment. Moreover, the decoupling of biotech research from productive activities in related manufacturing industries means that successful outcomes upstream are not necessarily going to lead to employment creation or revenues that can be captured locally. Even in the nine major US biotech centres, which together account for over 60% of the sector's US output and 80% of investment, the sector represents only 3.5% of all manufacturing employment (Cortright and Mayer, 2002). While biotechnology is one of the most sought after cluster specialisations across all OECD countries, there are a number of other sectors that are also attractive because of their high growth potential, such as ICT. However there will be winners and losers in these sectors.

Collaborative research and commercialisation. To promote commercialisation and network support, the programmes of innovation policy place a strong emphasis on collaborative as opposed to individual research projects. The organisational structure and funding of the programmes are therefore designed to facilitate this objective, with respect to both promoting research alliances and joint ventures and providing funding for the research itself. The Japanese Knowledge Clusters and Georgia Research Alliance programmes, for example, both use universities as cluster hubs and use research units within the university as the focus for developing multi-actor research projects. In most of the other programmes, if universities and research institutions are not the hub they are important network partners. There are also explicit requirements or preferences in project selection for a minimum number of actors of each type involved in these collaborative projects. This is an important issue given the concerns about accountability in the use of public funds. At the same time, the need to build consortia could represent a disincentive for some potential partners given the transaction costs involved and also the possible ambiguities regarding intellectual property rights from joint projects involving both public and private actors.

Often public researchers are expected to be key facilitators of joint projects; however they do not always have the appropriate incentives to perform this task effectively. The structure and regulatory framework governing the higher education and research systems can have an important influence on the nature of such incentives for public employees. The 1980 Bayh-Dole Act in the United States was introduced precisely to provide incentives for universities and their staff to actively seek co-operative projects with non-university entities. However, not all countries have had such a policy. Until very recently, Japanese researchers were unable to participate in collaborative research with private companies. There are now greater prospects for Japanese public universities to play a significant role as regional hubs for innovation. In 2004, Japan's national universities – part of the central government for more than a century – were reformed as independent public corporations. University faculty members are now non-governmental employees, not civil servants as before. Universities are also rapidly establishing technology licensing offices, incubators, collaborative industry-research centres, and other programs to promote research commercialisation and regional development.*

Limited public and service sector targets. Despite the weight of the public and non-high-technology service sectors in terms of employment, these sectors appear to be left behind by innovation programmes. In OECD countries, the service sector accounts for more than 70% of employment, and that figure continues to rise. However, the sectors selected by the innovation-oriented programmes tend to be focused on a high-technology area such as biotechnology, nanotechnology and ICT. This focus is due to several factors, including the strategic nature and the high investment costs of these technologies. Furthermore, these programmes have a long-term time horizon and require strong non-public framework conditions such as the existence of venture capital. However, the social return of innovations in under-represented fields, even if not exclusively high-technology, could be very important. There are some programmes that have attempted to address these areas. The Finnish National Cluster Programme, due to its implementation by sectoral ministries, did support some projects that could have been helpful for improving public service efficiency, notably in the well-being and work life cluster projects. As previously mentioned, several of the regionally-focused cluster programmes have promoted innovation projects in a much broader range of sectors.

* The 1999 Industry Revitalization Law (also known as the "Japanese Bayh-Dole Act") reduced obstacles to collaboration between universities and private enterprises and also allowed private firms to acquire intellectual property rights from publicly-funded research. This has given stimulus to the growth of Technology Transfer Offices in Japan, of which there are now 37 (Rissanen and Viitanen, 2001).

Industrial and enterprise policy: supporting groups not firms

Introduction

As with regional policy and science and technology policy, industrial policy has also changed in orientation to support cluster programmes. In the past, policies have supported individual firms, strategic industries and infant industries. Such approaches to industrial policy are now problematic from several standpoints. Trade regulations and competition policy on an international scale constrain a country's ability to provide direct firm subsidies. The main areas in industry or enterprise policy where there are still justifications for public policy concern key economic drivers, market failures, co-ordination costs, regional policy and employment creation/spillover arguments.

In each case, cluster-type approaches have a logical role. Moreover, it is clear that innovation is integral to each of the above objectives, which has led to increasingly close links between industrial/enterprise policy and science and technology policy. Many of the issues, trends and rationales described above that underpin science and technology-driven programmes are therefore applicable here. In particular, while general framework conditions support the development of firms overall, they lack the specificity to harness the context-dependent nature of innovation. This is why industrial policies are also seeking to address systemic failures, that is to say that they address failures in the relationships between the actors in the innovation system.

Discussion

Key sectors and drivers of competitiveness. Cluster policy is a key element of competitiveness policies at national and regional levels. Although somewhat difficult to define, these policies tend to group measures that target the productivity of enterprises. Most often they target key sectors or industries, what can be seen as a somewhat broadened version of the strategy of picking winners. The Oregon Clusters Programme, the former Finnish National Cluster Programme, the Basque Country, Spain and the French international *Pôles de compétitivité*, among others, share this orientation. They tend to focus on identifying and supporting clusters that appear internationally competitive and have growth potential or at a minimum represent the largest sectors of employment (see Table 2.4).

With the exception of France, the industrial policy programmes in case study countries that target large clusters used basic statistical cluster mapping to identify key agglomerations. The principal limitation with this approach is that it tends to identify employment clusters while the growth engine strategy can imply a focus on technology-intensive activities that might not employ large number of workers. In all cases, there is a clear goal of designating these

Table 2.4. **Targeted sectors: Spain (Basque Country), US (Oregon) and Finland**

Spain (Basque Country) (on-going)	US (Oregon) (on-going)	Finland: National Cluster Programme (some clusters may be on-going)
• Household appliances • Automotive • Machine tools • Eco-industry • Management knowledge • Telecommunications • Bilbao Port • Aeronautics • Energy • Paper-pulp • Shipbuilding industry	• High technology/software • Forestry/wood/paper products • Food processing • Apparel/sports goods • Transportation equipment • Creative services • Recreation • Metals • Nursery products • Professional services • Biomedical	*Ministry of Agriculture and Forestry* • Forest • Food products *Ministry of Transport and Communications* • Telecommunications (NetMate) • Logistics (KETJU) • Transport (TETRA) *Ministry of Social Affairs and Health* • Well-being cluster *Ministry of Environment* • Environmental programme *Ministry of Labour* • Cluster approach in National Programme for the Development of Working Life

clusters with the hopes of organising government support around them, across levels of government, to leverage resources for these privileged targets.

Another interesting example of this competitiveness approach is provided by the Regional Development Agencies in the United Kingdom. These RDAs were established in 1999/2000 and are charged with the task of improving the performance of business in their regions. Almost from the outset, the Department of Trade and Industry (DTI) recommended that the RDAs should use a cluster approach to identify and target resources to the key sources of regional growth (DTI, 2001). This guidance was prompted by an assessment by the DTI that clusters were one means by which targeted investment could help regions transition from dependence on declining industries or low value-added sectors to the knowledge economy. Each RDA has since developed a strategy that targets key clusters (usually divided into: existing, established or embryonic) as the core of its regional economic strategy. One outcome of this approach, visible also in the United States, is that the focus on growth sectors leads to some overlapping with respect to the targets of regional strategies. As shown in Table 2.5, most regions emphasised similar sectors, including biotechnology, and ICT, while other more traditional industries were targeted in fewer regions (for example, textiles and manufacturing).

SME support. Often the cluster approach focuses on small firms because of the additional obstacles they typically face to grow and the clear scope for policy intervention. Such obstacles include accessing information, attracting capital or adopting new technology. On the demand side, SMEs need assistance in formulating their needs. Small enterprise managers are often not aware of new technology, do not recognise the potential for improvements

Table 2.5. **Priority clusters identified by UK Regional Development Agencies**

Shaded areas indicate priority

Cluster	North East	Yorks.	East Mids.	Eastern	London	South East	South West	West Mids.	North West
Biotechnology									
ICT									
Creative industries									
Advanced engineering									
Food/agro-food									
<…>									
Manufacturing									
Textiles									

Source: Higher Education Policy Institute (2004), "Research and regions: An overview of the distribution of research in UK regions", Centre for Policy Studies in Education, University of Leeds.

(on their own or through consultants), or lack the financial, organisational and managerial capabilities to implement new technology. On the supply side, technology providers and consultants generally do not tailor their products to local firms. The costs of reaching small firms with relevant information are relatively high, as are the costs of tailoring equipment to their needs. Hence, technology markets suffer from problems of information asymmetry, transaction costs and a lack of scale economies that help justify policy intervention. Two basic forms of intervention required on these grounds are technology advice and transfer as well as the provision of other non-financial services (marketing, logistics advice, exports, accounting, etc.) that are often supplied by sector-oriented centres (OECD, 1999b). Therefore, to address these considerations SME policies increasingly emphasise clusters.

The cluster programmes growing out of an SME policy are usually designed to promote networking among small firms and to provide basic, collective services to these firms. Italy's Law 317(91) is perhaps the earliest example among the case studies. The original measure that gave an institutional framework for policy making to target clusters was approved in September 1991. The main innovation of this law was its focus on SMEs and, in particular, the scope that it gave for providing support to groups of small firms rather than concentrating only on single, usually large firms. This approach acknowledged the vital importance of the industrial district model in the Italian economy and recognized that such districts had, or potentially had, different policy needs. Article 4 of the law was particularly significant because it formalises the concept of consortia of small firms and gave prominence to the provision of collective services for groups of firms.

This idea that SME consortia can be a unit for enterprise policy intervention has since been taken up in other contexts, though usually as a programme rather than as a legislative framework. The French SPL programme,

OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

for example, is also designed to provide support to groups of SMEs located within a given geographical area. The Czech example is interesting because, although it is seeking to support the most prominent clusters to drive national growth, the clusters are comprised mainly of domestic SMEs. The Klastry programme and its cluster approach replaced the former Co-operation programme that had supported basic horizontal SME networking.

More recently, the programmes have begun to address technology absorption and innovation issues. The United States has a long history of small business support. Among the most prominent programmes to support technology for SMEs are the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programmes that are implemented across multiple agencies with research funds. In contrast, the multiple programmes that serves predominantly SMEs but are originating out of other policy streams have a more active innovation focus. This is especially true of programmes from the Nordic countries. Even the Czech Klastry programme, which is out of industrial policy, does require a research or university partner and will fund research projects, albeit the primary goal in this first round is to build cluster relationships.

Restructuring sectors. In countries (regions) most affected by restructuring sectors, the primary programme focus is on sectoral competency and improving supply chain linkages. Spain's Basque Country Competitiveness Programme strategy was born in response to such economic challenges. In the early 1990s, on the eve of joining the EU, the competitive advantages of cheap currency and low-cost labour were about to disappear. The region therefore had to upgrade its manufacturing base to achieve other competitive advantages. In the Czech Republic, since regions outside of Prague are mainly specialised in lower-technology manufacturing, the target sectors are often restructuring sectors, albeit not exclusively as there are high-technology sectors included in the programme. Korea's Innovative Cluster Cities strategy is also designed to transition manufacturing clusters to innovation systems.

Inward investment. Several, but not all of the programmes, are using the clusters to actively support export promotion, inward investment and the attraction of foreign firms. The Nordic country examples and Korea are very active in using clusters to promote international linkages. In Sweden, the programme Visanu was co-managed by the Invest in Sweden Agency to develop this component. A new programme, Nutek's Regional Cluster programme, is also focused on international market development. One important aspect of cluster and specialisation programmes in this respect is the labelling of regions as centres of competence in particular fields as an important tool for attracting new investors that seek to tap into pools of knowledge or buy into supplier chains. Regional Competence Networks in Germany are but one example. This initiative promotes networking among education, research, development and business in order to bundle competence and to market internationally attractive networks to the world, including via the Internet. The initiative aims at promoting co-operation within top-level technology networks. Each network is in a technology field, has a specific industry theme and is focused on a region in which this industry is strong. The state of Oregon in the United States is also actively using clusters to promote the state's economic attributes.

Even if the foreign direct investment (FDI) attraction strategy is not successful, the cluster approach can still be used for other ends. It appears that the United Kingdom's emphasis on clusters as the centre of regional economic strategies was guided by a desire to re-orient economic development efforts away from an emphasis on inward investment. The Regional Development Agencies (RDAs) in a number of English regions started by trying to imitate the relatively successful FDI strategies of the existing RDAs in Scotland (Scottish Enterprise) and Wales (Welsh Development Agency). However, after achieving only limited success the cluster approach was seen as a way to develop existing regional assets, both the enterprise base and human capital, instead of trying to draw in foreign firms.

Non-OECD country examples. International development agencies and development banks are also actively supporting clusters. Often they have an explicit focus on helping natural resource or manufacturing clusters access global markets and link into value chains. The Inter-American Development Bank (IDB), for example, has three different programmes that support clusters and value chain development that, like OECD country policies, range from key industries for competitiveness to SME support. One programme includes loans made to local authorities to develop and execute Competitive Strengthening Plans that include cluster support. A second vehicle through the Multilateral Investment Fund includes horizontal and vertical networks which frequently emphasise the link to the territorial productive system, and sometimes focus on the insertion and integration into broader value chains. A third programme focuses more on small enterprise development to better integrate small firms into value chains and larger trading firms. The United Nations Industrial Development Organisation (UNIDO) has focused its cluster programmes mainly on clusters with vulnerable populations in micro and small firms. Implemented in 15 developing countries, these UNIDO programmes focus on achieving the benefits of external economies and collective actions as well as building up trust and social capital. The institutional framework and business environment are other factors they address (see Box 2.1). The United States development agency, USAID, is also actively supporting clusters as part of its small business support programmes.

Box 2.1. **IDB and UNIDO: cluster and value chain support**

IDB

The Inter-American Development Bank (IDB) has three lines of activity that under different names and sources of funds fall under the category of projects for clusters or value chains. They are: 1) the IDB loans; 2) the Multilateral Investment Fund (MIF) operations; and 3) the Small Enterprise Program (SEP).

1) Among the *IDB loans*, the principal group of operations aimed at fostering cluster competitiveness is comprised by operations (or components) of about USD 10 million each lent to the local authorities. This operations line includes support to four Brazilian States (Sao Paulo, Minas Gerais, Pernambuco and Bahia Blanca), three Argentine provinces (Rio Negro, Mendoza and San Juan), and Uruguay. One project for regional development agencies in Chile is under preparation. This type of program typically has two stages: first, the local counterparts, together with private sector players, prepare the Competitiveness Strengthening Plans (CSPs), which include: 1) a diagnosis assessing the degree of competitiveness at both the cluster and firm levels; 2) a strategic plan to promote competitiveness among clusters and value chains; and 3) a precise definition of actions the plan includes (objectives, firms comprising the cluster, budget, design, etc.), which, according to the previously defined strategy, could be financed by the program.

Two different types of proposals can be funded: 1) projects aimed to create externalities whose benefits are hardly internalized by individual firms; and 2) projects and activities of groups of firms which are necessary to enhance the overall degree of competitiveness but also generate highly proprietary internalized benefits. In the second stage the executing local counterparts implement the actions defined in the CSPs and apply grants that have to be matched by local counterparts and beneficiary firms. Firms must belong to a network or cluster previously selected by the programme. Their particular projects have to be prioritized according to their relevance within the competitiveness strategy, and must meet certain eligibility requirements to access financing. Neither land, nor infrastructure directly involved to the production process, nor operating expenses are covered by this line of activity. On the other hand, the Bank has approved loan operations in Panama, Honduras and the Dominican Republic, under the name of Competitiveness Programs that identify the clusters with greater potential, and foster governance and institutional strengthening and capabilities to enhance the competitive performance of the local clusters.

2) The *MIF* operations, 18 since 2001, typically refer to two or three specific clusters in one country or a particular territory, having private executing agencies (either enterprise associations or private institutions), as recipients of the IDB loans. MIF projects include a varied typology that include horizontal and vertical networks which frequently emphasize the link to the territorial productive system, and sometimes focus on the insertion and integration to broader value chains. Some examples of MIF projects, always linked to specific locations within each country, are: the shoe, lingerie, and wood furniture clusters located in specific municipalities of Brazil; the wine and the rhea value chains in Uruguay; and shoe and ceramics in Guanajuato, Mexico. Other umbrella projects include clusters at

Box 2.1. **IDB and UNIDO: cluster and value chain support** *(cont.)*

the national level in countries such as Colombia and Peru; the supra-national level in Central America; or at sub-national level such as in the Cordoba province, in Argentina. Resources from the MIF range from USD 0.5 to 3.5 million of non-reimbursable funds per project that have to be matched by local counterparts. MIF projects finance part of the cost of raising awareness of the importance of co-operation and the creation of local networks of firms. Then, as in the Bank projects, they have two more stages: one for having a diagnosis and a plan for increasing the competitiveness of the network of firms, and a second stage for implementing the plan, when MIF resources finance about 50% of training, technical assistance and co-operative action of firms. MIF project executing agencies have created a learning community to exchange experiences and analyze specific issues in their day-to-day activities.

3) Among the *SEP* activities, the objective of which is to enhance the quality of life for low-income populations through promoting microentrepreneurial activities, the Bank has supported about ten operations directed to integrate small producers in value chains and larger trading firms. These program include both reimbursable and non reimbursable funds from USD 200 000 to 500 000. Two examples are support of the cacao value chain in the peninsula of Paria, Venezuela, and support of the recycling of banana industrial waste in Colombia.

The IDB seeks to continue and strengthen each of these lines of operations to obtain valuable lessons aimed at better understanding the formation and impact of clusters and value chains, and how to more effectively foster competitiveness among them.

UNIDO

The United Nations Industrial Development Organisation (UNIDO) has been involved in promoting industrial clusters in developing countries over the last fifteen years. The development of clusters of micro-, small- and medium-enterprises is an important component of strategies to achieve the Millennium Development Goals (MDGs), and most notably the reduction of poverty. This is because, in large parts of the developing world, small-scale firms are the main sources of employment and income for the population. Revitalizing clusters, thus, can be an important step towards raising the well-being of small producers and workers that would otherwise lack any economic opportunity.

For this reason, UNIDO focuses on those regions and sectors where the survival and growth of clusters is critical for securing the livelihood of local stakeholders. The main targets of UNIDO's intervention are clusters that have a preponderance of micro-enterprises and home-workers, clusters in labour-intensive sectors (*e.g.*, garments, leather, food-processing) and those employing women, migrants and unskilled workers. These groups are the most marginalized and vulnerable segments of the society, characterised by high exposure to risk and low disposable income. Clusters of artisans or manufacturers of traditional products are also increasingly exposed to international competition and often unable to upgrade and improve productivity.

OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Box 2.1. **IDB and UNIDO: cluster and value chain support** *(cont.)*

In order to address these challenges and enhance the income of small-scale entrepreneurs, UNIDO leverages on the benefits of clustering: external economies and collective actions. Agglomeration economies allow firms to specialize in specific tasks, and account for an increased access to skills, inputs and services. Joint actions help firms overcome the obstacles due to their small size by pooling resources, sharing investments and facing common threats.

However, low levels of social capital in under-performing clusters and limited trust among the local stakeholders can hinder the achievement of these benefits in developing countries. Thus, UNIDO works primarily on improving interaction among firms and facilitating co-operation. Once trust is created, entrepreneurs are able to mobilize their limited resources and combine efforts in order to take advantage of economic opportunities.

The development of social capital within clusters helps them confront a second dimension of poverty, namely marginalisation and powerlessness. The strengthening of trust-based relations offers a strong basis to ensure the inclusion of the most vulnerable, especially women, ethnic minorities and workers with low levels of education. These dynamics are reinforced through the implementation of complementary interventions aimed at facilitating access to training and micro-finance. As a result, assets and capabilities of the actors within a cluster are improved, and their empowerment promoted.

UNIDO also acknowledges the importance of creating a conducive business environment to facilitate cluster development. This is achieved by favouring the engagement of local institutions and strengthening linkages between enterprises and support organisations. On the one hand, UNIDO's projects are aimed at creating awareness of the benefits of clustering among all stakeholders. On the other hand, they promote dialogue and partnerships between the public and the private sector.

Finally, creating a strong institutional framework is crucial to ensure the sustainability of the intervention. Once this is concluded, the existence of solid mechanisms of governance will support entrepreneurial initiatives and provide answers to future challenges.

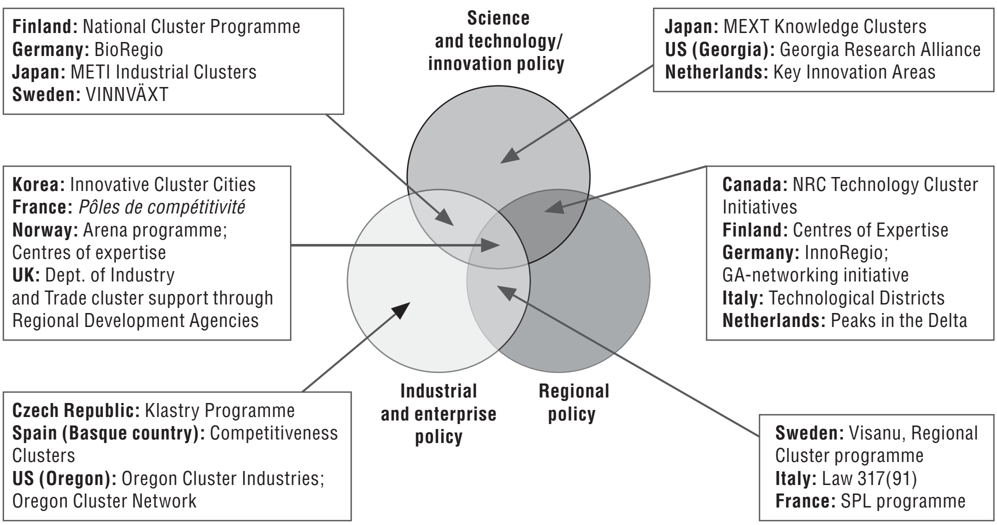
UNIDO has implemented this approach to cluster development in over 15 countries in Latin America, Africa and Asia thanks to financial support made available by donors such as Italy, Austria, the United Kingdom, the European Union and Switzerland. Tools and methodologies have been developed over the years and are now also available through an on-line toolbox on cluster development available at the address: *www.unido.org/psd-policy/*.

Source: UNIDO, *www.unido.org*; IDB, *www.iadb.org/mif/v2/supplychains.html*; *www.iadb.org/sds/mic/publication/gen_159_4053_e.htm*.

Linking objectives across policy streams

It is more common than not that the policies to promote clusters and regional specialisation are linked across at least two policy streams, as while origins differ the objectives may be similar. Among the case study countries, there exist examples of effective linkage strategies. As illustrated in Figure 2.2, these linkages occur at all intersections between regional policy, science and technology policy and industrial/enterprise policy. This is possible because similar tools are capable of addressing the policy objectives of each area. This trend towards convergence across these policy arenas is evident in the programmes studied. The important question is whether or not one programme can effectively accomplish multiple objectives.

Figure 2.2. **Intersection of policy streams**



Linking two policy streams. Most programmes link at least two policy streams. As previously mentioned, the prominence of science and technology policy to OECD country competitiveness helps explain the prominence of linkages with that field. Most industrial policies seek to promote technology related clusters and most regional programmes acknowledge the importance of innovation for regional development. Regional policy being by definition designed to accommodate multi-sectoral needs, it is not surprising that there are few examples of programmes that exist as regional programmes in isolation of other policy goals. The programmes that are purely science and technology or industrial policy are the exception. Even among these exceptions, the programmes do not necessarily operate in isolation. For example, the Japanese Knowledge Clusters have organisational ties to the

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Industrial Clusters programme and the Oregon Cluster Network hopes to cultivate a pipeline of clusters that may be eligible for innovation-focused programmes currently being developed.

Linking three policy streams. A few of the programmes link all three policy streams, in part given a more integrated approach at the central level to addressing these policy fields. Among the programmes at the core of all three policy streams is the Korean Innovative Clusters Cities. It is integral to the country's Balanced National Development Plan, an overarching theme for the President and a cornerstone of Korea's regional policy. The industrial complexes that will serve as the platform for these city clusters are the product of Korea's industrial policy. Furthermore, the clusters selected are also consistent with the country's 2010 Industrial Vision. This vision includes a listing of key industries and the specific goals for international market share to support the country's economic growth. Finally, given the focus on technology and R&D, the programme is highly related to the country's innovation system efforts to upgrade manufacturing centres.

The French *Pôles de compétitivité* programme is another example of a multi-objective programme with significant resource investment. France has been concerned with both its industrial strategy and innovation approach and recognised a regional dimension to these issues. Three key reports that influenced policy all pointed to such a strategy. In 2004, the Inter-ministerial Regional Planning Agency DATAR (now DIACT) outlined key issues for the creation of the *Pôles de compétitivité* as an industrial policy with regional grounding. The subsequent 2004 Blanc report, "Ecosystems of growth", promoted two key themes: 1) that France must move from an economy of planning and imitation to one of innovation; and 2) that this would best be done by regional actors who are most interested in inter-sectoral co-operation in a given territory. The January 2005 Beffa report "Towards a new industrial policy" came out after the programme call for proposals, but it reinforces the same message. It explains that France is too concentrated on low-technology industries and needs to promote a transition to more high-technology industries. At the same time, France has been seeking to reformulate its approach to innovation, albeit reforms of the public research system will require a much longer timeframe. Since the programme began, national and regional governments have been coalescing around these clusters.

European Commission (EC) policy. Mirroring the national policy approaches, the EC policies that support clusters and regional specialisation also originate in regional policy, industrial policy and innovation policy. The European Commission's role in the development of cluster policies can be characterized as seeking to provide a favourable framework for information exchange, networking and co-operation at a policy level. A number of policies highlight the important role of clusters and networks as a key priority to foster firm competitiveness, contribute to innovation and grow Europe's economy. Not all of the programmes are explicitly called cluster programmes, but they contribute to an environment of co-operation among stakeholders at the local and/or regional level. The main Directorate-Generals to support programmes are the *Regional Policy Directorate-General*, the *Enterprise and Industry Directorate-General* and the *Research Directorate-General*. Most often programmes and activities are funded through the DG Research and DG Enterprise and Industry framework programmes or the DG Regio through their Structural Funds. The EC either works directly with clusters in the member countries or funds are used in the context of national programmes that result in cluster-type programmes. A more detailed description of the policy areas may be found in Box 2.2. Many of the more recent initiatives are summarised in Table 2.6.

Changing objectives over time

The single or multiple objectives of the programmes may also change over time. Programmes are developed to address economic imperatives but these are not static and will evolve. Sometimes the change in objectives is a result of general changes in the economy of the country or a reaction to an external shock in one or more regions. In other cases, it is the programme-level impact of a change in strategy or a change in government. Changes can also be due to policy popularity, when policy or programme approaches spread from one country to another, often in the hope of replicating success stories.

All approaches continue to be used. Across the country case studies, there is no clear relationship between the date the policy began and the policy family from which it flows. The groups of policies in each shaded area of Figure 2.2 above span starting dates from the early to mid 1990s through to the very recent policies instituted in 2005 and 2006. For example, Denmark's small business networking, the Basque Country region's Competitiveness programme for key clusters, Italy's Law 317(91) to promote SMEs for regional policy and the Georgia Research Alliance to support key research all began before 1992. The most recently implemented programmes, such as the Oregon Cluster Industries for key clusters, the French *Pôles de compétitivité* combining research and key clusters, and the Korean Innovative Cluster Cities with a strong regional policy and R&D focus, all started within the last three years. Nevertheless, there are some discernible trends.

Trend 1: From SME networks to national competitiveness clusters. Several countries began with a first programme that supports hard networks or clusters of SMEs. Such countries include France, Finland, Italy, Norway and Oregon in the United States. These initiatives were often focused on manufacturing firms in traditional sectors, and were inspired by the industrial district model. These programmes were subsequently complemented by policies that emphasised (different) regional clusters as the drivers of national or regional competitiveness.

Box 2.2. **EU policies supporting clusters**

The EU policies to support clusters emanate from three policy families: regional policy, enterprise and industrial policy and research policy.

EU Regional Policy seeks to assist the economic and social development of the EU's less-favoured regions. Clusters and networks are supported mainly through their Structural Funds (most often the European Regional Development Funds) but also within the Rural Development Funds and the PHARE programme. Member States are encouraged to develop regional and national policies for innovation clusters and poles, using the support offered by these different funds. Several of the case study countries have done so.

The goal of ***Enterprise and Industry Policy*** is to help create an environment in which firms can thrive and meet the objectives of the Lisbon Agenda. This agenda seeks to ensure productivity growth, job creation and wealth generation to meet the goal of becoming "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion". For the successful development of SMEs, cluster policies are regarded as key factors and promoted through Innovation, Industrial and Enterprise policy sub-areas. Most of the policies/activities within the *Innovation and Industrial policy* aim to promote policy learning and co-operation for better understanding and exchange of best practices. For example, the PRO INNO initiative (*http://cordis.europa.eu/innovation/en/policy/pro-inno.htm*) supports, among others, trans-national mutual learning and co-operation between policy authorities responsible for cluster policy development and the Europe-INNOVA initiative (*www.europe-innova.org*) is designed to facilitate networking, trans-national co-operation and learning between clusters with a view to create world class competitive clusters in Europe. Moreover, cluster mapping statistical activities are currently undertaken in order to create a European Observatory of clusters by 2007. The Innovation Relay Centres Network, co-funded by the European Commission, that provide technology transfer and innovation support services to European firms, also carries out specific actions in support of European clusters. *All above initiatives and actions* will be continued under the Competitiveness and Innovation Framework Programme (CIP) for the programming period 2007-13.

The EU's policy work in the field of ***Research and Development*** serves to activate regional research-driven clusters, mainly through the "Regions of Knowledge" pilot actions (*http://cordis.europa.eu/era/regions_knowreg2.htm*) aimed at supporting experimental actions at the regional level to develop regions of knowledge in the area of technological development, co-operation between universities, and research at the regional level. Built on the above two actions, a new "Regions of Knowledge" scheme is foreseen under the Seventh Framework Programme with a focus on supporting research-driven clusters with a view to increase research investment in Europe.

Source: http://ec.europa.eu/.

Table 2.6. **Selected EU programmes supporting clusters and regional specialisation**

Activity	Objectives	Duration
Euro Info Centres	To serve as a network and provide information, advice and assistance to SMEs *http://ec.europa.eu/enterprise/networks/eic/eic.html*	1987 on-going
RITTS/RIS	Following a common methodology, the project aims to develop regional innovation strategies. So far, more than 100 regions have participated *www.innovating-regions.org*	1994 on-going
Innovation Relay Centres (IRC)	To support innovation and transnational technological co-operation in Europe with a range of specialised business support services, mainly between small and medium-sized companies (SMEs); 71 regional IRC's have been established in 33 countries *http://irc.cordis.lu/*	1995 on-going
PAXIS (Pilot action on the mechanisms to set-up and develop innovative firms)	To boost the transfer of local and regional excellence in innovation and to have an instrument for the co-operation and the exchange of tacit knowledge and learning among local innovation stakeholders, profiting from each other's experience *http://cordis.europa.eu/paxis/*	1999-2005
IRE working group on clusters	The IRE network has been supporting regional authorities in developing innovation strategies, in which the development of clusters have been an important part; a working group was set up to work on cluster policies *www.innovating-regions.org/network/whoswho/projects_extended.cfm?sub_id=26&project_id=8*	2000-04
Thematic network ACENET (Accelerating the establishment of clusters)	This network brings together regional organisations interested in the development of processes and methodologies to set up and manage clusters and company networks *www.innovating-regions.org/network/whoswho/projects_extended.cfm*	2001-03
Observatory of European SMEs report on "Regional Clusters in Europe"	To focus on the knowledge of clusters and compare 34 European clusters *http://ec.europa.eu/enterprise/enterprise_policy/analysis/observatory_en.htm*	2002
2002 MAP Project on enterprise clusters and networks	To analyse to what extent clusters and networks do really offer a favourable framework for SMEs; to identify examples of good practices related to clusters and to identify future possible actions *http://ec.europa.eu/enterprise/entrepreneurship/support_measures/cluster/map_project.htm*	2002-03
Regions of knowledge initiative	To support transnational mutual learning and co-operation between research-driven clusters, bringing together regional authorities and development agencies, public research organisations, industry and other relevant stakeholders *http://cordis.europa.eu/era/knowreg_about.htm*	2003 on-going
Clusters in the EU10 new member States (report)	To learn more about cluster development in the EU10; since no systematic mapping of European clusters has been done, another objective is to carry out a more systematic mapping compared to earlier ones *www.europe-innova.org/index.jsp?type=page&lg=en&classificationId=5967&classificationName=Cluster%20Mapping&cid=5981*	2005-06

Table 2.6. **Selected EU programmes supporting clusters and regional specialisation** *(cont.)*

Activity	Objectives	Duration
Mapping and analysis of innovation clusters in Europe	To create a European database on clusters and cluster policies; to establish a common methodology throughout the EU-25 and candidate countries (based on the same methodology as in "Entrepreneurial innovation in the Future member States: Challenges and Issues at stake for the Development of Clusters of Innovative Firms"); to identify successful clusters for best practice and policy recommendations including a cross-border dimension *www.europe-innova.org/ index.jsp?type=page&lg=en&classificationId=5967&classificationName=Cluster %20Mapping&cid=5981*	2006 on-going
Europe INNOVA initiative	To facilitate networking between clusters with a view to intensifying transnational co-operation and learning between clusters for establishing joint research projects and developing business strategies *www.europe-innova.org/index.jsp*	2005 on-going
PRO INNO Europe	To develop a new form of transnational innovation policy co-operation, building upon the results from the European Trend Chart on Innovation and the PAXIS initiative *http://cordis.europa.eu/innovation/en/policy/pro-inno.htm*	2006 on-going

Source: European Commission, Entrepreneurship Action Plan-Key Action 6-B – Fostering innovative clusters *http://ec.europa.eu/enterprise/entrepreneurship/action_plan.htm* for programmes through 2004 with updates.

This is true for Japan, for example, where a range of small-scale local initiatives to support traditional and artisanal clusters were developed by METI in the 1980s and early 1990s that attempted to build local SME networks similar to those found in northern Italy. These measures were then superseded by the more comprehensive, growth-oriented METI Industrial Clusters and MEXT Knowledge Clusters programmes that are featured in the case study. Similar evolutions have taken place in Denmark, Finland, and Spain (the Basque Country and Catalonia) to name just a few. The influence of Michael Porter's work is evident here. Several countries implemented such programmes after the publication of his book *The Competitive Advantage of Nations* (1990), often using tools his team has developed in that process.

Trend 2: increasing focus on innovation. Another trend is a transition to a focus on technology and innovation. This trend in cluster programmes follows a policy change towards more innovation focused industrial policy in general and the prioritisation of instruments related to innovation among the various forms of enterprise support. This evolution has been strongly pushed by the emergence of regional innovation system and triple helix-type concepts. While the Czech Klastry programme developed out of industrial and enterprise policy, its objectives are also being incorporated in the new National Innovation Plan. In Korea the prior industrial complex model is ceding to a regional innovation systems approach. Oregon's policy approach has begun with an industrial focus in terms of major industries and cluster development generally, but the creation of the Oregon Innovation Council's mission will be to identify innovation opportunities for the clusters involved in these other programmes.

Change for economic and other reasons. Over time, a number of countries have changed the objectives and instruments used to promote regional specialisation and clusters. The interesting question is whether these changes are due to evolving needs, policy fads, lessons learned or another reason. Denmark was one of the first countries to implement a programme to promote small business networking in 1989. It later attempted to address the country's mega clusters, after several mapping studies, resulting in dialogues and numerous policy measures to support them. When those actions were deemed too broad, the country chose to support smaller clusters of competence, however the problem of "picking winners" was raised. The national government then chose to change strategies by giving regions the lead in cluster issues and focusing instead on framework conditions and the promotion of linkages across relevant government institutions and industry with a more notable innovation and technology focus (see Box 2.3).

Specific challenges in economic performance or new directions in policy can radically change the context for policy, making regional innovation policies more or less relevant. For example, after several reports supported the idea that France's biggest competitiveness challenge was in growing high-technology capabilities, the French government put in place the *Pôles de compétitivité* initiative along with several other measures in rapid succession. In the space of just a year, policies to promote innovation and clusters in regions have become very prominent. As another older example, Germany's assessment of lagging performance in biotechnology led directly to the BioRegio programme, the success of which has in turn led to a range of other spatially focused innovation and cluster programmes in Germany. Georgia's strategy was in direct response to the state's lagging economic performance within the US and to an assessment that the state was falling behind in key high-technology sectors.

Oregon (United States) is a particularly interesting case for considering policy responses to economic changes over time. It too began with an SME network programme, in fact modelled on Denmark's programme. Economic recovery efforts helped trigger a transition to a "key industries" sectoral approach for the state's economic development efforts. A number of initiatives were developed around these sectors, including an accompanying workforce development programme. By the mid 1990s, the cluster concept simply became less prominent, although not as a direct result of any specific evaluations of prior programmes. Attention merely shifted away from key industries and clusters to other topics like rural development. This may have been the result of the fact that the economy was doing well and there was a

Box 2.3. **Denmark's cluster policy**

Denmark was one of the first countries to promote cluster policies of various forms that have been replicated around the world. Yet today, Denmark has no flagship national cluster policy. However, there are a number of policies to encourage innovative co-operation and to help regions promote projects that serve to develop regional specialisation and clusters.

Inter-firm co-operation and networking. In 1989, the Ministry of Trade and Industry initiated a three-year program for the development of inter-firm co-operation and networking. The main purpose was to improve the co-operation culture in Denmark and to show Danish companies the value of networking. Brokers were trained to create networks and groups of companies were funded for the conceptualisation, planning and implementation of joint projects. They included research and development, joint marketing, production, problem solving and purchasing. Even though the program ended after only three years, it became a prototype for several countries around the world. The Ministry anticipated that three years would be enough time to reach the programme's objectives. A subsequent evaluation demonstrated that the networks formed during the programme were still in place after the programme ended, but it did not answer all the questions about effectiveness at meeting the programme goals, and many felt the programme should have lasted longer.

Resource Areas (mega clusters). In 1994, the Ministry of Trade and Industry initiated the so called Resource Areas (mega clusters). The purpose of the initiative was to gain deeper knowledge about the Danish business climate. This approach was in response to a number of cluster studies on Denmark, including Porter's 1990 book *The Competitive Advantage of Nations* (Denmark was one of ten studied countries) as well as studies on industrial complexes and micro-based clusters. Eight Resource Areas covering 90% of the Danish industry were identified: services, agro/food, construction, environment/energy, transport/communication, medico/health, consumer goods and tourism/leisure. The initiative consisted of analysis and dialogue with companies and other relevant stakeholders to inform policymaking. As a result, the Government promoted 170 new policy initiatives.

Clusters of Competence. Even though the Resource Areas (mega clusters) approach resulted in numerous policy initiatives, they were seen as too broad to stimulate an effective policy formulation process. Therefore, from 1999-2002, the Ministry of Industry and Trade initiated a narrower concept of cluster activities, the so called Clusters of Competence. Using a mapping and analysis, 29 clusters of competence were identified.

However, the Ministry of Trade and Industry was criticized in the selection process for "picking winners" and for favouring some industries above others. When the Government changed in 2001, the national level focus changed in favour of developing general framework conditions and strengthening innovative co-operation between business and knowledge institutions on a regional level.

Policies to promote framework conditions for growth and regional actions

Denmark has changed its strategy from using national policies that support the development of existing clusters to seeking to support better general framework conditions for entrepreneurs and to strengthen the regional development and co-operation around new business development and innovative networks. It was felt that this strategy would avoid

Box 2.3. **Denmark's cluster policy** *(cont.)*

challenges to the selection process which also include the risk of overlooking future growth opportunities in a changing global economy as well as the risk of paying for projects that would have been implemented in any event. Some of these programmes include:

Regional Growth Centres: In 2001, the Ministry of Science and Technology launched the Regional Growth Centres initiative. As a result, 17 Regional Growth Centres were established with the aim to strengthen and develop the framework for regional co-operation and knowledge sharing among companies, knowledge institutions and other relevant stakeholders.

Action Plan for Public-Private-Partnerships on Innovation: In September 2003, the Government launched this action plan with the overall goal to further strengthen co-operation between various players in research, trade and business and facilitate access to knowledge for SMEs. The six areas of focus in the plan are: 1) co-operation on research and innovation; 2) access to competencies; 3) commercial utilisation of public research; 4) new framework conditions for university interplay with society; 5) focus and prioritising in public research; and 6) access to qualified technological service and counselling.

Action Plan for Regional High-tech Development: To further strengthen regional high-tech development, the Ministry of Science, Technology and Innovation launched this Action Plan in September 2004. It involves two new initiatives, Centres of Expertise (*regionale teknologicentre*) and Regional Knowledge Pilots, as well as activities to further strengthen existing programmes such as Technology Incubators, Innovation Consortia and the Industrial PhD Initiative. With a focus on regional competencies, Centres of Expertise are intended to act as intermediaries between regional research and SMEs. The Regional Knowledge Pilots programme aims to improve the conditions for SMEs to hire academic staff.

Other initiatives: In the last couple of years, the Danish innovation system structure has undergone major changes and, in 2007, the 14 counties will be replaced by five regions. The main purpose of the municipal reform is a more suitable governance structure and better public service. The development of regional innovation systems has become a higher priority on the national, regional and local political agendas. The five regions will be responsible for regional development and growth.

Regional Growth Fora have been established in order to carry out strategic planning, monitor regional growth conditions, develop projects and prioritize Structural Funds from the EU in accordance with the regional growth strategy. The Regional Growth Fora consist of representatives from local and regional government, knowledge institutions and businesses.

Partnership agreements on regional business development will be developed between the Regional Growth Fora and the central government to ensure co-ordination between local, regional and national goals and initiatives. In addition, Reg.Lab was created in 2005 and focuses on regional business development through benchmarking activities, knowledge sharing, and discussions among the members within the Reg.Lab network.

Source: EC and Enterprise Directorate-General (2003d), *Theme-specific Country Report – Denmark*, European Trend Chart on Innovation; EC and Enterprise Directorate-General (2004a), *Annual Innovation Policy Trends and Appraisal Report – Denmark*, European Trend Chart on Innovation, Holm Dalsgaard, M. (2001), "Danish Cluster Policy: Improving Specific Framework Conditions", in OECD (2001), *Innovative Clusters – Drivers of National Innovation Systems*, OECD, Paris; Rosenfeld, Stuart (2001), "Networks and Clusters: The Yin and Yang of Rural Development", in the conference proceedings Exploring Policy Options for a New Rural America (Federal Reserve Bank of Kansas City), Kansas City, Missouri, pp. 103-120.

change in political administration. A recession in 2001 hit the state, which prompted a much greater interest in the economy, and the cluster approach was offered as one way of conceptualising the economy and supporting its growth. In response, the private sector and the state developed the Oregon Business Plan as a framework for the state to develop an action plan to support economic growth. Within that is a revival of the sectoral cluster approach (11 leading sectors have been identified) along with the Oregon Clusters Networks (to serve any business grouping that seeks to develop as a cluster).

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 3

How Do Programmes Pick Participants?

This chapter discusses the important steps in policy design for selecting programme participants. First it explores the policy targets since that choice needs to map to the underlying problem the policy seeks to solve. It then reviews the different methods of identifying the potential targets, which may be quantitative or qualitative or a combination of the two. Finally, it analyses the different selection mechanisms used by the programmes and the appropriateness of those methods relative to the policy's goals and targets.

Introduction and key points

The economic rationale for government intervention underlies the different choices regarding programme targets. Those targets may be places, sectors or specific actors or groups of actors. They could also be a combination of these different target categories. The targets then need to be clearly identified to ensure that the resources available for the programme are adequate and that goals are achievable. The choice of selection mechanisms is a key first step and needs to be consistent with the objectives. This chapter will discuss the following themes:

- *Policy targets: what is the real problem?* There is a fundamental choice to be made between targeting leading regions, lagging regions or including all regions. The case studies include programmes focusing on the most advanced regions, others that target lagging regions (often supported by EU Structural Funds) and yet others that include all regions as potential participants. Another basic issue is the choice between dynamic *versus* exposed sectors or simply opening the programme to all sectors. Some programmes focus on only the most advanced sectors or those with specific characteristics (strategic sectors, high growth sectors, etc.). Others target sectors in difficulty or those most exposed to international competition. Some programmes may seek to focus on other sectors, such as those of strong social importance. Several countries have also experienced tension in whether to target small *versus* large firms, as they have different needs yet programmes may try to serve both.
- *Identification methods: analytic and strategic choices.* Countries identify potential programme recipients using three general approaches: 1) a statistical method, such as a mapping study; 2) through a lower level of government; or 3) through a process of self-selection, such as a call for proposals. The first method is particularly used when the goal is to support national economic drivers. In some instances, national programmes provide only a framework and rely on regions to identify target clusters within their jurisdictions. These different approaches can be further characterised as top-down, bottom-up or a combination of the two.
- *Selection mechanisms: matching programme goals with targets.* The selection mechanisms used include both competitive and non-competitive procedures. Competitive strategies are used to identify the strongest projects within a given target group and to measure the motivation of key actors, notably the private sector. The credibility of the selection mechanism and the number of selected participants has an important impact on the "labelling" effect that many programmes seek.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

Table 3.1. **Targets and selection mechanisms of case study countries**

	Programme/ policy	Primary performance goal	Target regions	Target sectors	Selection mechanism	Competitive?	Selected (applied)
Canada	NRC Technology Cluster Initiatives	National	All regions	Technologies in high-technology and other industries	Dialogue	No	n.a.
Czech Republic	Klastry	National (excluding Prague)	Lagging regions (all regions except Prague)	All, many restructuring	Self-selection via application, some groups encouraged to participate	Rolling applications til all funds used	All qualified applicants selected
Finland	Centres of Expertise	Regional	Regional urban centres (initially major cities)	Leading (potential for innovation, even if not high technology)	Self-selection via application	Yes	22 (n.a.)
	National Cluster programme	National	No regional focus	Largest sectors in the economy	Mapping results and relation to sectoral ministries	No	n.a.
France	*Pôles de compétitivité*	National ("inter-national" clusters); regional ("regional" clusters)	Leading ("international" clusters); all regions ("regional" clusters)	Leading sectors ("international" clusters); all sectors ("regional" clusters)	Self-selection via application	Yes; multiple tiers	67 (105)
	Local Production Systems (SPL)	Regional	All regions (often not leading)	All sectors grouped in industrial districts, for SMEs	Self-selection via application	Yes	n.a.
Germany	BioRegio	National	Leading	Biotech	Self-selection via application with support by *Länder*	Yes	4 (17) received most of the funding
	InnoRegio	Regional	Lagging (Eastern *Länder*)	Sectors with growth potential	Self-selection via application	Yes	25 (400)
	GA-network initiative (Joint Task)	Joint national-regional	Lagging *Länder*	All	Identified by the *Länder* in the context of a larger regional development strategy	No	n.a.

Table 3.1. **Targets and selection mechanisms of case study countries** *(cont.)*

	Programme/ policy	Primary performance goal	Target regions	Target sectors	Selection mechanism	Competitive?	Selected (applied)
Italy	Law 317(91)	Regional	All	Regional level decision	Statistical mapping	No	n.a.
	Technological Districts	National	All regions (includes additional component for southern Italy)	Strategic fields in national S&T policy	Strategic mapping	No	11
Japan	MEXT Knowledge Clusters	National	Leading university areas	High technology	Identified by Ministry in consultation with universities	No	18
	METI Industrial Clusters	National	All regions (explicitly recognises needs of different region types)	Leading	Regional METI officers identified promising cluster projects for consideration	No	19
Korea	Innovative Cluster Cities	Regional	All regions (outside of Seoul); based on existing industrial complex infrastructure	National strategic industries	Strategic selection criteria	No	7 (selection for pilot, should be extended to all 30+ complexes)
Netherlands	Peaks in the Delta	Regional	Regions driving national economic growth	Largest sectors in regional economy of national significance	Analysis by Regional Programme Commission	No	n.a.
	Key Innovation Areas	National	No explicit regional focus but regional implications	Leading (innovation and growth potential)	Analysis by Innovation Platform Council	No	n.a.
Norway	Arena Programme	Regional	All regions	All (sector neutral)	Self-selection via application and dialogue	No	n.a.
	Centres of Expertise (NCE)	National/ regional	All regions	All (sector neutral but R&D important)	Self-selection via application	Yes	n.a.
Spain, Basque Country	Competitive-ness clusters	Region-wide	All sub-regions	Important sectors in the economy; many restructuring	After mapping and public/ private dialogue, industries could apply; after initial selection, clusters petition government	No	Eligible and willing candidates accepted

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Table 3.1. **Targets and selection mechanisms of case study countries** *(cont.)*

	Programme/ policy	Primary performance goal	Target regions	Target sectors	Selection mechanism	Competitive?	Selected (applied)
Sweden	VINNVÄXT	National	Leading	Leading (high growth)	Self selection	Yes	Round 1: 3 full and 7 partial recipients (25 selected out of 150 for planning grant) Round 2:5 (23)
	Visanu	Regional	All	Priority in regional development plan	Already identified in regional growth plan; selection by dialogue	No	30 (process support recipients)
	Regional Cluster programme	Regional	All	Priority in regional development plan	Already identified in regional growth plan; selection by dialogue	No	Round 1: 3 selected for projects, 7 for 1-year basic support
United Kingdom	DTI/RDA/DA	National	All	Priority clusters defined by region in regional economic strategy	Regions organise mapping studies or similar (guidelines and support provided by DTI)	No	n.a.
United States, State of Georgia	Georgia Research Alliance	State-wide	All sub-regions containing partner university	High technology	Non-profit or industry/ university professionals select projects with greatest potential positive impact for state	Yes, but rolling	Project by project basis
United States, State of Oregon	Oregon Cluster Industries	State-wide	All sub-regions	Largest sectors in the economy, potential for job growth	Identified via mapping study	No	n.a.
	Oregon Cluster Network	State-wide	All sub-regions	All	Self-selected to become member	No	All accepted

Policy targets: what is the real problem?

The nature of the target is determined by the policy objectives and the geographic scale at which those objectives are to be achieved. The places, sectors and actors to be served by the programme, as illustrated in Figure 3.1, can have very different sets of needs. The targeting may be an explicit choice or a *de facto* choice based on the programme structure and instruments. In

Figure 3.1. **Types of policy targets**

fact, there are examples of programmes that end up serving different types of actors across region types, as revealed in evaluations of programmes in Finland and Japan, and the participation rates by different types of actors in the numerous programmes.

A clear definition of the problem to be solved serves to define the programme targets. Goals such as improving growth are not specific enough to understand the real problem. Raising levels of GDP per capita can be achieved by targeting high value added sectors but this does not necessarily create a large number of jobs. Consequently, there are a number of tensions inherent to choosing among the range of possible targets.

Leading versus. lagging regions. Programmes that have a primary objective of increasing national economic growth will usually focus on the most prominent drivers, which are leading regions and/or sectors. These prominent targets either have the greatest potential to contribute to economic growth given their weight in the economy as measured by jobs or output, or by their potential for higher rates of productivity gain. This emphasis on motor regions or industries can also serve to increase regional disparities by concentrating growth in specific areas of the country. The original structure of the *Pôles de compétitivité* programme in France assumed that national competitiveness requires some focusing of resources in key areas with spillovers from growth poles to other regions. Critics argued that the programme should, on the contrary, aim to promote growth directly in the other regions and that resources should be divided accordingly. However, allocating resources across too many clusters risks diluting the programme impact. The debate about how the programme should be implemented brought out clearly these different perspectives. Only a few of the programmes in the case study countries seek specifically to support lagging regions to address issues of regional disparities and social cohesion. Most national programmes have used EU funding to target lagging regions and sectors.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Dynamic versus *exposed sectors*. Similarly, support for dynamic sectors is designed to increase the competitive edge of these industries in global markets, with benefits spilling over into the national economy. The problem is that identifying growth sectors involves predicting the future. This means that even identifying which are the leading sectors can be problematic. Moreover, providing resources for exposed sectors that must refocus to take advantage of new opportunities has a strong structural logic and often responds to concerns about unemployment. It also moves the programme's focus away from high-growth drivers.

Several programmes target restructuring (exposed) sectors, as opposed to lagging regions. These tend to be industries that are historically key sectors for the country concerned, often heavy industries such as steel or traditional manufacturing industries. In the Basque Country, Spain and the Czech Republic (all regions except Prague), for example, the programmes began primarily in response to a need to restructure key industries. The programmes have since evolved to other industries, including new growth sectors. In most programmes the distinction between targeting restructuring industries and lagging regions is quite blurred.

Other sector types. Cluster programmes may also target sectors for reasons other than strictly economic growth or job creation/retention. For example, Sweden's Visanu programme supported cross-sectoral clusters and the creative industry which also had the benefit of serving clusters with a stronger female labour force participation rate. These sectors supported were in addition to the clusters prioritised in regional growth programmes. One of the goals of the Italian Technological Districts is to support sectors associated with social goals such as environmental industries, safety and health. Another example of a cluster target for more social goals is the introduction by the West Midlands RDA of a clothing cluster initiative. Unlike some other UK regions, notably the northwest and Yorkshire, the textile industry is not traditionally strong in the region. However, the arrival of immigrants from Asia has promoted the development of a strong though relatively low-profile clothing manufacturing cluster. The aim of this initiative was to broaden the scope of the priority clusters to take account of new economic actors, immigrants.

Small versus *large firms*. Several countries have experienced tension in how to target both small and large firms in the same programme given their different capacities and needs. The involvement of large firms is appealing, particularly in cases where the objectives emphasise research intensive industries. The Italian Technological Districts, for example, were designed so as to draw in the most dynamic technology user firms in the region, as well as to leverage private sector investment coming mainly from large firms. Supporting small firms is more easily justified on the market failure arguments mentioned above, but can also limit the impact of programmes in situations where the participation of large firms is important if the programme is to have a real impact on the regional economy. If there are no size restrictions, tensions may arise when trying to serve all firm sizes and types with the same programme and instruments. However, interaction between firms of different sizes in the context of a public programme (as opposed to a market relationship) is not straightforward. The level of service needs, the ability for technological absorption and the resources available for R&D are just a few of the important distinguishing factors by firm size. The tension occurs in the design of the instruments and the power dynamics in clusters. The nature of the cluster type (*i.e.*, hub and spoke, Marshallian or satellite) also structures cluster power dynamics by firm size.

This challenge of simultaneously serving small and large firms has been observed, for example in the French *Pôles de compétitivité* programme and the work of UK RDAs. In France, the application process was designed to attract the clusters that drive national economic growth. Therefore, that process was dominated by large firms that may or may not have actively included small firms in their proposals. However, ultimately 52 clusters that did not have an international focus were also selected for a lesser level of support. Small firms have expressed confusion as to their place in these different categories of clusters as well as the relationship between this programme and the prior SPL programme, which specifically targets small firms. The UK RDAs are expected to include representatives of business in their governing boards and to engage individual businesspeople in the formulation of policy. In practice, it is often easier to get representatives of large firms than it is to involve managers of SMEs. Moreover, the interest of policy makers in showing that programmes attract private sector funding could encourage participants to favour the interests and opinions of large firms over those of smaller firms.

Identification methods: analytic and strategic choices

The identification of potential programme participants for cluster programmes is a challenge for several reasons. The first is the difficulty of quantifying the existence and workings of a cluster. Differences in results of identification methods stem largely from the differences in methodology but also reflect different perspectives on what policy should be targeting. This section will describe different issues regarding quantitative and qualitative identification methods, notably the pros and cons of the different approaches and their appropriateness for the different programme types. One of the major distinctions is between top-down and bottom-up identification strategies.

Analytic differences in quantitative identification. There are two basic approaches to mapping of clusters focused on either industry sector concentration alone or a combination of concentration and interdependence. See Box 3.1 for a more

Box 3.1. **Quantifying clusters**

Quantification methods usually compare the ***concentration of different industries*** in specific regions with the national average. This analysis then assesses to what extent each sector is under- or over-represented with respect to the nation as a whole. It may further measure either the performance of the region as a whole or look at the aggregate performance of individual firms. The location quotient or similar statistic is the metric used to identify such over-representation. A principal drawback of this approach is that it depends on industry classifications, which tend to be clear for traditional manufacturing industries but inadequate for broad and rapidly evolving industries such as biotechnology. Standard industry classifications are also poorly adapted to take account of the fuzzy boundary between manufacturing and service employment in many high-technology sectors. Studies of the spatial location of industry in France looked at employment zones (local labour market areas) and analysed where particular sectors were over-represented, with this concentration being not dependent (or not only) on one or more large firms. One such study identified 144 existing clusters in France plus a significant number of emerging clusters (EC, 2002). Another study using a different set of criteria identified 680 potential industrial districts (Lainé, 2001).

The other approach is to look in more depth at the ***productive linkages*** between firms, both within specific sectors and between firms in related sectors in a given region. This analysis is clearly a more difficult task as it requires an understanding of the different components of a value chain and the interactions among suppliers and customers. In practice, this means combining the location quotient – type methodology with something that shows cross-linkages.

The **cluster report for the UK** Department of Trade and Industry (DTI) is a good example of a multi-faceted initiative to quantify clusters and place them geographically using both quantitative and qualitative information. The assessment first identified regional concentrations using location quotients showing over-representation in different sectors and significant concentrations of employment in specific sectors/branches. These regional concentrations were then reviewed using a data set that gave more specific firm-level information about the activities of the larger firms in the regional cluster, which gave clues as to the linkages across sectors/branches. The information was completed with interviews and input from other sources. This final step was important insofar as it enabled some conclusions to be drawn about the nature of the clusters in terms of the subjective criteria, such as:

1. Stage of development (embryonic, established or mature).
2. Depth: deep (complex linkages, multiple institutions), shallow (co-location, few linkages, or unknown).
3. Employment dynamics.
4. Significance: internationally significant, containing internationally competitive industries, nationally significant, large but concerned with domestic markets, regionally significant, or local concentration.

Source: EC and Enterprise Directorate-General (2003b), "Background Paper on Methods for Cluster Analysis", prepared for the Trend Chart Policy Workshop Innovative Hot Spots in Europe: Policies to promote trans-border clusters of creative activity held in Luxembourg, 5-6 May 2003.

detailed explanation of these methods and their drawbacks. They are more commonly used for programmes coming out of industrial policy as opposed to science and technology programmes. Such studies seek to identify at a minimum the largest statistical clusters, meaning those clusters that have the greatest weight in the economy in general or in traded sectors. In some studies, a more detailed competitiveness analysis is used to determine how promising the largest clusters are in general and for the particular country. Spain's Basque Country Competitiveness programme, Finland's National Cluster programme in the late 1990s, and more recently the Czech Republic and Oregon Clusters Initiative have all used the statistical concentration approach in their identification process, at least as a first step.

The statistical cluster mapping studies indicate co-location, but follow-up studies are needed to assess the actual linkages among actors. This information is necessary to develop instruments most adapted to the cluster needs. Several programmes have begun with this basic mapping for identification and then elaborated on this. The Czech Republic, through the Klastry programme, has followed up with the regions and completed over 40 additional mapping studies that go into more depth. These more detailed studies are often part of a programme's initial phase in cluster development. The results of an analysis of this kind in Sweden in 2003 were taken into consideration by some Swedish agencies for their programmes in identifying clusters, but were complemented by other sources of information. A similar but more elaborated approach was used in the United Kingdom as described in Box 3.1. Several other programmes include in their eligible expenses studies to better understand the cluster's linkages.

Relying on a lower level of government. For a national policy, another strategy for identifying programme targets is simply to rely on another level of government, or decentralised central level government agents, to do so. As discussed later in Chapter 5, this type of strategy also helps support policy coherence across levels of government. For example, in Sweden the national government has required that regional governments include cluster and innovation systems as part of their regional growth programs (RTPs). Therefore, the regions, which have better information on the regional economic situation, could help the national level identify potential targets for their programmes. A similar strategy is used in Germany by the GA-networking initiative. The *Länder* identify the most prominent networks as part of their regional strategy for funding under the GA programme. The Japanese Industrial Cluster programme relied on the national ministry's regional officers, in consultation with local and prefectural authorities, to identify the most promising projects for consideration. In the United Kingdom, the DTI provides guidance but the regions identify priority sectors or clusters and determine the levels of support and types of instruments in accordance with their broader Regional Economic Strategy (which is submitted to the DTI and other central ministries for review and approval).

The Italian Law 317, by contrast, was designed as a statistical model that set out clear and very specific criteria for defining an industrial district type cluster that a region may support. These criteria were based on the level of concentration (in terms of employment and number firms) of a particular industry in a given labour market area. This model could then be applied by any region in order to define industrial districts that would then be eligible for support through a variety of SME support measures. As the process of decentralisation advanced, Italian regions gained responsibility for enterprise support and then a number of regions either used their own formula or replicated that of the central government as a means of selecting clusters.

Self-identification. Many programmes simply rely on cluster self-identification, a bottom-up approach. In most cases the universe of potential programme participants is delimited by certain eligibility criteria. Those criteria may concern the number and type of actors required in the cluster (including regional public support), geographical location or the scope of projects or collaboration that can be funded. The challenge is ensuring that the potential targets are made aware of the opportunity to self identify, such as via a request for proposals.

Selection mechanisms: matching programme goals with targets

Selection mechanisms tend to be either competitive (based on an open competition, a call for proposals or similar) or non-competitive (the recipients are designated). Selection can also be characterised as top-down or bottom-up. There are strategic reasons for using these different types of mechanisms based on parameters such as programme goals, policy maker knowledge about the universe and quality of potential participants, and ambitions for leveraging additional funds. Different selection mechanisms may also entail varying transaction costs which can be compared with the benefits of different options. A summary of these options is outlined in Table 3.2.

Competitive selection (including bottom-up). Most of the programmes that have a strong innovation focus used a competitive selection process. This is consistent with the purpose of such programmes, which is to support the highest quality proposed projects that are promising sources of economic growth. In the case study countries, such programmes include Sweden's VINNVÄXT (150 applicants), the French *Pôles de compétitivité* programme (105 applicants), Germany's BioRegio, InnoRegio and BioProfile programmes, and Norway's new Centres of Expertise.

Even when lagging regions are a possible or explicit target, some programmes include a competitive selection progress to identify the best public investments within the target group. Germany's InnoRegio, while targeting the lagging Eastern *Länder*, selected only 23 out of 444 applying networks. Other programmes open to lagging regions also included a competitive process. The

Table 3.2. **Rationale for different selection mechanisms**

Mechanism	Rationale
Competitive	• When best participants not clear upfront • Gauge motivation of participants • Value of labelling effect • Longer–term spillovers for groups not selected
Limited number	• Clear prioritisation of resources • Value of labelling effect
Top-down	• Clear targets (strategic, quantitatively identifiable) • Coherence with other programmes
Bottom-up	• When best or possible participants not clear upfront • Information best obtained by self-identification • Gauge motivation of participants
Combination	• Best choice in a pre-defined universe • Lower level of government best placed to select • Collaboration across levels of government required • Special additional considerations in cluster selection

French SPL programme used a competitive process in the several rounds of funding. The Finnish Centres of Expertise, across both leading and lagging regions, compete periodically for designation and annually for funding.

The structure of these competitions often recognise that, although there may be a critical mass of firms, many potential applicants to a competition would need time to prepare an effective application. As such, some programmes are based around a pre-selection or multi-stage selection process. For example, the Czech Klastry programme provides Phase 1 funding to the initiating group to identify other potential partners for a cluster initiative. Funding therefore covers studies and other expenses in the development of the group prior to the funding of more substantial collaboration. The first round of VINNVÄXT funding also included a two-stage process such that a subset of candidates received funding to further develop their proposals.

One of the explicit goals of Norway's Arena programme is a highly flexible procedure for selection that allows different points of entry. If an idea for a project needs development, the group may enter at Stage A and receive funding for a preliminary study. If the group is a bit more advanced, it may enter at Stage B directly with a preliminary project. If the initiative were truly advanced, it may enter at Stage C for a main project. A similar staged process was also used for the InnoRegio Programme in Germany.

Limited selection via credible mechanisms. While a competitive selection process can contribute to the importance of a labelling effect, the number selected in the process must also be limited. Those programmes seeking to support leading regions or industries are often more strict in the selection process and the numbers funded. The Norwegian Centres of Expertise is seeking specifically to limit the number of selected clusters such that the labelling effect would be important enough to attract international attention. The Swedish VINNVÄXT programme in its first round selected only 3 full recipients and 7 partial recipients out of 150 initial applicants, with the second round selecting only 5 out of 23. While France did select a very large number of clusters, they developed a four-tier labelling system to distinguish among them: 6 were "international", 9 were "internationally oriented", 15 were "inter-regional" and 37 were "regional".

The capability and credibility of the bodies that make selections plays a role in the programme's public perception and hence the effectiveness of this label. The involvement of private actors appears to be an important source of credibility in this process. The Georgia Research Alliance, for example, serves as an expert body to select the most relevant research projects to support growth in Georgia. While state legislators vote to allocate the funding to the GRA, its Board members are representatives from universities (many are private entities) and industry. Most countries have selection committees comprised of both public and private actors. In cases where the selection process is performed entirely by civil servants, the process is more subject to debate. In France, for example, the lack of private sector involvement in the selection committee has been raised by the policy's critics. However, France does have a committee to ensure the integrity of the cluster label. In Sweden, the fact that the programme designation was national, and not only regional, was observed in evaluations to play an important role in cluster legitimacy.

One additional benefit of competitive selection procedures is that sometimes, even for candidates that do not get selected, the process in and of itself resulted in network building and action plans. Sweden's VINNVÄXT programme only accepted a small fraction of the applications received. When Sweden's subsequent Visnau programme was introduced, many of these groupings who had already worked together on a VINNVÄXT application applied to Visanu and were selected. Some networks have also worked together to reapply for subsequent VINNVÄXT funding rounds. The same result was found in Germany. Unsuccessful applicants to the BioRegio and InnoRegio programmes have gone on to develop their projects on the basis of other funding mechanisms. The momentum that was generated by the BioRegio competition led to the expansion of support to biotechnology via the BioProfile programme to a larger number of regions, many of which had been unsuccessful applicants for BioRegio.

Top-down selection. There are several technology- and innovation-focused projects that used a top-down selection process for strategic reasons. Finland's National Cluster programme had allocated R&D funds to the largest statistical clusters in its recession recovery efforts. In Italy, the Technological Districts were selected on the basis of criteria such as the availability of a well-structured project, the coherence of the project with the strategic fields of the national S&T policy, and the participation and leadership in the district of public and private stakeholders. The Korean Innovative Cluster Cities selected are consistent with the national industrial vision of strategic industries, the pilot locations selected being the most promising. Finally, Japan's two cluster programmes were both top-down in the sense that the selection was led by officials of the central ministries and followed the strategic lines set out in policy documents for industry and science. However, in the case of the Japanese Industrial Clusters programme, the top-down approach to a selection procedure was tempered by a bottom-up element: regional level staff of METI made the selection.

Statistical methods versus *negotiated approaches (or a combination of the two)*. While some selection processes are based solely on statistical mapping, several programmes have used the flexibility of a dialogue or negotiated process. The statistical selection is based on objective criteria less subject to political influence but it can miss clusters important for other reasons. Programmes based on a mapping include the former Finland National Cluster programme and the Oregon Cluster Industries approach, in both cases seeking to target the largest sectors. Several programmes used a combination of a preliminary cluster identification followed by a dialogue for a final selection so as to preserve some flexibility and ensure participant motivation. After Spain's Basque Country competitiveness assessment, the region promoted a public/private dialogue to select the pool of initially eligible sectors. Interestingly, that dialogue gave a list that was different from the Porter-inspired competitiveness exercise, albeit there were some areas of overlap. It was then up to the firms themselves to decide if they would go forward as a formal cluster. One identified cluster had even declined to participate in the beginning of the programme but later chose to join. Since that first selection round in the early 1990s, other clusters have self-identified to authorities and, if convincing, have became part of the cluster programme.

Sweden and Montreal have also used this dialogue/negotiation process in cluster selection. The Visanu and Regional Cluster programmes in Sweden used a dialogue method to select participating clusters, but did not rely solely on those clusters already prioritised in regional growth plans or identified by a statistical mapping. The process was also used to adjust for the complexity of large urban areas, which made it more difficult for projects in the Stockholm and West Gotia regions to be selected under VINNVÄXT given the importance of regional consensus on priority sectors to the selection process. A recent process in Montreal, a city with strong industrial specialisations in aeronautics and pharmaceuticals, took the form of a cluster audit (Box 3.2). The city was looking to establish a more comprehensive cluster development strategy to take into account different categories of existing clusters as well as to identify new opportunities. On the basis of the statistical analysis of established and emerging clusters, the metropolitan authority (CMM) worked with a range of actors to develop a consensus around the main priorities for resource allocation.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Box 3.2. **Cluster audit in Montreal**

The first task for policy makers was to identify the key characteristics of clusters and understand their different dynamics and potential. This work was undertaken in Montreal through the Metropolitan Strategy for Economic Development by Area of Excellence (*Stratégie métropolitaine de développement économique par créneaux d'excellence*). Montreal's economy is based on strong specialisation in a number of sectors. The preliminary research phase identified 15 possible clusters to focus on in Greater Montreal: agriculture/bio-food, professional and business services, tourism/leisure, aerospace, information technology, life sciences, nanotechnology, metals and metal products, fashion/textiles, transportation/distribution, plastics, composite materials, printing/publishing, chemicals, and environmental industries. These were divided into three categories: existing/traditional clusters, emerging clusters and diffused clusters (those not geographically concentrated).

The point of departure in the case of Montreal was that the strategy should take a metropolitan-region perspective. Unless cluster initiatives are specifically structured to engage actors throughout the metropolitan region, they run the risk of heightening the tensions that exist between smaller municipalities in the region and the new mega-city of Montreal itself. A second principle of the cluster strategy was that it should address problems of duplication among institutions, streamlining interventions according to an agreed set of priorities. Given the potential for conflict between proponents of specific locations or specific institutions, it was important that the process of identifying priority clusters and priority measures was both transparent and focused. In this respect, the initiative to engage a working group to elaborate a development strategy based on clusters "of excellence", appears to be an important step forward. While there is a great deal of activity around the different clusters – various cluster-based associations and committees – there had not been until then an overview of the range of clusters in the metropolitan region that both diagnosed strengths and weaknesses and proposed concerted policy action. The ultimate aim of the group is to follow an open methodology by which the results are verified and lead to agreement regarding the policy actions as well as the level and type of public investment.

Source: OECD (2004), *OECD Territorial Reviews: Montreal, Canada*, OECD Publications, Paris.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 4

What Instruments Do They Use and How?

This chapter highlights the different instruments used in the cluster-based programmes across OECD countries. It first reviews the categories of instruments frequently used, notably to engage actors, provide collective services and/or promote collaborative research. It then discusses issues of programme duration and funding. Finally it concludes with examples of effective synergies and linkages across programmes to serve the wide variety of cluster types.

Introduction and key points

The instruments to implement policies and programmes supporting regional specialisation and clusters seek to capitalise on the theoretical benefits described in Chapter 1. These benefits include basic networking advantages of scale and scope, the traditional Marshallian externalities (labour market pooling, greater levels of specialisation and thus access to higher order services, and knowledge spillovers), Porter's Diamond inciting greater innovation (demanding customers, rivalry and complementarity) as well as more sophisticated innovation processes. While the benefits lead to greater firm efficiency, innovation and specialisation, a diversity of instruments can be used to achieve those benefits. This chapter will discuss several issues related to:

- *Categories of instruments*. Most programmes focus on one or several families of instruments to: 1) engage actors; 2) provide collective services; and/or 3) promote collaborative research. Several innovation-focused programmes also include instruments to promote entrepreneurship and new firm creation. Given the diversity of region types and cluster types, offering a menu of instruments increases a cluster's ability to adapt the programme to its own needs.
- *Programme duration and funding*. In general, the funding patterns can be broken down into three types: 1) engagement of actors with budgets of less than EUR 100 000 per cluster annually and financing typically for three years or less; 2) more substantial collective services and "light" R&D investment with per cluster annual spending between EUR 100 000 and 1 million; and 3) "heavy" R&D, often for a long-term time horizon even up to ten years. In some cases, the programme timeframe is shorter than would be expected to successfully achieve the stated goal. While some programmes do have co-financing requirements with other levels of government or the private sector, the leverage effect of private funds seems to be under-developed across many programmes.
- *Building synergies through linkages*. Several countries have linked instruments through different programmes across parameters, such as the product lifecycle or the cluster initiative's stage of development, to offer a full range of cluster support instruments. The programmes have also sought in several cases to link clusters of the same industries in different geographic locations or of different industries but under a common theme.

Table 4.1. **Instruments and budgets of case study countries**

	Programme/ policy	Primary instruments	Overall programme budget	Avg. annual spending per cluster	Co-financing (in addition to programme)
Canada	NRC Technology Cluster Initiatives	Innovation (collaborative R&D, specialised R&D services and infrastructure, industry development)	EUR 342 million over first 5 years (includes three five-year funding rounds)	Approximate range from EUR 1.2 to 8.4 million	Yes (may be national or provincial sources)
Czech Republic	Klastry	Engagement of actors (cluster facilitator trainings, supporting cluster initiative formation, incentive to incorporate at least one university)	EUR 12 million over three years	Part I: finding partners (EUR 7 000-35 000); Part II activities (100 000 to 1.6 million)	Increasing from 25% to 75% over the three years
Finland	Centres of Expertise	Entrepreneurship and innovation (collaborative R&D, business services to existing and start-up SMEs)	1999-2005 totalled EUR 46 million (approximately EUR 8 million 2003, EUR 9.4 million 2004)	From EUR 150 000 to 900 000 per CoE (overall average approx. 400 000)	50% regional government
	National Cluster programme	Innovation (collaborate R&D)	More than EUR 100 million over two to three years	Approximately EUR 4-6 million	n.a.
France	*Pôles de compétitivité*	Innovation (collaborative R&D); engagement of actors (development of cluster initiative)	EUR 1.5 billion over three years	Approximate estimated average 26.7 million for international clusters, 1.9 million for regional	Yes
	Local Production Systems (SPL)	Engagement of actors (supporting cluster initiative formation and joint activities)	Not available (< 3 million thus far)	< EUR 40 000	Yes
Germany	BioRegio	Innovation (collaborative R&D)	EUR 95 million with preferential access to other funding totalling EUR 700 million	Approx. EUR 2 million direct programme funding per region for top 4; others significantly less	n.a.
	InnoRegio	Innovation (collaborative R&D)	EUR 110 million	n.a.	40% of total spending combined was private
	GA-network initiative (Joint Task)	Engagement of actors (supporting cluster initiative formation)	n.a.	Max 300 000 over 3 years; up to 500 000 for project with more than 5 partners. Public funding up to 70% of eligible costs	70% public, 30% other

Table 4.1. **Instruments and budgets of case study countries** *(cont.)*

	Programme/ policy	Primary instruments	Overall programme budget	Avg. annual spending per cluster	Co-financing (in addition to programme)
Italy	Law 317(91)	Government service delivery and resource allocation (defining industrial districts)	n.a.	n.a.	n.a.
	Technological Districts	Innovation (collaborative R&D)	n.a.	Expected EUR 50-60 million per district over the entire period	Private sector co-financing
Japan	MEXT Knowledge Clusters	n.a.	n.a.	Approximately EUR 3.8 million	n.a.
	METI Industrial Clusters	Entrepreneurship and innovation (collaborative R&D, business services to existing and start-up SMEs)	n.a.	n.a.	n.a.
Korea	Innovative Cluster Cities	Entrepreneurship and innovation (collaborative R&D, business services to existing and start-up SMEs)	Approximately EUR 150 million over four years	Approximately EUR 3.6 million in first year, up to EUR 6.3 million in later years	25% co-financing by private sector for technology projects
Netherlands	Peaks in the Delta	Regions may choose appropriate instruments using funds from the block grant (soft and hard infrastructure)	EUR 216 million for 2007-10 (of which EUR 130 million (EUR 32.5 million per year) pre-allocated to regions	Annual funding per region ranging from EUR 2 to 10.5 million, cluster support a part of this figure	No formal requirements
	Key Innovation Areas	Instruments flexible, mainly: Engagement of actors (requirement of cluster initiative and programme development) and Innovation (joint R&D, research centres, SME technology support)	Approximately EUR 200 million per year (minimum of 5 years)	Will vary, but in the tens of millions per cluster	Private sector contribution required
Norway	Arena Programme	Engagement of actors (supporting cluster development around key projects)	Approximately EUR 4 million per year	Approximately 50 000 for initial phases, 200 000 to 300 000 for later projects	Flexible co-financing
	Centres of Expertise (NCE)	Entrepreneurship and innovation (collaborative R&D, commercialisation assistance, incubators, internationalisation to become global players)	Approximately EUR 4 million first year, EUR 6 million second year	Approximately EUR 600 000 to 700 000	Minimum of: 25% private business/ knowledge actors; 25% local or reg. gov't

Table 4.1. **Instruments and budgets of case study countries** *(cont.)*

	Programme/ policy	Primary instruments	Overall programme budget	Avg. annual spending per cluster	Co-financing (in addition to programme)
Spain; Basque Country	Competitiveness clusters	Engagement of actors (supporting cluster initiative)	EUR 2 to 4 million annually	Approximately EUR 180 000 to 400 000	40-50% private
Sweden	VINNVÄXT	Entrepreneurship and innovation (collaborative R&D)	n.a.	Approximately EUR 800 000 per year over 10 years	50% regional co-financing
	Visanu	Engagement of actors (support cluster initiatives, knowledge sharing)	EUR 7.5 million for three years: process support (EUR 3 million), knowledge development (EUR 1.5 million), inward investment (EUR 1 million) and support activities (EUR 2 million)	Approx. EUR 30 000 for process support (other funds earmarked for overall goals)	50% regional co-financing
	Regional Cluster programme	Engagement of actors (support cluster initiatives, instruments to support market related activities)	EUR 7.5 million for five years	Maximum support of EUR 215 000; average support of 125 000 to first three winners	50% regional co-financing
United Kingdom	DTI/RDA/DA regional cluster initiatives	Varies from region to region – engagement of actors activities are particularly common; emphasis on role of HEI; business services to existing and start-up SMEs in clusters	Varies according to region; funding from "single pot" (combined funding from several government departments including DTI) for regional strategy; funds then allocated to programmes including cluster initiatives	Varies according to region	Strong emphasis on leveraging private sector funding in RES; some co-funding from local authorities or in-kind support expected
United States, State of Georgia	Georgia Research Alliance	Entrepreneurship and innovation (collaborative R&D, commercialisation assistance, SME incubators, joint access to technology labs)	Over USD 400 million since inception of 1990s	n.a.	Co-financing level depends on programme
United States, State of Oregon	Oregon Cluster Industries	Government service delivery (re-focus economic development efforts around top clusters)	Budget not yet established	n.a.	n.a.
	Oregon Cluster Network	Engagement of actors (assemble cluster initiatives, knowledge sharing)	Basic operations funding by the state for now	n.a.	n.a.

Categories of instruments

In general, the instruments used by programmes in the case studies are of three distinct types: 1) to engage actors; 2) to develop collective services; and 3) to support collaborative R&D. A basic overview of these instruments by category is found in Table 4.2. Engaging actors is frequently a prerequisite for participating in collective services or as a component of a collaborative R&D project. One review of clusters has identified three critical success factors

Table 4.2. **Instruments promoting regional specialisation and clusters**

Goal	Instruments
Engage actors	
Identify clusters	● Conduct mapping studies of clusters (quantitative and qualitative) ● Use facilitators and other brokers to identify firms that could work together
Support networks/ clusters	● Host awareness raising events (conferences, cluster education) ● Offer financial incentives for firm networking organisations ● Sponsor firm networking activities ● Benchmark performance ● Map cluster relationships
Collective services and business linkages	
Improve capacity, scale and skills of suppliers (mainly SMEs)	● SME business development support ● Brokering services and platforms between suppliers and purchasers ● Compile general market intelligence ● Co-ordinate purchasing ● Establish technical standards
Increase external linkages (FDI and exports)	● Labels and marketing of clusters and regions ● Assistance to inward investors in the cluster ● Market information for international purposes ● Partner searches ● Supply chain linkage support ● Export networks
Skilled labour force in strategic industries	● Collect and disseminate labour market information ● Specialised vocational and university training ● Support partnerships between groups of firms and educational institutions ● Education opportunities to attract promising students to region
Collaborative R&D and commercialisation	
Increase links between research and firm needs	● Support joint projects among firms, universities and research institutions ● Co-locate different actors to facilitate interaction (*i.e.*, science parks, incubators) ● University outreach programmes ● Technical observatories
Commercialisation of research	● Ensure appropriate intellectual property framework laws ● Overcome barriers to public sector incentives in commercialisation ● Technology transfer support services
Access to finance for spinoffs	● Advisory services for non-ordinary financial operations ● Public guarantee programmes and venture capital ● Framework conditions supporting private venture capital

for cluster development that instruments could focus on: networks and partnerships, strong skills base and innovation and R&D capacity (DTI, 2004). Beyond these broad success factors, the need for instruments can vary across different cluster forms, stages of the cluster lifecycle, etc. A discussion of public strategies for a more cluster-friendly environment is found later in the next chapter on governance. The budgets and timeframe of the programmes vary greatly according to which of these types of instruments are used.

Engaging actors

Programmes that use instruments to engage actors are generally appropriate for all contexts. Building networks and partnerships (*i.e.*, interaction among firms, between firms and other actors) may be an end in and of itself; however several programmes that have focused exclusively on building networks alone have not proven durable. These initiatives may also be focused either on internal linkages within the cluster or external linkages between the cluster and other actors or regions. The goal of these instruments is not only to bring actors together but to get them organised around key issues by industry or a common theme that cuts across several industries. The private actor motivations need to be carefully assessed as many programmes in OECD countries have been evaluated as having too strong a public role and not a sufficiently active private role in these engagement relationships. This section will discuss several important issues in building these linkages, such as the importance of facilitators, the forms of cluster initiatives, the spatial area to be served, the level of engagement desired and the instruments to develop common goals.

Importance of facilitators. The role of the facilitators in engaging actors predates the mass popularity of clusters in public policy in the 1990s. Facilitation is either part of the budget of the programme generally or an eligible expense within approved projects. The nature of facilitation can differ based on the types of actors, the ease of identification of actors, and the goals for working together. At its most basic form of facilitation, an animator is employed to bring firms together for informational or social events. For example, in one of its earliest cluster initiatives, the United Kingdom's DTI sponsored a facilitator for the Biotech sector in and around London. This led to BioWednesday events, attracting several hundred participants, which were credited with raising the level of interaction among the region's biotech companies. Taking the facilitation role further, Scottish Enterprise also emphasised network building through the use of a range of events and meetings organised by a facilitator who visited firms and built interest in the idea of a network of common interest among firms in the region. Italy has a long tradition of supporting facilitators in their industrial districts targeting SMEs. Perhaps one difference between the Italian situation and that of the United Kingdom and many other countries is that many of the social ties on which co-operation were based were strongly embedded in Italy whereas they were often underdeveloped in other countries.

Denmark's Network programme had an active approach to recruiting and training facilitators that was replicated around the world. The Danish programme trained brokers, including the development of a broker certification system, as well as used other "scouts" to identify opportunities for joint activities (see Box 4.1). Many US states replicated this approach in the early 1990s, especially for rural areas, such as North Carolina, Arkansas and Oregon (Rosenfeld, 2001). The concept of facilitator training and certification continues to be used today, including in the latest Oregon programme and the Czech Klastry programme.

Forms of cluster initiatives. The organisations that manage the cluster initiatives take a variety of forms. The main variants include: 1) non-profit associations; 2) university or similar nominated agents; and 3) public agencies. They typically take the form of a non-profit association when the goal is to have a separate legal status, such as in France or Spain's Basque Country. Other strategies have used a university representative or local government representative as the recipient and manager of programme funds, such as in Phase 1 of the Czech Klastry programme. In Germany, the clusters and networks of its different programmes are also managed by an independent association or consortium, rather than a firm or public authority. In the GA-networking initiative, these associations must include at least three types of partners, one of which must be a commercial enterprise. Italy also relied on consortia of firms, a legally defined concept. The cluster facilitators in Sweden's Visanu programme were a mix of public and private actors.

Spatial configuration of actors. The spatial configuration of the targeted actors is an important factor in trying to engage them. If the participants are in close proximity, instruments for regular informal gatherings like the BioWednesday example are possible. If the actors are located in different countries not in immediate proximity, the instruments to develop networks need to account for this distance. Japan's two programmes offer an interesting contrast in terms of strategies for building networks. The Knowledge Clusters are based on a university as the hub; therefore the instruments best serve clusters that are geographically concentrated in an urban area. The Japanese Industrial Clusters are based on presence of firms in a particular administrative region, but they do not necessarily share a geographic hub and are more dispersed. The Korean Innovative Cluster Cities have industrial complexes that serve as the focal point for instruments. In France, the wide distances between cluster members were making the programmatically required meetings among firms problematic, which resulted in a change in programme requirements. According to the Global Cluster Initiative Survey 2003, 50% of the 238 surveyed cluster initiatives have most of their members within one hour driving distance (Sölvell *et al.*, 2003).[1]

Box 4.1. **Denmark's Network programme: brokers and scouts**

Denmark's Network programme offered monetary incentives to promote co-operation among firm groups of at least three independent firms that sought to commit themselves contractually to a long-term relationship. Grants were provided for three different phases of network creation: feasibility studies to evaluate the potential for co-operation, planning grants to prepare an action plan or budget for a network, and start-up grants for operational costs in the first year.

Network brokers: The Network broker was the key to the programme, serving as an external facilitator, or systems integrator for network functions. In some instances, the brokers were consultants expecting to earn a living in this role, but in most cases brokers worked for agencies that already served small and medium-sized enterprises (SMEs). Because the idea of working with groups of firms was uncommon, Denmark designed a training and certification program.

Network multipliers: These are people intimately familiar with the companies and able to detect and assess opportunities for collaboration that can be passed on to brokers. Sometimes referred to as "scouts", they include staff of chambers of commerce, trade associations, banks, accounting firms, law offices, trade centres, technical colleges, and technology extension services that serve SMEs.

Incentives for rural networks: Denmark offered sequenced incentives to compensate small firms for some of the costs of participating in activities with uncertain returns. The Danish program was based on the US Small Business Innovation Research program, with small 100% concept grants (up to USD 10 000), larger planning grants (up to USD 50 000) and larger still implementation grants (up to USD 500 000).

Information campaigns: Denmark also distributed information widely through the media, brochures, and newsletters on the potential value of networks and funding opportunities. They used distribution venues ranging from conferences to pubs.

Institutional hubs: This was not part of Denmark's official program but was part of those of most of its imitators. Because the sector centres in Emilia-Romagna were viewed as essential parts of its co-operative structure, many regions used specialised technical institutes, research centres, and councils for network formation and services.

Source: Rosenfeld, Stuart (2001), "Networks and Clusters: The Yin and Yang of Rural Development", in the conference proceedings *Exploring Policy Options for a New Rural America*, Federal Reserve Bank of Kansas City, Kansas City, Missouri, pp. 103-120.

Level of engagement. The number of participating actors in an initiative is an indication of their level of responsibility and engagement. The groupings need to be inclusive, yet as they expand the direct involvement of actors could be reduced. While the average numbers per cluster were not readily available for all countries, there is definitely a wide range. Some programmes establish a minimum number of actors to get funding. The Czech Klastry programme requires a minimum of 10 firms for its first phase, and 15 for its second phase. The average cluster membership for Sweden's Visanu was approximately 40 firms per cluster overall, although not all participants were active and the number of firms ranged considerably from four to 200 firms in a given cluster. France's programmes tend to have clusters with a large number of reported participants, however the number actually involved in joint projects is considered to be approximately half of those reported as members. Japan's Industrial Cluster programme reported several thousand firms as participants in the 19 clusters, along with around 200 universities and research institutions. The first evaluation of the programme noted that, although generally positive about outcomes, the main benefit reported by participating firms was informational materials, which suggests that most firms might have a relatively passive engagement. The Global Cluster Initiative Survey (GCIS) found that 95% of the surveyed formal cluster initiatives had 10 or more active members.

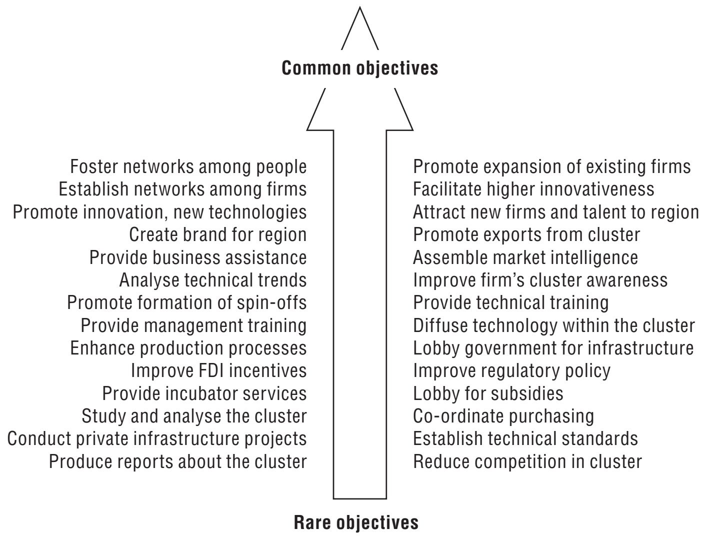
Building common goals. Potential members of a cluster need tools to motivate participation and guide common action. Programmes that bring actors together usually start with some form of study. Often this can be a mapping of cluster linkages, a competitiveness analysis, and/or the development of strategic action plans. As illustrated in Figure 4.1, the range of objectives resulting from these assessments is wide. The development of a cluster initiative itself is also an instrument, and typically the management costs, such as a dedicated staff person, are reimbursed in the context of these programmes. Studies may be a precondition for the formalisation of a cluster initiative or the first step.

Collective services

Once the actors have agreed to work together, their common interests dictate the nature of collective services to support participants. Collective services involve a significant degree of consensus and require active firm participation. It is of course more difficult to evaluate the outcomes of collective services than those targeted at single enterprises. This section will discuss the common instruments to promote internal and external (including FDI and exports) business linkages, provision of services through collective service centres and instruments related to skill development.

Business linkages. For decades, horizontal SME networking programmes have used very practical instruments to meet specific business needs. These instruments include the strategic plans and studies described above, as well as

Figure 4.1. **Cluster initiative objectives from GCIS**



Note: GCIS is the Global Cluster Initiative Survey.
Source: Sölvell *et al.* (2003), *The Cluster Initiative Greenbook*, Ivory Tower AB, Stockholm, Sweden.

concrete business plans. Other instruments include joint purchasing, partner search databases, participation in local trade fairs under a common label, or certification of standards to name a few. The collection and dissemination of market and business intelligence is another instrument that is particularly useful when cluster-specific to support various competitiveness analyses and cluster marketing.

Increasing inward investment and exports. Several programmes did actively use instruments for inward investment in the context of the specific cluster programmes. Labelling is perhaps the most common instrument in the programmes. In many cases the programme's selection process was designed to identify the most notable areas of competence in the country. In other cases, the programmes offered support with international market development, supply chain linkages and export promotion. The national or regional level inward investment agency is sometimes involved in these approaches in the context of cluster programmes.

Collective service centres and facilities. Most of the programmes reviewed simply reimbursed eligible costs for privately purchased collective services. However, there are examples of publicly provided collective services. These "real services" to SME groups of manufacturing companies are expected to increase the competitiveness and market opportunities of user firms by modifying in a structural way their organisation of production and their relation with the market. For a number of reasons, such as their public good nature or excessive transaction costs for private providers, these services are not always readily available for purchase in the market by SMEs, thereby necessitating public intervention. Within Italy, there has been a development since the early 1980s on a grass roots level for such service centres. For example, the ERVET centre in Emilia Romagna along with many craft and industry associations have provided these "real services" such as market information, testing and export support. Given their different areas of focus, many of which are designed to support a particular local cluster, they take purely public, purely private and mixed public-private forms. Spain is another country which has taken advantage of this model for publicly provided collective services in the form of technology and business development centres. Beyond services, programmes to support clusters can also meet specific collective needs. For example, in the northwest of England, there are a number of biomedical start-up companies, clinical trial companies and large teaching hospitals.

Human resource development. Although a strong skill base is frequently cited as a critical cluster success factor and a key determinant for firm location, the programmes studied did not typically emphasise human resource development. This result is perhaps due in part to the fact that most education and training programmes are often viewed as framework conditions. They are also sponsored by different agencies and ministries and can not always be easily aligned with the particular needs of a cluster in one region. The Georgia Research Alliance is unique among the sample as placing a strong accent on the attraction of world-class researchers and the attraction and training of highly skilled graduate students. Canada's NRC Technology Cluster Initiatives also place a strong accent on highly skilled human resources.

Nevertheless, clusters in several programmes did support training or took the opportunity to collaborate with a local educational institution on skill development. Traditionally, the SME-support type programmes have offered training programmes to serve collectively the training needs of SME employees through a cluster skill centre for both technical and managerial skills. There are also attempts to help train future employees for a cluster. In France, for example, one of the SPL programme clusters worked with a local high school to develop a targeted vocational education training programme in plastics. In Sweden's Visanu programme, although skill development was not a focus for financing, more than 40% of the participating clusters used part of the financing for education or competence development (*e.g.*, new university programs, competence centres, and seminars or workshops on specific topics). A few of the Innovative Cluster Cities in Korea have listed skill development as part of their plan, with resources going in part to construction. These are just a few of the examples across OECD countries.

Collaborative R&D

Some cluster policies are clearly positioned so as to build linkages between research and business. These programmes are part of the general shift in R&D policy towards multi-actor and multi-sector projects with an emphasis on innovation and commercialisation potential. Often the programmes seek to address specific weaknesses in the country's innovation results. The nature of these initiatives span from "light" or one-off joint R&D projects to capital intensive "heavy" collaborative R&D programmes in key national industries. This section will discuss the common instruments used in programmes to support collaborative R&D, the networking of these actors, commercialisation of results and entrepreneurship instruments to support spin-offs and new firms.

Addressing weaknesses. Many of the instruments to promote innovation are designed to overcome clearly identified weaknesses in national innovation systems and performance. For example France's assessment revealed that R&D is too heavily dominated by the public sector, resulting in a lack of market orientation. German initiatives in this field are expected to address a perceived lack of effective co-operation between industry and the research/ university sector and insufficiently co-ordinated research support activities. Italy's recent regional innovation initiatives are part of a more general response to concern among policy makers that Italy tends to be behind other advanced European nations with respect to some key indicators of performance in the field of R&D and innovation. For example, business R&D expenditures, tertiary and continuing education rates, EU and international patenting, and other indicators are lower than the EU average.[2] In Sweden, concern over the so-called Swedish paradox of high R&D expenditure but low levels of commercialisation is a key factor in regional innovation and cluster policies. In each case, an emphasis on building synergies has emerged.

Building networks and platforms. Given the importance of engaging actors in the context of these joint research projects, most programmes involve instruments to that effect. For example, in Sweden's VINNVÄXT programme, at least 50% of eligible expenses had to be spent on R&D but other eligible expenses included process management, brand creation, organisation and strategic work. In Finland's National Cluster programme, which was primarily collaborative R&D, 25% of funds were spent on cluster governance. France's *Pôles de compétitivité* requires new formal structures as a key element of the programme. Nevertheless, many cluster programmes are not always linked to existing research platforms.

In some cases, these platforms and networks are promoted through research parks, industrial complexes and other vehicles. There have been mixed results regarding the effectiveness and efficiency of such tools to promote greater innovation in the context of collaborative research (OECD, 2005). Occasionally a large-scale project does achieve success, such as the North Carolina Research Triangle in the United States, but building from scratch is long and expensive process. The Hsinchu Science Industrial Park in Chinese Taipei began in 1980 with a governmental mandate and more than 20 years later is a cluster of almost 100 000 employees, two universities and 335 firms and research centres (Conference Board of Canada, 2004). France's Sophia-Antipolis began through government initiative in a region without an industrial or university tradition. After a difficult first phase, the momentum of France's decentralisation and firm-led development helped to strengthen this cluster. Often these complexes are regionally or locally sponsored instruments and therefore explicit links need to be made with a separate cluster programme.

Commercialisation. The programmes included a range of instruments beyond funding collaborative R&D projects with firms to support commercialisation. Universities in general and within the context of these cluster programmes have dedicated technology transfer and industry liaison officers to support the commercialisation of university research. In Japan, for example, the Knowledge Cluster programme included patent lawyers in their activities. The Georgia Research Alliance, among others, includes counselling services to researchers. Framework conditions may also be a significant barrier to R&D commercialisation but these issues are addressed outside of cluster programmes.

Promoting entrepreneurship and firm creation. Entrepreneurship instruments are being emphasised in only some of the programmes with a clear innovation orientation, despite the benefit of small firms in innovation systems given their potential for "creative destruction". Both the Finnish and Norwegian Centres of Expertise are actively linked with the science park and incubator programmes in their respective countries. In fact, the Finnish programme even includes in its evaluation of success the number of new companies created. The Georgia Research Alliance supports projects with university partners, including the commercialisation of research via the creation of new spin-off firms with counselling services and management advice. Japan's Industrial Cluster programme has a strong SME creation focus and seeks to establish facilities to provide training to entrepreneurs. The Korean Innovative Cluster Cities often include an incubator component. Instruments to provide financing for these research spin-off companies, such as public venture capital funds, were only used in few of the programmes reviewed.

Using a range of instruments

Evaluations reveal that the way different clusters and regions take advantage of the same programme can vary significantly. Even if the policy targets are clearly defined, those variations across cluster development stage,

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

level of technology and spatial configuration are important. For example, an evaluation of Finland's Centres of Expertise programme noted that the smaller centres focused more on cluster-based development and internationalisation and the larger centres focused more on R&D projects conducted with universities and other research institutions.

An evaluation of Japan's programme highlights these variations in programme implementation very clearly. The programme was designed to cover a range of clusters in regions throughout the country. The variations were based on a combination of region types and clusters types. As illustrated in Table 4.3 the evaluation identified four major types of clusters served by the programme: metropolitan, science-technology centred, niche, and mini-clusters. Had the programme not allowed for flexibility in the use of different instruments, it would not have been possible for all these different cluster types to benefit fully.

Table 4.3. **Japanese Industrial Cluster programme typology**

Type	Cluster characteristics	Focus
Metropolitan areas	These regions need to revitalise diverse clusters with strong existing capacity	Innovation process near commercialisation, often with large firms
Science-technology-centred clusters	Industrialisation of technology with a central role for high-level universities and research institutes	Technology transfer, business incubation, and greater investment in R&D (the latter resulting in a greater time lag between support and economic impact)
Niche clusters	Smaller regional agglomerations with some cluster practices present and some niche activities	Supporting existing networks, albeit for niche fields with limited market share
Network formation between mini-clusters	Industrial agglomeration is thin and there are no broad-based clusters	Network formation among small scale clusters that need time to develop

Source: Ministry of Economy, Trade and Industry (METI) (2005), "Report on Industrial Cluster Programme", evaluation report submitted to METI by the Industrial Cluster Study Group.

Programme duration and funding

While a particular instrument may be appropriate to meet a specific need, if the programme's timeframe, funding level and exit strategy are not consistent with that need it can undermine programme effectiveness. When there is no clear exit strategy, the policy risks a moral hazard problem, whereby actors will count on future programme access and therefore do not exert as much effort to be effective from the start. Some programmes simply have a fixed programming period regardless of the policy, such as the six-year EU funding periods. In cases where evaluations discuss programme timeframes, they more often indicate that they were too short to achieve the goals rather than too long. The funding level and continuity go hand in hand with these programme duration decisions. This section will describe the trends in programme timeframes and funding patterns, including overall programme funding levels and co-financing arrangements. No information was available on funding and duration for programmes seeking primarily to re-orient public service delivery.

Long-term R&D projects. Programmes with an accent on substantial R&D projects require years to implement and continuity in funding is important for the nature of such investments. The Korean Innovative Cluster Cities are part of a long-term time horizon composed of interim five-year plans. Sweden's VINNVÄXT programme offers funding over ten-year periods. Norway's Centres of Expertise programme also uses a ten-year cycle, albeit this timeframe is broken up into three stages with minimum milestones to continue funding. The BioRegio programme lasted eight years after the selection competition. The Japanese MEXT Knowledge Clusters have a five-year programme period but multiple programming periods are envisioned to correspond with their evolution. The Italian Technological Districts are designated for four years but are expected to continue. The French *Pôles de compétitivité* programme seeks to make substantial investments for those top 15 international clusters. However, the programme period is only three years, including the selection phase. The tight timeframe may prove very challenging for participants to coalesce as a group and implement large-scale R&D projects. A CzechInvest study noted that individual investment projects need a timeframe of between four and ten years (CzechInvest, 2003).

Overall funding levels. With few exceptions, the level of funding for these programmes relative to other important initiatives in regional, industrial or S&T policy is generally modest. As previously mentioned, Korea and France are the exceptions as their programmes are very prominent on the national political agenda. At the state level, the Georgia Research Alliance does serve to channel the majority of its R&D investments. Finland's National Cluster programme served to reorient a portion of R&D spending through sectoral ministries and did involve large sums over a short timeframe. The other programmes in case study countries tend to have budgets of a few million EUR annually, as compared to the hundreds of millions or billions spent in total on the related policy areas. Of course these figures need to be carefully interpreted. First, the programmes to engage actors are simply never going to have the same budgets as capital intensive R&D programmes. These figures do not account for the total funds available to the programme given the frequent matching funds requirements from other public and/or private actors. Neither do they capture the amounts that are rerouted from other sources given the label of a selected cluster, as the BioRegio example illustrates. Nevertheless, it does reveal that these programmes are simply one of many programmes in each policy field and do not necessarily command significant resources.

Engaging actors. The timeframe for organising cluster initiatives and other networking mechanisms need not be as long as R&D-intensive programmes, but they do need several years. The programmes in the case study countries that focus on building networks typically last between three to five years. Some programmes have such an initial grant cycle but appreciate that there are changing needs over time which is met by programme renewals or the development of another programme to build on this first stage. Examples of both instances are found in the case studies. The Japanese Industrial Cluster approach has a long-term vision with an "evolutionary" plan with regards to cluster progress. While there are a limited number of evaluations of the effectiveness of such programmes to launch long-term networks, evidence does suggest that even a three-year timeframe is not always sufficient. The CzechInvest study also found that a period less than three years is unlikely to be sufficient to allow the cluster to stand alone, and that four years would be a more realistic minimum programme period.

Funding category 1: forming partnerships. The first category of spending is a small investment to launch a cluster initiative. These amounts are less than EUR 100 000 per year per cluster (often less than EUR 50 000) and last only a few years. Examples of this type are the SPL programme in France, Part 1 funding of the Czech Klastry programme, and Sweden's Visanu programme.

Funding category 2: "light" R&D and collective services. A second category of hybrid spending includes supporting cluster collaborative projects, sometimes with "light" R&D. This spending category ranges from between EUR 100 000 to approximately 1 million. The Basque Country's Competitiveness Program falls into this category, although since the cluster initiatives have been in existence for several years they now access funding from other programmes to support many collaborative R&D projects. The Czech Republic's Klastry programme Phase 2 and Germany's InnoRegio also support collaborative projects in this spending range. The Finnish and Norwegian Centres of Expertise investment are other mid-range spending programmes.

Category 3: "heavy" R&D investment. A third category is for "heavy" R&D investment. These projects receive around EUR 1 million or more for a sustained period of time or several million per year but for a more limited timeframe. The Finnish National Cluster programme allocated several million to each cluster but only for 2-3 years as an initial period. It was then up to the sectoral ministries to decide how to allocate their increased R&D budget, and some ministries continued to support clusters. BioRegio and VINNVÄXT are examples of sustained long-term investments of EUR 2 million and 800 000 respectively per year. The calculations for the French *Pôles de compétitivité*, with a very high estimated spending per cluster for international clusters, should be interpreted with caution as the total budget of EUR 1.5 billion is an upper bound based on allocations from a range of ministries and agencies and a number of programme decisions are still being finalised. Korea's spending per cluster is also very high relative to other programmes. This is in part because some of the funding goes to infrastructure investments.

Multiple goals of programme co-financing from different sources. The matching funds requirements of many national programmes serve several important goals. A private sector matching requirement helps test that participants are motivated and are willing to contribute their own funds. It also serves to reduce moral hazard, for if private funds are involved, participants are more likely to act efficiently than if it is a pure grant. Sometimes that private sector contribution is measured in terms of in-kind resources. A co-funding requirement from another level of government also serves to promote policy coherence. In all cases, the matching serves to leverage additional funds to increase the impact of the programme seed funding. In one example from the French SPL programme, the leverage effect of national public funds was one to 40. Across the Georgia Research Alliance programmes, the leverage effect is reported to be one to five, as the investment of USD 400 million in state funds yielded an additional USD 1 billion in federal government research dollars and USD 1 billion in private resources.

The programmes focused on grant funding and typically did not have explicit links with access to other forms of financing. France is one example that has included other types of financing from the start. Of the up to EUR 1.5 billion for the programme, several EUR hundred million will come in the form of loans, guarantees or equity investments from either the OSEO Financing Agency (SME and innovation financing entity) or the CDC, a quasi public bank that provides financing in the context of programmes with a public interest. While the goal of the labeling effect should help leverage private funds beyond basic programme requirements, that information was not available in most case studies.

Linking across programmes, instruments and clusters

Complementary programmes. Since not one policy or programme can cover all instruments, one solution is to ensure that different programmes serve effectively as complements. In Japan, the Industrial Cluster and Knowledge Cluster programmes are complementary across the production cycle (see Table 4.4). The Knowledge Clusters focus on supporting university-hub clusters for R&D transfer. The Industrial Cluster programme is designed to support existing and newly created SMEs through networking and collective services. As discussed in a later section, Japan seeks to ensure the success of this complementarity through national and regional level bodies with representatives from both programmes. In Sweden, that complementarity was also sought across the VINNVÄXT and Visanu programmes, the former being more focused on R&D projects and the latter on general cluster development and business linkages.

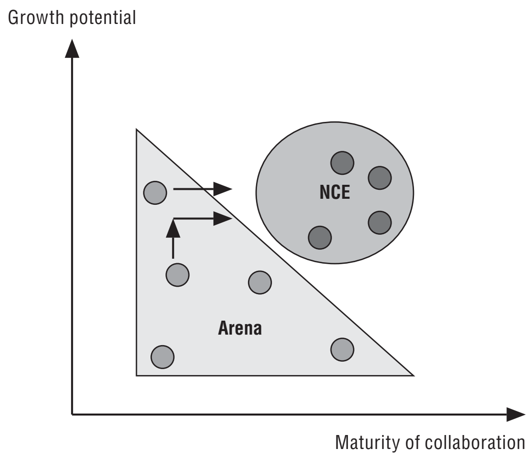
Table 4.4. **Complementarity of Japanese and Swedish cluster programmes**

	Japan		Sweden	
	Knowledge Clusters	Industrial Clusters	VINNVÄXT	Visanu
Ministry/Agency	Ministry of Education, Culture, Sport, Science and Technology (MEXT)	Ministry of Economy, Trade and Industry (METI)	VINNOVA (Innovation Agency)	Nutek (National Agency for Economic and Regional Growth, VINNOVA, Invest in Sweden Agency
Goal	Reform and upgrade R&D transfer and systems in regions	Promote networking among economic actors in a region	Cultivate regional innovation systems using the triple helix	Strengthen clusters through "soft" infrastructure
Instruments	Collaborative R&D, technology transfer services	Collaborative R&D, business services to SMEs	Collaborative R&D, engagement of actors	Engagement of actors (process support and knowledge sharing)
Selection	Key universities with technology specialty	Identified by regional level officials of METI as "promising" clusters	Competitive process	Dialogue
Spatial aspect	18 urban centres based on selected universities	Firms across 19 regions spanning the country	Functional area, aligned with related regional growth plans	Administrative region, aligned with regional growth plans

Complementary instruments. The Georgia Research Alliance offers a package of instruments that also serve the different stages of development from finding the researchers to commercialisation of ideas. The first step is attracting quality researchers and with them quality graduate students. The Eminent Scholars programme serves to bring expertise to the state. GRA also sponsors labs and equipment that are made available to industry and university researchers to support research. The VentureLab programme offers pre-incubator services that help universities identify laboratory discoveries that have commercial potential and that guide faculty through the various stages of technology development to the stage of company formation. The GRA Innovation Fund awards are made to university faculty that work with firms to develop and deploy technology. The Technology Development Centers (technology incubators) then help emerging companies access the research and development resources of host universities while refining the commercial potential of the technologies under development. In addition to specialized equipment and facilities, incubator companies have access to a range of business start-up services and affordable space.

Complementary by cluster stage of development. Some countries/regions have conceived of their programmes as complementary with one serving as a pre-selection or pipeline to identify clusters for the other. This is the case, for example, in Norway, Oregon (US) and Sweden. The Arena programme is flexible and open to promising initiatives and is designed to support their development. Most programmes take a year for the initial stage(s) before getting funded for a main project that lasts typically around two years. The Centres of Expertise programme is designed to select already functioning clusters that seek to increase the level of R&D collaboration and to internationalise. The competitive selection and longer-term funding (ten-year cycles) are the conditions for the programme to which the best Arena networks may seek to graduate (see Figure 4.2). Oregon's Cluster Network seeks to support all clusters interested in development. OregonInC, a separate organisation, will develop programmes to serve those that have been identified as successful. Within Sweden, the Visanu programme targeted many of the initiatives that did not get funding under VINNVÄXT. Further, the latest programme, the Regional Cluster programme, seeks to direct at least 80% of funding to former Visanu participants, and in the first round of funding all the winners had participated previously in Visanu. Given that a potential drawback to the pipeline approach is the exclusion of new promising clusters, keeping the programme open to candidates that were not in the pipeline is a consideration.

Figure 4.2. **Complementarity of Norwegian cluster programmes**



Source: Government of Norway (Innovation Norway).

Across successive funding rounds of the same programme, the goals may be complementary. For example, VINNVÄXT had funded in the first two rounds the most promising clusters/projects. The third round is focusing on more embryonic clusters. Both the Japanese and Korean programmes view their programmes in a longer-term timeframe with distinct phases. For example, the National Plan for Balanced Development views the innovation programmes in three stages of five years: 1) set up innovation systems; 2) move into the world class innovative cluster; and 3) enhance the regional innovation system. An evaluation of Japan's industrial clusters also proposed three five-year stages for the programme: 1) start-up period; 2) growth period; and 3) self-sustaining period. These different phases imply a need for complementary instruments over time.

In some cases, the linkages between programmes and their instruments is an afterthought. For example in France, the development of the policy for the clusters (*pôles*) was a higher profile political issue than the SPL programme in place since 1998, and as a result, the linkages between the two policies are being assessed now that the second programme is in place. While the SPLs are composed of SMEs, the *pôles*, often driven by large firms, have typically not made SME inclusion a top priority. The government has requested that, when appropriate, *pôles* not selected be re-oriented via the SPL programme and that *pôles* make a stronger effort to include SMEs.

Information sharing. Several countries/regions have developed interesting ways of sharing information across clusters. In the Basque Country, for example, each cluster has a common core of committees that cover internationalisation, quality and technology. The Competitiveness programme staff serves as a link across cluster initiatives on these cross-cutting themes. One staff person covers all of the meetings for a particular cluster while another staff member attends meetings across all clusters for one of the common activities. Sweden's Visanu programme actively encouraged clusters to participate in knowledge sharing with other clusters in the context of thematic work groups. Such groups included integration of horizontal aspects, entrepreneurship in the creative industry, and interactive research on cluster development among others. A national network was also created to help cluster initiatives with skill development and experience sharing of the process managers engaged in the programme. In Oregon, the Oregon Cluster Network's main goal is to share information across clusters. In addition, the state's economic development group has designated staff to follow the different cluster related programmes.

Cluster linkages. Beyond basic information sharing, these linkages can be both cross-sectoral linkages to develop a cluster as well as linkages across clusters in the same fields. The cross-sectoral linkages serve to develop new thematic clusters. For example, telematics is a theme that brings together the ICT, Global Positioning System (GPS), sensor and automotive industries. Cross-cluster linkages serve to achieve greater critical mass. In Sweden, cross-sectoral cluster initiatives such as packaging (pulp and paper, design, ICT, surface technology) were encouraged. As an outcome of Visanu and the Invest in Sweden Agency, a cross-cluster initiative for this cluster was initiated, the National Packaging Project, which is run by the national research institute STFI Packforsk (*www.stfi.se*). Within the Finnish Centres of Expertise there are several networks of Centres to bring together different clusters working in the same fields (food processing, tourism, metal industry and wood products).

Notes

1. The Global Cluster Initiative Survey 2003 identified more than 500 cluster initiatives, of which 238 responded. The sample bias is towards more formalised and English language cluster initiatives. For more details on this study, please see Sölvell *et al.* (2003).
2. At the same time, the Italian economy has some features that explain at least some of these results. In particular, the economy is marked by a predominance of small manufacturing enterprises and a lack of large, technology-based enterprises, which tends to depress business R&D statistics, reduce the number of patents applied for and influence the type of innovation (*i.e.*, incremental process innovation rather than technology-based innovation).

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 5

Who Does What? Governance

As policies to support clusters are coming from many different levels of government, this chapter explores the issue of governance. It reviews the different strategies used by national level governments to co-ordinate across different ministries and agencies. It then analyses the different strategies used in the articulation of national versus regional roles for supporting clusters. The strategies used to develop policy coherence across levels of government are considered. Finally, it identifies strategies that have been successful in ensuring private sector engagement in such programmes.

Introduction and key points

The level of government best suited to initiate, implement or fund a policy depends on the governance frameworks as well as the nature of the policy. In the case of regional specialisation and clusters, there are economic rationale for all levels of government (local, regional, national and in some cases supra-national) to support such policies. Furthermore, different levels of government have available different sets of competencies and tools and in turn reap different degrees of benefit. The role of the private sector is also a very important consideration in these programmes.

There are three classic justifications for higher levels of government to be involved in a particular policy according to the fiscal federalism literature, and those lessons apply here (Bergvall *et al.*, 2006). If there is "vertical imbalance", a lower level of government may have responsibility for a policy such as regional development but lack the funds to execute such a policy. Given the weak regional levels in many countries, this is clearly a relevant issue for why national policy, at least for the funding, is needed. In other cases, there may be a need to overcome "horizontal imbalance" in performance across different sub-national (or national) units. Those policies targeted at lagging regions seek to address this problem. Thirdly, there is an important issue of spillovers (externalities). When the economic health of one region has a positive impact on other regions that do not accrue to the region generating the benefit, a higher level government may want to promote this higher social return. This line of reasoning can be used as a justification for targeting leading regions that accrue important benefits to the national economy. Additionally, a higher level of government is in an appropriate position to promote synergies across levels and to prevent, when possible, wasteful competition that results in an overall welfare loss for the country.

There are of course justifications for lower levels of government to play an active role in policies with an important place-based component. Regional authorities may have more information and contacts than a central government with respect to target needs. They are closer to the clusters to be able to identify possible linkages among actors in the cluster or barriers to cluster development. They may also more directly benefit from the economic activity generated by more successful clusters in the region. A brief overview of these considerations is found in Table 5.1.

Table 5.1. **Considerations for level of cluster policy intervention**

Rationale for level of programme responsibility	Level of government
● Spatial dimension of regional innovation actors ● Nature of spillovers and their spatial implications ● Institutional frameworks ● Financial resources (availability, redistribution issues) ● Knowledge of actors in regional innovation and their relationships ● Technical capacity	● Supra-national ● National ❖ Federal ❖ Regionalised unitary ❖ Decentralised unitary ❖ Centralised unitary ● Regional (administrative) ● Regional (functional) ● Local

National governance contexts clearly play a role in the development and implementation of policies to effectively promote regional specialisation and clusters. The programmes are embedded in a variety of constitutional frameworks. The country types range from a federal structure with very strong sub-national units as well as unitary countries ranging from regionalised to centralised forms (Loughlin, 2000).* Some of the key governance issues taking these differences into account include:

- With the proliferation of policy families that could potentially support regional specialisation and clusters, *central level co-ordination* is becoming increasingly important. Country strategies at the central level include inter-ministerial or inter-agency committees designing programmes and overarching national plans that include these programmes.
- The *articulation of national and regional roles* in these policies is clearly dependent on the institutional frameworks. Unitary countries may simply develop the programme at the national level. Federal countries and certain unitary countries have to rely on financial incentives to engage their more autonomous sub-national regions.
- Strategies to develop *policy coherence across levels of government* for cluster policies include several co-operative approaches to policy sharing with respect to initiating, funding and implementing a programme There exist a number of *common missed opportunities* in terms of coherence both at the same level of government as well as across levels of government.
- While all programmes seek to work with *private sector actors*, some are more successful than others in ensuring their active participation.

* Loughlin's typology is based on constitutional frameworks and accountability of different levels of government to the voter and not on assignment of responsibilities across levels of government.

Table 5.2. **Governance considerations for case study countries**

	Programme/ policy	Constitutional framework	National government role	Lead ministry/agency	Regional government role	Private sector role
Canada	NRC Technology Cluster Initiatives	Federal	Initiate, fund, implement, monitor	National Research Council	No pre-set role but in most cases partial co-funding	Participate
Czech Republic	Klastry	Centralised unitary	Initiate, fund, monitor and implement policy, capacity building for regions	CzechInvest (Investment and Business Development Agency, under Ministry of Industry and Trade)	Orient regional approach to identify and support selected clusters	Apply for funding, participate
Finland	Centres of Expertise	Decentralised unitary	Initiate, co-fund	Ministry of Interior, Department for the Development of Regions (with inter-ministerial committee)	Co-fund	Apply for funding, participate
	National Cluster programme	Decentralised unitary	Initiate, fund and implement	Individual sectoral ministries	None	Participate
France	*Pôles de compétitivité*	Regionalised unitary	Initiate, partial funding, implement	Inter-ministerial delegation for regional planning and competitiveness (DIACT), joint with Ministry of the Economy, Finance and Industry	Support applications, partial funding	Apply for funding, lead cluster initiative (with public participants)
	Local Production Systems (SPL)	Regionalised unitary	Initiate, partial funding, implement	Inter-ministerial delegation for regional planning and competitiveness (DIACT)	Increasingly involved in partial funding	Apply for funding; lead cluster activities
Germany	BioRegio	Federal	Initiate, fund	Federal Ministry for Education and Research (BMWA)	Co-fund and implement	Apply for funding, participate
	InnoRegio	Federal	Initiate, fund	Federal Ministry for Education and Research (BMWA)	Co-fund and implement	Apply for funding, participate
	GA-network initiative (Joint Task)	Federal	Initiate, joint selection and funding	Ministry of Economy, *Länder*	Support applications; joint selection and funding	n.a.
Italy	Law 317(91)	Regionalised unitary	Initiate through framework conditions for regional decision	None, Ministry of Productive Activities promoted the law	Adapt, fund and implement	Depends on regional programme
	Technological Districts	Regionalised unitary	Initiate and fund	Ministry for Education and Research	Lead implementer	Co-fund projects

Table 5.2. **Governance considerations for case study countries** *(cont.)*

	Programme/ policy	Constitutional framework	National government role	Lead ministry/agency	Regional government role	Private sector role
Japan	MEXT Knowledge Clusters	Centralised unitary	Initiate, fund and implement	Ministry of Education, Culture, Sports, Science and Technology (MEXT)	No set role	Participate (public sector led)
	METI Industrial Clusters	Centralised unitary	Initiate, fund and implement	Ministry of Economy, Trade and Industry (METI)	No set role	Participate
Korea	Innovative Cluster Cities	Centralised unitary	Initiate, fund and implement	Korea Industrial Complex Corporation (under the Ministry of Commerce, Industry and Energy)	No set role	Participate
Netherlands	Peaks in the Delta	Decentralised unitary	Initiate, fund	Ministry of Economic Affairs	Identify clusters and other areas for support, potentially co-fund, involvement of development agencies	Participate
	Innovation Key Areas	Decentralised unitary	Initiate, co-fund and implement (via cluster initiatives)	Ministry of Economic Affairs/ SenterNovem Agency	Not directly involved	Active role in strategy setting and financing
Norway	Arena programme	Decentralised unitary	Initiate, funding, implement	Joint agreement three agencies: Innovation Norway, SIVA (Industrial Development Corp.) under the Ministry of Trade and Industry + Research Council under the Ministry of Education and Research	Include in regional and local development plans; possibly co-fund (but more "bottom-up" than Centres)	Apply for funding
	Centres of Expertise (NCE)	Decentralised unitary	Initiate, matching funding, implement	Joint agreement three agencies (request of Ministry of Local Government and Regional Development)	Include in regional and local development plans; co-fund	Apply for funding; lead cluster initiative
Spain; Basque Country	Competitive-ness clusters	Regionalised unitary	Not a national policy	Basque Regional Government, Department of Industry, Commerce and Tourism	Initiate, fund, implement	Apply for funding; lead cluster initiative

Table 5.2. **Governance considerations for case study countries** *(cont.)*

	Programme/ policy	Constitutional framework	National government role	Lead ministry/agency	Regional government role	Private sector role
Sweden	VINNVÄXT	Decentralised unitary	Initiate, matching funding, implement	VINNOVA (Swedish Agency for Innovation Systems, under the Ministry of Education, Research and Culture)	Matching funding	Apply for funding; participate
	Visanu	Decentralised unitary	Initiate, matching funding, implement	Nutek (Swedish Agency for Economic and Regional Growth) joint with VINNOVA (Innovation Systems) and Invest in Sweden Agency. They depend on the Ministries of Industry, Foreign Affairs and Education respectively)	Support applicants in regional growth plan, matching funding	Apply for funding; participate
	Regional Cluster programme	Decentralised unitary	Initiate, matching funding, implement	Nutek (Swedish Agency for Economic and Regional Growth)	Support applicants in regional growth plan, matching funding	Apply for funding; participate
United Kingdom	DTI/RDA/DA cluster initiatives	Centralised unitary (with 3 devolved governments)	Facilitate, fund	Department of Trade and Industry; Regional Development Agencies (RDAs); Devolved Administrations (DAs)	Work with RDAs to develop cluster initiatives within regional economic strategies, some co-funding	Participate on RDA board
United States, State of Georgia	Georgia Research Alliance	Federal	Not a national policy; indirect support via co-financing of R&D and commer-cialisation	Georgia Research Alliance (non-profit organisation of business leaders and universities)	Partial funding	Initiate, partial funding, implement
United States, State of Oregon	Oregon Cluster Industries	Federal	Not a national policy	State of Oregon Economic and Community Development Department	Initiate, fund, implement	Participate
	Oregon Cluster Network	Federal	Not a national policy	State of Oregon Economic and Community Development Department	Initiate, fund, implement	Request to participate

Central level governance: co-ordinating at the top

As with any national multi-sectoral and/or placed based programme, co-ordination at the central level can serve to increase the initiative's potential effectiveness. The lead ministry behind a national programme is inextricably linked to the policy orientation. Programmes are promoted by a ministry to fulfil its mission using the tools it has at its disposition. Programmes are usually implemented by the ministry or affiliated agencies most consistent with the programme goals. The central level co-ordination mechanisms that can overcome these biases are usually based on inter-ministerial or inter-agency committees to plan, finance and even implement programmes. In the case of Japan, a co-ordinating committee at the regional level has also been introduced to ensure that the METI and MEXT activities in each region are co-ordinated.

While most programmes have one clear managing ministry or agency, a few countries use central level co-ordination mechanisms. Both of France's programmes are managed by DIACT (formerly known as DATAR), the Agency for Regional Competitiveness and Development. DIACT is actually an inter-ministerial agency reporting to the Prime Minister and is currently housed within the important Ministry of Interior. Given the prominence of the *Pôles de compétitivité* programme and its large budget, the Business Division of the Ministry of Economy, Finance and Industry is also actively involved. Finland's Centres of Expertise are led by the Ministry of the Interior, Department for the Development of Regions, but the committee specifically for this programme is highly inter-ministerial.

One of the explicit goals of Sweden's Visanu Programme was to facilitate central level co-ordination across three agencies to overcome programme fragmentation. The central level government had a proliferation of programmes under different agencies, a problem which the Visanu programme sought to overcome. The programme name actually represents the national level agencies that worked together on its design and implementation: **Visanu** (**V**INNOVA, **I**nvest in **S**weden **A**gency, and **Nu**tek – Agency for Economic and Regional Growth). These agencies report to separate ministries for Education/Research, Foreign Affairs and Industry respectively. For practical reasons, the budget was administrated by Nutek, but all three agencies were involved in planning and implementation. For example, the three General Directors had regular meetings and personnel from all agencies were part of the steering committee and the working groups. The process support and knowledge development components were mainly administrated by Nutek with support from VINNOVA, while international marketing was led by ISA. Sharing across agencies included personnel, funding and experiences.

Norway has also sought a tri-partite agency sponsorship approach to co-ordinate at the central level. Both the Arena programme and the Centres of Expertise have used the same strategy. In fact, the three agencies signed in 2005 a joint venture agreement to bring "closer and more binding co-operation" so as to provide "unified service for users throughout the country". The sponsors are Innovation Norway and SIVA, the Industrial Development Corporation of Norway, both under the Ministry of Trade and Industry, along with the Research Council of Norway under the Ministry of Education and Research. This co-ordination goes beyond these two programmes to include Incubator Initiatives, Value Creation 2010 (a programme for in-firm and network-based innovation), and MOBI for R&D-based innovation, among others.

In the case of Finland's National Cluster Programme, the central level co-ordination was actually a common strategy applied by the different sectoral ministries. The Science and Technology Policy Council allocated funds to cluster programmes. The respective ministries were responsible for funding and co-ordinating different programmes to support their cluster(s). TEKES (under the Ministry of Industry and Trade) and the Academy of Finland (under the Ministry of Education) were also asked to support these clusters in their research programmes. One of the positive findings in a mid-term evaluation was related to central level co-ordination, as the programme served to increase co-operation of the public actors funding research.

Japan has developed an interesting strategy for linking its two cluster policies at both the national and regional levels through a range of co-ordinating bodies. For example, at the initiative of the Council for Science and Technology Policy, a regional science and technology cluster collaboration policy group was set up to bring together the key government departments concerned (METI, 2005). Moreover, each region has established a Regional Cluster Promotion Association consisting of representatives of both the Industrial Cluster projects and the Knowledge Cluster projects. The Regional Cluster Promotion Associations organise joint seminars for presentation of the outcomes of projects in both programmes (Kodama, 2004).

Several countries have also made use of some form of public-private group, such as a competitiveness council, to help in co-ordinating actors around a common competitiveness agenda. In Spain's Basque Country programme, the selection of key sectors included first a cluster mapping and competitiveness analysis study and then a public/private dialogue in the form of a Competitiveness programme. Oregon's cluster programmes were developed as part of a broader economic development "business plan" for the state in co-operation with the Oregon Business Council. The Georgia Research Alliance serves as a platform for co-ordinating across universities and industry projects which receive state funding via this non-profit organisation. There exist numerous international examples of competitiveness councils such as in the US (national, state level and even sub-state level councils), Ireland, several Latin American countries and Singapore among others. There are examples of entities initiated by both the public and private sectors, but in all cases there is an active private sector involvement.

National/regional articulation: managing the relationship

The articulation of policies between the national and regional level is of course dependent on the national constitutional and legal frameworks. The assessment of which is the "right" policy level depends on the considerations given above but often this articulation across levels of government implies a shared responsibility.

Incentives for and delegation to sub-national governments. The national governments of federal countries have limited options in promoting policy coherence across levels of government. They simply do not have the legal authority to dictate certain programmes or policies to sub-national governments. In some cases, the funding can go directly to a project or place within a sub-national government; however the transactions costs of such an approach may in some cases be high. It is the promise of funding that can incite sub-national governments to take certain policy directions. Germany is a federal country that has successfully used national level cluster programmes. BioRegio and InnoRegio, for example, were national competitions for projects in the *Länder*. The German federal government sees its role as that mainly of a facilitator by organising competitions and selecting regions but playing little active role in managing the programmes, which is either a *Länder* responsibility or assigned directly to NGO consortia or networks. In Canada the NRC Technology Cluster Initiatives are another example.

Federal and regionalised countries also have an opportunity to empower regions to promote cluster development through decentralisation or legal frameworks. Italy's Law 317, which dates back to 1991, explicitly recognised consortia of small firms as a distinct group that could benefit from targeted policies that regions were legally enabled to develop. Progressive measures of decentralisation in Spain have increasingly granted regions the responsibility and tools relevant for clusters. While the central government took the lead in industrial policy until the 1990s, regional governments now address a number of policy areas important for firms and the overall business environment, including industrial policies. Additionally, a constitutional jury has ruled that innovation is a matter for regional governments while R&D is a matter for national governments but with a goal of effectively co-ordinating with regional governments.

Shared responsibility. Shared responsibility for the selection and funding of recipients is one vehicle for supporting policy coherence. In Sweden, the national government has asked that regional governments adopt regional growth plans that make explicit which areas of regional specialisation are the most important to the region's economic development. The Visanu programme then supported clusters that in most cases have been pre-selected by the regions themselves. Regions are also required to match national level funding to increase the leverage effect of national funding and to ensure regional support. In France, the regions helped to submit the proposals as well as pledge co-financing for the *Pôles de compétitivité* programme.

Contracts and other funding agreements for national/regional policy articulation are another vehicle for supporting policy coherence with respect to clusters. In Germany, the GA joint taskforce has incorporated finance for co-operation and cluster management within the wider framework of negotiated funding agreements between the Federal and *Länder* governments. France has used a similar vehicle. The latest round of the French seven-year *Contrat Plan Etat Region* explicitly prioritises funding for projects that support the clusters selected by either the national *pôles* or SPL programmes. These joint plans specify important regional initiatives and the respective financial obligations of the national and regional governments.

Frameworks, the enabling environment and cluster-informed policies. A number of countries that cultivated successful clusters, like Ireland, did so without a national cluster programme. Rather, the framework conditions and indirect financing did actively support successful clusters. In Ireland, the very active FDI attraction strategy played a major role in the development of the ICT cluster. The policy served to bring in computer assembly plants of multinational computer companies. From that public-supported start, the ICT cluster grew to include spin-offs and software makers. The most recent strategy is now much more focused on strengthening these locally grown businesses and downplays the inward investment dimension, partly because the cluster now seems to be established and is somewhat less dependent on multinationals.

The experience of Scotland's so-called "Silicon Glen" is another example of coming to a cluster approach via an inward investment strategy. Over the course of the 1970s and 1980s, several high-technology companies located in Scotland, among them IBM, Hewlett Packard, Motorola, NEC and Compaq. These companies created large numbers of jobs and the inward investment strategy was successful in moving Scotland away from reliance on declining heavy industries. By 1990, electronics manufacturing accounted for 20% of all manufacturing and 42% of exports. This policy was supported through large-scale incentives with electronics manufacturers in Scotland receiving half of the available regional selective assistance grants over the period 1995-99. Nonetheless, the linkage between foreign-owned firms did not live up to expectations. For example, locally sourced inputs were only a very small proportion of total inputs. Moreover, the local input tended to be mainly at the low-technology end, such as packaging, plastics, rubber and metal components. Signs that the local linkages were not likely to increase, but if anything more prone to decrease, along with the increasing difficulty of attracting new investors, led Scotland's development agency Scottish Enterprise to rethink its strategy. They chose to embark on a new development strategy entitled *Smart Successful Scotland* that emphasises the importance of innovation, human capital and the competitiveness of indigenous business, building on the nascent clusters in the economy.

In the US, the indirect support via R&D funding has been more prominent in terms of resources and cluster success stories, but there are a few programmes to support more directly the enabling environment. The ICT cluster in Boston and Silicon Valley began in part from investments of US federal defence research dollars. The different R&D funding sources available at the federal level are highly sought after by regional clusters. In fact, the ability of states to capture federal R&D funds is closely tracked and used as a benchmark of success at the state level. To complement this indirect support, there are federal level programmes that are explicitly directed at cluster support for economic development in lagging or distressed regions and communities. For example, the Economic Development Administration of the US Department of Commerce has aligned its programs to emphasize regional economic development that fosters innovation and promotes entrepreneurship. The goal is to enable distressed communities to achieve competitiveness and participate in the nation's growing economy. By promoting more directly the development of functioning economic regions focused on developing regional competitive advantage, the objective of these federal programmes is to encourage multi-jurisdictional collaboration and co-operation across local political boundaries.

Other countries that have established an enabling legislative framework or programme include Italy, the United Kingdom, and Australia among others. Italy's Law 317(91) is explicitly designed to allow regions to target industrial district clusters in their public policy. The UK's Regional Development Agency approach provides a framework for regional economic development generally. While it does not mandate a cluster approach, the infrastructure of regional offices facilitates the targeting of resources to clusters of importance to specific regions. Australia does not have an explicit cluster programme, but consistent with the cluster concept, the country's regional development planning supports the clear identification of regional strengths and seeks to support co-location of related up- and down-stream businesses. The Regional Partnerships Programme, as described in Box 5.1, has already supported the defence and marine sectors.

Beyond these enabling programmes, some countries or regions may have very explicit cluster-informed policies. An overview of the types of cluster-informed policy approaches is summarised in Table 5.3. The example of Oregon illustrates a plan to reshape the state's overall approach to economic development using a cluster approach. The state is implementing the private sector-initiated Oregon Business Plan (OBP) which is a 12-point programme for the state that covers issues such as innovation, education, economic development, infrastructure and public finance. At the same time, this initiative

Box 5.1. **Australia's Regional Partnership programme**

The Regional Partnerships Programme, under Australia's Department of Transport and Regional Services, falls under the country's framework for regional development, *Stronger Regions, A Stronger Australia*. While the programme has a broad and community-level focus, the projects funded can and have supported clusters. The projects must seek to:

- **Strengthen growth opportunities** by investing in projects that strengthen and provide greater opportunities for economic and social participation in the community.
- **Improve access to services** by investing in projects that, in a cost effective and sustainable way, support communities to access services. It will give priority to communities in regional Australia with a population of less than 5 000.
- **Support planning** by investing in projects that assist communities to identify and explore opportunities and to develop strategies for action.
- **Assist in structural adjustment** by investing in projects that assist specifically identified communities and regions adjust to major economic, social or environmental change.

These Regional Partnership projects are facilitated by Area Consultative Committees (ACC), volunteer community based organisations. The national network of ACCs provides an important link between the Australian Government and rural and metropolitan regions. ACCs work in partnership with the Department of Transport and Regional Services to identify opportunities, priorities and development strategies for their regions.

Source: www.regionalpartnerships.gov.au.

spawned the Oregon Cluster Network, which serves to support all groups that are or seek to become a cluster initiative. The newly created Oregon InC (the Oregon Innovation Council) is a public/private team to identify Oregon's innovation-driven growth opportunities, maximise the state's competitive advantages and establish Oregon's niche in the global economy. They have been meeting with numerous clusters in an effort to recommend public programmes that will best meet the state's economic goals. The Oregon Economic and Community Development Department is also undergoing organisational restructuring around the idea of clusters.

Regional government capacity. The strength of regional governments within the governance system is an important consideration when national governments seek to work with regions, particularly in unitary countries. Depending on the level of centralisation, the regions may range from mere administrative divisions to appropriately skilled units of government. When a

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Table 5.3. **Cluster-informed policy options**

Category	Tools
Organise service delivery around clusters	● Aggregate, collect and sort information by cluster ● Form cross-agency quick response teams ● Encourage and support multi-firm activity ● Build incentives for multi-firm applications to funding programmes
Target investments to clusters	● Invest in cluster R&D and innovation ● Invest in cluster technology centres or parks ● Support cluster entrepreneurial activity ● Market clusters and build cluster markets
Strengthen networking and build bridges	● Establish or recognise cluster organisations and alliances ● Facilitate external linkages ● Encourage cluster communications channels
Develop human resources for clusters	● Develop a skilled and specialised labour force ● Engage community-based employment intermediaries ● Qualify people for cluster employment ● Establish cluster skills centres ● Support regional skill alliances

Source: National Governor's Association (NGA) (2001), *National Governor's Guide to Cluster-Based Economic Development*, Washington, DC.

region does not have the budget or instruments to promote regional economic development issues, their ability to select clusters for national programmes can have limitations. In Sweden, for example, regional governance became an issue in the identification of clusters to be supported by national programmes. In larger regions, where there exists a portfolio of clusters and a lack of consensus regarding the priorities, it is harder for the national programmes to take advantage of regional plans.

A benefit of the national/regional government collaboration is capacity building for regional governments with respect to cluster development. The Czech Klastry programme is administered by the national agency CzechInvest but has an explicit goal of building regional capacity. The regions are becoming involved in the mapping process for identifying and understanding their clusters. They also benefit from trainings and conferences. In France, the *Pôles de compétitivité* programme, and to a lesser extent the much smaller SPL programme, are both helping the regions learn how to build their economic strategies in support of the cluster approach. While this was not an explicit goal of the programmes at onset, the positive results in this area have become evident.

New public actor relationships. Another benefit of these programmes is that different units of government that do not normally work together are doing so. In France, one of the interesting results of the *Pôles de compétitivité* programme was the fact that a range of sub-national entities worked together. Since the spatial configuration of the clusters often cut across several sub-national administrative barriers, those actors came to the table in support of a cluster candidacy. A study of the BioFuel region in Sweden, a recipient of Visanu funding, illustrated another instance of this co-operation. The initiative helped bring together municipal and county actors, despite some mild local tensions across administrative units.

Administrative borders. The spatial dimension of clusters can often span regional administrative boundaries. While some programmes are very flexible regarding the cluster layout, such as in France, other programmes use regional boundaries as a delimiting factor. When there is a requirement for a cluster to be prioritised, for example by a regional entity, there is greater difficulty to ensure coverage of the entire cluster across administrative units unless there are clear mechanisms for horizontal co-ordination at the regional level. This administrative boundary issue is a frequent challenge in such programmes.

Missed opportunities: common examples

While it is unrealistic to expect all policies to be fully integrated, there are several areas of common missed opportunities for linking objectives. This usually occurs when programmes could have clear synergies but governance barriers prevent their realisation. In some cases this is due to programmes emanating from different sectoral policies and in others because they are emanating from different levels of government.

Missed opportunity 1: research centres and cluster programmes. Most OECD countries have developed centres of research expertise in parallel to other cluster policies, although the lack of direct linkages represents a missed opportunity. They even have the same name in many different countries, Centres of Excellence. These policies typically emanate from a research policy focus, often out of an Education Ministry that oversees the universities where these centres are housed. Because these centres are often focused on basic research using public funds, or are politically difficult to reform, the institutional links with industry and with other policy families are not automatic. It may occur that the sheer number of different types of research specialty programmes and research/industry linkage programmes makes co-ordination very difficult. These centres clearly serve to support regional specialisation but without those linkages, regions are less effective at capturing the benefits of that research.

Missed opportunity 2: science and industrial parks with cluster programmes. Programmes to promote science and industrial parks often originate at the local level and are therefore not explicitly linked with the cluster policies or programmes originating at the national level. Korea is an unusual case in that there are a number of very large industrial complexes managed by a specialised agency under the Ministry of Commerce, Industry and Energy, in addition to the several other hundred smaller complexes at the local level. In Finland clear linkages exist, as the Centres of Expertise are often housed within a local science park. A national science park association, TEKEL, serves as a network connecting 23 science parks and technology centres in university cities. TEKEL co-ordinates national programmes and networks with these science parks as well as serves as an intermediary between policy makers and science parks. SIVA, the Industrial Development Corporation of Norway, is also a co-owner of numerous science parks, incubators and investment companies. To help link this system with the Arena and Centres of Expertise programmes, SIVA is one of the three co-lead agencies of both programmes.

Missed opportunity 3: regional with national innovation systems. A lack of co-ordination leaves some of the regional systems isolated from the significantly greater resources available with those national programmes. These resources include not only financing but access to R&D and other specialised services. This is more likely to occur when the programme supporting regional innovation is developed outside of the national science and technology policy fields, such as in regional policy, but not always. For example, Finland's Centres of Expertise began through a regional policy with a clear innovation focus but an evaluation indicated that it should be more linked to the national innovation system. The same challenge presumably exists in other case study countries.

Private sector participation: cultivating long-term engagement

All these programmes face the challenge of how to involve private sector actors effectively so as not to be too dependent on public actors. One of the most common evaluation results is that the public sector plays too prominent a role in the process. What are the ways in which the private sector could be motivated to participate or even take charge and continue the process after the programme ends?

Programme origin. For the two US case study states, in both cases the programmes themselves were initiated by private sector actors. The Georgia Research Alliance was launched in 1990. A group of Georgia's industry leaders brought together business, research universities and state government players to support technology-based economic development. The cluster initiatives in Oregon came also from a private sector initiative. The Oregon Business Council (OBC) helped to develop the Oregon Business Plan Agenda. The OBC is an independent and non-partisan association of top business executives that seeks to mobilize business leaders to contribute to Oregon's quality of life and economic prosperity. By working with the state on the Oregon Business Plan, they helped orient the nature of public actions and involved many business groups in the discussions to make policy recommendations.

Selection and funding. There are selection mechanisms that clearly lend themselves to a greater assurance of private sector participation. When the selection mechanism is not strictly bottom-up, the most clear indication of private sector interest, there are interesting alternatives. For example, the programme of Spain's Basque Country did begin with a pre-selection of priority sectors but ultimately gave the private sector the choice of participating or not. This required private sector initiative helps explain why the groups are still working together and conducting projects through this or other public programmes ten years later. The financial contribution of the private sector in the programme design also serves as a selection mechanism because if the private sector is not willing to pay at least in part for a service, it is much less likely that these firms would continue to work together after programme funding ends.

Long-term approach. The cultivation of long-term relationships is not easily achieved in the short-term or in a pure project based approach. The existence of on-going relationships beyond the programme funding period can be considered a sign of success. For the programmes in the case studies that have terminated, such as Denmark's SME networking or Finland's National Cluster programme, there are mixed results with regards to clusters or networks continuing to operate actively. Even the programmes supporting collaborative R&D do try to construct platforms that will serve beyond the particular research project. One of the common thoughts is that the programme period is too short to achieve these long-term goals.

Transaction costs. High transaction costs for the programme can discourage private sector participation. For example, the French *Pôles de compétitivité* programme involves funding from five ministries and four agencies or banks. Given the large number of different pots of money available for the programme and the paperwork burden required of each separate funding application, the participating clusters complained. One prominent cluster initiative was quoted in newspapers as indicating that the transactions costs were starting to exceed the programme benefits. The national government responded to these critiques by developing a one-stop shop for fund applications to the ministries providing funding. Transaction costs were also high in terms of cluster governance. As required by the programme, clusters had to register as a not-for profit entity with a number of different oversight committees. Given the time commitment required of cluster members and the delays that these various committees entailed, the national government also changed the programme requirements to allow for more flexibility in formal cluster governance to render them more efficient.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART I

Chapter 6

What Have We Learned?

This chapter explores one of the most challenging aspects of cluster-based policies, evaluating their effectiveness. First it addresses the question of what should be evaluated, as the answer to this question varies by stakeholder needs. Second, it reviews many of the lessons learned from the different programmes studied in OECD countries. Finally, it highlights the areas for future research.

Introduction and key points

There is a long list of challenges to evaluating the effectiveness of policies to promote clusters and regional specialisation. As discussed in Chapter 1, there is a lack of agreement on how to even define a cluster, let alone measure the dynamics within the cluster. The public financial resources allocated to most programmes often being modest, especially relative to the ambitious goals, may also mean that the evaluation tools are not sensitive enough to measure any impact. Existing tools do not always measure some of the more relational aspects of cluster development that are often promoted in these programmes. Classic problems of causality in evaluation are exacerbated in the context of clusters and their ultimate impact on regional development. Nevertheless, based on some programme evaluations and a review of these OECD programmes there are definitely lessons to be learned. This chapter will focus on:

- *What are we evaluating?* The answer to this question is not always straightforward as there are several possible aspects that one could evaluate, such as the cluster's existence and performance, the cluster initiative and policy impacts. Several programmes studied have identified indicators that they are using to monitor or evaluate their programmes, notably in terms of concrete outputs and policy learning. They may also use evaluations as a requirement for accessing future funding.
- *Lessons learned.* This review of different OECD country programmes reveals that there are lessons to be learned for programme design that could help at least improve the likelihood that the programmes will be successful in their ultimate goals. A first set of lessons learned concerns the degree to which these programmes are appropriate, realistic and flexible enough to achieve their goals. A second set of lessons learned relates to policy coherence within and across levels of government. A third set of lessons learned is about the risks involved in such policies, which are often related to insufficient private sector engagement.
- *Future research.* Many questions remain regarding the appropriateness and effectiveness of policies to support clusters. First, more clarity is needed regarding the impact of globalisation on cluster positioning. There are also numerous regional level cluster support strategies that were not subject to this review of national policies but could offer more clear and concrete details on successful strategies.[1] Clearer frameworks for evaluating such policies and

their links with a region's overall innovation capacity, innovation performance and competitiveness, are also warranted.

What are we evaluating?

The first question regarding evaluation to be answered is what the subject of the evaluation should be. The answer of course will vary depending on the stakeholder. A cluster member is presumably more interested in the overall cluster's competitive position than in the cost-effectiveness of a particular public policy action. A cluster initiative manager may be most interested in success at bringing actors together in joint activities and the development of stronger economic and social relationships. A politician may need to know how many jobs were created or how much the region's economy has improved. One could group these evaluations into a couple of general categories. The analytic tools for both merit further analytic development.[2]

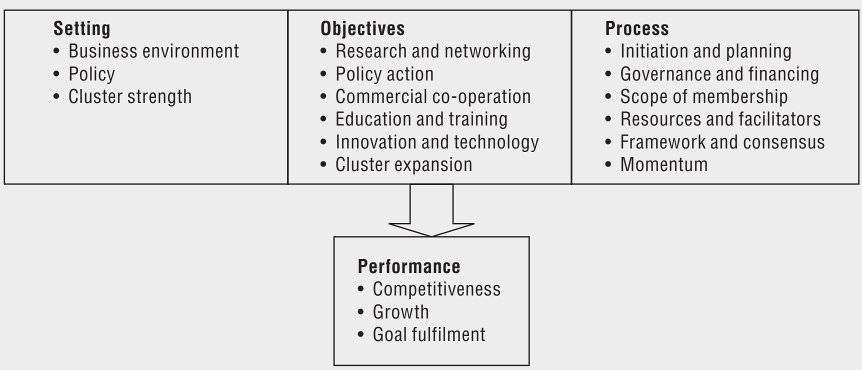
Cluster and cluster initiative performance. The goal of these policies is generally to improve a cluster's performance in the hopes of increasing competitiveness and supporting economic growth. Therefore, tools to measure its performance and changes in performance are required. Various analyses of cluster performance and competitiveness have been used across OECD countries. The most extensive was the Bank of Italy study of Italy's industrial districts, which seemed to show that clustered firms performed better than those elsewhere. Similar exercises have also taken place in Spain and in France, though in both cases the results were more ambiguous. Porter's study of US clusters, since extended to a number of EU countries and to Canada, also falls into this category. In contrast to a cluster *per se*, which may exist without any policy support, cluster initiatives have been defined as "organised efforts to increase the growth and competitiveness of clusters within a region, involving cluster firms, government and/or the research community" (Sölvell *et al.*, 2003). The Cluster Initiative Performance Model, as described in Box 6.1, offers one framework for such an analysis.

Cluster policy effectiveness. This category covers a broad range of potential studies. The cost-effectiveness of an intervention is a classic policy evaluation area that may be of interest in cluster policy analysis. The nature of cluster interventions – specifically, the mix of tangible and less-tangible objectives – poses an immediate evaluation challenge, common to many partnership based programmes. In essence, the more the programme focuses on changing attitudes and behaviours, which is an underlying goal in many cluster programmes, the more difficult the programme becomes to evaluate. If the outcomes are measured simply in terms of co-location of enterprises, services received or meetings arranged, then the measurement can be relatively sound. However, when the definition of positive clustering outcomes is based on "levels of informal

Box 6.1. **Web-based cluster evaluation surveys**

Two web-based tools using the Porter cluster approach are available to the community of cluster practitioners.

Cluster Initiative Performance Model. This model was developed to better understand how different operational aspects of cluster initiatives are correlated with cluster performance. Those performance drivers include: 1) the social, political and economic setting; 2) the cluster initiative objectives; and 3) the process of its development. These drivers are broken down into different categories as illustrated below and assessed using a series of survey questions. A large scale Global Cluster Initiative Survey was conducted in 2003 and again in 2005. The results enable participants to get a better sense of how their responses compare with other respondents on these drivers and performance.



Cluster Competitiveness Report. This is a web-based, automated system of reporting on cluster competitiveness and cluster-policy effectiveness. The report measures the performance of clusters. It is designed to help business leaders to better understand their cluster's competitive position, and government leaders to measure progress and prioritise cluster-specific policy choices. This survey is administered by the non-profit Foundation for Clusters and Competitiveness and seeks to provide useful reports for individual clusters with a longer term goal of providing a global database containing accurate, objective information about clusters from a variety of industries. The survey is administered anonymously to a critical mass of actors in the cluster. The results of the survey are broken down into four areas: 1) profile of the companies and institutions participating; 2) competitive position (overall competitive position and assessment of specific business environment conditions); 3) analysis of response patterns (impact of company positioning, impact of specific factors on overall competitive assessment); and 4) trends.

Source: Sölvell *et al.* (2003), *The Cluster Initiative Greenbook*, Ivory Tower AB, Stockholm, Sweden and *www.clustercompetitiveness.org*.

collaboration or on the presence of informal knowledge spillovers then assessing the contribution of policy to changes in firm productivity become qualitative" (Martin and Sunley, 2003). Moreover, cluster policies have been applied in very different regional contexts and with differing levels of funding. As a result, despite the enormous interest, cluster policies still have much to prove in terms of their effectiveness and general applicability.

Measures of success in case study programmes. Of the programmes that specifically measure outputs, many tend to be firm and innovation oriented. For example, the Finland Centres of Expertise measure success by the number of jobs created, innovations developed, participants and persons trained. An evaluation of Japan's Industrial Cluster programme measured the number of collaborative projects, and new businesses launched from existing firms or universities. The Georgia Research Alliance tracks similar statistics and others with a more clear human resource and knowledge generation focus, such as attraction of top professors, training of skilled graduate students and publications. Spain's Basque Country focuses more on overall cluster economic performance in terms of key sectoral economic indicators.

Norway has taken an interesting approach by choosing to track indicators common to all projects as well as specific goals per individual project. Indicators common to all Centres of Expertise include increased co-operation, increased innovation and increased international involvement among others. Individual Centres have specific targets and an assessment of such targets based on the project's own scale, level of development, challenges and potential. The programme also includes three stages of evaluation and reporting requirements: 1) a management evaluation; 2) a main evaluation after five years on results; and 3) annual reports, based both on project annual reports as well other information such as the management reports.

Several programmes link some evaluation of success to subsequent funding rounds. Norway's Centres of Expertise Programme, which has a ten-year funding timeframe, does have two interim steps for project monitoring and assessment. The programme combines the need for an expectation of continued funding with a need to ensure on-going programme success. Other programmes include shorter funding cycles but allowing the successful programmes to participate in more than one cycle. Spain's Basque Country's programme requires semi-annual reports and has an annual funding cycle. Korea plans to use primary evaluation results for allocating budgets as a vehicle for creating some competition among the selected cluster cities.

Because many programmes seek to catalyse clusters or joint projects with seed money, the ability to leverage additional funds is often considered a measure of success. While matching funding requirements help to support this goal by design, funding achieved above and beyond these requirements increases the programme's impact. The Georgia Research Alliance, whose goal was to increase the economic performance for the state via technology, reports to have achieved a five to one leverage, attracting USD 1 billion in federal research dollars and USD 1 billion in private investment for the state's total investment of USD 400 million. The French SPL programme for small firms sought specifically to serve as a base funding for small firm consortia to use to attract additional funds, and in one exceptional case this was a 40 to one ratio. Visanu's programme funding requirements were 50% national government and 50% regional government. One study found that the total funding included 23% private financing, albeit usually in time as opposed to money, and more regional than national funding.

One of the explicit, if not implicit, goals of national programmes is to improve the public sector's approach to innovation and clusters. The Czech National Innovation Plan seeks to increase involvement of regional public actors in support of clusters and regional innovation systems. This is one of the anticipated measures of success for the next round of the Klastry programme. An evaluation of the Finnish National Cluster Programme revealed that one of the key findings was co-ordination across public sector agencies that fund research.

Policy learning. While not every programme has a formalised post-programme evaluation, there are examples of policy learning. The mechanisms for this are both informal and formal, including pilot programmes and special "learning" components. The challenge is not only to improve an existing programme, but to capture that knowledge for the development of future programmes. For example, there are countries that have changed policies over time or are re-introducing similar policies but the lessons learned from the last rounds are not known.

Informal participant feedback has proven useful in the development of the *Pôles de compétitivité* programme in France. Given the high profile nature of the programme as well as the stature of some of the large firms participating, firms have provided feedback on the programme. In some cases this feedback is highly public and in national newspapers. Some of the changes made to the programme to respond to these comments include somewhat less onerous cluster governance requirements and a certain level of simplification regarding the funding mechanisms.

Countries are also using pilot programmes to promote policy learning with regards to clusters and innovation systems. Norway actually ran a pilot programme of its Centres of Expertise before having the first official call for proposals. Participants in the pilot programme then had to compete in the official round. While Korea's Innovative Cluster Cities is a major national investment and could not be considered merely a pilot project, the lessons learned from this programme will serve to inform the programmes to be implemented in all industrial complexes in the future.

To better understand the dynamics of development in clusters and innovation systems in detail, a few programmes have an explicit "learning" component. Sweden's Visanu programme included several interactive research projects. These projects involved researchers who took a participant observation approach and followed the cluster throughout the funding cycle. The on-going presence of such researchers was designed to get valuable information on the process of developing cluster interactions and a regional platform. Some of these reports are available in English to promote knowledge sharing even beyond Sweden.[3] Norway's Centres of Expertise will include periodic management evaluations to provide recommendations to improve programme strategic development.

Lessons learned

Appropriateness of a cluster policy

This first set of lessons learned concerns the degree to which these programmes are appropriate, realistic and flexible enough to achieve their goals. Given the popularity of the cluster approach, there is concern that it is being used as the core strategy to achieve competitiveness, yet the two are not merely interchangeable. After an analysis regarding why a cluster policy is helpful and to whom it should be addressed, the appropriate programme design question becomes relevant. The wide variety of cluster types, cluster stages and regional conditions complicates these design efforts but flexibility in solutions is possible.

Identify explicitly what the national level's interests are, what the barriers to achieving those goals are, and how a cluster approach can help overcome these problems.

Often governments launch programmes to enhance competitiveness or build innovation capacity yet these objectives are very broad. Such goals do not specify the nature of the problem that the national level needs to address and hence why programmes to promote clusters, as opposed to other tools, would be the most effective option. This lack of clarity also limits the ability to target, fund and evaluate outcomes.

Germany's BioRegio was perhaps the most focused of all the policies studied, as it was designed to support one sector and therefore much less comprehensive than some other programmes. Nevertheless, the clarity of motivations for national level intervention, the straightforward goals for this programme and the focused public support contributed to its success.

Weigh the relative merits of active intervention from the national government *versus* framework conditions and facilitation.

In some countries, the policy approach focuses on framework conditions and arms-length facilitation. Several OECD countries use this framework approach instead of an explicit national policy, and they possess successful clusters. The United States, for example, only has relatively modest national level programmes for lagging regions (such as the EDA University Centre programme) but otherwise seeks to provide better framework conditions for competitiveness. Explicit cluster approaches are really found more at the state (subnational) level. Ireland's FDI attraction strategies played an active role in serving to develop certain clusters like ICT, without the need for a national cluster programme. The UK's Regional Development Agency approach is a national level framework for regional development that encourages a cluster approach through advice and funding but does not involve a specific programme. The Netherlands "Peaks in the Delta" regional strategy has a similar approach of providing funding for spatial economic development planning that includes cluster support. Australia's Regional Partnerships Programme, under the *Stronger Regions, Stronger Australia* framework, also has a more broad-based facilitation approach rather than obliging regions to adopt a cluster or regional innovation approach.

Consider that cluster-type policies can be valuable as a practical tool, not only to respond to conceptual models.

Some of the very pragmatic advantages include helping governments to: diagnose regional economic strengths, clarify market linkages among economic actors, dialogue with "systems" of public and private actors and focus public resources. Therefore, regardless of philosophical approaches to the cluster and innovation system concepts, these programmes could be considered for their other merits.

Several programmes have made very active use of this practical aspect of the cluster concept to adopt cluster-informed approaches to economic development. In Spain, managers of the Basque Country Competitiveness Clusters programme have used a clever approach to working with clusters. Their duties are conceived in the context of an organisational matrix. They ensure that all the meetings of a cluster are attended by the same person, and that all the meetings on a particular horizontal common theme across clusters are attended by the same person (internationalisation, technology and quality/excellence in management). Furthermore, approximately half of the region's industrial base can be reached through an email to 12 cluster initiatives. As a result, there is very active contact between the cluster initiatives and civil servants. The Oregon Cluster Industries approach is not a programme with clear budget per say, but the Oregon Economic and Community Development Department is trying to restructure itself to be more focused on clusters. Italy's Law 317 sets out an authorising environment that explicitly recognises industrial districts as entities eligible for certain forms of public support.

Be realistic with respect to clarity of targets, funding and duration as compared to programme goals.

The programme goals should determine both the targets and the resources, but these choices include a number of inherent tradeoffs. The first trade-off is whether to concentrate resources with a very limited pool or to be more inclusive. Other trade-offs concern leading *versus* lagging regions and dynamic *versus* exposed sectors. The available funding and timeframe in turn need to be realistic given the number and nature of targets resulting from these choices. Engaging actors may be costly in terms of time and transaction costs even if not in public expenditure, while the benefits of R&D investments may take considerable time to accrue.

Disappointment regarding the effectiveness of programme results is often related to insufficient funding and timeframes relative to expectations. For the major R&D initiatives, several have very long-term timeframes, up to ten years like Sweden's VINNVÄXT and Norway's Centres of Expertise. While there may be interim evaluations to ensure the full period of funding, this timeframe implies that such long-term commitment may be needed for successful results. Programmes with a very short timeframe but with substantial R&D investments are perhaps less likely to achieve their goals.

Ensure that programmes have a range of instruments for adaptation across the targets (in terms of cluster types, region types, etc.).

Even where a limited range of regional economies and clusters are targeted, they nonetheless have diverse needs. One of the most notable distinctions that impacts the use of instruments is the cluster lifecycle, as a cluster that is emerging *versus* mature *versus* transforming will have different needs. Clusters are also embedded in different environments that may be rich or weak in knowledge generating institutions or linkages among actors. Evidence from recent evaluations documents the variations in instrument use within the same programme across clusters. Programmes thus need to have this flexibility built in by offering a range of possible instruments from which clusters may choose.

Programmes have shown flexibility to different cluster and region types without necessarily sacrificing clarity of goals. An evaluation of the Japanese Industrial Clusters programme revealed four general categories of clusters with very different characteristics and needs that were nevertheless able to benefit from the programme. They included metropolitan areas (strong existing clusters with large firms), science and technology-centred clusters (technology transfer), niche clusters (smaller agglomerations with niche fields) and networks across mini-clusters (thin and small scale clusters). Finland's Centres of Expertise were also using the programme for different sets of needs. An evaluation noted that smaller centres focused on cluster-based development and internationalisation while larger centres focused on R&D projects.

Policy coherence

Achieving policy coherence across sectors and across levels of government is a perennial challenge in supporting regional development. In the case of supporting regional specialisation, there are a multitude of programmes from at least three different policy families all working towards potentially similar goals. The fragmentation of resources across these different programmes is confusing to both public and private actors. At best, the programmes are simply co-existing but with potential increased transactions costs for the participants. At worst, the programmes actually divide actors that should otherwise be working together, such as when administrative boundaries don't map to the clusters or certain relevant actors are not eligible for support in the context of the programme.

Determine a cross-ministerial strategy for national level intervention.

Clear objective setting and planning at the central level can help to align different actions and serves to promote coherence across regions. The proliferation of cluster-type approaches at the central level, in addition to sub-national programmes, necessitates a clear programme mapping to prevent duplication, fill gaps and avoid missed opportunities. While different central level agencies and ministries have sought to collaborate in some countries, high-level support strengthens the motivations for such collaboration and raises the level of the programme on national agendas.

There exist interesting examples of either clear strategies or cross-ministerial efforts in support of a plan. France's *Pôles de compétitivité* and the Korean Innovative Cluster Cities are both highly prominent in their respective countries and therefore assemble key actors across ministries. There are several other examples of programmes that are less politically prominent but have sought to work across ministries, especially in the Nordic countries. Sweden's Visanu programme (three agencies), Norway's Arena and Centres of Expertise programmes (three agencies) and Finland's Centres of Expertise (inter-ministerial committee) are all examples. While the inter-agency rivalries may not be resolved by such arrangements, they certainly have opened doors to greater communication for improved policy coherence.

Work in consort with regional levels in programme development for capacity building, coherence and complementarity.

In several countries, cluster programmes began at the regional and local level well before any explicit national level policy. In those cases, the national level can learn from the experiments across different regions in the development of its programme. In other countries, the regional level lacks the capacity and/or financing to effectively support a cluster programme. In such cases, the national level has a role of building regional capacity, an important issue in the context of decentralisation trends. For countries where there exist numerous regional level initiatives, the national government may seek to promote some coherence in the pursuit of national goals or identify opportunities to provide complementary programmes.

Several countries have addressed this national-regional coherence question by actively involving the regional level in selection and funding. Numerous programmes have a regional co-financing requirement, such as Sweden's VINNVÄXT and Visanu programmes, the Centres of Expertise programmes in Finland and Norway, as well as the *Pôles de compétitivité* and SPL programmes in France. All the national programmes in Germany require active regional support in terms of funding and programme implementation. While many programmes seek to build regional capacity in supporting clusters, the Czech Klastry programme is the most explicit in this goal.

Risks

Beyond questions of appropriateness and coherence, there are inherent risks related to the use of public policy to support clusters. These risks concern the strategy of public sector investment, notably the cost of cultivating nascent clusters and the risks of vulnerability due to insufficient diversification of sectors or a high degree of dependence on an anchor firm. In some cases the cluster approach is actually used to address these risks by serving as a vehicle to promote diversification. While addressing these risks in strategy requires strong analysis, there are strategies for designing programmes to reduce some of the common risks inherent to a cluster-type approach.

Structure the programme to minimise the associated risks, such as picking winners and lock-in.

The public sector at national and regional levels is less equipped than the private sector to manage business risks such as predicting movements in highly competitive and rapidly evolving product markets in the context of globalisation. There are also greater risks that cluster groups unduly influence government in their favour (administrative capture) when they become the clear focal point of policy. Furthermore, supporting the strongest existing clusters may reduce the opportunities for innovation that could jeopardise these selected clusters. Instruments that are less industry specific and/or region-neutral can be easier to manage politically. Therefore, national policy makers can take steps to mitigate those risks such as revisiting cluster designations periodically or giving other types of firms an opportunity to compete.

Several OECD country programmes have tried to mitigate these common risks. One strategy used by the programmes is to involve key researchers and firms in the selection process. There are also programmes that are complementary in terms of a cluster's stage of development such that not only the strongest existing clusters receive support. For example, the Oregon

Cluster Network in the United States and the Arena programme in Norway allow clusters in earlier stages of development to participate with the idea that if they develop they may be eligible for programmes with greater resources. In addition, the competitive process of numerous programmes has helped cluster initiatives form that later have grown with other resources. Many candidates not selected by the VINNVÄXT programme in Sweden or the BioRegio programme in Germany were nevertheless able to find alternative resources and develop, therefore the "picked winners", albeit through a competitive process, were not the only parties to benefit.

Ensure sufficient private sector engagement, as their motivation ensures longevity of partnerships and their skills reactivity to market changes.

Given the risks mentioned above, the role of the private sector in helping to guide regional economic strategies, including cluster-based programmes, is crucial. Cluster programmes can offer tangible benefits to the private sector (*e.g.*, labelling, increased R&D investment or tailored support services) if structured properly. Yet many programmes, particularly in Europe, are heavily driven by the public sector and allow for more limited engagement of public-private partnerships. The programme's conception, target selection and implementation all need to take the private sector role into account more explicitly.

The more effective strategies to ensure private sector engagement tended to involve the private sector early on. For example, in the United States, the two state examples of Georgia and Oregon illustrated that private actors helped in the design and administration of the programmes. The Oregon Business Council, a non-partisan association of top business executives, helps to develop the Oregon Business Plan Agenda with input from Oregon's clusters. To ensure that smaller firm needs are heard, they canvass the clusters instead of simply relying on the state's leading firms for input. In Spain's Basque Country, the private sector was involved in the dialogue to select the potential clusters as well as in the decision to participate. Even though most programmes do have some sort of competitive selection process to gauge private sector motivation, this has not proven sufficient for long-term private sector engagement.

Set outcome targets, even if it is difficult to evaluate the causal relationship of public policy on private action.

The more the programmes emphasise changes in behaviour or attitudes among firms/entrepreneurs, the more difficult those outcomes are to measure. The easier end of the spectrum is to measure the take up of services by participants, but these statistics usually leave unanswered the question of whether a cluster policy is more effective than another approach to regional development. The evaluation problem is ever-present but should not prevent an effort to identify specific outcomes, which is one important way to clarify what the programme is trying to achieve and how feasible its ambitions are.

Only a few of the programmes studied had a clear evaluation approach when establishing the programme. For example, Norway's new Centres of Expertise programme includes three stages of evaluation and reporting: annual reports from projects and other management reports, a main evaluation after five years in operation and a management related evaluation. Sweden's Visanu programme included interactive research initiatives that tracked certain clusters closely and over time to better understand how they were functioning. Finland's Centres of Expertise have been in place for several years and evaluations regarding performance on key indicators are on-going. Several programmes include regular reporting as a condition for on-going funding.

Future research

There are still many unanswered questions regarding the benefits of clusters themselves as well as the effectiveness and efficiency of cluster policies seeking to influence their development. These questions are even more pressing given the rapid changes in industry transformation as well as the continued proliferation of policies at all levels of government in OECD countries. A number of themes merit additional consideration by researchers and international organisations such as the OECD.

Do cluster policies have an influence on the transformation of industries with globalisation? As industries transform and OECD clusters seek to keep pace with these transformations, public policy may help, may hurt or simply be marginal to the overall picture. OECD countries are interested in how policies can help regions, especially those highly exposed to international competition, best manage off-shoring and other processes related to globalisation. In general, the cluster model seems still to have a role to play in traditional manufacturing activities, offering a means to build critical mass among SMEs, increase the flow of information on new technologies, improve product quality and upgrade workforce skills. At the same time, the ability of firms to make external linkages cannot be ignored and regional strategies need to take account of these economic realities. For example, in Veneto, Italy, many cluster members are off-shoring aspects of operations to a common area in Romania. Off-shoring is not only a major concern for textiles, as higher value added services and even R&D functions are migrating. Public policy may be able to facilitate the identification of off-shoring partners or organise support in such contexts so as to help the region best manage the impacts of these trends.

What are the goals and instruments of policies to promote innovation, understanding that the term innovation is used as a motivation to describe a wide range of activities in regions? The term has been introduced into regional development policy only recently but has now become a key component and objective of policy. Yet, the precise goals are often not clear and the link between success in innovation policy and regional outcomes is not so easy to detect and measure. This is clearly the case for the cluster policies reviewed in this report, which have included innovation as a goal but without a clear set of indicators to assess impacts either on firms or on the region as a whole. Therefore international organisations like the OECD and the EU can help fill the information gap at the sub-national level to better understand innovation processes at the regional level and their relationship to policy.

What are the long-term impacts of these policies? Helping actors come together does not mean that they will stay together. One of the perceived benefits of cluster programmes as a policy is that, once actors come together with the aid of public intervention and financing, this momentum will continue when public support stops. This catalytic public sector role is an attractive approach for many reasons, notably because this upfront investment in developing partnerships is expected to reap benefits to the regional economy over the long term. While some research results exist on the successes and failures regarding the longevity of basic SME networking programmes, there is not considerable information on larger scale cluster programmes.

Notes

1. The OECD, in conjunction with Nutek, the Swedish Agency for Economic and Regional Growth, is currently conducting a study on regional level strategies to help address this gap.
2. Evaluation being a critical issue, The Competitiveness Institute, a not-for-profit alliance of cluster practitioners, seeks to address this topic through symposiums and a forthcoming publication.
3. Reports may be obtained from Nutek, the Swedish Agency for Economic and Regional Growth.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

Bibliography

Andersson, Thomas *et al.* (2004), *The Cluster Policies Whitebook*, International Organisation for Knowledge Economy and Enterprise Development, Malmö, Sweden.

Barkley, David and Mark Henry (2001), *Advantages and Disadvantages of Targeting Industry Clusters*, REDRL Research Report 09-2001-01, Regional Economic Development Research Laboratory, Clemson University, Clemson, SC, September 2001.

Beffa, Jean-Louis (2005), "*Pour une nouvelle politique industrielle*" (Towards a New Industrial Policy), Report submitted to the French Government January 15, 2005.

Blanc, Christian (2004), "*Pour un écosystème de la croissance*" (An Ecosystem for Growth), Report submitted to the Prime Minister, National Assembly.

Brusco, Sebastiano (1982), "The Emilian Model: Productive Decentralisation and Social Integration", *Cambridge Journal of Economics*, Vol. 6(2), pp. 167-184.

Bergvall, Daniel *et al.* (2006), "Intergovernmental Transfers and Decentralised Public Spending", *OECD Journal of Budgeting*, Vol. 5, No. 4, OECD Publications, Paris.

Coe, N.M., M. Hess, H.W.C. Yeung, P. Dicken and J. Henderson (2004), "Globalizing Regional Development: a Global Production Networks Perspective", *Transactions of the Institute of British Geographers*.

Conference Board of Canada (2004), *Clusters of Opportunity, Clusters of Risk*, The Conference Board, Ottawa, Canada.

Cooke, Philip (2004), "Regional Knowledge Capabilities, Embeddedness of Firms and Industry Organisation: Bioscience Megacentres and Economic Geography", *European Planning Studies*, Vol. 12, pp. 625-641.

Cortright, Joseph (2006), *Making Sense of Clusters: Regional Competitiveness and Economic Development*, The Brookings Institution, Washington, DC.

Cortright, Joseph and Heike Mayer (2002), *Signs of Life: The Growth of Biotechnology Centres in the US*, The Brookings Institution Center on Urban and Metropolitan Policy, Washington, DC.

CzechInvest (2003), *Cluster Funding: A comparative study of the methods for financing uses in the establishment of industrial clusters in the EU and countries about to join the EU*, unpublished report.

Department of Trade and Industry, United Kingdom (DTI) (1998), *Competitiveness White Paper: Our Competitive Future – Building the Knowledge Driven Economy*, DTI Publications, London.

DTI (2001), *UK Business Clusters in the UK: A First Assessment*, DTI Publications, London.

DTI (2004), *A Practical Guide to Cluster Development*, a report to the Department of Trade and Industry and the English RDAs by Ecotec Research and Consulting, DTI Publications, London.

Dunning, John (1992), "The Competitive Advantage of Countries and the Activities of Transnational Corporations", *Transnational Corporations*, Vol. 1.1.

Enright, Michael (1998), "The Globalisation of Competition and the Localization of Competitive Advantage: Policies toward Regional Clustering", Paper presented at the Workshop on Globalisation of Multinational Enterprise Activity and Economic Development, University of Strathclyde, Glasgow, Scotland, 15-16 May 1998.

Ernst, Holger and Nils Omland (2004), "Vitalisation of Industry through the Promotion of Knowledge Intensive New firms: The Case of German Biotechnology", Presentation made at the Japan Institute for Labour Policy and Training, Tokyo, Japan, 26 March 2004.

Ernst and Young (2005), *Étude relative à l'implication des PME et des SPL dans les Pôles de compétitivité* (Study of the Involvement of SMEs and Local Production Systems in the Competitiveness Clusters), Draft report to the DATAR.

EC and Enterprise Directorate-General (2002), *Regional Clusters in Europe: Observatory of European SMEs* (No. 3/2002), European Commission, Brussels.

EC and Enterprise Directorate-General (2003a), "Background Paper on Cluster Policies", prepared for the Trend Chart Policy Workshop, *Innovative Hot Spots in Europe: Policies to promote trans-border clusters of creative activity*, held in Luxembourg, 5-6 May 2003.

EC and Enterprise Directorate-General (2003b), "Background Paper on Methods for Cluster Analysis", prepared for the Trend Chart Policy Workshop, *Innovative Hot Spots in Europe: Policies to promote trans-border clusters of creative activity*, held in Luxembourg, 5-6 May 2003.

EC and Enterprise Directorate-General (2003c), *Thematic Report: Cluster Policies*, Brussels.

EC and Enterprise Directorate-General (2003d), *Theme-specific Country Report – Denmark*, European Trend Chart on Innovation.

EC and Enterprise Directorate-General (2004a), *Annual Innovation Policy Trends and Appraisal Report – Denmark*, European Trend Chart on Innovation.

EC and Enterprise Directorate-General (2004b), *Annual Innovation Policy Trends and Appraisal Report – Germany*, European Trend Chart on Innovation.

Gordon, I. and McCann (2000), "Industrial clusters: Complexes, agglomeration and/or social networks?", *Urban Studies*, Vol. 37(3), pp. 513-532.

Holm Dalsgaard, Mette (2001), "Danish Cluster Policy: Improving Specific Framework Conditions", in OECD (2001), *Innovative Clusters – Drivers of National Innovation Systems*, OECD Publications, Paris.

Higher Education Policy Institute (2004), "Research and regions: an overview of the distribution of research in UK regions", Centre for Policy Studies in Education, University of Leeds.

Kodama, Toshihiro (2004), "Cluster Promoting Initiatives in Japan", presented at the conference *Innovation and Regional Development*, sponsored by the OECD, EU Erik Network and the Tuscany Region, Florence, Italy, November 2004.

Krugman, Paul and A.J. Venables (1990), "Integration and the Competitiveness of the Peripheral Industry", pp. 55-77, in Bliss, C. and J. Braga de Macedo (eds.), *Unity with Diversity in the European Economy*, Cambridge University Press/CPER, Cambridge/London.

Lainé, Frédéric (2001), "Une approche statistique des systèmes productifs locaux" (A Statistical Approach to Local Production Systems), in *Réseaux d'entreprises et territoires : Regards sur les systèmes productifs locaux* (Networks of Firms and Regions: Local Production Systems), DATAR, la Documentation Française, Paris.

Loughlin, John (2000), "The Regional Situation in the Year 2000", Assembly of the European Regions, Brussels.

Lublinski, Alf Erko (2003), "Does Geographic Proximity Matter? Evidence from Clustered and Non-clustered Aeronautic Firms in Germany", *Regional Studies*, Vol. 37, pp. 453-467.

Lundvall, Bengt-Åke and Björn Johnson (1994), "The Learning Economy", *Journal of Industry Studies*, Vol. 1, pp. 23-42.

Markusen, Anne (1996), "Sticky Places in a Slippery Space: A Typology of Industrial Districts", *Economic Geography*, Vol. 72, pp. 293-313.

Martin, Ron and Peter Sunley (2003), "Deconstructing Clusters: Chaotic Concept or Policy Panacea?", *Journal of Economic Geography*, Vol. 1, pp. 5-35.

Ministry of Economy, Trade and Industry (METI) (2005), *Report on Industrial Cluster Programme*, evaluation report submitted to METI by the Industrial Cluster Study Group.

National Governor's Association (NGA) (2001), *National Governor's Guide to Cluster-Based Economic Development*, Washington, DC.

Organisation for Economic Co-operation and Development (OECD) (1999a), *Boosting Innovation: The Cluster Approach*, OECD Publications, Paris.

OECD (1999b), "Report on Innovation and Territories: Upgrading Knowledge and Diffusing Technology in a Regional Context", OECD internal document DT/TDPC(99)8, 17 May 1999.

OECD (2001), *Innovative Clusters: Drivers of National Innovation Systems*, OECD Publications, Paris.

OECD (2004), *OECD Territorial Reviews: Montreal, Canada*, OECD Publications, Paris.

OECD (2005), *Building Competitive Regions: Strategies and Governance*, OECD Publications, Paris.

OECD (2006), "The Changing Nature of Manufacturing in OECD Countries", OECD internal document DSTI/IND(2006)1, 13 February 2006.

Pietrobelli, Carlo and Roberta Rabelloti (2002), *Business development service centres in Italy, An empirical analysis of three regional experiences: Emilia Romagna, Lombardia and Veneto*, Prepared for the Restructuring and Competitiveness Network, United Nations ECLAC, Santiago, Chile.

Porter, Michael (1990), *The Competitive Advantage of Nations*, The Free Press, New York.

Porter, Michael (1994), "The Role of Location in Competition", *Journal of the Economics of Business*, Vol. 1, No. 1.

Porter, Michael (2003), "The Economic Performance of Regions", *Regional Studies*, Vol. 37, pp. 549-578.

Power, D and M. Lundmark (2004), "Working through Knowledge Pools: Labour Market Dynamics, the Transference of Knowledge and Ideas, and Industrial Clusters", *Urban Studies*, Vol. 41, pp. 1025-1044.

Reich, Robert (1991), *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*, New York, Alfred A. Knopf.

Rissanen, Juho and Jukka Viitanen (2001), *Report on Japanese Technology Licensing Offices and R&D Intellectual Property Right Issues*, The Finnish Institute in Japan.

Roelandt, Theo J.A. and den Hertog, Pim (1999), "Cluster Analysis and Cluster-based Policy Making in OECD Countries: An Introduction and Theme", in *Boosting Innovation: The Cluster Approach*, OECD Publications, Paris, France, pp. 9-23.

Romer, Paul M. (1990), "Endogenous technological change", *Journal of Political Economy 98(5)*, pp. 71-102.

Rosenfeld, Stuart (2001), "Networks and Clusters: The Yin and Yang of Rural Development", in the conference proceedings *Exploring Policy Options for a New Rural America*, Federal Reserve Bank of Kansas City, Kansas City, Missouri, pp. 103-120.

Saxenian, AnnaLee (1994), *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Harvard University Press, Cambridge, MA.

Sforzi, Fabio (1990), "The Quantitative Importance of Marshallian Industrial Districts in the Italian Economy", in Pyke *et al.*, *Industrial districts and inter-firm co-operation in Italy*, IILS, Geneva.

Sölvell, Örjan, Lindqvist, Göran and Christian Ketels (2003), *The Cluster Initiative Greenbook*. Ivory Tower AB, Stockholm, Sweden.

Storper, Michael (1997), *The Regional World*, Guildford Press, New York.

Storper, Michael and Anthony Venables (2004), "Buzz: Face-to-Face Contact and the Urban Economy", *Journal of Economic Geography*, Vol. 4, Issue 4, pp. 351-370.

PART II

Case Studies

Part II contains 15 separate case studies of cluster-based programmes. They cover 14 countries and over 26 programmes. Information for the case studies was collected throughout 2006.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 7

Canada

This chapter is a case study on a national level cluster programme sponsored by Canada's National Research Council. The Technology Cluster Initiatives seek to foster the development of innovation-driven clusters in regions across Canada.

1. Programme(s) and their goals

While many sub-national governments in Canada have implemented strategies to support clusters, at the national level Canada's National Research Council (NRC) is the most prominent with an explicit cluster strategy. The approach, that began in 2000, has an ultimate goal of forming a strong national economic/industrial backbone in the pursuit of longer-term Canadian economic, S&T and social objectives. Its four strategic goals are:

- Creating a globally competitive research and technology base for cluster development at the community level.
- Supporting community leadership, champions and knowledge-based strategies.
- Working with stakeholders to leverage funding and new investment in community clusters.
- Stimulating the emergence of new firms, jobs, exports and investment growth.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

One key feature of the Canadian economy is the low level of business sector R&D investment. Canadian private R&D is much lower (53%) than private R&D in other countries and is declining, as are the number of companies making such investments, despite one of the most generous R&D tax regimes. One reason is that Canada's private sector is dominated by SMEs, 98% of which have fewer than 100 employees. Although SMEs can be receptive and adaptable, they generally have limited capacity to absorb R&D advantages. The NRC therefore considers this fact when analysing the innovation system as clusters attract both highly qualified people and capital that may help sustain an industry sector over time.

Another important fact is that Canada has a resource-based and regionalised economy. Although primarily dependent on natural resources and manufacturing, Canada is seeking strategies to better adapt to the knowledge-based economy. Stronger innovation performance in Canada's regions and communities is deemed integral to national growth. While many smaller

Canadian communities have significant knowledge and entrepreneurial resources, in many instances they lack the networks, infrastructure, investment capital or shared vision to live up to their innovative potential.

The innovation performance for Canada is mixed (OECD, 2006). Innovation density is high in terms of the proportion of firms engaging in innovation activities, however the sales resulting from innovation are lower than in some European countries. The innovation performance is much stronger for products than processes, like in many countries. However, given the sectoral composition in Canada with the large share of resource-based and extraction industries, success in process innovation takes on greater importance.

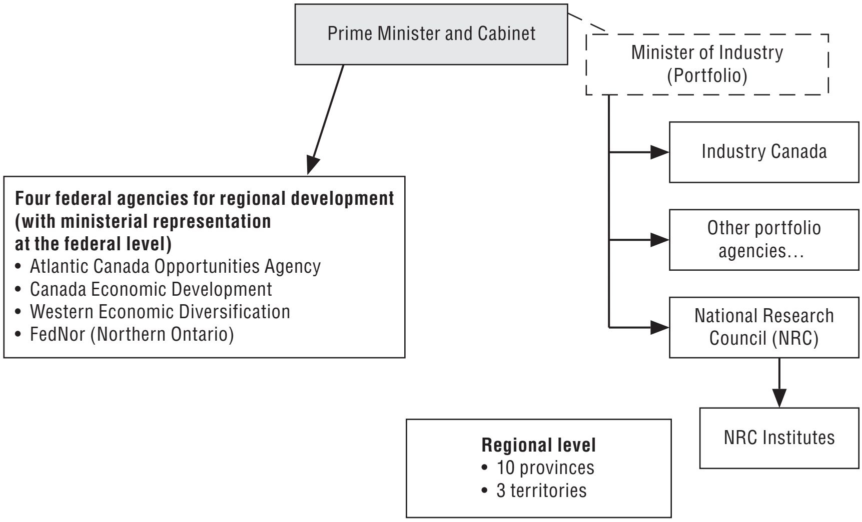
Historical development/evolution – where the programme came from in the context of other policies

The cluster strategy is part of the country's national innovation strategy. As the National Research Council (NRC) delivers all of its programs through regional sites across Canada, the cluster programme follows this approach. NRC's current programmes include the performance of research, the provision of services by the Industrial Research Assistance Program (IRAP) and the Canada Institute for Scientific and Technical Information (CISTI). NRC has research institutes in many communities across Canada, and as a result has developed a network of relationships at the local level. Prior to the development of this programme, the NRC has played a key role in the growth of the biopharmaceutical cluster in Montreal, and the agricultural biotechnology cluster in Saskatoon. NRC provides a sustained R&D presence in the cluster, and with its associated programs and services, offers: 1) incubation and technical support to start-ups; 2) easy flow of highly qualified people to new firms through its Research Associate and Post-Doctoral programs; 3) access to technology knowledge, strategic advice and seed capital through CISTI and IRAP; 4) sustained research partnerships; and 5) regional innovation fora.

Description of programme's place in governance framework

Canada's organisation of Ministers is flexible, with each Minister taking a portfolio of federal departments and organisations. The Minster of Industry covers most of the groups that address industrial and science and technology policy. The most prominent of these departments is Industry Canada. Its mandate is to help make Canadians more productive and competitive in the knowledge-based economy, thus improving the standard of living and quality of life. Its strategic outcomes support growth in employment, income, productivity and sustainable development. This mandate also includes fostering innovation in science and technology. Other organisations in the portfolio of the Minister of Industry include: the National Research Council (NRC), the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities

Figure 7.1. **Organisational chart: Canada**



Research Council of Canada, the Canadian Space Agency, the Copyright Board of Canada and the Business Development Bank of Canada, among others.

NRC, the sponsor of this cluster strategy, is the leading federal agency for R&D development and has been for almost a century. It is composed of over 20 institutes and national programs, spanning a wide variety of disciplines and offering a broad array of services located in every province in Canada to help stimulate community-based innovation. NRC is an agency of the Government of Canada, reporting to Parliament through the Minister of Industry, and governed by a council of 22 appointees drawn from its client community. Its institutes and programmes are organised around five themes: life sciences, physical sciences, engineering, technology and industry support, and corporate services.

Institutional frameworks and regional development policy

Canada is a federal country subdivided into ten provinces and three territories. While it covers a very large geographic area, the population is mainly concentrated in the southern part of the country. In 1986, Canada chose to decentralise federal regional policy into four agencies that cover the country. These agencies provide a link between the federal and provincial level by both translating national priorities in their regions and representing regional interests in national policies and programmes (OECD, 2002). For this programme, the cluster initiatives are generally the responsibility of NRC, and are for the most part run by NRC. However, in most instances the provincial governments are active in supporting the development of clusters and technology areas through provincial strategies and investments.

Role of programme in the context of science and technology (or innovation) policy

The NRC Technology Cluster Initiatives were launched in the context of Canada's innovation strategy. The main intent of this strategy was to bring government, academia and the private sector together to improve innovation, skills and learning by leveraging Canada's existing strengths in research, technology and innovation. The aim is to move Canada to the front ranks of the world's most innovative countries.

Associated programs in support of science and technology are numerous. They include: the Scientific Research and Experimental Development (SR&ED) tax credit, funding to the granting councils for university research, Natural Sciences and Engineering Research Council Canada, Canadian Institutes of Health Research, Genome Canada, funding to improve R&D infrastructure in Canadian universities through the Canadian Foundation for Innovation, Technology Partnerships Canada, funding to attract and maintain academic researchers through the Canada Research Chairs program, and funding for Networks of Centres of Excellence, to establish virtual networks of researchers focused on specific subject areas.

Role of programme in the context of enterprise policy

The NRC Technology Cluster Initiatives are a response to low levels of R&D by Canadian firms, and the need to vitalize regional economies. The other principal enterprise development policies include: the SR&ED tax credit as mentioned above, the Business Development Bank of Canada, the Regional Development Agencies, various small business financing initiatives, Export Development Canada and Technology Partnerships Canada.

Cluster studies conducted

The NRC has undertaken baseline studies of five of the 11 clusters in which it is involved (NRC, 2006). Baseline studies for the remaining clusters are anticipated in the near future. The studies examine the current conditions and performance of the clusters, and will facilitate performance measurement of the cluster over time. The studies are based on a framework and methodology developed for the NRC and are publicly available documents.

3. Details on programme budget and timeframe

NRC receives five-year funding envelopes from the federal government for its Technology Cluster Initiatives. To date, approximately CAD 500 million has been invested in the cluster initiatives through three rounds of funding since January 2000, including the recent renewal of Round 1 funding in the amount of CAD 110 million over five years. Details on cluster funding can be found in Tables 7.1 and 7.2.

Table 7.1. **Funding for NRC cluster initiatives: Central and Western initiatives**

Initiative	Institute(s) involved	Amount awarded	Objectives
Funding: 2002/03 – 2006-07 *Funding renewal process underway*			
Aluminium technologies	NRC-IMI	CAD 27 M (+ CAD 25 M from federal partner)	• Support the development of a technology cluster in high valued-added aluminium products, with a focus on SMEs • Assist companies in managing, adopting and developing new aluminium-related manufacturing technologies
Photonics technologies	NRC-IMS	CAD 30 M	• Assist clients and partners turn research into commercial success through provision of more integrated services, including prototyping • Promote further collaborative activity • Support formation of spin-offs/start-ups
Biomedical technologies	NRC-IBD	CAD 10 M (+ CAD 2 M from provincial partner)	• Promote the development of medical technologies, in particular medical diagnostic technologies
Functional foods and nutraceuticals	NRC-PBI	CAD 10 M	• Provide a focal point for linkages • Help Canadian companies take advantage of significant emerging economic opportunities • Support accelerated growth of a competitive, Prairie-based plant-derived health products industry
Nanotechnology	NINT	CAD 60 M (+ CAD 60 M from provincial partners)	• Help stimulate the emergence of new nanotech-based industries in Alberta and across Canada
Fuel cells and hydrogen technologies	NRC-IFCI	CAD 20 M over five years	• Facilitate the growth of viable and environmentally sound fuel cell and hydrogen industries in the region and across Canada
Funding: 2003/04 – 2007-08 *Funding renewal will be sought*			
Sustainable urban infrastructure	NRC-IRC (CSIR)	CAD 10 M over 5 years (+ CAD 20 M in supporting initiatives from federal, provincial partners)	• Catalyze the growth of a technology cluster that builds on local capacity • Help Regina meet its infrastructure challenges and become a national centre of research, expertise and testing • Provide a focal point for IRC urban infrastructure programs and collaborations in the west • Facilitate development of competitive advantage to SK businesses in infrastructure technologies, IT, and environmental management • Contribute to development of cost-effective, community-based infrastructure solutions for use across Canada
Nutri-sciences and health	NRC-IMB (INH)	CAD 20 M over 5 years	• Strengthen research base on Prince Edward Island (PEI) • Foster PEI's nutri-sciences cluster • Contribute to developing synergies with knowledge-based industries in Atlantic Canada and elsewhere • Contribute to new company creation and new jobs

Notes: M = million, CAD = Canadian dollar.
Source: Government of Canada, National Research Council.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Table 7.2. **Funding for NRC cluster initiatives: Atlantic initiatives**

Initiative focus	Geographic locale	Delivery institute(s)	Partner institutes
Funding for 2001-2 through 2004-5 (CAD 110 million) *Funding renewed 2005-6 through 2009-10 (CAD 110 million)*			
e-Business and information technology	New Brunswick: Fredericton (e-business) Moncton (e-learning) Saint John (e-health)	NRC-IIT	NRC-IRAP, NRC-CISTI
Life sciences	Nova Scotia Halifax	NRC-IMB NRC-IBD	NRC-IRAP, NRC-CISTI
Ocean technology	Newfoundland St. John's	NRC-IOT	NRC-IRAP, NRC-CISTI
Wireless systems	Nova Scotia Sydney (Cape Breton)	NRC-IIT	NRC-IRAP, NRC-CISTI

Notes: The wireless systems initiative in Cape Breton was discontinued after a formative evaluation of the ensemble of initiatives. The e-health initiative in Saint John was consolidated into the other New Brunswick locations to increase efficiencies and effectiveness.
Source: Government of Canada, National Research Council.

Spending on related programmes

N.a.

4. Targets and scope

Targets and selection criteria

Selection of clusters targeted evolved through discussions with cluster stakeholders and following informal assessments of potential complementarity and appropriateness of the role for NRC.

Cluster selection process

The selection mechanism was through dialogue. Many cluster participants are likely to have worked together before.

Number of cluster participants

The size of each cluster varies, as does the stage of development. The cluster studies undertaken as baseline measures of the state of development provide statistics on the size of each cluster and stakeholders involved, including:

- Saguenay Lac St Jean aluminium technologies: approximately 48 core firms, one university, technical colleges, three industry associations.
- Edmonton nanotechnology: approximately 21 core firms, one university, one industry association.
- Vancouver fuel cells and hydrogen: approximately 35 core firms, three universities, two principle industry associations.

- Saskatoon functional foods and nutraceuticals: 17 local core firms, one university, one regional network, approximately 50 members in neighbouring provinces.
- Winnipeg biomedical technologies: 25 local core firms, two local universities, one college, several research institutes, laboratories and hospitals, two associations.
- Ottawa photonics technologies: 60+ core local firms, several industry associations, three universities, several government research centres.

Cluster institutional status, governance and linkages

Within NRC, Cluster Initiatives in each region are the responsibility of the local NRC representatives. They may be from an NRC institute, the Industrial Research Assistance Program, or the Canada Institute for Scientific and Technical Information. They are supported by a Technology Cluster Secretariat within the Corporate Services group of NRC. For example, the nanotechnology cluster initiative in Edmonton, Alberta, which saw the establishment of the National Institute for Nanotechnology, is a joint initiative of NRC, the University of Alberta and the province of Alberta.

Administrative boundaries

NRC is a national organisation with a national mandate, and thus encourages collaboration, outreach and networking across regions and internationally. All clusters have linkages and networks beyond their region – selected examples include: Ottawa photonics with Vancouver, Toronto, Quebec city, Boston, Phoenix, etc.; Saskatoon FFN with a Prairie research network; Winnipeg biomedical with Calgary, Toronto, Halifax and Minnesota; Edmonton nanotechnology with California, Quebec; Vancouver hydrogen and fuel cells with Alberta, Toronto, Montreal, China; Saguenay aluminium with Montreal, Windsor, Waterloo, etc.

5. Instruments

The cluster strategy includes a range of potential instruments with a focus mainly on science-based innovation.

- *Identification and benchmarking:* Identification and benchmarking were part of the negotiated process for the selection of clusters to support.
- *Engagement of actors:* Networking and joint initiatives to strengthen the clusters (*e.g.*, demonstration collaborations), branding are possible.
- *Government service delivery:* Other than resource allocation as discussed below, there is not an explicit focus on reorganising government service delivery.

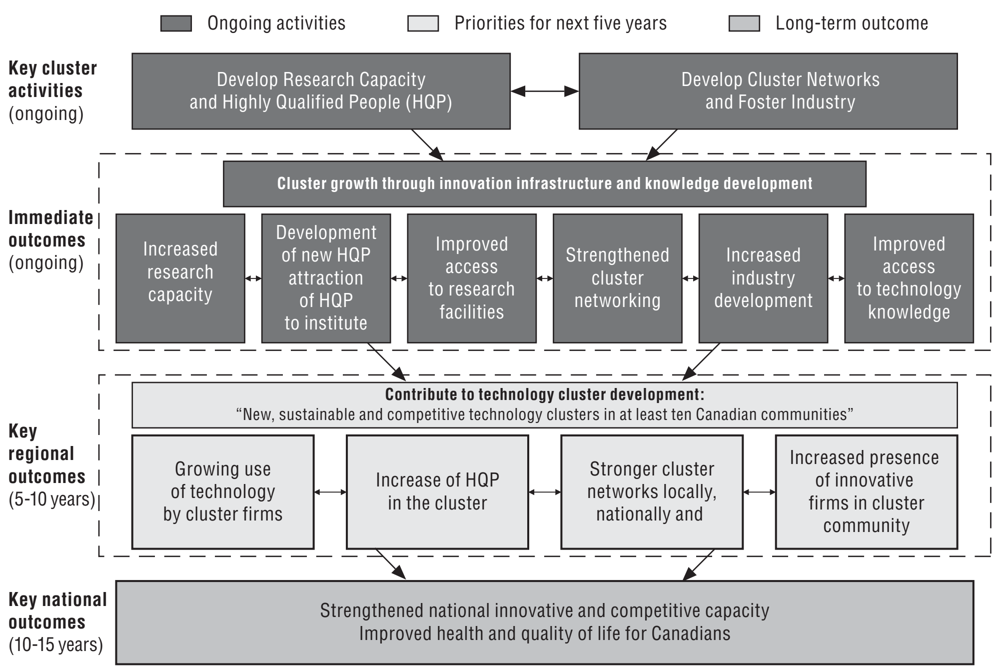
- *Skilled HR:* Support for training is one of the initiatives, particularly advanced science-related human resources (graduate students, post doctoral fellowships, etc.).
- *Entrepreneurship and innovation:* This programme has a main focus on research-related activities, including collaborative research and technology development, the provision of specialized R&D services and infrastructure, and access to specialized technology knowledge and information. Industry development is also included to a lesser extent. It may include seed funding, technical and business advice, spin-offs, licensing, incubation support for start-ups, etc.
- *Resource allocation and investment (including branding):* The federal level support is often complemented by provincial governments, albeit not through an explicit formula, to facilitate an alignment on key clusters.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

The NRC cluster strategy has a number of outcome measures broken down by timeframe (see Figure 7.2). In the short-term, for example, measures

Figure 7.2. **NRC cluster programme goals by development phase**



Source: Government of Canada, National Research Council.

of success include increased research capacity, stronger cluster networking and improved access to research facilities and technology knowledge, among others. More long-term measures include an increased use of technology by cluster firms, an increase in the level of highly qualified people and greater presence of innovative firms.

Implementation evaluations of NRC Cluster Initiatives have been undertaken or are underway. Evaluations address requirements of the federal Treasury Board: relevance (Is there an on-going need for the initiative?); success (Is the initiative achieving intended objectives?); and cost effectiveness (Is the initiative the most effective way to achieve objectives?). As part of cost effectiveness, and for early stage initiatives in particular, NRC examines the effectiveness of design and delivery including governance, management systems, performance measurement systems, etc. In terms of objectives, the logic model in Figure 7.2 describes the intended results of the initiatives over time.

Results of evaluations, if any

One summary of cluster studies for this programme offered some interesting findings regarding the nature of the challenges and the NRC's ability to fully address them. For example, it noted a need for NRC to co-ordinate more with other federal and provincial public entities involved in business development related areas (trade, investment) to support one of the less strong parts of the innovation system in Canada, commercialisation. It also mentioned a need for NRC to play a role in helping build cluster governance when it does not exist, albeit this does not mean that NRC should lead the cluster governance. Another key finding was the need for different strategies given the clear variations across clusters in terms of stage of development and composition (NRC, 2006).

Bibliography

Industry Canada (*www.ic.gc.ca*).

National Research Council (*www.nrc-cnrc.gc.ca*).

National Research Council (NRC) (2006), *Cluster Studies for NRC Technology Cluster Initiatives: Final Report*, Prepared by Hickling Arthurs Low, 23 August 2006.

OECD (2002), *OECD Territorial Reviews: Canada*, OECD Publications, Paris.

OECD (2004), *OECD Territorial Reviews: Montreal, Canada*, OECD Publications, Paris.

OECD (2006), *OECD Economic Surveys, Canada*, Vol. 2006, Issue 10, OECD Publications, Paris.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 8

Czech Republic

This chapter is a case study on the Czech Republic's Klastry (clusters) programme that supports the development of sectoral competencies and networking, mainly among firms, in all regions outside of Prague and with support from EU Structural Funds.

1. Programme(s) and their goals

The most explicit cluster programme thus far is Klastry (clusters), which began in 2004 to support national growth and competitiveness through sectoral cluster initiatives. Per the recently adopted National Innovation Plan and the future Enterprise and Innovation Operational Programme, this project will be expanded after it ends allocating funds in 2006 for this first period. It will also be linked to a national strategy to support regional innovation systems. A number of other national programmes have served the needs of clusters via SME support and technology centres, as described in the sections below. These various programmes serve a range of primary goals: sectoral competency and vertical linkages in key industries in the Klastry programme, FDI attraction in industrial zones/brownfield sites, and employment creation through SME support, to name a few.

Objectives of the national cluster policy under the Ministry of Industry and Trade (MIT) are to:

- Channel MIT resources to regions in a focused and co-ordinated manner that will maximise the impact of the support provided. This will involve integrating measures from other policy areas such as SME development and innovation as well as from other Ministries in areas such as skills and infrastructure.
- Enable MIT and CzechInvest to have improved dialogue with and between regions, universities and the private sector to develop common priorities for action.
- Enable identification and support of new sectors and sub-sectors with potential and will to improve competitiveness through collaboration and innovation and through this encourage small firm collaboration, innovation and entrepreneurship.
- Focus financial support to regions demonstrating commitment to innovative clusters.
- Create a framework for analysis, monitoring and evaluation of cluster initiative performance.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

As a post-socialist country, the Czech Republic had an economy dominated by large state industries until the early 1990s. While there has been a rapid transition, the lack of a tradition of entrepreneurship and SMEs during the socialist period has been a hindrance to bottom-up economic development. Clusters tend to be made up of small domestic firms. Notable exceptions include an automotive cluster and ChipInvest, an emerging micro-electronics cluster driven by foreign capital from large companies that is expected to support small local firms and science institutions as well. The recent implantation of a Hyundai car plant should also support automotive related clusters. Per the EU Trend Chart, the Czech Republic only scores above average on one indicator; the main challenges being educational inputs, improving business/university links and fixing bottlenecks in innovation financing (EC, 2005). Regional disparities between former heavy industrial areas and the capital region have increased markedly over the last few years, as well as the productivity gap of the dual economy between larger international firms and local SMEs. International firms are also highly concentrated in leading regions, minimising the spillover opportunities to the other regions that contain only domestic firms. In terms of strengths, the country is in a strategic location at the heart of Central and Eastern Europe and has been the most successful country in the region for attracting FDI through a pro-active incentive policy. It has also experienced increased rates of GDP growth over the last couple of years.

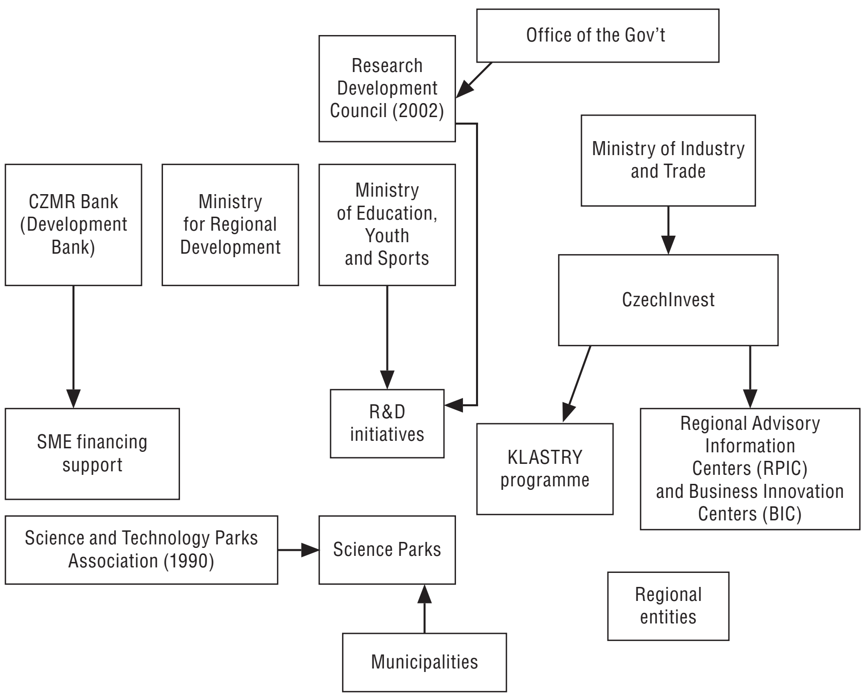
Historical development/evolution – where the programme came from in the context of other policies

Several policies for regional development and frameworks to support clusters have been developed in conjunction with EU programmes and Structural Funds. These programmes support either NUTS II "social cohesion" regions (8) or the NUTS III regions (14). Regional development has historically focused mainly on the lagging regions with the highest unemployment rates through programmes to support job creation, often through subsidies. The country's first regional cluster study of Moravia Silesia was executed in this context. Programmes to support clusters in brownfields are emanating from the industrial restructuring and environmental clean-up policies.

The Klastry programme is part of the larger Operational Programme Industry and Enterprise co-financed by the European Regional Development Fund (ERDF) that places an emphasis on clusters as a tool for competitiveness in general. It is intended to promote stronger vertical linkages among firms and have a more explicit regional component than its predecessor programme for SMEs, Kooperace (Co-operation) that focused on horizontal linkages. Klastry has a stronger focus on business development than innovation and research, which are more directly addressed by other programmes. However, in the next generation of Klastry the focus on innovation and research will increase. The cluster concept has since spread and is part of several other national planning documents.

Description of programme's place in governance framework

Figure 8.1. **Organisational chart: Czech Republic**



The Klastry programme is managed by the CzechInvest Agency under the Ministry of Industry and Trade. Note that CzechInvest has a mandate that goes beyond FDI promotion to include local firm business development. Per the National Innovation Plan, its mission may in the future become that of a technology agency, akin to TEKES in Finland or VINNOVA in Sweden (see Box 8.1). University related R&D funds are managed by the Ministry of Education with direction from the Research Development Council. The Ministry of Industry and Trade also has an R&D budget, with an emphasis on commercially oriented research. The National Innovation Policy seeks to create stronger links between the Ministry of Education and the Ministry of

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Box 8.1. CzechInvest: combining business development with FDI attraction

CzechInvest, the Investment and Business Development Agency, is an agency of the Ministry of Industry and Trade. Established in 1992, the agency contributes to attracting foreign investment and promoting the Czech Republic abroad. It is exclusively authorized to file applications for investment incentives at the competent governing bodies and prepares draft offers to grant investment incentives. Its task is also to provide potential investors current data and information on business climate, investment environment and investment opportunities in the Czech Republic free of charge. The Czech Republic is one of the most successful transition economies in attracting foreign direct investment. The introduction of investment incentives in 1998 has stimulated a massive inflow of FDI into both greenfield and brownfield projects and since 1993 more than EUR 46 billion in FDI has been recorded.

The Agency also helps develop domestic companies through its services and development programmes and acts as an intermediary between the EU and small and medium-sized enterprises in implementing structural funds in the Czech Republic. It therefore manages a portfolio of programmes under the national Operational Programme for Industry and Enterprise. In the future, it is possible that its mission will expand to become a technology agency. In addition to its headquarters in Prague and 8 offices abroad, the Agency has a network of 13 regional offices within the Czech Republic.

Source: www.czechinvest.org.

Industry. These links, as well as links between clusters with regional public entities and science parks, are hoped to be developed as cluster initiatives become fully functioning. In the next round of structural fund programmes starting in 2007, there will be additional programmes for science and technology policy and technology platforms that could also involve linkages.

Institutional frameworks and regional development policy

The Ministry for Regional Development has responsibility for co-ordination of policies for regions at the central level.[1] It oversees the Regional Operational Plans (ROP) and the National Development Plan (NDP). The Ministry was created in 1996 to serve as a cross-sectoral entity to co-ordinate roles for the regionalisation process in compliance with EU plans. The first NDP went into effect in 2001. The latest plan will go into effect in 2007. Of the five Operational Plans (Industry and Enterprise, Infrastructure, Development of Human Resources, Rural Development and Multifunctional Agriculture, and Joint Regional Operation Programme – JROP), only the latter is focused on regions specifically. The JROP maps the Sector Operational Programme to the Regional Operational Program (ROP). The Regional Sector Operational Programme matrix approach therefore serves to facilitate co-ordination between sectors and regions as well as national and regional levels. The new National Innovation Plan also serves as a platform for co-ordination in that it assigns managing and co-ordination responsibilities across key ministries that may help with greater policy coherence.

Co-ordination at the regional level includes several bodies. Regional Assemblies are elected at the NUTS III level and handle devolved central level tasks but they dedicate few staff to regional economic development. The assemblies in turn elect regional councils at the NUTS II level. ROPs are done at the NUTS II level and monitored by Regional Development Committees composed of public and private actors. Regional Development Agencies exist in a variety of legal forms and were created prior to the designation of the EU NUTS II and NUTS III region types. Their role in the development of regional strategies is therefore more *ad hoc* since they do not map to the same administrative units. In general, regional entities have had limited funding to support economic development but the decentralisation process is underway. The Klastry programme is not a core component of the country's regional development strategy.

Role of programme in the context of science and technology (or innovation) policy

The first comprehensive innovation strategy was implemented in 2005 to address the lack of a co-ordinated policy approach to innovation, and the Klastry programme is related to this new strategy. The National Innovation Policy covers the period from 2005 to 2010 with proposals mainly to strengthen R&D, but also to establish public-private partnerships, improve human resources and reform government administration of innovation. The plan breaks out these four axes into a series of 48 measures that are assigned to one or several ministries/ agencies respectively over a specified timeframe. The Ministry of Education or the Ministry of Industry and Trade are typically designated as the lead agency for the different measures, with strong involvement of the Research and Development Council.

Within this innovation plan framework, three measures are designed to address issues of regional innovation strategies. They fall under the responsibility of the Ministry of Industry and Trade. The Plan anticipates that these measures will be carried out in co-operation with the Ministry for Regional Development and the regions themselves:

- Adapt and expand the Klastry programme (part of the 2004-06 Industry and Enterprise Operational Programme) through 2013 (under the Enterprise and Innovation Operational Programme).

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

- Develop a monitoring and evaluation system with respect to the impact of clusters as a tool for regional innovation.
- Select and prepare experts and managers of cluster initiatives, using trainings and certification among other tools.

Technology platforms that link with EU level initiatives are another proposed measure in the innovation plan that is consistent with the support of regional specialisation. Although the plan does not make explicit the regional dimension, it is possible, albeit not certain, that there would be one. The programme is intended to target technology innovation in a select number of disciplines and bring together public and private research entities, firms (large and SME), finance providers, government and citizen's associations.

Science and technology parks under the Ministry of Industry and Trade also provide a foundation for greater firm co-operation and innovation. The Park programme supported a network of approximately 25 science and technology parks. Starting in 2001, Park2 added more functions such as the creation of a business incubator and co-operation with a university or research centre. Up to 65% of investment costs may be recovered. The Science and Technology Park Association provides consulting and training services as well. Different models are used to develop the parks. In the case of Brno in South Moravia, the park is a joint venture between the City of Brno, the city's technical university and a private multinational shipping company. In the case of Ostrava in Moravia Silesia, the park is funded by the EU, the Ministry for Regional Development and the City and is a joint stock company with the City, two universities and the Regional Development Agency as shareholders. There are no formal links at present between these parks and the cluster policy, although collaboration may occur in locations where a local university is able to lead the collaboration.

Role of programme in the context of enterprise policy

Given the weaknesses in the SME sector and the need for job creation notably in lagging regions, numerous programs have been developed to target SME development and networking. Projects include financing assistance to 35 Regional Advisory and Information Centers (general business support) and five Business Innovation Centres (innovation and technology support). CzechInvest oversees both programmes. The Kooperace or Co-operation programme provided subsidies up to 50% of business association expenses related to networking and joint activities (capped at EUR 90 000 per association). A total of 75 associations were supported in the three years from 2000-02, the numbers increasing each year (10 in 2000, 26 in 2001, and 39 in 2002). The Czech-Moravian Guarantee and Development Bank (CZMR Bank) is a leading funder of SMEs, including start-ups, and offers a range of tools to support them, including bank guarantees, preferential loans and financial subsidies or grants.

The Operational Programme Industry and Enterprise 2004-06 includes several programmes that support clusters or innovation, in addition to Klastry, and is complemented by a National Cluster Strategy passed in June 2005. For example, the Prosperita (Prosperity) programme requires firm co-operation and networking in the development of science and technology parks and business incubators and includes support for industrial research, technology development and innovation. Thus far 15 projects have been approved for technology-oriented firms. The Tandem programme seeks to improve co-operation between SMEs and universities/research centres by financing labour and equipment for joint applied industrial research projects. Other programmes that are addressed to individual firms include Inovace (Innovation) to increase technical and non-technical innovation in firms through funding of specific projects and Rozvoj (Development) to support process improvement and technology in SMEs so that they may reach international standards. More specific SME programmes include Marketing to support Czech exporters and Start to help support start-up firms with subsidised loans.

FDI attraction strategies have also included an implicit regional/cluster approach. The Industrial Zone Programme allows for support of site infrastructure and land, location being based on investor choice. CzechInvest reviews applications for investment incentives to support job creation with a sliding scale that providers a higher incentive in the most disadvantaged areas. The successful Supplier Development programme helps Czech suppliers to better link into international supply chains. CzechTrade also offers services to exporting firms.

Cluster studies conducted

A first mapping study, commissioned by CzechInvest in 2002 with funding by the EU PHARE programme, focused on the lagging Moravia Silesia region (restructuring industries and high unemployment). The analysis was based on location quotients and supplemented with desk research, company interviews and focus groups. In total eight clusters were identified in the region, including a large engineering cluster of between 600 to 900 companies depending on the definition (46 000 to 60 000 workers). The categorisation of the cluster was considered broad but useful because the firms face similar problems. This study contributed to the creation in 2003 of the Moravian Silesian Engineering Federation, the first official Czech cluster.[2]

In the context of an EU-funded cluster mapping study on the new EU member states, the Czech Republic was noted to have eight large statistical clusters (see Table 8.1) (Sölvell *et al.*, 2005). In addition CzechInvest has also conducted its own national mapping study and is working with the regional governments to support up to 30 more in-depth regional level studies.

Table 8.1. **Eight Czech statistical clusters**

● Heavy construction services	● Automotive
● Metal manufacturing	● Hospitality and tourism
● Processed food	● Building fixtures, equipment and services
● Transportation and logistics	● Financial services

Source: Sölvell, Örjan *et al.* (2005), *Entrepreneurial Innovation in the New Member States: Challenges and Issues at Stake for the Development of Clusters of Innovative Firms: 1st Interim Report*, Regional Clusters in the EU10, 15 July 2005.

3. Details on programme budget and timeframe

The total budget for the Klastry programme over the three years is approximately EUR 12 million (average of EUR 4 million per year) to fund both Part A and Part B applicants.

Part A "Mapping phase": The budget per cluster may reach up to EUR 33 000 (for the total programme period of up to three years) for activities connected with the creation of a cluster, not to exceed 75% of eligible costs. Eligible costs include items such as studies, meetings, or workshops and associated materials.

Part B "Development phase": The budget per cluster can range from approx. EUR 100 000 to 1.6 million for management and development of clusters (for the total programme period of up to three years). Reimbursement is not to exceed 50% of the total project cost based on the following schedule (maximum of 75% of eligible costs in year 1, 50% in year 2, and 25% in year 3). Eligible costs may include cluster staff, tangible and intangible assets for the cluster initiative, consulting services, benchmark studies, cluster promotion, evaluation of economic impact and research (market, competition and innovation).

Spending on related programmes

Examples of spending in other relevant programme areas in the 2004-06 Industry and Enterprise Operational Programme (OPIE) include:

- OPIE budget: EUR 348 million total (of which EUR 160 million is for the development of enterprise competitiveness); approx. EUR 116 million per year.
- Marketing: EUR 10 million total; approx. EUR 3.3 million per year.
- Start: EUR 20 million total; approx. EUR 6.6 million per year.
- Inovace (Innovation): 64 million total; approx. 21.3 million EUR per year.
- Rozvoj (Development): EUR 49 million EUR total; approx. EUR 16.3 million per year.
- Prosperita (Prosperity): EUR 75 million total; approx. EUR 25 million per year.
- Tandem: 93 million for the period 2004-10 or approx. EUR 13 million per year.

4. Targets and scope

Targets and selection criteria

For many of the programmes that provide a supportive framework for cluster development, the focus has traditionally been lagging regions or restructuring sectors as opposed to high-technology sectors. The Klastry programme is focused more on international competitiveness through strengthening of cluster initiatives than targeting specific regions *per se*. However, given that the Klastry programme benefits from certain EU funds, clusters in the Prague region may not participate.

Cluster selection process

For the Klastry programme, applicants were self selected and may not have worked together formally before but pledge to work together. They must meet the following criteria: a minimum number of companies in a geographic area, a focus on innovation, access to R&D training facilities, a clearly defined activity, support of major firms for the cluster mission and strong customer/ supplier links.

There are two types of application: Part A is to finance the search for companies to participate in the cluster initiative and Part B is the management and development of the cluster. Cluster initiatives must be in the Czech Republic (but not in Prague), include at least 15 firms, of which 75% must be in the Czech Republic (10 firms for Part A), include at least one university or research institute, have 60% of members be SMEs (Part B only), have a complete and quality proposal, illustrate potential for cluster sustainability and have completed a study for suitable cluster partners.

Per CzechInvest, there are 51 different clusters or potential clusters across Czech regions, not all supported by the Klastry programme. The programme has supported 42 mapping exercises (Part A) and 14 development projects (Part B). Approved projects are in clusters such as wine-growing, lumber and wood-working, renewable resources and construction among others. For a complete map of these clusters, please see Figure 8.A1.1 in the annex.

Number of cluster participants

At a minimum, the cluster must include at least 15 independent entities (ten for Phase A), include at least one higher education or research institute and have 60% of members be SMEs (Phase B). Applicants tend to have a number of firms close to the minimum required.

Cluster institutional status, governance and linkages

In Phase 1, the actual applicant must be a local government authority, organisations recognised by the local government, Czech higher education or research institutions, or CzechInvest itself. The cluster initiatives in Phase 2 of the programme register as not-for-profit entities. While there are no specific linkages across clusters as yet, there are opportunities for knowledge sharing such as the annual cluster conference.

Administrative boundaries

Klastry is open to projects that are at a regional, national or cross-border level, although there are no examples of Czech based trans-national clusters receiving support as yet. An important potential supra-natural cluster for the automotive industry has a strong base in the Czech Republic. Although it is not currently participating in the Klastry programme, it may be included in future programmes for technology platforms.

5. Instruments

The Klastry programme essentially subsidises the cost of either identifying other potential cluster members or setting up the cluster initiative. The programme funding amount possible can reach up to EUR 1.6 million total over a maximum of three years (with at least overall matching funds for eligible costs by the cluster or other public funds), which offers opportunities for joint projects beyond networking but not for significant R&D projects.

- *Identification and benchmarking:* CzechInvest plans to work to improve regional statistics to help regions better identify clusters and analyse the regional economy. It is expected that benchmarking among national and international clusters will be part of cluster monitoring. The goal is to support at least 30 cluster mapping exercises (42 completed to date) in both traditional and new sectors, so this goal has been exceeded. Part A of the Klastry programme is designed specifically to finance a cluster initiative's search for other cluster partners. The Klastry programme does require on-going information updates to satisfy programme monitoring and evaluation requirements and one of the eligible expenses for clusters is international benchmarking exercises. The National Innovation Plan anticipates on-going evaluation of clusters as a tool to support regional innovation systems.
- *Engagement of actors:* Prior to launching the programme, CzechInvest offered a training and cluster awareness sessions to over 30 cluster facilitators, 60 academics and 350 regional government and private sector actors. Periodic trainings as well as public relations on the cluster concept are in process, such as the Annual National Cluster Conference. CzechInvest also plans to develop a formal accreditation process for specific cluster facilitation skills. The

engagement of actors is the main focus of both Parts A and B in terms of identifying partners as well as linking firms with research institutions and universities. It is hoped that the programme will support over 1 000 companies (mainly SMEs) and will involve 1 500 extra days of university services to cluster initiative firms.

- *Government service delivery:* As the programme advances, it is hoped that in the future other government entities will be delivery partners as well.
- *Skilled HR:* The deficits of skilled human resources in the Czech Republic are noted in the National Innovation Plan and a series of measures will be introduced to address them. The Klastry program is not specifically linked with the question of human resources, other than the skill development of cluster initiative managers/facilitators.
- *Entrepreneurship and innovation:* The promotion of firm creation and entrepreneurship are not the subject of the Klastry programme but may be supported by other SME programmes. The programme requirement to link firms with at least one research/higher education institution provides an opportunity to support innovation.
- *Resource allocation and investment (including branding):* It is hoped that programme funds will be able to leverage other public and private funds with a ratio of one to five. Branding is not an explicit goal of the program since the criteria are not competitive *per se* and applications are accepted on a rolling basis until funds are exhausted, although branding could be a positive benefit.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

As an EU-funded programme, Klastry has an evaluation component. Evaluations are expected to focus on competitiveness indicators and innovation issues, such as the number of patentable ideas resulting from cluster inter-firm collaboration.

For the three cluster-labelled measures in the National Innovation Plan, including an extension of the existing Klastry program, the measures of success are an increase in the number of regional clusters and increased participation of regional actors in the innovation process and funding of such initiatives.

Results of evaluations, if any

The Klastry program began in 2004, so the first intermediate review is scheduled for December 2006. A first lesson learned was to break the programme out into a more user-friendly process through Part A to identify partners first and then the Part B for the cluster initiative subsidy.

Notes

1. As described in the 2005 *OECD Territorial Reviews: Czech Republic*, the mandate of the Ministry for Regional Development includes regional policy, regional business support, housing policy and development, area planning, tourism, and urban and rural development along with other responsibilities. The Ministry also co-ordinates activities of other ministries in certain related topics. Over time, several programmes initially under its charge have migrated to other ministries, for example the SME support is now under the Ministry of Industry and Trade (MIT), and Structural Funds for industry as well as trade promotion are under the executing agencies of MIT. The increasing number of specialised agencies has been noted to make co-ordination more difficult.
2. Another cluster mapping project was conducted by researchers not affiliated with CzechInvest. For more information, see Mikoláš, 2005.

Bibliography

Abrám, Josef *et al.* (2005), "Opportunities for the Development of Clusters in the Czech Republic", available as a conference paper from the European Regional Science Association, *www.ersa.org/ersaconfs/ersa05/papers/572.pdf*.

CzechInvest (*www.czechinvest.org*).

European Commission (EC) (2005), "Policy Brief: Czech Republic", prepared for the Ministerial Conference "Towards a Knowledge Society – the Nordic Experience", 14-15 November 2005 in Gothenburg, Sweden, *http://europa.eu.int/information_society/activities/gothenburg_conference/doc/pdf/brief_czech.pdf*.

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Czech Republic 2004-2005*.

Klusáček *et al.* (2004/5), *Final Report of the Project on CSF Evaluation: 4/04 Barriers to Growth of Competitiveness of the Czech Republic*, Prepared for the Ministry for Regional Development of the Czech Republic, by Technology Centre ASCR in co-operation with the Economics Institute ASCR and financed by the Joint Regional Operational Programme (EC).

Lukasik, Lubos (2006), "Support of Company Competitiveness in the Czech Republic", Presentation made in Brussels 15 March 2006.

Moravia-Silesia Engineering Cluster, *www.ostrava-city.cz*.

Mikoláš, Zdeněk (2005), "Czech Republic", in *Business Clusters: Promoting Enterprise in Central and Eastern Europe*, OECD Publications, Paris.

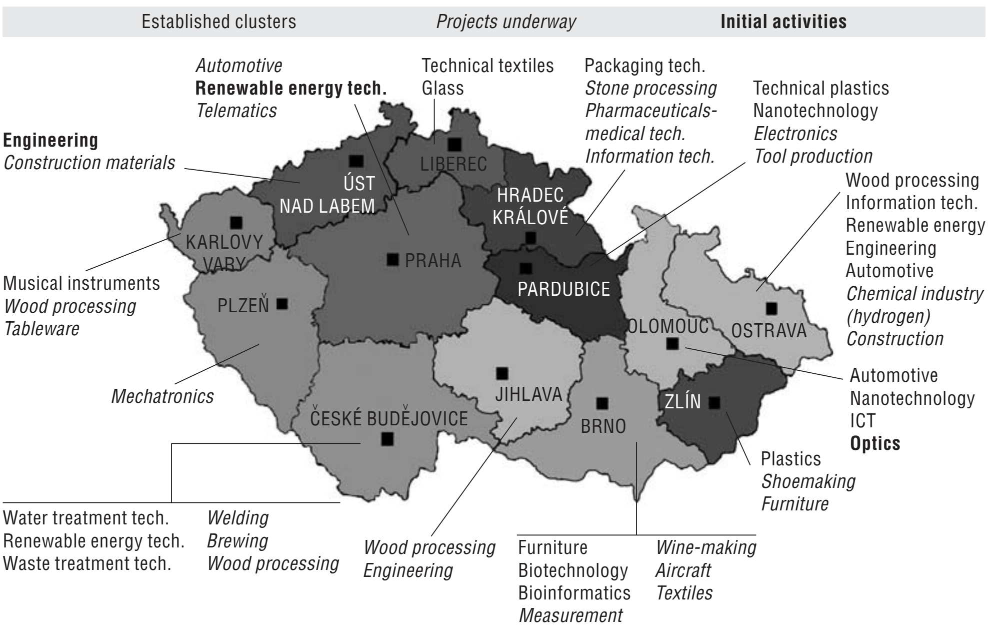
Ministry of Industry and Trade (2004), "Clusters in the Czech Republic: Supporting innovative and competitive businesses across the Czech Regions", Internal draft document dated October 2004.

OECD (2004), *OECD Territorial Reviews: Czech Republic*, OECD Publications, Paris.

Sölvell, Örjan, Christian Ketels and Torbjörn Folkesson (2005), *Entrepreneurial Innovation in the New Member States: Challenges and Issues at Stake for the Development of Clusters of Innovative Firms: 1st Interim Report, Regional Clusters in the EU10*, 15 July 2005.

ANNEX 8.A1

Figure 8.A1.1. **Map of Czech clusters**



Source: Government of the Czech Republic, CzechInvest.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 9

Finland

This chapter offers a case study on two programmes to support clusters in Finland. The National Cluster programme was a strategy in the late 1990s to support Finland's most prominent industry clusters as selected by different sectoral ministries through increased R&D financing for collaborative projects. The current flagship programme is the Centers of Expertise that support the development of expertise, firm creation and innovation in different regional urban hubs, usually in conjunction with technology parks.

1. Programme(s) and their goals

Finland has approached regional specialisation and the competitiveness of its firms through several different programmes and approaches. All share an important innovation and R&D focus. This case study will focus on the National Cluster programme and the Centres of Expertise (CoE) as two interesting and different examples of policies to support economic specialisation.

- *The National Cluster programme* was actually a series of initiatives to strengthen the Finnish mega clusters that drive national growth. The goal was to help target R&D expenditures to key clusters and to increase co-operation among actors, both firms and the public sector. This programme was implemented in the late 1990s and is now over, although some sectoral ministries may still support associated clusters.
- *The Centres of Expertise* are designed to develop regional innovation systems using the triple helix of university, industry and government. The Centres seek to capitalise on local assets and know-how and have a high-technology focus when appropriate (sophisticated technology is not a goal *per se*). The Centres promote collaborative public-private projects, often using a local technology centre or science park to house them. The programme is an explicit element of the country's regional development and regional innovation system strategies. The program goals, as indicated by certain quantitative targets, are to create jobs, prevent job loss, create companies, develop innovations and train people in selected knowledge-based sectors.

The forthcoming Centre of Expertise Programme (2007-13) will still be a regional-based tool. The most essential change compared to the current model will be the encouragement of stronger national and international collaboration. Currently, business-driven clusters lie in the centre of innovative development. Since the actors of clusters may be situated in different regions, settings of regional policy and the role of different stakeholders in it keep changing. An entirely regional viewpoint was considered insufficient. Policies and tools are needed to create networks between actors that are linked within the same cluster in different regions. As many Centres as possible are aiming to become global "stars". This demands greater critical mass than before. The new programme also encourages centres to take a more broad approach to innovation using both high technology and research as well as other areas of excellence such as business expertise and design.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

Other programmes supported by TEKES (national technology agency) and the Academy of Finland (research funding agency) involve R&D investment and commercialisation that support specialisation and industrial knowledge. For example, the Centres of Excellence programme was developed to support a national innovation system. It is focused on supporting research environments for internationally recognised research and is managed by the Academy with support from TEKES. The intent is to improve competitiveness on an international level. The technology programmes are used to promote co-operation among companies, research institutes, and TEKES to support innovation. A number of other projects, including business incubators, work in conjunction with this and other TEKES programmes. For example, TEKES is sponsoring the training of cluster facilitators in 2006.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Finland scores very high on many international rankings related to competitiveness generally as a result of strong performance in R&D, innovation and the education system. Per the EU Trend Chart, Finland is the most competitive country in the EU15 according to Lisbon Agenda criteria (EC, 2005). In terms of R&D spending, a large portion of private R&D investment is attributable to Nokia. A small number of large domestic multinational firms dominate the national economy, albeit the vast majority of firms in terms of numbers are actually small firms.

Historical development/evolution – where the programme came from in the context of other policies

The National Cluster programme flows from an active approach in Finland to support R&D and innovation with a goal of improving economic performance after a severe recession in the early 1990s. Finland began to consider the concept of clusters after the publication of Michael Porter's seminal work on the topic. Finland developed a new industrial strategy in 1993 and then after a cluster mapping exercise in 1995, developed a cluster-oriented approach to R&D spending that was known as the National Cluster programme.

In contrast, the CoE programme has a strong regional focus but is consistent with a general approach in Finland to promote the triple helix model of collaboration to promote innovation. It began as an urban policy initiative, with the first eight Centres being in the largest urban regions in Finland. It has since expanded to smaller urban centres that serve as regional hubs. The CoE programme represents a bottom-up type of policy framework and it combines different sector policies such as regional development, industrial, innovation, education and labour force policy.

Description of programme's place in governance framework

The National Cluster programme involves a range of actors. The Science and Technology Policy Council allocated seed money funds to cluster programmes. The respective ministries were responsible for funding and co-ordinating different programmes to support their cluster(s). TEKES (under the Ministry of Trade and Industry) and the Academy of Finland (under the Ministry of Education) were also asked to support these clusters in their research programmes. TEKES plays a central role in the planning and financing of applied technical research and industrial R&D. TEKES, the national technology agency, uses R&D related grants and loans for firms that work with public research organisations. The Academy of Finland is the major financing and planning body in the field of basic and university research. Regional Employment and Economic Development Centres serve as regional offices that combine several ministry representatives in one location, and TEKES now has offices co-located in these centres.

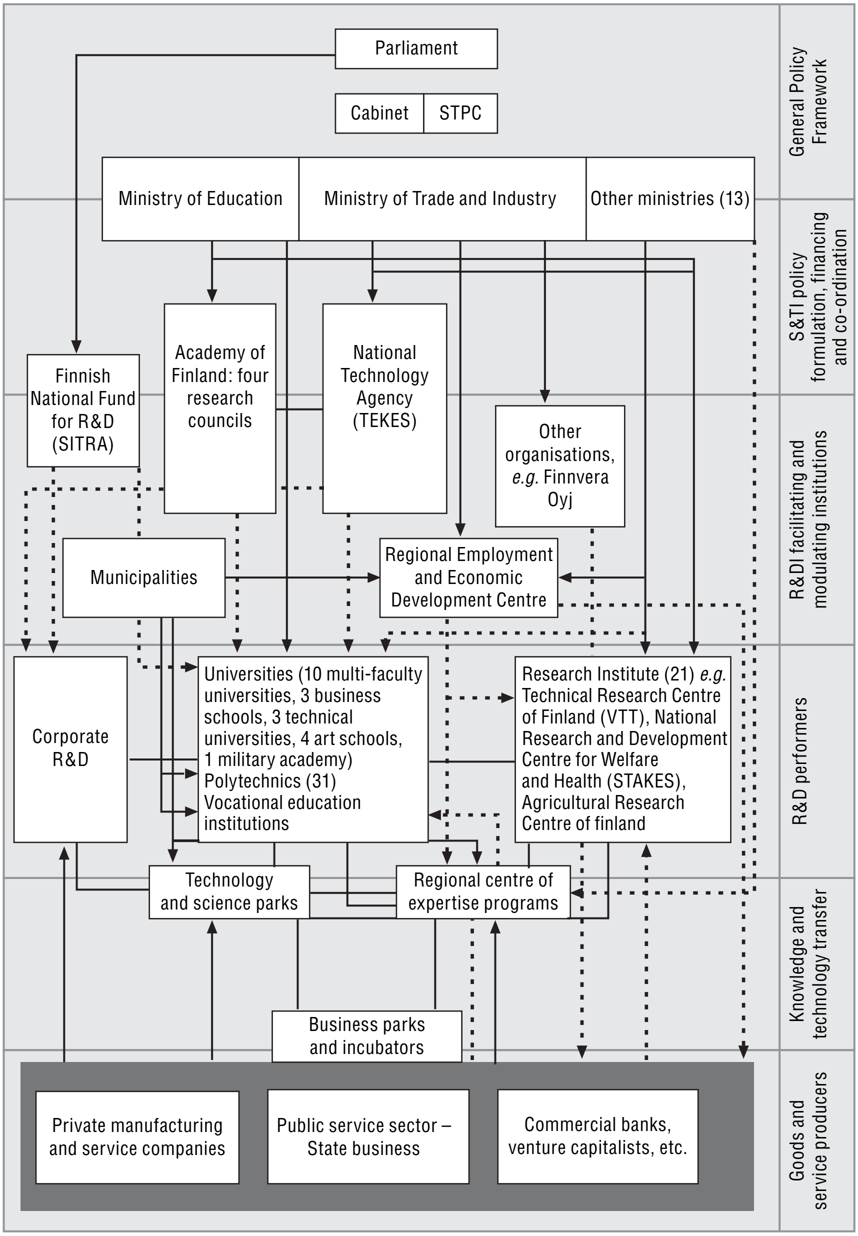
The CoE programme is managed by an inter-ministerial Committee administrated by the Ministry of Interior's Department for the Development of Regions. The purpose of the multi-disciplinary committee is to help co-ordinate and align efforts across different national ministries. At the regional level the CoEs often use science parks as their operational platforms. In science parks their tenants can use numerous special services, including: project management, business development and marketing, technology transfer, incubator, patenting/licensing/funding and business premises. However, the Centres of Expertise work in much wider territorial areas than science parks, consisting of companies and other cluster actors in the whole city region or council.

The Finnish Science Park Association TEKEL is a nationwide network connecting 23 science parks and technology centres in Finland's university cities. Established in 1988, TEKEL co-ordinates and implements co-operation among the different science parks, and acts as an intermediary between policy makers and science parks. The TEKEL science parks accommodate 1 700 enterprises and other organisations, gathering 32 000 experts working in different technology fields.

Institutional frameworks and regional development policy

As with many countries, Finland's regional policy has transitioned from a top-down subsidy approach to one that promotes the leveraging of regional assets and an active effort to co-ordinate across ministries (OECD, 2005). The 1994 Regional Development Act, in response to the severe recession of the early 1990s, focused on access to basic services, infrastructure, improving firm operating environments, and strengthening regional economies and skills. This began the transition from investment-driven growth to innovation-driven development.

Figure 9.1. **Organisational chart: Finland**



Source: OECD (2005), *OECD Territorial Reviews: Finland*, OECD Publications, Paris based on Nieminen, M. and E. Kaukonen (2001), "Universities and R&D Networking in a Knowledge-Based Economy", SITRA, Report Series, 11, 2001.

Given an improved economy, the latest Regional Development Act (2003) is centred on regional competitiveness, safeguarding service structures and developing a balanced regional structure, with the CoE being integral to this policy. The Act also requires that the central government develop guidelines to harmonise regional strategic programs and develop measurable targets across levels of government. Ten of the ministries are now required to also define a regional development strategy. Since 2004, the government has adopted nine Regional Development Targets, two of which are: 1) improving competitiveness internationally through specialisation and the information society (*i.e.*, the CoE Programme, see Table 9.1); and 2) promoting industrial development and entrepreneurship, notably firm operating environments.

Table 9.1. **Objectives of the Finnish Centres of Expertise programme**

• Long-term strategy to capitalise on high-level expertise	• Strengthen and modernise expertise
• Support specialisation and co-operation across regions	• Improve ability of regions to benefit from R&D
• Create new products, services, firms and jobs with world-class expertise	• Promote networking of expertise (national and international level)
• Increase regional appeal to attract investments and expertise	• Improve compatibility of regional and national development objectives

Source: Government of Finland, Ministry of Interior's Department for the Development of Regions.

Using the CoE programme as a model, the Regional Centres Programme was launched in 2001 with the goal of developing small and medium-sized urban hubs as a source of competitiveness for the region with a focus on sub-regional co-operation. The Centres are less business-focused than the CoE and more focused on linking the core city and peripheral municipalities within a functional area. In this context, the CoE appear as a strategic element of policies to reinforce the economic role of small and medium-sized urban hubs.

At the sub-national level, Regional Councils are responsible for developing long-term strategic Regional Plans that are in line with national regional development level goals. These Councils also serve as an interface with the private sector as well as other levels of government to promote coherence. From these long-term plans flow Annual Implementation Plans that break down funding sources from supra-national, national, local and private sources. They integrate different development components and in particular the CoEs (territorialisation of innovation).

Role of programme in the context of science and technology (or innovation) policy

Finland developed a national innovation system early relative to other OECD member countries. The national approach is monitored by the Science and Technology Policy Council, a key body chaired by the Prime Minister. The

Ministry of Education and the Ministry of Trade and Industry are the driving force for innovation related work, each with a focus on their sectoral mission. They work through the Academy of Finland, TEKES and the Technical Research Centre of Finland (VTT). These efforts to develop innovation systems have resulted in its success at promoting effective R&D expenditure and co-operation among universities, research centres, governments and the private sector. Finland is now seeking to transition from a science-and technology-focused innovation system to a more broad-based innovation approach integrating regional development concerns.

The National Cluster Programme was clearly related to Science and Technology Policy. The R&D focus of the programme was initiated by the Council, which offered seed money. The programme also encouraged funders of research and technology transfer to support these clusters (TEKES and the Academy of Finland). The CoE are related in the sense that they mainly focus on technological expertise. Science parks, which the CoE work with, are usually local level initiatives. Some of the other policies are directly linked to national innovation system goals, such as the Centres of Excellence Programme.

Role of programme in the context of industrial policy

The National Cluster programme was integral to the Finnish industrial policy approach. As described above, its genesis was a response to the severe recession in the early 1990s and the concepts popularised by Michael Porter. A new industrial strategy was developed in 1993 to help make the transition from the old paradigm of national champions to a new paradigm focused on improvement of framework conditions and markets. The programme was an industrial strategy of supporting key clusters through technology and increased R&D spending via sectoral ministries. Although planned for 1997-99, most programmes actually ran from 1998 until 2000 or 2001.

The CoE programme is not explicitly related to national industrial policy.

Table 9.2. **National Cluster programme targets: Finland**

Ministry	Clusters
Ministry of Agriculture and Forestry	• Forest cluster • Food products
Ministry of Transport and Communications	• Telecommunications (NetMate) • Logistics (KETJU) • Transport (TETRA)
Ministry of Social Affairs and Health	• Well-being cluster
Ministry of Environment	• Environmental programme
Ministry of Labour	• Cluster approach in National Programme for the Development of Working Life

Source: Pentekäinen, Tuomo (2000), “Economic Evaluation of the Finnish Cluster Programmes”, Working Paper # 50/00 for the VTT, Group for Technology Studies.

Cluster studies conducted

Finland conducted its own mega cluster mapping study in 1995 through the Research Institute of the Finnish Economy and the Finnish National Fund for Research and Development. The study identified nine clusters based on approximately 60 smaller studies. Eventually eight clusters were supported in the National Cluster programme (see Table 9.2).

3. Details on programme budget and timeframe

Most National Cluster programmes actually spanned for approximately three years from 1998 until 2000/2001. The Ministries, TEKES and the Academy of Finland funded the projects. Overall more than EUR 100 million was granted in the context of this strategy for additional R&D spending, with 25% of total programme funding used for initiating and supporting cluster governance and creating public-private partnerships. With eight clusters, a rough average of EUR 12.5 million was granted per cluster for a period of two to three years. Eligible expenses were related to the collaborative projects. The criteria for funding were not strictly defined, but improving co-operation among firms and between public and private sectors was required. The budget increases that the cluster ministries received were permanent increases for R&D. A few of these clusters are still supported.

While the expectation in the National Cluster programme was that the incremental R&D funding would help leverage additional funds, this amount varied considerably across clusters. Per an evaluation mid-programme in 1999, in the Wood Wisdom cluster the incremental funding was 10% of total public funding and 5% of overall funding. In contrast, in the Well-being cluster programme funding was approximately half of all public funding, with only 3% of total funding coming from private sources. Only a couple of clusters reported significant private funding. None of the cluster programmes reported bringing in loans, risk investment or venture capital (Pentekäinen, 2000).

The CoE programme began in 1994 and the present second programme cycle ends December 2006. Basic state funding provided from 1999-2005 totalled EUR 46 million, with total project grant funding of EUR 450 million over the same period for leverage of almost ten to one. The programme budget was EUR 8 million in 2003 and EUR 9.4 million in 2004, which varies between 22 centres from EUR 150 000 to 900 000 per CoE per year in base funding. Eligible expenses for financing included co-ordination, project planning and seed funding for TIP projects. Roughly 20% is used as seed funding for projects and 80% for operational management. For state basic funding, regional co-financing of 50% is required, with much of the funds coming from localities that have either supported investment in the science parks and technology centres or provided direct project funding. For basic funding there is no requirement for private funding.

In comparison, Finland's funding of other initiatives related to regional development or R&D is:

- For the Centres of Excellence, in the first three years, centres received on average EUR 336 000 per centre per year (in the Period 2000-05, 26 Centres were supported and in the Period 1995-99, 17 Centres were supported). In addition, the seven umbrella organisations were funded with EUR 3.5 million per three-year period.
- The Regional Centres Programme budget for 2001-03 was EUR 10 million per year, and for 2004-06 it is EUR 20 million per year.
- Per the Regional Development Act, funds from all ministries for regional development totalled EUR 1.546 billion in 2004 (although not all of the funds comprising this amount are 100% for regional development – but at least EUR 668 million including EU funds is 100% regional development).

4. Targets and scope

Targets and selection criteria

The National Cluster programme mega clusters were identified through mapping. This first cluster selection was therefore top-down by the S&T Policy Council. However, the specific projects funded were selected using a competitive process based on co-operation, scientific and industrial criteria. This first round supported eight different cluster programmes grouped under five different ministries. In later rounds, the responsibility in formulating and implementing new cluster and cluster-like programmes were delegated directly to the ministries.

The CoE selection criteria for participating in the national programme are based on international calibre of expertise and the innovative nature of the projects that have potential for growth. The first programme cycle began in 1994 with eight centres selected in the largest urban areas. A second cycle began in 1999 and a third began in 2003 (to end in 2006) that increased the number of centres to 22 CoE containing 45 fields of expertise (see Annex 9.A1 for a listing and map of the Centres). The fields of expertise selected are based on the amount and quality of high-level research and industry, the innovativeness and effectiveness of the proposed projects, the existence of a workable organisation of participants, and a long-term regional commitment. The accent on expertise and innovation does not necessarily mean high-technology, as some of the fields of expertise include tourism, culture (for example a field of expertise in chamber music) or the environment. Since clusters may be at different stages of development, the specific goals for each Centre vary, keeping in theme with the triple helix model of collaboration. The projects tend to include predominantly SMEs and micro-enterprises although there are Centres that involve some large multinationals and medium-sized firms.

Cluster selection process

In the case of the National Cluster programme, participants in the mapped clusters may or may not have worked together before. The project proposals involved self-selected actors. The CoE are based in regional hubs but self-selected to apply. The actors may have worked together before, for example through the science park that houses them.

Number of cluster participants

National Cluster programme: In mid-1999, the number of projects per cluster ranged from 10 to 113. The number of participating companies ranged from 8 to 70 with an average of 40 firms per cluster in addition to a large number of other entities like educational and research institutions.

CoE: There were 5 000 participating firms across the 22 Centres annually in 2002-05 for an average of 227 firms per Centre. The majority of those firms are companies with firms of fewer than ten employees, although large firms are increasingly interested in co-operative networks and projects in CoEs.

Cluster institutional status, governance and linkages

There were no explicit linkages across the mega clusters. Presumably since each ministry set up its own programmes, they were not uniformly designed or executed across sectors. An evaluation noted that the cluster governance was laborious and costly because the programme required temporary governance structures and that the different initiatives were public instead of private sector led.

The CoE funding is determined by an inter-ministerial committee. The local science park company often serves as the governance structure to manage the Centre. Cross cluster linkages is an explicit goal of the programme. For example, networks of Centres have been created around key themes such as food development, tourism, wood, pharmaceuticals and software products.

Administrative boundaries

The South-East Finland CoE, Koske, supports trans-border cluster links with Russia in the area of logistics. This expertise is used in several international projects, such as Straightway, which is a joint project of local ports, logistics companies and regional development organisations. There exist co-operation arrangements between Finnish and Russian universities and research centres.

Although not part of the National Clusters or CoE programmes, the Network of Innovation Relay Centres (IRC) connects innovation centres in 33 countries as well supports technology transfer between companies and research institutes. IRC Finland is the local manager. The programme is financed by the EU and TEKES. IRC Finland searches international partners for technology developed in Finland, spreads information about international technology supply and demand, and organizes technology transfer meetings and events. TEKES supports IRC Finland's functions and TEKEL helps implement the programme with its partner organisations.

5. Instruments

The National Cluster programme focused on concentrating resource allocation, R&D projects and to a certain extent engagement of actors. Per an evaluation of the CoE, the smaller centres focused more on cluster-based development and internationalisation and the larger Centres focused more on R&D projects conducted with universities and other research institutions.

- *Identification and benchmarking:* The National Cluster programme involved a mapping exercise that may have involved some general benchmarking. The CoE programme may involve benchmarking with data collected across Centres.
- *Engagement of actors:* In both cases the engagement of actors was clearly a goal. In the National Cluster programme, co-operation among firms, research institutions and the public sector was a goal, but an evaluation noted that the short-term, project-based approach was not conducive to cluster relationship building. It also helped firms better appreciate the supply chain. In an evaluation of the Centres, one of the most important findings was that they served as an effective framework for building regional innovation systems by engaging actors through joint strategy and cluster specific forums.
- *Government service delivery:* Since the mega cluster support was managed by different sectoral ministries, the reorientation of government service was not an explicit goal. However, an evaluation noted that an interesting result of the National Cluster programme is that it also helped get public entities that fund projects to work more effectively. In terms of the CoE, an evaluation noted that regional actors could do more to re-orient government services around them. There is also a link with regional Economic Development Centres. In addition to the services they provide, CoEs are dependant on funding granted by these centres.
- *Skilled HR:* This was not an explicit focus of either programme although different Centres or clusters may have incorporated this aspect into their initiatives. In many Centres of Expertise it is important that R&D-oriented growth clusters have skilled human resources available. Therefore projects initiated by local CoEs have trained in total over 80 000 persons in 1999-2005 mainly in projects funded by the European Social Fund.
- *Entrepreneurship and innovation:* Both programmes are focused on innovation, research and technology transfer applications. The entrepreneurship aspect is more prominent in the CoE as they seek to generate new firms and support SMEs through their projects in the technology parks and incubators with which they are typically affiliated.

- *Resource allocation and investment (including branding)*: The purpose of the National Cluster programme was to help reorient funding across different organisations towards the projects important to industrial clusters with an important weight in the Finnish economy. The CoE, with a requirement of regional co-financing, seeks to align resource allocation objectives across different levels of government (EU Structural Funds, national, regional and local funds).

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

An evaluation of the National Cluster programme noted that since the goals were so broad, measurement of success was complicated.

For the CoE, the measures of success have been quantified in terms of jobs created or preserved, new companies founded and innovations. Evaluations are required for each programme cycle.

Results of evaluations, if any

An evaluation was conducted during the course of the National Clusters programme with a focus on two of the mega clusters. Evaluators noted increased co-operation, mainly of the public actors funding research, and a greater appreciation of supply chain relationships. Areas for improvement that were noted included greater private sector involvement (including financing), expensive governance costs and insufficient long-term relationship building (Pentekäinen, 2000).

The evaluation for the first programming period of the CoE identified an increase in the level of co-operation among actors. The programme's added value from the firm perspective related to the Centres' impact on R&D and the resources made available to firms.

The mid-term evaluation for the 1999-2002 programme cycle indicated that in total, 5 700 knowledge-intensive jobs were created, 5 100 jobs were preserved, 316 new firms were created with a high-technology focus, 1 400 innovations (new products, services or operational models) were created and 28 000 persons benefited from training services. In terms of engagement, there were 1 100 experts, 3 075 firms, 460 research and training units and 480 other development organisations involved in the programme. In terms of improvements, it was noted that regional governments had become more involved but had not yet fully coalesced around all the Centres. The connections across Centres at a national level was also identified as an important aspect to be strengthened. The *ex post* evaluation is now underway and it will be finished next autumn. The Government has already decided to renew the CoE Programme in 2007-13 according to the national Committee's proposal.

Bibliography

Academy of Finland *(www.aka.fi)*.

Centres of Expertise (*www.oske.net*).

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Finland 2004-2005*, *http://trendchart.cordis.lu/*.

Finnish science and technology information service (*www.research.fi*).

Halme, Kimmo (2003), "Improving Innovation Policy Co-ordination through Inter-ministerial Cluster Programmes", presented at the conference Trend Chart Policy Benchmarking Workshop, Luxembourg, 5-6 May 2003.

Kavonius, Veijo (2004), "Innovation and Regional Development", presentation held in Florence, Italy November 2004, sponsored by the Tuscany Region, the EU ERIK Network and the OECD.

Luukkainen, Sakari (2001), "Industrial Clusters in the Finnish Economy", in OECD Proceedings, *Innovative clusters. Drivers of National Innovation Systems*, OECD Publications, Paris.

OECD (2005), *OECD Territorial Reviews: Finland*, OECD Publications, Paris.

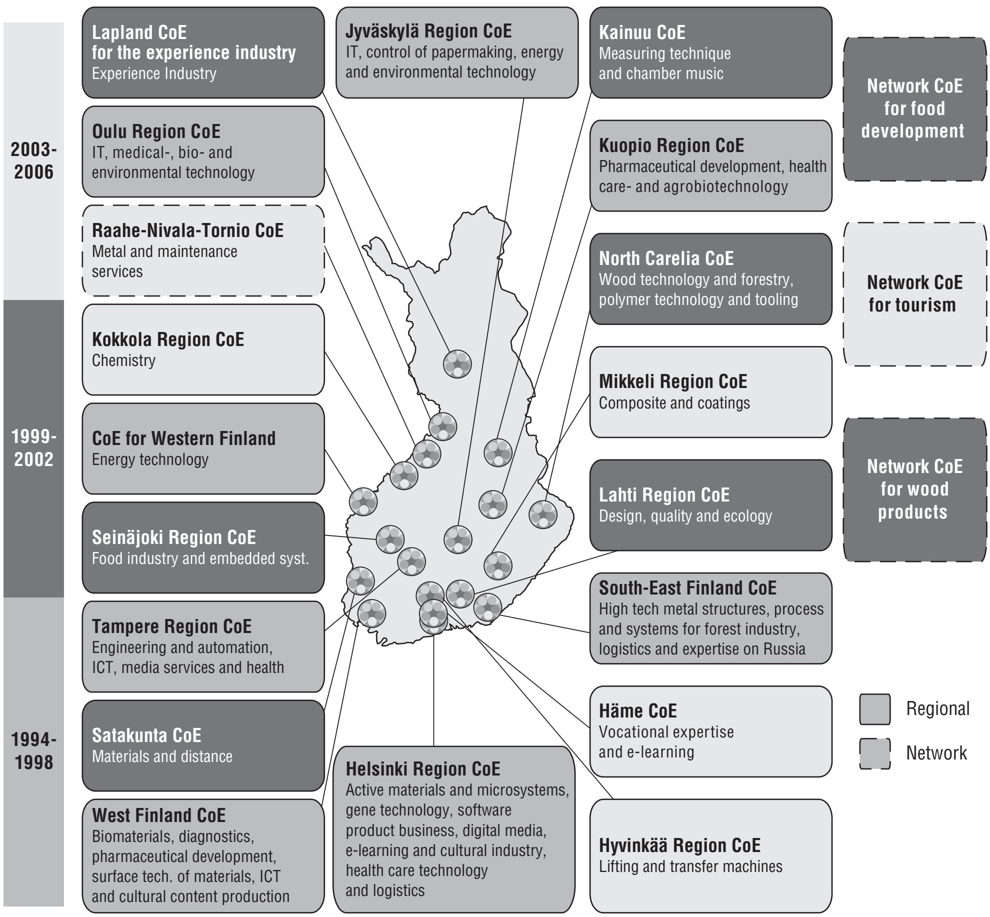
Pentekäinen, Tuomo (2000), "Economic Evaluation of the Finnish Cluster Programmes", Working Paper # 50/00 for the VTT, Group for Technology Studies, *http://virtual.vtt.fi/inf/julkaisut/muut/2000/wp50.pdf*.

Rouvinen, Petri and Ylä-Anttila, Pekka (1999), "Finnish Cluster Studies and New Industrial Policy", Chapter 15 in OECD Proceedings, *Boosting Innovation. The Cluster Approach*, OECD Publications, Paris.

TEKEL-Finnish Science Park Association (*www.tekel.fi*).

ANNEX 9.A1

Figure 9.A1.1. **Map of Finnish Centres of Expertise**



Source: Government of Finland, Ministry of Interior's Department for the Development of Regions.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 10

France

This chapter is a case study on two programmes in France with a cluster-based approach. The SPL programme began in the late 1990s and supports networking among small firms in French industrial districts. The more recent Pôles de compétitivité programme is France's main competitiveness policy that supports collaborative industry-research projects in both "international" and "regional" clusters.

1. Programme(s) and their goals

France has two separate programmes that explicitly support clusters, in addition to other programmes for geographically-based research specialties and networks as described later.

The new *Pôles de compétitivité* programme launched in 2005 was designed to support clusters with a critical mass in terms of innovation or industrial base to be competitive internationally, and thus support the key drivers of competitiveness for France nationally. Although the program will benefit regions with the selected clusters, the primary goal is to address the performance of French firms and notably to develop or strengthen the triple helix relationship between firms, research centres and higher education institutions through joint projects.

However, the clusters selected were not all of internationally competitive character. The original programme design was to select approximately 10-15 international sectors. Upon final selection in July 2005, there were 6 international clusters and 9 clusters with an international orientation, for a total of 15 "international" clusters. In addition, 15 inter-regional clusters and 37 regional clusters were also selected. The ultimate selection of 52 inter-regional or regional clusters located throughout the country indicates that the programme goals for those clusters, while designed to promote innovation through joint projects, are in this case perhaps more oriented toward regional rather than national objectives and with less emphasis on the innovation critical mass in favour of industrial critical mass.

Another national policy to support local production systems or *systèmes productifs locaux* (SPL) has been in place since a first call for proposals in 1998. The policy pursued by the government consisted of both recognising the SPL phenomenon and providing selected SPL with funding for joint activities. These SME clusters (industrial districts) are often concentrated in low-technology sectors and located in peripheral areas. The goal is to increase the level of co-operation and optimise the workings of existing SPLs to help firms overcome their small size through common activities such as marketing and industry monitoring. In some cases SPLs have also engaged in more technology and innovation related projects.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

In France the co-operation among firms and the links between firms, universities and research are behind those of the European innovation leaders. France is also characterized by a fragmented educational system (under-funded public universities, small but important *grandes écoles*) whereby the institutions have very little autonomy and therefore little ability to act in the context of a triple helix. France's R&D is also dominated by public R&D investment that is less market oriented than its peers. French industrial policy, traditionally focused on big business, has only more recently turned to SMEs and small business collectives.

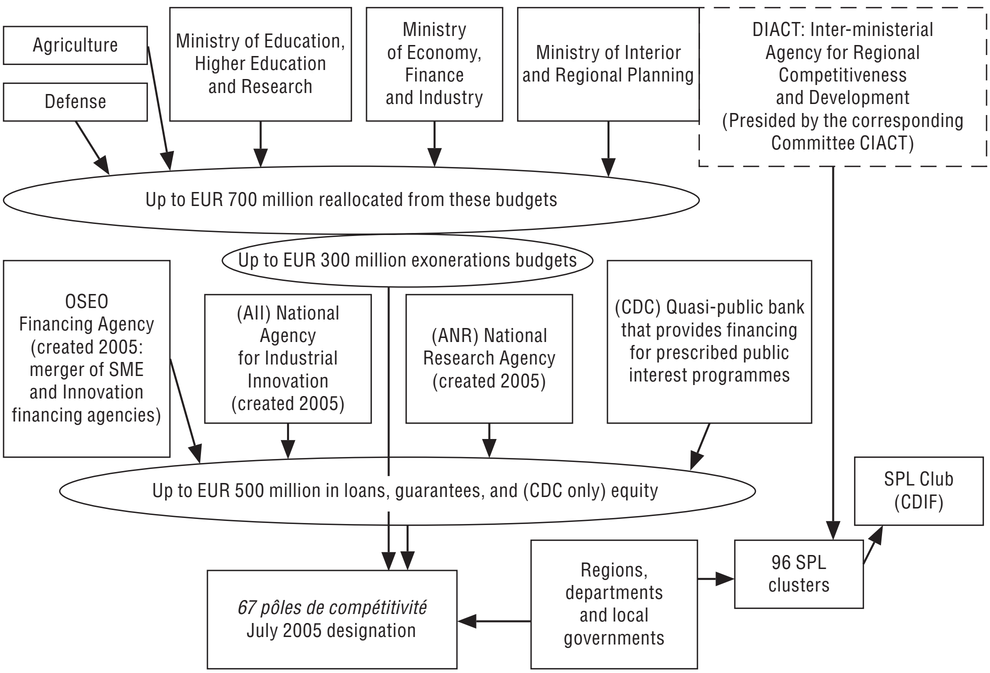
Historical development/evolution – where the programme came from in the context of other policies

The *Pôles de compétitivité* programme is a departure from existing policies, although the SPL cluster policy for SMEs was already in place, and it is consistent with a general trend in France to improve research/industry linkages. Following a decision in December 2002, the CIADT (now named CIACT – *Comité interministériel d'Aménagement et de Compétitivité des Territoires*) agreed that the government would pursue such a policy. Three important reports contributed to the policy elaboration process. In 2004, the Regional Planning Agency DATAR outlined key issues for the creation of the *pôles de compétitivité* as an industrial policy with regional grounding. The subsequent 2004 Blanc report, "Ecosystems of Growth", promotes two key themes: 1) that France must move from an economy of planning and imitation to one of innovation; and 2) that this would best be done by regional actors who are most interested in inter-sectoral co-operation in a given territory. The January 2005 Beffa report "Towards a New Industrial Policy" came out after the call for proposals for the programme but reinforces the same message. It explains that France is too concentrated on low-technology industries and needs to promote a transition to more high-technology industries.

The development of the policy for the *pôles* was a higher profile political issue than the SPL programme in place since 1998, and as a result, the linkages between the two policies are being assessed now that the second programme is in place. A recent evaluation report on this topic noted that given the tight timeframe to put together the *pôles*, often existing SPLs were excluded from *pôle* development, but only a few were ultimately included in the governance structure of the *pôle* or have since developed other links to a *pôle* such as for a particular project. While the SPLs are composed of SMEs, the *pôles*, often driven by large firms, have typically not made SME inclusion a top priority. The government has requested that, when appropriate, *pôles* not selected be re-oriented via the SPL programme and that *pôles* make a stronger effort to include SMEs.

Description of programme's place in governance framework

Figure 10.1. **Organisational chart: France**



The combination of actors involved in this programme illustrates its importance in France as a policy for economic growth and its regionally-dependent basis. The call for proposals for the *pôles de compétitivité* was a highly publicised event and co-ordinated by DIACT (formerly known as DATAR), the Agency for Regional Competitiveness and Development, and the Business Division of the Ministry of Economy, Finance and Industry. DIACT is an inter-ministerial agency reporting to the Prime Minister and is currently housed within the Ministry of Interior whose Minister at the time was a powerful figure in the French political landscape.

The fact that the agency changed its name to include the term competitiveness is indicative of an orientation shift towards a regional development policy that works towards competitiveness. It also accounts for the incorporation of the former Inter-ministerial Mission on Economic Restructuring (MIME). Its oversight body, the CIACT, has also asked that a number of other government authorities incorporate the winning clusters in their plans. This is true of the French Agency for International Investments and the 2007-13 contracts between the central government and regions, among others. Regional governments are also encouraged to support clusters not selected through other programs, such as the SPL programme. Furthermore, France frames this policy as a response to the EU Lisbon agenda goals for a knowledge economy and as consistent with the Eureka network of clusters and French-German research alliances.

Institutional frameworks and regional development policy

The regional policy strategy for France has a long history with a dedicated lead agency since the 1960s (DATAR, now DIACT). The agency has become less a centralising and directive organisation than in the past and has re-centred itself on strategic functions. It serves a co-ordinating role among sub-national, national and supra-national entities. Thanks to its inter-ministerial nature, the agency is rather unique; albeit its budget remains a small portion of the funds spent on regional planning. It is currently attached to the Ministry of Interior, but has been attached to other ministries in the past depending on government priorities.

The regional strategy has focused for several decades on correcting spatial inequalities across the very diverse regions, mainly through fiscal redistribution and infrastructure finance. Since 1982, decentralisation has led to inter-governmental arrangements that favour greater decision-making by regional and local entities. Changes in EU funding priorities have also had an impact on funding for regional policy matters. Special multi-level governance contracts for regional development (CPERs) have helped to expand the regional development policy approach to include a wider range of beneficiaries (agglomerations, zones not corresponding to an existing administrative boundaries) and domains (industry modernisation, others areas of public responsibility). CPERs have similar conditions for regions as contracts for EU Structural Funds. Additional place-based initiatives in France include special zoning (reductions in social charges, tax incentives and direct aid) and the regional planning premium (PAT) that provides a premium per job created. These spatial initiatives are typically for sensitive urban areas or rural priority areas.

Since 1999 and even more strongly since 2002, France has added to its regional policy a competitiveness dimension. The rationale for this addition is that 50% of its industrial production is based on knowledge, and the effective circulation and use of knowledge occurs at a regional or local level. The SPL programme and now the *pôles de compétitivité* are integral to France's regional policy. For example, in the upcoming 2007-13 CPER, the SPL and *pôles* are part of the priority objectives for these contracts.

Role of programme in the context of science and technology (or innovation) policy

To improve the effectiveness of science and technology policy, France has embarked on several reforms. The goal is to better link the public research system, educational institutions and private industry – the same triple helix which the cluster policy also tries to address. The reforms include a merging of two business financing entities into one (the former SME development bank and the former business innovation financing agency), a new National Research Agency, and a new Industrial Innovation Agency. Additional reforms are underway with the organisation of public research to transition from one based on civil servant contract researchers to a system inspired by models such as the National Science Foundation in the US for competitively allocated research funds. The higher education system is not, however, undergoing any significant reforms in the context of these changes in science and technology policy. The *pôles de compétitivité* are therefore integral to his new policy approach.

In the context of the *pôles de compétitivité* policy, a legislative decision created special research and development (R&D) zones around the *pôles*. Firms participating in approved projects and located in a R&D zone may therefore benefit from social and fiscal exonerations. The conditions for the exonerations include: 1) co-operation among firms; 2) the firms are located within the R&D zone; and 3) the project was accepted by the *pôle de compétitivité*. The zoning is based on the regional distribution of business and research centres around the competitiveness clusters. The zone boundaries were discussed with the cluster representatives as well as government representatives from the central government ministries, local representatives of the central government (*préfets*) and local governments and will soon be approved.

Since 1995, an array of different programs have been successively added to link research and industry for the goal of technology transfer or designate areas for research specialties, albeit the distinctions between them are not always clear. A new research law voted in March 2006 also supports the concept of regional concentrations of research. These groupings operate with the logic to either concentrate research funds and/or promote firm/research collaboration. In addition to resource concentration for such fields as genetics, cancer and nanotechnologies, there are technological research teams (ERT) to strengthen the role and improve the perception of university research groups working in partnership with the business sector (95 at present). There are an additional 80 technological platforms designed to improve SME's access to technologies, 20 national centres for technological research (CNRT) and networks of technological innovation (RRIT) which finance co-operative projects led by SMEs, large firms and public laboratories. These programmes are in addition to over 200 networks that had already been established as

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

centres of research, innovation and technology transfer within universities (CRITT) and other technological development networks (RDT). If these centres or networks are located in proximity to an SPL, there may have been collaboration across programmes.

Role of programme in the context of enterprise policy

The national champions approach to industrial policy, the dominant form before the 1990s, is being replaced now by a more innovation-oriented approach bringing public and private actors together. As discussed above, the 2005 Beffa report "Towards a New industrial Policy" suggests a re-orientation of France's industrial approach to support higher technology sectors. The report also posits that given their structure, the current tax incentives for R&D are in effect more useful to SMEs than to large firms. One suggestion of the report to address this problem, which has since been put in place, is the Agency for Industrial Innovation. The goal is to provide substantial funding for research projects designed for large firms in 10-15 major projects in high-technology sectors. The budget from late 2005 through 2007 is EUR 2 billion in public funds, which must be complemented with private funds. The *pôles* are eligible to compete for these project funds as would any other applicant.

Cluster studies conducted

No mapping was done in the context of the *pôle* policy as applicants self-selected, however the national statistics agency had previously estimated with 1999 data that clusters/industrial districts covered approximately 41.5% of industrial employment or 1.5 million jobs using the basic criteria of: 1) at least five firms in the same activity; 2) at least 100 employees in the same activity; 3) the density of establishments per km^2 (at least twice the national average of density of firms per km^2); and 4) specialisation that is higher than the French average. When using a selection criterion a bit stricter for critical mass, the number is approximately 1.2 million jobs or 33.2% of industrial employment (680 agglomerations of specialised establishments).

3. Details on programme budget and timeframe

Central government public funds planned for the programme total up to EUR 1.5 billion over three years for the 67 *pôles*. Note that those funds may be augmented and the number of *pôles* may change as a result of a couple of mergers and new additions since the initial July 2005 designation. Of that amount, EUR 300 million will be in the form of exonerations for social charges and other taxes, up to EUR 700 million will derive from different ministries and up to EUR 500 million will flow from different agencies through priority financing instruments from OSEO, the *Caisse des Dépôts*, the Agency for Industrial

Innovation and the National Agency for Research. A budget of 11 million for the three-year program will be available to support the management of the *pôles*.

Initially the amount planned for the programme was EUR 750 million for approximately 10-15 clusters, the amount on average per cluster being approx. EUR 16.7 to 25 million per cluster per year for three years. With the selection of 67 clusters, the funding amount was doubled to EUR 1.5 billion. The 15 labelled international or "destined" to be international should receive approximately 80% of that central government funding. Therefore, this gives an average for the international clusters of EUR 26.7 million per cluster per year for three years, excluding co-financing, for collaborative R&D projects. For the other clusters (regional or inter-regional clusters), the amount is approx. EUR 1.9 million per year per clusters for the same purpose. These are of course theoretical calculations as the funding process is only beginning in 2006 and the funding will be based on project proposals by the clusters, albeit the exonerations are based on a formula for all firms depending on firm size. Additional funds from the EU, regions and local governments are expected for these projects within EU guidelines, however there is no set formula for co-financing.

The SPL programme was designed to encourage firms to work together as an initial step. The total budget has been approximately EUR 4 million out of the DATAR (now DIACT), however much of the funding to SPLs come from other sources such as the Ministry of Economy, Industry and Finance regional offices. In 2000, for example, EUR 1 spent by DATAR leveraged EUR 4 in funding from other public sources and that figure is estimated to have increased as regional governments have grown more engaged in financing such programmes. In one exceptional case, an SPL that received EUR 20 000 in 2005 leveraged 800 000 in other funds, a factor of one to 40.

Spending on related programmes

While the SPL budget is extremely modest, the *Pôles de compétitivité* budget is more significant in comparison to other spending areas. For example, among research budgets, the civilian budget for research and technological development (BCDR) by various non-defence ministries totalled EUR 9.2 billion in 2004, with a defence R&D budget of EUR 3.6 billion in 2004. There exist a handful of other research funding sources, each under EUR 200 million (EC, 2005). The newly created Agency for Industrial Innovation budget for the first two years or so is EUR 2 billion or approximately EUR 1 billion annually. Regional development spending by the central government in the context of the regional development contracts (CPER) 2000-06 was approximately EUR 2.8 billion (with near matching of regional funds). The DIACT's annual budget is approximately EUR 300 million per year.

4. Targets and scope

Targets and selection criteria

The main target of the *pôles de compétitivité* policy as initially stated was those clusters (including firms, training centres, higher education and research entities) that work in partnership around a particular market or technology that is internationally competitive. The expectation is that these clusters would be in growth sectors. With the inclusion of an additional 52 clusters, the target expanded to the strongest clusters in almost all regions across the country, whether leading or lagging. Some of these lower technology clusters cover fields related to meat and construction, for example.

The SPL programme seeks to support smaller industrial district type clusters. The specifications in the request for proposals in 1998 and 1999 gave some basic criteria for eligibility based on geographic concentration. These criteria include: 1) the presence in the regions concerned not only of a concentration of activities but also of a high level of inter-enterprise links; 2) one or more facilitation structures; and 3) operators qualified to stimulate interaction between enterprises. The SPLs are defined as "a particular productive organisation located in a region which generally speaking corresponds to an area of employment. Such an organisation operates as a network of connections between productive entities engaged in similar or complementary activities which divide the available work between themselves (manufacturing or service centre, etc.)".

Cluster selection process

The call for proposals issued by the French government in 2004 resulted in 105 applications for 15 anticipated nominations. The announced winners in 2005 totalled 67 *pôles* although the high number selected, especially the non-international clusters, and the selection committee (mainly public sector instead of private sector actors) have been the subject of programme critiques. Cluster participants may have worked together to some degree in the past (21 of the 105 applicants were large SPLs under the other cluster program and approximately three-fourths were selected) but the impetus for cluster co-operation was the request for proposals. The large majority of *pôles* did not have existing formal collaboration relationships prior to the call for proposals.

In terms of SPLs, out of approximately 180 applicant co-ordination bodies to the call for proposals in 1998 and 1999, 96 were retained in total. They were selected based on the SPL assets, appeal and success factors as demonstrated in the application which included a business plan for the group. In 2001 the call for proposals focused on trans-national co-operation and in 2003 the proposal focused on innovation for SPLs in rural areas, with 5 out of 11 applicants being retained.

Number of cluster participants

The number of firms involved in each *pôle* varies and per the application for *pôle* designation can include up to a handful of very large firms and hundreds of SMEs. In terms of actual participation in *pôle* projects, the number of firms has yet to be determined but will be a more restricted size group. Often there are three to four higher education institutions and three to four research institutions affiliated with the cluster. In practice, large firms serve as the anchor of the *pôles* and to a certain degree control the process. The very different expectations of the actors brought together for the *pôles* has been cited by participating firms as a challenge, especially between SMEs and large firms, and since in some cases the collaboration was rushed to meet the call for proposals. On average, SPLs include approximately 100 SMEs, although participation in actual collaborative projects may involve approximately 30 to 40 firms. SPLs are encouraged to work with a university or research institution but this is not a funding requirement.

Cluster institutional status, governance and linkages

Each *pôle* has a governance structure which is typically that of a non-profit association in this first stage. They were developed specifically for this programme with several oversight bodies: finance committee, scientific committee and strategy committee. The statutes of each association are approved by the regional *préfet*. These governance bodies include local and regional government actors as well as firms and other experts. One critique of the programme has been that this system of governance is complicated and difficult, although the CIACT has now recommended that the number of oversight committees be more flexible. The DIACT is also considering creating a national club for the *pôles de compétitivité* to promote knowledge sharing across entities. The President of these cluster initiatives is a business person and the structures will have a management team.

For SPLs, there is a voluntary association of French Industrial Districts, the CDIF (*Club des Districts Industriels Français*) that covers SPLs (more than 5 000 companies and over 150 000 employees). The purpose of the club is: to promote knowledge sharing among SPLs; to serve as a resource centre to promote innovation and partnership between its members; and to support the development of other enterprise networks in France, Europe and worldwide. It also seeks to promote the SPL approach generally in other regions and to potential technical service providers or financial institutions.

Administrative boundaries

The clusters within France may extend across many local administrative borders, covering multiple geographic units. In continental France there are 95 departments and 22 regions. Since the specific modalities for access to

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

funding and co-financing are not yet finalized, the potential challenges of cross-jurisdictional clusters have yet to be fully felt (15 are defined as inter-regional in scope and many *pôles* actually include multiple regions). The boundaries are defined by the cluster participants as listed in the application, although the central government did request in one case a merger of two proposals for what they considered to be one cluster. The designated R&D zones that accompany this policy were subsequently defined based on the expertise of the clusters and other local institutions and administrative factors. Trans-national clusters, especially with Germany in the context of EU programs, are encouraged but there is nothing specific in the current policy to promote such collaboration other than to study the possibilities.

5. Instruments

For SPLs, the financings were mainly focused on collective management expenses to engage actors. They include: facilitation, audits, the creation of Internet websites, internal communications, studies and diagnostics, and to a more limited extent, commercial initiatives or innovation. Human resource issues were also addressed by the SPLs, in at least one example of co-ordination with a local institution for an adapted technical degree.

The objective in the *pôles* programme is to increase the generation and diffusion of innovation through R&D that can lead to commercialisation. This will depend on the effective collaboration of actors within the *pôle* who may have not worked together in this way before. The reallocation of government resources and the tax incentives towards selected clusters support this objective. The project-based approach allows a certain degree of flexibility for clusters in their proposals to pursue what is of greatest value to them. The success of the accompanying reforms in innovation framework conditions could reinforce the potential for success. The instruments for the *pôles* include:

- *Identification and benchmarking:* Clusters are self-selected applicants and there was no requirement to have been previously identified via a mapping or benchmarking exercise. As described above, France did do a mapping exercise in the context of the SPL programme and this was used as a criterion in programme eligibility.
- *Engagement of actors:* The request for proposals was a key factor in inciting firms, universities and research institutions to work together formally. The nature of pre-existing collaboration varied considerably. Some *pôles* came together in a matter of months to respond to the request for proposals. Several were already formally organised in the form of an SPL that then added large firms to apply to be a *pôle*. In other cases, the actors may have had some informal collaborations but not in the context of a cluster initiative. The governance structure of each *pôle* requires the involvement of numerous

public and private actors. In fact, the process was noted to have brought together different layers of government who may not have worked together before in such a way.

- *Government service delivery:* The programme has entailed co-ordination at the central level, although the details of this co-operation in practice are still being worked out. Sub-national governments have also played an active role in supporting candidates for *pôles* and will participate in financing. It is expected that the regions and other local entities will take the *pôles* into account in their overall strategies. An interesting result of the programme is that it will help regions learn more about how to support economic development through clusters and help them restructure their policies to be more supportive of clusters.
- *Skilled HR:* The promotion of skilled HR is not an explicit aspect of the policy. The links between business and higher education institutions outside of research issues are not strong. The timeframes for the cluster policies are more accelerated than that of education policies.
- *Entrepreneurship and innovation:* The programme is targeted to clusters that already have critical mass by increasing collaboration within the triple helix model. The focus is on existing firms in the cluster application and not on start-ups (via financing, incubators, etc.). Other reforms to the public research sector could improve the currently inexistent mobility of public research staff and their potential involvement in spin-offs and start-ups.
- *Resource allocation and investment (including branding):* The programme requires ministries and agencies to dedicate funds from existing programs to the selected clusters. In the first stage of the programme, the *pôles* have had to complete different applications by funder, which has led to discontent. The programme has therefore been modified to have a one-stop shop fund that will be administered by the Business Division of the Ministry of Economy, Finance and Industry for funds coming from the ministries, although not the agencies. Critiques of this funding mechanism note that it is too centralised and will not give as prominent a role to SMEs. It is hoped that the branding will also attract additional public and private support, especially for the 15 clusters with an international orientation, and this will be taken into account by the Invest in France agency. A committee will monitor the integrity of the *pôle de compétitivité* label. The *pôles* will also serve for regional branding and marketing initiatives.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

The evaluation approach will be pragmatic and address issues related to the project research and R&D, governance structures for the cluster initiatives, and the nature of activities developed by the *pôles* over time.

Results of evaluations, if any

The selection of the *pôles* took place in July 2005 with final project approvals in late 2005/early 2006. It is therefore too early for evaluations. The fact that a high number of initial applications (105) were submitted despite the short time-frame to respond to the request for proposals is indicative, at a minimum, of the programme's appeal. The process of programme development is subject to on-going informal evaluation. For example, the critiques of the first several months of the programme (such as heavy administrative procedures, insufficient incorporation of SMEs) are being taken into account by policy makers to adapt procedures as the programme evolves.

Preliminary evaluations by DATAR noted progress in the stronger partnerships for SPL projects, a mobilisation of firms and the development of positive spillovers in terms of collaboration with public authorities. When looking at job creation, between 1993 and 2001, of all SPLs minus the large automotive SPLs, employment growth was 9% *versus* 5.7% in equivalent sectors. As compared with national level industrial performance, 78% of firms in well-organised SPLs were more dynamic in terms of employment *versus* only 30% for firms in SPLs not yet organised in a system.

Bibliography

Beffa, Jean-Louis (2005), "Pour une nouvelle politique industrielle" (Towards a New Industry Policy), Report submitted to the French Government, 15 January 2005.

Blanc, Christian (2004), "Pour un écosystème de la croissance" (An Ecosystem for Growth), Report submitted to the Prime Minister, National Assembly.

CIACT (*Le Comité interministériel d'aménagement et de compétitivité des territoires*), notes of the meeting held 6 March 2006.

CIACT (*Le Comité interministériel d'aménagement et de compétitivité des territoires*), notes of the meeting held 24 October 2005.

CIADT (*Le Comité interministériel de l'aménagement et du développement du territoire*), notes of the meeting held 12 July 2005.

CIADT (*Le Comité interministériel de l'aménagement et du développement du territoire*), notes of the meeting held 14 September 2005.

DATAR (*Délégation à l'aménagement du territoire et à l'action régionale*) (2004), *La France, puissance industrielle, une nouvelle politique industrielle par les territoires* (France, Industrial Power, a New Industrial Policy for Regions).

Ernst and Young (2005), *Étude relative à l'implication des PME et des SPL dans les Pôles de compétitivité* (Study on the Involvement of SMEs in the SPL and Competitiveness Clusters), Draft report to the DATAR.

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: France 2004-05*.

French Competitiveness Clusters (*www.competitivite.gouv.fr*).

French Industrial Districts Club (*www.districts-industriels.com*).

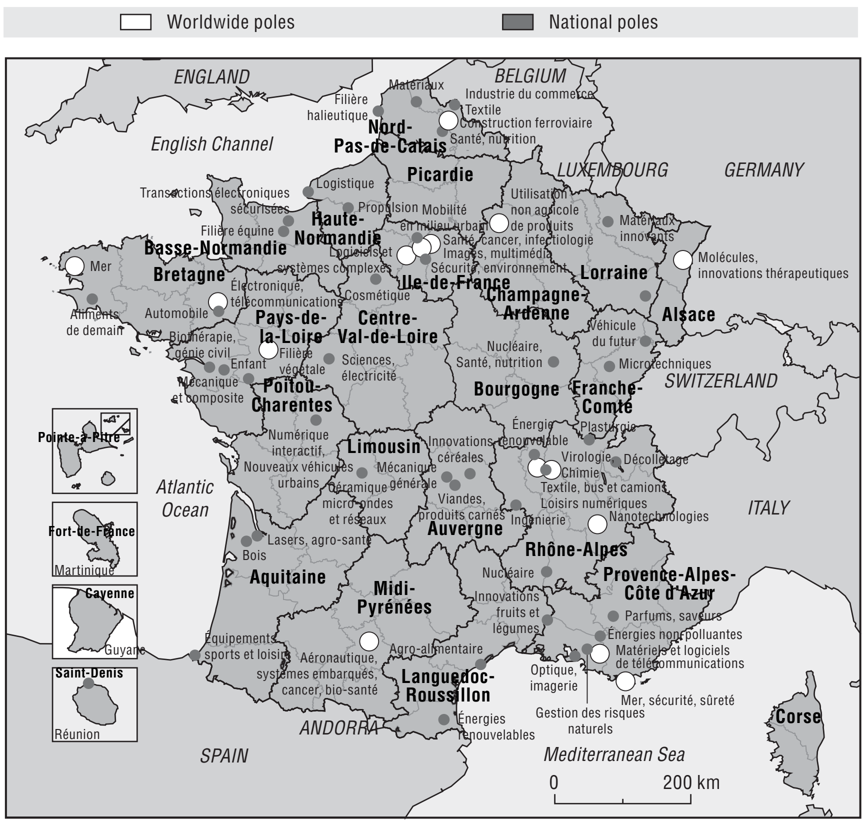
Lainé, Frédéric (2001), "Une approche statistique des systèmes productifs locaux" (A statistical approach to local production systems), in *Réseaux d'Entreprises et territoires : Regards sur les systèmes productifs locaux* (Networks of Firms and Regions: Local Production Systems), DATAR, la Documentation Française, Paris.

OECD (2006), *OECD Territorial Reviews: France*, OECD Publications, Paris.

Pommier, P. (2003), *La politique française des systèmes productifs locaux* (The French Policy for Local Product Systems), Presentation made in Copenhagen, Denmark, 10 June 2003.

ANNEX 10.A1

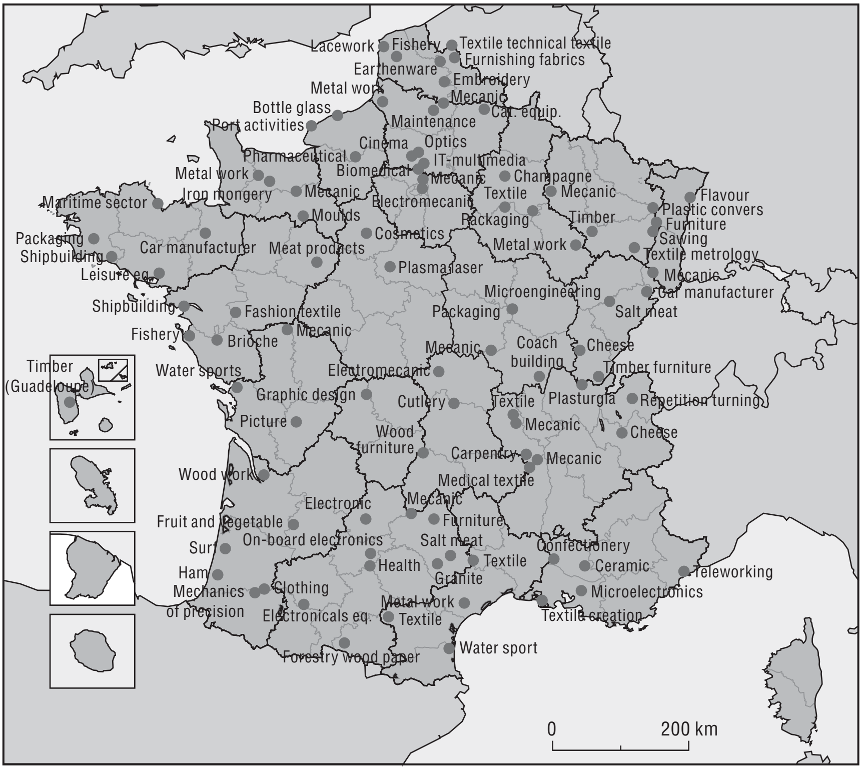
Figure 10.A1.1. **Map of French *Pôles de compétitivité* clusters**



Note: The location of each *pôle* is based on the postal address of the application in response to the call for proposals. The *pôle* listed in this map for Bidart is physically located in the area near Lyon.

Source: *Le Monde* newspaper based on data from DATAR.

Figure 10.A1.2. **Map of SPLs (industrial districts) in France**



Note: Map may not include all SPLs designated by a national commission.

Source: *www.districts-industriels.com.*

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 11

Germany

This chapter is a case study on a range of programmes in Germany, emanating from various policy streams with a cluster-based approach, with a special focus on three of the most prominent programmes. The BioRegio programme served to concentrate research funds in a limited number of regions to support biotechnology, a sector of strategic national interest. The InnoRegio programme seeks to improve the innovation capacity of the lagging new Länder in Eastern Germany with support from EU Structural Funds. The GA-network initiative is a funding negotiation tool between the federal level and Länder to provide funding for projects that improve collaboration among regional actors with a strong research focus.

1. Programme(s) and their goals

Unlike other countries that will be reviewed, this summary looks at several programmes rather than at one large programme. While there is no single overarching programme that promotes sectoral specialisation or clusters, a number of recent initiatives have been introduced that emphasise the cluster concept in different contexts and with various objectives. This case study will focus on the BioRegio programme, the InnoRegio programme and the GA-networking initiative. The programmes described below seem to exemplify the shift in thinking towards policy measures to facilitate networking and interaction among economic actors along several different policy strands.

- There are programmes to support research in key sectors and branches (these include the BioRegio and BioProfile initiatives and the Networks of Competence).
- There are a set of programmes that are broader in scope in terms of sectors but that are specific to the eastern *Länder* [InnoRegio, Regional Growth Poles, Network Management East Germany (NEMO)]. This second group tend to be funded in part through EU regional funding programmes (*i.e.*, are included in the 2000-06 Operational Programme).
- The GA-networking initiative is somewhat different from both of these because it places cluster support in the wider framework of on-going central-regional funding mechanisms. In other words, it represents a new area of expenditure that can be covered through central-regional negotiated transfers. This could be considered as a third type of objective.

BioRegio, BioProfile and other biotechnology activities

The BioRegio programme was initiated in 1995 with the four winning regions selected in 1997 to receive preferential access to funding for R&D projects in biotechnology. The programme was based on the assumption that knowledge-intensive companies tend to be concentrated in specific regions and that these regions draw on specialised local factors markets (skilled labour force, targeted capital markets and specialised services). BioRegio is an important element of the overall biotechnology initiative of the German government. This was launched in recognition of the strategic importance of biotech for the life sciences industry and its increasing importance as an enabling technology in other sectors. The initiative underlines the role of public policy in making research more

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

commercially productive, given concern that Germany's biotech industry was small in comparison to that of other countries, such as the United States and United Kingdom, despite strong research output, often commercialised elsewhere.

In 1999, the follow-up programme BioProfile was launched with a similar approach but with an emphasis on regions that have a strong profile in a particular field of biotechnology. Three regions were selected in this programme. Today, there are a large number of regional biotechnology initiatives that have been generated out of the BioRegio and BioProfile activities.

InnoRegio and Enterprise Region – the BMBF's innovation initiative for the New Länder

The InnoRegio programme is designed specifically to address issues of innovation in eastern Germany. The basic ideas behind InnoRegio and the subsequent programmes are to support regional development through the formation of innovative networks with specific abilities and technologies which provide it with competitive advantages. In particular for small and mid-sized companies in eastern Germany, it is of vital importance to strengthen their innovative ability through new forms of co-operation with science and research generation. These programmes are also based on the assumption that innovation-related activities directed to new or growing markets and segments have the greatest potential for growth. Successful regional networks thus do not require the best economic infrastructure as a pre-condition but can be created on the basis of a specific competence – even in regions with previously weak structures. The programme seeks to support the best, but not all, of these innovative networks in weaker economic areas.

InnoRegio is now part of an umbrella of BMBF programmes that have a regional or cluster focus. Together, they are called *Unternehmen Region – die BMBF-Innovationsinitiative Neue Länder* (Enterprise Region – the BMBF's innovation initiative for the new *Länder*). In addition to InnoRegio, the following programmes are part of this umbrella initiative: Innovative Regional Growth Poles (described below), Centres for Innovative Competence, Interregional Alliances for Tomorrow's Markets and InnoProfile.

GA-networking initiative ("Joint Task" funding for network development)

Since 1969, regional policy in Germany has operated primarily in the context of a jointly agreed and jointly funded federal-*Länder* framework, the so-called GA (*Gemeinschaftsaufgabe Verbesserung der regionalen Wirtschaftsstruktur*) or Joint Task for the Improvement of Regional Economic Structures. The aim of the GA is to avoid excessive competition between the *Länder* in the provision of regional aid but to allow the *Länder* independence in the implementation of regional policy. The GA is defined by a federal-*Länder* Planning Committee, which drafts an annual Framework Plan detailing assistance measures, specific eligibility conditions, the spatial coverage of the assisted area maps and regional development priorities.

The "co-operation networks and cluster management" measure was introduced into the GA in 2005. This programme is bounded in the sense that it is not available to all regions but rather those facing more important economic development challenges. The new targeted support can be provided for regional and supra-regional co-operation between enterprises and business-related institutions by means of co-operation networks and cluster management. A more intensive co-operation between the various actors is designed to strengthen existing potential and increase the competitiveness of individual regions.

Other important initiatives

In addition to these three general programme families, a range of other initiatives are also grounded on the cluster concept. These include, in particular the programmes NEMO (Network Management Eastern Germany), EXIST (start-ups from higher education institutions) and others such as:

Innovative Regional Growth Poles. The programme supports the establishment of regionally and thematically focussed innovation initiatives in the new *Länder*. Initiatives consist of enterprises, public research organisations/universities and other actors. Co-operative R&D/education projects build on regional strengths to develop future growth poles. These initiatives are oriented on market commercialisation, including an effective management of the initiative. The programme is implemented as a competition with a thematic focus defined by bottom-up initiatives.

Learning Regions. The programme aims at promoting life-long learning and the development of a learning society by supporting the building up of networks of educational organisations on a regional level as well as by developing innovative measures for implementing the principle of life-long learning. The programme seeks to bring together supply and demand in education within a region and motivate individuals to life-long learning as well as improve education infrastructure.

Regional Competence Networks. This initiative promotes networking among science, education and enterprises in order to bundle competence and to market internationally attractive networks to the world via the Internet. The initiative aims at promoting co-operation within top-level technology networks. Each network is in a technology field, has a specific industry theme and is focused on a region in which this industry is strong.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

The programmes seek to address both high growth and lagging areas. The biotechnology initiatives were designed to specifically address weaknesses with regards to commercialisation of R&D results. The programmes for eastern Germany seek to overcome several structural economic weaknesses. For example, the eastern German business and research landscape was marked by small and mid-sized companies, a low level of innovative ability in the economy, a lack of employment and training positions and the migration of young people to the old federal states. In light of these structural deficits, the innovation policy approach was adapted.

Historical development/evolution – where the programme came from in the context of other policies

There is a general shift in the field of innovation policy in Germany towards more networked forms of innovation, and greater emphasis on commercialisation. There have been concerns that the R&D system in the past was well funded but did not lead to the same levels of commercial success for German firms as was the case in other countries. This is particularly true in biotechnology (though less true with respect to some other sectors such as automotive where large German firms tend to be strongly involved in collaborative R&D). More generally, the slowdown in the German economy and concerns about both growth and employment creation have led to calls for investment in R&D and innovation more broadly to be more output-oriented.

Insofar as several of the programmes target eastern Germany, these initiatives have a strong regional development component. Given the history of the new *Länder*, the promotion of innovation and entrepreneurship has been a priority since reunification. The network approach is particularly appropriate in these states because while the research and university systems are relatively strong, there is little tradition of these institutions co-operating with private enterprise nor is there a tradition of small businesses conducting research or engaging in joint projects. As such, the aims of regional policy and these innovation promotion measures based on clusters seem well aligned.

More generally, the GA-networking initiative seems more in line with recent concepts of regional competitiveness, seeking to move the focus of regional policy away from support for lagging regions to a more broadly-based competitiveness focus that is relevant for all regions. In this respect, GA-networking can be seen as a regional competitiveness instrument.

Description of programme's place in governance framework

The main central government departments that sponsor these programmes are the BMWi (Federal Ministry for Economics and Technology – formerly the BMWA (the Federal Ministry for Economics and Labour) – and the BMBF (Federal Ministry for Education and Research). In general, the BMWi is responsible for industry and enterprise promotion, including supporting research, technology and innovation by firms. BMBF is more focused on funding research institutions. In addition, the BLK (Joint Conference of the Federal Government and Federal States on Education, Planning and Research Promotion) plays an important role as an interface with the *Länder*.

Institutional frameworks and regional development policy

The federal nature of the country has a strong influence on the way that the programmes are operated. They tend to be strongly decentralised and involve the federal government mainly in a facilitator role, organising the competition and selection of regions but then playing little active role in managing the programmes, which is either a *Länder* responsibility or assigned directly to NGO consortia or networks.

Role of programme in the context of science and technology (or innovation) policy

The Ministry of Education and Research (BMBF) states that it is now focusing research funding under its programmes on those fields which have great leverage for growth and employment. The areas of focus include: strengthening information and communications technology as the basic technology and driver of growth in many branches as well as its linkage with other technologies and its integration into applications (motor vehicles, machinery, services), microsystems engineering, optical technologies, materials research, and clean processes and production technologies, and new fields in biotechnology and nanotechnology (OECD, 2004).

The BioRegio initiative and the Competence Networks illustrate that the cluster approach is seen as a mechanism for maintaining the competitiveness of German firms in key high growth sectors. In these cases, national economic objectives are seen to be served by promotion of regional clusters in industries that are considered drivers of the national economy and important sources of new technology.

The general change in orientation can be summarized as: 1) a shift from scientific to innovation goals; 2) less funding of individual R&D projects run by specific institutions and more emphasis on joint projects and research themes; and 3) stronger marketing of linked competences across business, research and government. All of these have promoted an approach to programme design that emphasizes network building. This approach is expected to improve outcomes in a number of areas where current performance is considered to be inadequate. These weaknesses include: co-operation between industry and the research/university sector; co-ordination of research support activities; and transfer of knowledge across economic actors and across the national territory (EC, 2004).

In addition, the *Länder* themselves often have significant innovation policies that are separate from those originating from the federal level. A recent report by the Ministries for Economics and Labour (now Technology) and Education and Research noted over 100 innovation policy programmes among the 16 *Länder* governments (cited in EC, 2004).

Cluster studies conducted

No cluster mapping studies were used in connection with these programmes.

3. Details on programme budget and timeframe

Table 11.1. **Budgets of cluster-based programmes in Germany**

Programme	Start date and programme duration	Total annual programme budget (last few years)	Estimated spending per cluster/network	Eligible expenses	Matching funding
GA-networking	2005 on-going	n.a.	EUR 300 000-500 000	Cluster management (staff and equipment) of the contracting agency. No operational funding for enterprises	70% public; 30% from other sources
BioRegio	Initiated in 1995; programme period 1997-2001	EUR 90 million for winning regions plus preferential access to general biotech funding worth over EUR 700 million	In practice, the 4 winning regions (17 applicants) received around 2/3 of all available biotech funding in the first two years	n.a.	n.a.
BioProfile	Initiated in 1999, programme period 2001-06	EUR 50 million	3 out of 20 selected	n.a.	n.a.
InnoRegio	1999-2006; next phase to extend funding for 19 most successful regions	EUR 110 million (private investment of EUR 50 million so far)	23 networks out of 444 applicants; 500 projects for these networks financed so far	All costs related to R&D projects (labour, buildings, training, etc.)	Around 40% private finance leveraged in first period
Regional Growth Poles	2001-06	EUR 75 million	n.a.	All cost related to joint R&D and commercialisation	n.a.

Table 11.1. **Budgets of cluster-based programmes in Germany** *(cont.)*

Programme	Start date and programme duration	Total annual programme budget (last few years)	Estimated spending per cluster/network	Eligible expenses	Matching funding
Learning Region	2000-06	EUR 115 million (EUR 65 million public funds plus additional EUR 50 million from ESF for this period	Around 80 regional projects selected for funding from over 250 proposals	Costs for educational institutions measures in the field of life-long learning; new network based projects	EU co-funding
Competence Networks	1999 on-going	Not a funding programme; EUR 2 million	102 networks established so far, covering 21 technology fields in 32 different regions	Funds spent to operate the Internet site/network	n.a.
NEMO – Network Management Eastern Germany	2002-05	EUR 10 million	In 1st round 23 projects selected; 2nd round 15 projects selected	Financial support is restricted to network management costs. The network management must be carried by non-profit institutions or firms that are "predominantly in the public interest"	From Ministry budget

4. Targets and scope

Targets and selection criteria

Different programmes have different targets which are generally either high-performing regions in high-value sectors or regions in eastern Germany.

BioRegio

Given the strong national strategic focus of the programme, the issue at the outset was to maintain a strong geographical concentration and to avoid spreading the funds among too many locations. The programme is based on a competitive selection to identify the regions with the most promising potential in biotechnology research and commercialisation. The criteria included a critical mass of competitive enterprises, high profile research institutions, supporting services, networking between research labs, research commercialisation strategies, and appropriate finance sources. The extension of the programme to additional sites through the BioProfile was seen as a sign that other German regions were becoming more active and successful in developing business in the Biotech field.

Seventeen regions prepared submissions for the competition, with four selected as key regions. A few of the non-selected regions were later included in the BioProfile programme. The selection was made by an interdisciplinary jury. The regions chosen were Rhineland, Munich and the Rhine-Neckar-Triangle. In addition, the city of Jena in eastern Germany was also included. Key criteria were the strength of the existing science base, evidence of joint working in the past, particularly in biotech fields, and the strong presence of private actors and private sector investment.

Table 11.2. **Characteristics of winning regions for BioRegio**

	Research base	Firm structure
Munich	Two universities and large research institutions	Roche Diagnostics, a large biotech production site, plus around 34 biotech companies
Rhineland	Highest density of research institutions in Europe, including several in biotech	Bayer plus several medium-sized pharmaceutical companies (around 20 in 1994)
Rhine-Neckar	One university and several research institutes	Large pharmaceutical/chemical companies (Roche, BASF) plus several biotech companies
Jena	One university and three research institutes	One medium-sized pharmaceutical company, five biotech companies

Source: Ernst, Holger and Nils Omland (2004), "Vitalisation of Industry through the Promotion of Knowledge Intensive New firms: The Case of German Biotechnology", Presented at the Japan Institute for Labour Policy and Training, Tokyo, Japan, 26 March 2004.

The BioProfile programme targeted regions with specific biotechonology competencies. Selected regions include Berlin/Potsdam (nutrigenomics), Braunschweig/Göttingen/Hannover (functional genome analysis) and Stuttgart (regenerative biology).

InnoRegio

InnoRegio was advertised by the BMBF as a broad, open-themed competition. The goal was to develop self-supporting innovation networks and create locations with long-term competitive ability. The jury selected 23 networks (out of 50 pre-selected candidates from a total of 444 applicants) which were partnerships or consortia of companies, educational and research institutions and local governments. The second phase of the process centred on development of the project. The selected applicants were then given the label InnoRegio and were awarded DM 300 000 to develop the network and prepare the project. Advice and support were provided through the federal ministry.

GA-networking

Support for clusters through the GA-networking initiative (period 2004-6) can be allocated to areas that fall under one of five categories:

- Category A: comprises regions in the new states that face the most serious structural problems.

- Category B: consists of those regions in the new states and Berlin that have already made significant progress.
- Category C: include the economically weakest regions of the western German states.
- Category D, E: cover the structurally weak regions in western Germany.

The nature and ceilings of support varies according to the category of region concerned, with higher levels of support available for categories A-C. In 2004, the GA mechanism allocated EUR 700 million, of which EUR 600 million was for the new states and EUR 100 million for the western states.

Cluster selection process

The main innovation in the way the programmes have tended to be organised is the emphasis on competition for selection of projects. This method has been used in a number of programmes and has been successful in mobilising actors who may or may not have worked together before. For example, in both the BioRegio and InnoRegio programmes, unsuccessful applicants have gone on to develop their projects on the basis of other funding. The programme participants were self-selected to compete for projects, with the *Länder* playing an important role in the selection process, especially in the GA-networking initiative.

Number of cluster participants

These numbers vary considerably across programmes.

Cluster institutional status, governance and linkages

For many programmes, the cluster is usually managed by an independent association or consortium, rather than firms or public authorities directly. For the GA-networking programme, for example, the contracting agencies are amalgamations or associations of at least three partners, one of which at least being a commercial or business-related enterprise, along with other regional actors wanting to establish and implement co-operation networks or cluster-management projects. Discrimination-free access of further partners to the projects must be guaranteed. For the biotechnology programmes funds were granted to biotechnology organisations (firms, public research organisations).

Administrative boundaries

The programme participants tend to be bounded by the *Länder* given their role in the implementation of many of these programmes.

5. Instruments

For the smaller programmes funding is provided primarily for network establishment and management, directly to a consortia or association formed for the specific purpose. The focus is therefore on the instruments to engage actors. For example, the GA-networking initiative only permits outlays on the establishment of supra-enterprise structures and network management (expenditure for staff and material). Spending by the enterprises involved is not eligible for assistance.

In the case of the larger programmes, funding can be used for all R&D and related activities (staff, equipment, training, product development and commercialisation and marketing) on condition that the projects are clearly defined joint projects. For BioRegio, the range of instruments includes financing, consulting, knowledge and public relations (see Table 11.3).

Table 11.3. **Instruments of the BioRegio programme**

Category	Instruments
Financing	Advice on financing options Help with obtaining public and private funds Creation of a dedicated regional seed capital fund Close co-operation with venture capital firms
Contacts	Co-ordination of all stakeholders – founders, scientists, investors, policy makers Networking events
Consulting and training	Advice on business plan, market research, etc. Services concerning intellectual property Seminars and conferences for founders and employees (biotechnology-related, business-related)
Stimulation of knowledge transfer	Co-ordination of public research and local companies Promotion of spin-offs
Support:	Technology parks with offices and certified laboratory space
General public relations work	Promotion of the region at trade fairs, conferences, etc.

Source: Ernst, Holger and Nils Omland (2004), "Vitalisation of Industry through the Promotion of Knowledge Intensive New firms: The Case of German Biotechnology", Presented at the Japan Institute for Labour Policy and Training, Tokyo, Japan, 26 March 2004.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

The measures of success will vary across programmes. In the BioRegio programme, for example, the four winning regions were to receive priority treatment in the allocation of research funds. In the first two years after the competition, the four selected regions received the majority of direct (65%) and a significant share of indirect funding for biotech, which suggests that the government was successful in maintaining control over this aspect of the programme.

Results of evaluations, if any

BioRegio

An evaluation of the BioRegio programme indicated very strong positive results and has consequently served as a model for other programmes elsewhere in the world (Ernst and Omland, 2004). At the national level there was a positive result in firm creation and leveraging of resources. For example, there was more than a 300% increase in the number of dedicated biotech companies creating more than 9 000 jobs in new biotech firms. These results served to close the gap between the United Kingdom and Germany (in terms of number of companies). The programme also mobilized large sums of private investment (more than EUR 750 million) and inspired many new promotion programs in different technology fields. Even many of the 13 non-winning regions implemented their concept, without receiving priority funding, and succeeded in improving their biotechnology industry.

The success was also noted at the regional level. All winner regions attracted new companies and created a significant number of new jobs, with the Rhineland attracting more firms than the other regions. Jena managed to increase its local biotech industry from 5 to 34 companies. Both Rhineland and Jena increased their share of German biotech firms relative to other regions although Munich has more employees in biotech companies than any other German region. The relative increase in biotech jobs was significantly higher in the BioRegio winner regions than in Germany as a whole.

InnoRegio

An interim evaluation of the InnoRegio programme indicated positive outcomes for the organisation of networks, albeit positive outcomes in terms of innovation were less clear (Eickelpasch *et al.*, 2002). Among the main findings it was noted that during the phase of development, external moderation helped significantly establish and foster the networks. Most companies think that they are more capable than their competitors, and InnoRegio participants have this self-assessment more often than companies in eastern Germany in general. In InnoRegio networks, there is also a larger share of companies with capacities in research and development than in eastern Germany in general.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

Bibliography

Cooke, Philip (2000), "Learning Commercialisation of Science: Biotechnology and the New Economy Innovation System", Prepared for the DRUID Summer 2000 Conference, Aalborg University, Aalborg, Denmark, 15-16 June 2000.

Ernst, Holger and Nils Omland (2004), "Vitalisation of Industry through the Promotion of Knowledge Intensive New firms: The Case of German Biotechnology", Presented at the Japan Institute for Labour Policy and Training, Tokyo, Japan, 26 March 2004.

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Germany 2004-2005*.

EC and Enterprise Directorate-General (2004), *Annual Innovation Policy Trends and Appraisal Report: Germany 2003-04*, *http://trendchart.cordis.lu/*.

Eickelpasch, Alexander *et al.* (2002), "The InnoRegio programme: A new way to promote regional innovation networks – empirical results of the complementary research", Presented at the 42nd conference of the European Regional Science Association, Dortmund, Germany, 27-31 August 2002.

Federal Ministry of Economics and Technology (*www.bmwi.de*).

Federal Ministry of Education and Research (*www.bmbf.de*).

OECD (2004), *OECD Science, Technology and Industry Outlook 2004*, OECD Publications, Paris.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 12

Italy

This case study explores several different approaches in Italy that have a cluster orientation, with a focus on two in particular. One unique approach in OECD countries is the integration of the cluster concept into public service delivery. Law 317 (91), and its subsequent revisions to improve flexibility in its application, established a framework for regional governments to support consortia of small firms. Technological Districts have been created in the context of science and technology policy to improve collaboration for the funding, research and application of results in fields with strong commercial interest and social value. EU structural funds were used for southern Italy districts.

1. Programme(s) and their goals

Approaches to supporting regional specialisation in Italy have broadened significantly over the past few years. This case study will focus on Law 317 and the Technological Districts, which represent both a more traditional approach to supporting industrial districts and an attempt to promote high technology in specific regions.

Law 317

The original measure that gave an institutional framework for policymaking targeting regional clusters was the Law 317 which was approved on 25 September 1991. The main innovation of this law was its focus on SMEs and, in particular, the scope that it gave for providing support to groups of small firms rather than concentrating only on single, usually large firms. This was an admission of the crucial importance of the industrial district model in the Italian economy and recognized that such districts had, or potentially had, different policy needs. Article 4 of the law was particularly significant because it formalises the concept of "consortia" between small firms and gave prominence to the provision of collective services for groups of firms (often known as "real services"). Subsequent changes to this law have been adopted since 1991.

In general, the legislative framework has been overtaken by decentralisation, with regions now in charge of increasingly broad areas of innovation and enterprise policy. While this Law seems to have had only a limited impact in practice for a variety of reasons, the objective of promoting structural relations among firms and between firms and other economic actors in a region remains a high priority and has emerged in other forms in more recent national programmes.

Technological Districts

In the context of its efforts to improve the overall competitiveness of the national economy, strengthen key industries and make publicly-funded R&D more productive, the government is "mapping" national competence and regional expertise. One of the key measures to come out of this mapping process, and a key element of the National Research Plan (2005-7) are the Technological Districts, which were endorsed by the Ministry for Education and Research in 2002. This initiative has been characterised as an attempt to transfer the industrial districts model to regions with strong high-technology industries.

Overall the aim of these Districts is to create an effective relationship between funding, research and practical application. The targeted fields are those where there is both a strong private sector/commercial interest and technological content is high and also in areas where there is strong associated "social" value – environmental industries, safety and health, in particular. The Districts cover both leading regions as well as less successful southern Italian regions.

So far, 24 Technological Districts have been created (23 approved and 1 pending).

Initiatives focusing on southern Italy

While this review focuses on the Law 317 cluster programmes and on the Technological Districts, there are a number of other programmes that use a region-level instrument to create synergies among actors. A number of these are targeted at the *Mezzogiorno* and come under the Framework Programme Agreements (*Accordi di programme cuadro*) negotiated between the central government and the regions and some are funded through the EU Structural Funds. Two examples are:

PIA Networking – "*Pacchetti Integrati di Agevolazione*" is part of the 2000-06 Country Operational Programme (Development of Local Entrepreneurship) under the responsibility of the Minister for Productive Activities. The PIA Networking measure was born of the need to make the PIA integrated incentive plan available not only to individual enterprises, but also to groups of enterprises. PIA networking is focused mainly on entrepreneurial firms working in new economy branches and uses the consortia model to encourage production-related investments, the purchase of services, training and so on.

Digital Districts in Southern Italy (Funds of the Inter-ministerial Committee for Economic Planning – CIPE and of the Inter-Ministerial Committee for Information Society – CMSI). The targets of the framework agreements are local clothing and textile development systems located in areas ranked to be Objective 1. The aim of the project includes: *a)* the development of reciprocal trust between districts for a more efficient co-operation; *b)* improving communication and interaction between districts and between clothing and textile industry entrepreneurs; and *c)* improving the quality and efficacy of the instruments available for territorial development.

2. Context: Situating the programmes in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

There is concern among policy makers that Italy tends to lag other advanced European nations with respect to some key indicators of performance in the field of R&D and innovation – such as, business R&D expenditures, tertiary and continuing education rates, EU and international patenting, among others. At the same time, the Italian economy has some features that set it apart (and explain at least some of these results). In particular, the economy is marked by a predominance of small manufacturing enterprises, many of which are found in the context of industrial districts, and there is a lack of large technology-based enterprises which tends to depress business R&D statistics, reduce the number of patents applied for, and influence the *type* of innovation (*i.e.*, incremental process innovation rather than technology-based innovation) (EC, 2005).

Historical development/evolution – where the programme came from in the context of other policies

A number of different influences have promoted a regional approach that emphasises clustering and network building among firms and between firms and research institutions. *First*, in the context of globalisation and intense competition in key manufacturing sectors, the policy of the government has been to, on the one hand, strengthen research capacities with respect to key technologies, and, on the other, to respond to the specific needs of small businesses, which remain a key component of the economy but which are also facing strong pressure from foreign producers. *Second*, economic activity is relatively unevenly distributed across the country. This is particularly true with respect to innovation and technology-based enterprises and research. This means that prioritisation of investment in regions where technological capacity seems highest and where high-technology sectors are concentrated also means concentration in specific regions. This is complemented by efforts to reinforce the innovation capacity of the less advanced regions. *Finally*, the move to decentralisation has had an important influence on policies to promote scientific research and technological innovation.

Against this background, the main priorities of the government are to: *i)* increase R&D spending (in line with Lisbon agenda goals); *ii)* increase business R&D expenditure (which is significantly below that observed in other large OECD countries); *iii)* increase the use of digital technologies by SMEs; *iv)* increase the use of digital technology in the public administration; *v)* improve educational attainment; and *vi)* build networking among economic actors ("*fare sistema*") (EC, 2005). Current policy for innovation focuses in particular on concentrating resources in key sectors/technologies, creating/supporting clusters, and the promotion of technology transfer. These priorities have led to a number of new policy initiatives in the last couple of years that have favoured a more regional approach to supporting innovation. For example, the identification of Priority Technology Areas, the creation of High Technology Poles, the launch of 12 Strategic Research Programmes and the measure of university Industrial Liaison Offices (ILO) all tend to focus resources in particular locations.

While the initiatives share common assumptions about the network approach and the need for stronger region-based interaction among key actors, they also contribute to different national policy or sectoral policy objectives, specifically SME policy, regional policy and science and technology/ industry policy. Overall, three main approaches can be identified within the Italian system.

- First, there are programmes that focus on "traditional" industrial districts. These originated with the Law 317 and have now been taken over by regions (though in only a limited number).
- Second, there are a number of more recent initiatives that emphasise high growth industries and that recognise the important regional concentration of skills and investment in these industries, including the Technological Districts, as well as Priority Technology Areas and High Technology Poles
- Finally, there are programmes that have a strong regional development dimension, specifically programmes focusing on southern Italy. These are often co-funded through EU regional development funds.

Role of programmes in the context of science and technology (or innovation) policy

Science and technology guidelines for the period 2003-06, reinforced in the current National Research Plan, emphasise the promotion of innovation capability through systemic aggregations at regional level. The aim is to strengthen "the competitiveness of existing productive areas… by revitalizing them through research and development activities on key technologies, enabling product and process innovations". The most recent actions undertaken by the Italian government underline this evolution. For example, identifying sectors or clusters of activities where competitive advantages already exist and where new ones can be developed (public-private joint-labs created in strategic sectors to sustain new high-tech industries and the strategic programmes included in the National Research Plan). Another dimension is mapping out the core technology competencies and favouring the aggregation process of local clusters (promoting local concerted actions and innovative planning). In this regard, the government has created the Technological Districts in some carefully chosen geographic locations in Italy. So far, eleven districts have been created in various Italian regions (EC, 2005).

As far as support for clusters is concerned, the creation of an Agency for the diffusion of technologies for innovation (*Agenzia per la diffusione delle tecnologie per l'innovazione*) aims at fostering the competitiveness of SMEs including those in industrial districts. This suggests that the aims of Law 317 and the focus on promoting collaboration among SMEs remain important elements of national innovation policy.

Description of programme's place in governance framework

The recent general election (April 2006) has somewhat modified the institutional structure. The centre-left coalition led by Romano Prodi has introduced several changes to the ministries concerned with innovation:

- The former Ministry for Innovation and Technologies (MIT) has been replaced by the Ministry for Public Function and Innovation (*Ministero Funzione Pubblica e Innovazione*).
- The Ministry for Productive Activities (MAP) has become the Ministry for Economic Development (*Ministero Sviluppo Economico*).
- The Ministry of Education, Research and Universities (MIUR) has been split into two ministries, the Ministry of Education (*Ministero Istruzione*) and the Ministry of Universities and Research (*Ministero Università e Ricerca*).

In addition, the Treasury is closely involved insofar as it regulates overall spending plans and also has an important role in development of southern Italy.

Institutional frameworks and regional development policy

Italian regions are increasingly important both in terms of implementing policies sponsored at the central level and with respect to developing their own strategies. As far as R&D and innovation policies are concerned, Italian regions have a high degree of autonomy in planning their own innovation and industrial support programmes. A government decree in 1998 assigned specific powers to the regions in the formulation and implementation of policies relevant to innovation, and these powers have since been reinforced by the process of decentralisation that has taken place since 1999 across a range of policy domains. Regions are in charge of the promotion of applied research, innovation, and technology transfer programmes and projects (EC, 2005). Other responsibilities that used to be exclusively central government concerns are now shared responsibilities, such as pure scientific research (basic research).

Most regions have regional innovation plans which they design and then submit to the relevant central government ministries who verify the coherence of the regional strategy with respect to national R&D guidelines and policy. Examples of regions that have successfully developed their own plans with regional funding to support clusters are Campania and Emilia Romagna. The Lombardy and Veneto regions have also developed their own legislative framework to support industrial districts. The availability of EU Structural Funds which have promoted the national-regional co-funding mechanisms on which many of these strategies are based has been an important additional influence on this evolution. Similarly the consolidation of the governance processes within the *Patti territoriali* and *Contratti di Area* has also been influential in broadening the scope of regional action in the field of innovation.

Many programmes at the regional level have been strongly supported through the EU-funded Structural Funds. The National Operating Programmes (*Programma Operativo Nazionale – PON*) include one targeted on scientific research, technological development and higher education/training (*PON Ricerca, Sviluppo Tecnologico ed Alta Formazione*) and another one is targeted to local entrepreneurship development (*PON Sviluppo imprenditoriale locale*) (EC, 2005).

Governance and support for clusters and industrial districts

As regions have taken more control over innovation and related policies, public support for clusters has also become stronger at the regional level. Progress with decentralisation has shifted the emphasis of this legal framework provided by Law 317 and subsequent decrees from the national to the regional level, with regions now the main actors in defining their industrial districts and targeting funding to them. The Lombardy region was among the first to act on this new legislation, developing a system that identified a number of different clusters and making the framework a key component of its support for SMEs, with particular emphasis on product and management innovation in more advanced firms and sectors. By contrast, the use of the law in other regions has often been related to building co-operation and networking within industrial districts rather than on innovation as such. This was partly because the legislation was relatively complicated. For example, the restrictions on beneficiaries (that they should be collective rather than single firms) made projects of research and commercialisation difficult for the public authorities to support without the risk of contravening regulations.

In 1999, a new national law on industrial clusters (140/99) following Law 317 was enacted which simplified procedures and gave more power to the regions to develop their own strategies based on criteria that follow the national criteria but with some flexibility. For example, the Veneto region has adopted a law to combine the different regulations and instruments relating to industrial districts. This regional law emphasises some basic criteria (more than 80 companies in the same sector, more than 250 employees in those enterprises) but also adds more "qualitative" criteria designed to pick out regions where there is a history of joint working among enterprises and where the level of innovation is high. Funding from the regional government of up to 40% of costs for projects identified by the "industrial district committee" is provided.

Law 317 and its subsequent amendments and laws flow directly from the Ministry of Productive Activities and its long-standing approach to support SMEs in industrial districts.

3. Details on programme budget and timeframe

Law 317 is a facilitation law that allows programmes funded at both national and regional levels to target industrial districts collectively and recognises associations or consortia of firms as funding recipients. As such, this cluster support model is not a direct funding instrument. Funding allocations that use this mechanism will vary according to region and by specific use (support for networking or marketing a cluster, training and skills development, etc.). There is no timeframe linked to the law.

Funding for the Technological Districts is joint central government/ regional government. The level of funding provided varies by region; however an indication of the size of the budgets and contributions is given in Table 12.1.

Table 12.1. **Budgets for Italian Technological Districts**

2004-08

Region	Field	Central government (MIUR) (EUR million)	Regional government (EUR million)
Emilia Romagna	Advanced mechanics	25	25
Lazio	Aerospace	30	30
Friuli-Venezia-Giulia	Molecular biomedicine	Approx. 25	Approx. 25
Veneto	Nanotech	26	15

Source: Government of Italy, Ministry of Education, University and Research.

4. Targets and scope

Targets and selection criteria

Law 317. Clusters/industrial districts are recognized by Law 317/91 "*Interventi per l'innovazione e lo sviluppo delle piccole imprese*" (Interventions for innovation and development in small enterprises). Article 36 of this Law defines a district as a "territorial area characterised by high concentration of small enterprises having a productive specialisation and where a special relationship between local population and enterprises exists". A subsequent decree by the Ministry of Industry, 21/04/93, specified that clusters have to be identified among the local labour systems set up by ISTAT (National Institute for Statistics) and have to be manufacturing clusters both in terms of population and units. The criteria are described in Table 12.2.

According to ISTAT, the Italian National Statistics Agency, there are around 200 of these industrial districts that are legally codified under Law 317 of 1991 and its implementing provisions. However very few regions have established funding programmes using this law.

Table 12.2. **Criteria for Italian industrial districts**

Criteria	Threshold
1. Manufacturing industrialisation (total employees/total manufacturing industry employees)	30% more than the analogue national average
2. Manufacturing industry entrepreneurial density (manufacturing local units /resident population)	Higher than the national average
3. Productive specialisation (specialised sectors employees/total employees)	30% more than the analogue national average
4. Specialisation intensity (local units employees in specialised sectors)	30% more than the manufacturing employees of the local labour system
5. Employees small enterprises in the specialised sector	50% more than the manufacturing employees of the local labour system

Source: OECD (2001), *OECD Territorial Reviews: Italy*, OECD Publications, Paris.

Technological Districts. The main criteria adopted for the creation of new technological districts are:

- The availability of a well-structured project incorporating extended foresight studies in the chosen area of interest, the definition of vision, mission and of the regulatory processes for the management, rules for the protection and distribution of intellectual property.
- The coherence of the project with the strategic fields identified in the guidelines of the national S&T policy.
- The participation in the district of public stakeholders (university and/or research bodies) with the necessary experience in the field of interest and a background of collaboration with industrial partners.
- The presence in the proposed district of private relevant stakeholders, for industries with a long record of activity in the field, willing to establish a joint collaboration with public actors, and whose activity is mainly located in the same regional and local environment; the existence of a group of individual leaders, with proven experience in the field, belonging to the private and the public spheres.

Strategic fields include pharmaceuticals, nano-biotech products, medical/agro and advanced diagnostic tools, bio-informatics and neurological diseases. The full list of current Technological Districts is as follows: wireless applications (Piedmont), molecular biomedicine (Friuli Venezia Giulia), biotechnologies (Lombardy), ICT (Lombardy), advanced materials (Lombardy), polymeric materials and compounds (Campania), advanced mechanics (Emilia Romagna), microelectronics (Sicily), nanotechnologies (Veneto), integrated smart systems (Liguria), aerospace technologies (Lazio), renewable energy and environmental technologies (Trentino), ICT and security (Toscana), food security and quality (Abruzzo), Agro-industry (Molise), Agro-industry (Puglia), High-tech (Puglia), innovative technologies for seismic risks (Basilicata), Logistics (Calabria), Cultural heritage (Calabria), bio-medical and health technologies (Sardinia), naval transportation (Sicily), sustainable bio-agro and fishery (Sicily), nano-micro technologies and special materials (Umbria).

The organisation of the Districts is quite open but, as an illustration, HI-MECH, the high-tech district of Networked Laboratories for Advanced Mechanics in Emilia-Romagna, has over 40 partners including the major regional universities and enterprises. The aim is to include both one hundred of the region's largest companies and local SMEs.

The Technological District project also has a regional dimension to its selection criteria with the government aiming to relaunch research and innovation in southern Italy by means of the Framework Programme Agreements. In the Campania region, for example, the Federico II University, the Banco di Napoli Trust, the Italian Centre for Aerospace Research and a number of high profile companies- including Pirelli, StTMicroelectronics, Bracco Group, Alenia, etc. – have come together to enhance their work in the field of polymers and composite materials.

Cluster selection process

For Law 317, eligible clusters were defined by law and based on a statistical mapping. Firms may or may not have been actively working together before seeking to participate in any programmes flowing from this law.

For the Technological Districts, the main criteria used were those noted above, in the context of a desire to "map" and support key regional concentrations.

Number of cluster participants

The numbers of firms involved in cluster initiatives relating to Law 317 varies according to the region concerned. There are no specific regulations other than those that govern the "labelling" of a cluster that is eligible for funding.

The Technological Districts are very new and only three are currently established. The others are in preparation and, as such, the numbers of firms and HEI involved or invited to participate varies. The Hi-MECH initiative in Emilia Romagna, for example, involves more than 100 firms and around 700 researchers. Others have set out ambitious objectives such as creation of a specific number of new firms or leveraging of private sector funding for the innovation process. For example, Torino Wireless intends to create 50 stable new innovative firms and increase the number of researchers in the region engaged in ICT from 2 000 to 6 000, with the impact of ICT on the regional economy targeted to rise from 5% to 8-10% over the programme period (to 2008). The targets for the Campania Technological District are to create 30 new start-ups in the first seven to ten years, to attract new companies to the sector in the region (over 50 leading companies and 50 medium-sized companies in five years), to increase the number of recorded patents (100 in five years) and to speed up revenue growth of existing companies (target of 23% per year).

Cluster institutional status, governance and linkages

The consortia of firms under Law 317 are legal entities.

Technological Districts are managed by a legal entity representing the regional authorities and other public sector and private sector stakeholders.

Administrative boundaries

There are a number of examples of industrial districts in Italy being linked to production sites in lower cost countries through co-ordinated action by entrepreneurs and the public authorities. The Veneto region has established transnational clusters with Romania and with Slovenian regions.

5. Instruments

The Technological Districts use a variety of instruments. Looking across the Districts, the instruments can be grouped under the following main headings:

- Co-ordinating joint research projects involving HEI and private firms and strengthening the R&D infrastructure (buying equipment or building new facilities).
- Attracting and training researchers (*e.g.*, establishing labs, scholarships or training courses in the specialised field of the District).
- Supporting spin-offs and business expansion (including entrepreneurship training, help with patenting, marketing business services for SMEs).

Industrial districts supported under Law 317 and similar measures tend to emphasise network building and engagement of firms in collaborative projects. Other areas of specific interest are collective service provision (provided through intermediary organisations) and joint marketing and export promotion activities.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

Clusters supported under Law 317 are regional in nature and evaluations are the responsibility of the regions/provinces concerned. There is no national-level evaluation procedure.

There is no evaluation of Technological Districts as yet.

Results of evaluations, if any

N.a.

Bibliography

Calabrese, Giuseppi *et al.* (2003), "SMEs and Innovation: The Role of Regional Industrial Policy in Italy", Paper presented at the conference "Reinventing Regions in the Global Economy", sponsored by the Regional Studies Association held in Pisa, Italy, 12-15 April 2003.

Club dei Distritti Industriale (2006), quarterly newsletters.

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Italy 2004-2005.*

EC and Enterprise Directorate-General (2006), *Annual Innovation Policy Trends and Appraisal Report: Italy 2006.*

OECD (2001), *OECD Territorial Reviews: Italy*, OECD Publications, Paris.

OECD (2004), *OECD Science, Technology and Industry Outlook 2004*, OECD Publications, Paris.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 13

Japan

This case study reviews two explicit cluster programmes in Japan. The Japanese Knowledge Clusters are centred around key universities and seek to promote greater university-industry collaboration. The Industrial Cluster programme supports SMEs and research links in a range of regional area types through business incubation and support services with a strong focus on effective relationships among industry, university and government.

1. Programme(s) and their goals

The promotion of clusters has emerged in Japan as a significant and visible policy thrust to enhancing regional innovation and competitiveness. Central government ministries, local governments, and other groups are attempting to apply cluster models throughout Japan. There are two national-level programmes:

- Industrial Clusters programme: Ministry of Economy, Trade and Industry (METI).
- Knowledge Clusters: Ministry of Education, Culture, Sports, Science and Technology (MEXT).

METI's Industrial Clusters Programme

The Industrial Cluster programme introduced in 2001 is designed to promote networking among economic actors within a regional agglomeration that have complementary technology capacities and needs. The push for the programme was provided by a number of factors, including experience with low-technology SME cluster policies in manufacturing, efforts to better link industry and research, successful examples in Japan notably TAMA in Tokyo (see Box 13.1) and clustering of IT software firms in Sapporo as well as successful overseas examples.

Knowledge Clusters (MEXT)

The Knowledge Cluster initiative of MEXT (Office for the Promotion of Regional R&D Activities) is designed to respond to a key concern during the 1990s about the relative lack of dynamism in the relations between research generators and industry. The aims of the programme are to: reform and upgrade the R&D systems in regions, improve the flow of research by networking the principal actors and provide seed funding for joint activities. The concept of knowledge clusters, as set out in the Science and Technology Basic Plan 2001-05, is to give regional research organisations, including universities, a stronger role in R&D transfer in their local regions. The emphasis is on creating human resource-based and proximity-based networks that encourage stronger face-to-face interaction among actors who are inadequately connected at present. Overall, 18 regions were identified for funding. These differ from the cluster regions used by METI principally because they are focused around specific universities and geographically concentrated research areas. As such, they tend to be restricted to specific cities or urban agglomerations (Kodama, 2004).

Box 13.1. **Technology Advanced Metropolitan Area (TAMA): Japan**

The process that led to the emergence of the Industrial Cluster programme owes much to the success of one of the most prominent examples of the cluster principle, the TAMA (Technology Advanced Metropolitan Area) association. The area of TAMA is in a suburb of Tokyo and became industrialised as enterprises moved out of inner city and coastal areas, partly due to the Factory Restriction Laws, to find less congested areas for industrial locations. The area developed a strong accumulation of subcontracting enterprises in the electronics, transportation, precision machinery and other technologically advanced branches. Despite being sub-contractors for large firms, these SMEs developed strong product development capacities. As large firms moved overseas or contracted their operations during the 1990s, the smaller firms located in the TAMA region lost a major part of their customer base. A 1996 White Paper on SMEs noted that firms with the characteristics of those in the TAMA region could perhaps maintain their competitiveness through networking with other similar producers and with research generators such as universities and labs. The success of the TAMA initiative led directly to the national programme.

Source: OECD (2004), *OECD Territorial Reviews: Japan*, OECD Publications, Paris.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

At the heart of the new approach to innovation and technology policy, and one of the prime justifications for a regional emphasis, are Japan's small and medium-sized enterprises (SMEs). A key policy thrust, very relevant to the issue of regional specialisation and clustering, is to encourage existing SMEs to emphasize innovation. In the manufacturing sector, many Japanese SMEs have been organized into hierarchical vertical supply-chains led by larger companies. Long-term relationships in these vertical chains enabled SMEs to develop excellent technological and process capabilities in specific niches during Japan's rapid growth phase. But a shift away from this system is underway – for example, SME subcontracting rates in the general machinery sector have declined from nearly 85% in 1981 to under 60% today. The challenge now is to encourage and support these existing technologically advanced SMEs to develop market-oriented horizontal and lateral linkages, to increase investments in R&D (non-subcontracting SMEs are twice as likely to undertake R&D as subcontracting SMEs), and develop their capacity as product-developing SMEs.

Historical development/evolution – where the programme came from in the context of other policies

The current cluster programmes have precursors in past industrial policy in Japan. Over the course of the 1980s, the focus of industrial policy in Japan moved away from heavy industry toward high-technology industries. During this period, the government introduced the Technopolis programme which was an ambitious programme to relocate high-technology industries away from the major metropolitan areas (particularly electronics and materials industries) and develop in the same areas high quality research and educational facilities. The aim was to develop "clustered" production complexes in non-core areas that would develop self-propagating internal processes of innovation and technology development and transfer. From relatively small beginnings, the programme grew to encompass 26 sites around small or medium-sized cities in non-metropolitan areas of Japan. While the Technopolis programme was able to decentralise the least innovative portions of high-technology activities, its contribution to the equalisation of regional incomes was less clear. In order to influence location of the high innovation end of the industry spectrum, the Brains-of-Industry programme was established in 1988 as a complement to the Technopolis programme, offering a range of incentives for the design and research functions of businesses to relocate to Technopolis sites or to similar zones (OECD, 2004).

Economic changes over the course of the 1990s radically changed the context for regional industrial policy. In the 1990s, the pace of off-shoring and deindustrialisation accelerated in mature Japanese industries and many regions have seen manufacturing employment decline and plants close. The hollowing out of manufacturing seems to have affected the new industrial zones created through regional policies like Technopolis particularly hard. This has led to a re-orientation of policy thinking away from regions as production sites and towards regions as innovation systems. In this approach, the key innovation assets include sector specialisations, skilled labour, research facilities, networks and advanced supply chains. These regional assets are seen in economic policy circles as key drivers in the revival of Japan's competitiveness (OECD, 2004).

With respect to cluster policies, there have been some efforts to promote clustering among small firms in the past. The SME Agency of METI has implemented several programmes for specific industries, mainly traditional activities such as textiles, clothing and ceramics (Kodama, 2004). These programmes focused on building critical mass for small firms in these light manufacturing clusters (helping with market information, marketing, joint purchasing, etc.). The main difference in the current programmes is the strong emphasis on technology and knowledge-based linkages involving both firms and R&D institutions. Another difference is the explicit targeting of high-technology, innovative SMEs.

Description of programme's place in governance framework

The two ministries that sponsor the two programmes are both strong and centralised in structure. They have complementary functions with some overlap.

- *The Ministry of Education, Culture, Sport, Science and Technology (MEXT):* In the course of administrative reform during January 2001, there was a reorganisation of the structure of the ministries in charge of research and innovation. The Science and Technology Agency (STA) merged with the Ministry of Education forming a new ministry called MEXT. MEXT is primarily responsible for research and development policies in Japan.
- *The Ministry of Economy, Trade and Industry (METI):* This ministry is in charge of promoting industrial R&D policies (SME innovation policy, promotion of regional innovation clusters, R&D tax credit etc.). R&D promotion policies concerning other economic sectors (such as agriculture, environment, construction, transport, etc.) are managed separately by the ministry in charge of each respective sector, making up almost 7% of the Japanese government's S&T spending.

The cluster programmes tend to be situated at the interface in the responsibilities of the two ministries, in the sense that they bring together R&D policies mainly managed by MEXT with the industrial strategies directed by METI. There is a strong complementarity in theory because the collaborative research projects funded by MEXT form key elements in the practical relationship building on commercial ventures that are at the core of the METI programme. Conversely, the METI initiative provides a product development focus for the MEXT-funded research and offers links to businesses both large and small.

In order to achieve synergy effects, the two ministries link the Industrial Cluster programme and the Knowledge Cluster initiative through a range of co-ordinating bodies at central and regional levels. For example, at the initiative of the Council for Science and Technology Policy, a "regional science and technology cluster collaboration policy group" was set up to bring together the key government departments concerned (METI, 2005). Moreover, each region has established a Regional Cluster Promotion Association consisting of representatives of both the industrial cluster projects and the knowledge cluster projects. The Regional Cluster Promotion Associations organise joint seminars for presentation of the outcomes of the industrial cluster projects and the knowledge cluster projects (Kodama, 2004).

Institutional frameworks and regional development policy

The country has pursued an active and consistent regional policy over the past 40 years encompassing a range of national sectoral policy areas (industrial policy, employment policy, education policy, environment policy, etc.). Its primary tools were top-down land use planning, infrastructure investment and industrial relocation. This policy has had an impact on patterns of economic activity and employment, limiting polarisation pressures created by Japan's rapid post-war economic growth. The changed economic circumstances have, however, called into question both objectives and instruments of regional policy, and, as in many other OECD countries, the last decade has seen a shift in Japanese regional policy thinking, with an emphasis on endogenous assets, differentiation of policy according to regional situation, and with regions playing a greater role in the formulation of policies (which can be seen as a key feature of the new regional policy in Japan). The two cluster programmes both have clear regional policy dimensions, even if the link between the programmes and other instruments in an integrated regional policy is not explicit.

The move to greater local autonomy is now impacting on cluster initiatives. Since the mid-1990s, a process of reform and decentralisation has also been underway for local government. The trends offer new opportunities for Japanese prefectures, cities and other local development agencies to develop innovation strategies that are more customized to their own particular territorial circumstances. In the past, localities have experienced top-down pressure to participate in national programs or apply for grants for projects planned by central ministries. In the future, through the reduction of central administrative guidance, an increase in local autonomy, the use of block grants, and other decentralisation policies, prefectural and local agencies should have more flexibility to tailor local economic development strategies.

On-going reform of local government, including financing, is likely to give incentives to local governments to be more active in supporting local enterprises and fostering innovation and links between industry and local research and universities. The cluster programmes of both METI and MEXT both require strong involvement by the local authorities.

Role of programme in the context of science and technology (or innovation) policy

There has been increasing concern that Japan's S&T policy needed reform. The key policy objective has been to increase the flow of scientific knowledge, including research results from universities, to business. The importance of university-industry collaboration was highlighted in the Science and Technology Basic Law enacted in 1995. The 1999 Industry Revitalization Law (also known as the "Japanese Bayh-Dole Act") reduced obstacles to collaboration between universities and private enterprises and also allowed private firms to acquire intellectual property rights from publicly-funded research. More recently, public universities were reformed so that university faculty members are now non-governmental employees, not civil servants as before.[1] The aim is to stimulate a more flexible, competitive and entrepreneurial university system in Japan that can not only undertake world-class research but also have significant impacts on regional innovation and development. The Second Science and Technology Basic Plan, established by a Cabinet Decision in March 2001, specifically advocated the creation of Knowledge Clusters in regions.

Role of programme in the context of industrial policy

Enhancing the contribution of small and medium-sized enterprises (SMEs) to regional innovation and competitiveness is a key justification for the cluster policy approach in Japan.[2] There are perhaps three key focal points for policy. A first policy thrust is to encourage *existing* SMEs to emphasize innovation. In the manufacturing sector, many Japanese SMEs have been organized into hierarchical vertical supply-chains led by larger companies. Long-term relationships in these vertical chains enabled SMEs to develop excellent technological and process capabilities in specific niches during Japan's rapid growth phase and build-up of mass production beginning in the 1950s. But a shift away from this system is already underway. For example, per a 2003 White Paper on SMEs, SME subcontracting rates in the general machinery sector have declined considerably.

The challenge now is to encourage and support more existing SMEs to develop new market-oriented horizontal and lateral linkages, to increase investments in R&D (non-subcontracting SMEs are twice as likely to undertake R&D as subcontracting SMEs), and develop new products for a new era of increased international competition and innovation. A second policy thrust is to stimulate the start-up of new technology-based small businesses, for example through the spin-out of commercial ventures from regional university research and the spin-off of new firms from existing large companies or consortia of small companies. New technology-based ventures may be in emerging fields (such as life sciences), lack cash flow and reputation, require further product development support, and need to obtain intellectual property protection. A third policy thrust is to encourage the formation and growth of entrepreneurial knowledge-intensive small businesses in regions. Such firms may target evolving opportunities in such fields as business services, information services, logistics, tourism, health, social services, and other local community business markets. Again, the characteristics and needs of such businesses differ from those of the other two categories, for example, requiring entrepreneurial and service innovation and having lower entry barriers. This third category of policy is important to improve growth in high quality services employment in Japanese regions.

The cluster programmes are seen as one important instrument by which to address the diverse needs of SMEs.

Cluster studies conducted

No cluster mapping studies were used in the context of this programme.

3. Details on programme budget and timeframe

MEXT

- 18 small urban regions (cities).
- JPY 500 million per year, over five years, for each nominated region.
- The total annual budget is JPY 9 billion in FY2004 for the 18 regions.

METI

- 19 large regions.
- JPY 680 million in FY2004, to support the private cluster promoting organisations.
- In addition, related schemes including R&D support and schemes to strengthen incubation facilities under METI and its affiliated organisations in the amount of roughly JPY 48 billion for FY2004, although they are not solely earmarked for the Industrial Cluster programme, are available for the firms and universities participating in the 19 projects (METI).

With respect to the METI programme, an interesting feature is the "evolutionary" nature of the approach, as implied in the evaluation by the Industrial Cluster Study Group report which sets out a framework for the development of the networks over time (METI, 2005). This suggests a longer time horizon than is usually the case in cluster programmes.

Table 13.1. **Industrial Cluster programming stages: Japan**

Timeframe	The evolution of the programme
1st term (2001-05) Start-up period of an industrial cluster	Based on the current state of and policy needs for clusters, about 20 projects are started as the Industrial Cluster projects mainly led by the central government to form the "network where each face is visible", a basis for industrial clusters, in co-operation with clusters which are developed independently by local governments.
2nd term (2006-10) Growth period of an industrial cluster	Networking promotion is continued and specific businesses are developed. At the same time, management innovation of companies and the creation of ventures are promoted. If necessary, projects are revised and new projects are prepared flexibly.
3rd term (2011-20) Self-sustaining developing period of an industrial cluster	Networking and development of specific businesses are further promoted. Financial independence of industrial cluster activities is encouraged for the self-sustaining development of the clusters.

Source: Ministry of Economy, Trade and Industry (METI) (2005), "Report on Industrial Cluster Programme", evaluation report submitted to METI by the Industrial Cluster Study Group.

4. Targets and scope

Targets and selection criteria

MEXT: The clusters are focused on regional academic hubs where several universities or research institutions are located in proximity to one another to allow for a virtual "centre of excellence" at the level of the region to develop. The action plans for the Knowledge Clusters tend to emphasise technology development in fields in which the regional universities are strong and/or in which local industries specialise. The Kobe Bio-cluster, for example, has established a jointly funded and cross-institutional Biomedical Research and Innovation Foundation that supports local start ups.

METI: The clusters that are targeted are quite diverse. For example, whereas TAMA is focused around parts of a huge and industrially dense metropolitan region, the Hokkaido Super Cluster project has a networked character involving 16 universities, 5 public research institutes, and nearly 300 companies in four non-contiguous locations within the prefecture. In the Kinki region, which includes the cities of Osaka, Kyoto, and Nara, a Bio Cluster project has been established involving 36 universities, 9 local governments, 14 public research institutes, and about 220 companies spread over multiple locations.

The regional dimension is evident in the Industrial Cluster programme. The targeted clusters are diverse and respond to different spatial-economic contexts, with somewhat different objectives and policy instruments in each case. The Industrial Cluster Study report identified four general forms of intervention as illustrated in Table 13.2 (METI, 2005).

Cluster selection process

The MEXT clusters were identified by central level government officials. The METI clusters were identified by the regional office staff of the ministry. Cluster participants may or may not have worked together before.

Number of cluster participants

MEXT: No information.

METI: The programme focuses on 19 relatively large regions. In each region, officials of the Regional Bureaus of Economy, Trade and Industry (approximately 500 persons) co-ordinate and animate networks involving business managers, engineers, researchers and local government officials. To date, these networks include approximately 5 800 SMEs and researchers from more than 220 universities.

Table 13.2. **Region types served by Japan's Industrial Cluster programme**

Type	Characteristics of measures and goal setting
Type A: Metropolitan areas – revitalisation of diverse cluster with strong existing capacity	Each of the three metropolitan areas – Kanto, Chubu-Tokai, and Kinki – form a virtual mega cluster including a wide range of fields from automobile, digital appliances and mechatronics to bio and nano-industries. *[Examples of characteristics of goal setting]* Focused on revitalisation of existing companies. Support is provided mainly for levels near commercialisation. Collaboration with large companies is prominent feature. Collaboration at municipality level is also common.
Type B: Science and technology-centred cluster	These clusters are based on industrialisation of technology regardless of existing cluster structure. High-level universities and public research institutes play a central role in these clusters. *[Examples of characteristics of goal setting]* Technology transfer, support for firm start-ups, and business incubation are areas of focus. R&D absorbs a great percentage of support, and there is a big time lag between support and the increase in sales.
Type C: Niche clusters	Some smaller regional agglomerations already have some clustering practices present and are focused around a limited number of niche activities. Policy is focused on supporting existing networks. *[Examples of characteristics of goal setting]* Niche fields are often targeted. Market share is limited.
Type D: Network formation between mini- clusters	Industrial agglomeration is thin. Areas where agglomeration bases are distant from each other and have only mini clusters; there is no broad-based cluster. *[Examples of characteristics of goal setting]* Each cluster is small-scale and needs time to develop. Network formation between clusters also needs time.

Source: Ministry of Economy, Trade and Industry (METI) (2005), "Report on Industrial Cluster Programme", evaluation report submitted to METI by the Industrial Cluster Study Group.

Cluster institutional status, governance and linkages

The key feature of the two programmes with respect to other countries is the active facilitation provided by the ministries at the regional level. The initial phase of the programmes seems to depend on the ability of officials from METI and MEXT to co-ordinate and animate the network building process. The role of facilitation by public officials remains important in the METI programme as it goes forward. The Knowledge Cluster programme, on the other hand, requires the appointment of a Cluster HQ (with a president, programme director and research director). The activities are managed by this core organisation, usually a research institute or similar nominated by the local government to oversee implementation of the project. A team of Science and Technology Co-ordinators and experts such as patent lawyers animate the system by bringing the different actors into contact with each other through seminars, forums, etc. The Science and Technology Co-ordinators assist participants in establishing priorities, identifying areas for collaborative research and in identifying possible commercial or patent related activities and supporting R&D needs. As such, the independent broker concept is underlined in the Knowledge Cluster programme, while the Industrial Cluster programme favours the co-ordinating capacity of the local METI Bureaus.

Administrative boundaries

The clusters that were selected tend to conform to administrative (prefectural) boundaries.

5. Instruments

In terms of instruments, the MEXT programme emphasises support for specific basic and more applied research projects and for building networks to undertake such research. In the METI programme, there is a strong emphasis on facilitating co-ordination and collaboration, joint marketing, seminars and training, etc. In other words, "soft" instruments that build network and co-operative behaviour are supported. The measure can be split into three main categories: 1) giving support to exchanges and co-operation between industry, academia, and government; 2) giving support to the development of technologies for practical use based on regional characteristics; and 3) establishment of facilities to provide training to entrepreneurs. Examples of support provided through the METI Industrial Cluster programme are described in Table 13.3.

6. Programme evaluation and monitoring

Results of evaluations, if any

There has been no full evaluation of either programme yet.

The first assessment of the METI programme – by the Industrial Cluster Study Group – appeared to reveal some clear outcomes from the programme even at an early stage, particularly with respect to improving the flow of information, technical support for applications, information about policy measures and public supports. In addition there were clear results with respect to widening personal networks and building new relations with other firms and with universities and the establishment of new networks and collaborative projects. The following data summarises the overall outcomes from the survey on which the evaluation was based (METI, 2005):

- 38.5% of companies started new collaborative projects.
- 58.7% companies launched new businesses.
- 133 of total number of ventures "spun out" from universities.

In addition, Kodama cites some clear evidence from the TAMA region of the influence that this cluster association has had on the ability of product-developing SMEs, (*i.e.*, the more advanced and innovative manufacturing SMEs in the region) to move out of their reliance on large firm customers and develop new products and new market relationships (Kodama, 2004).

Table 13.3. **Instruments in Japan's Industrial Cluster programme**

Instrument category	Specific instruments
Network formation	• Establishment of organisations promoting cluster formation, networking with related organisations • Dispatch of co-ordinators to participating companies and universities • Information transmission through websites and e-mail magazines • Holding industry-academia collaboration exchange meetings, joint meetings for announcing the results, symposiums, seminars and workshops • Development of database on companies, researchers and supporters
Support for R&D (development of collaboration activities)	• Promotion and collaboration of R&D by public funds (projects of Economic Affairs Bureau, NEDO, AIST, and other ministries) • Promotion of utilisation of research results (meetings for announcing the results, technology matching, dispatch of specialists, etc.) • Support for protection and strategic use of intellectual property (establishment of local intellectual property strategy headquarters, etc.)
Enhancement of incubation function (support for launching business)	• Development of incubation facilities • Fostering incubation managers • Formation of network between incubation organisations and incubation managers
Support for market cultivation (enhancing marketability of newly developed products)	• Holding business matching and exhibition of products • Collaboration with specialized trading firms • Establishment of distribution system • Market cultivation through co-ordinators • Support for cross-industrial collaboration • Promotion of trade and interchange with overseas markets (local-to-local project, etc.)
Collaboration with financing institutions (management support)	• Establishment of local venture capital • Collaboration with local financial institutions (holding the Industrial Cluster Support Finance Conference, establishment of venture funds such as bridge loan and reduced rate loans through business collaboration) • Holding meetings for announcing business plans
Fostering human resources	• Fostering highly specialized human resources (manufacturing personnel, technology management personnel and judging personnel, etc.)

Source: Ministry of Economy, Trade and Industry (METI) (2005), "Report on Industrial Cluster Programme", evaluation report submitted to METI by the Industrial Cluster Study Group.

Notes

1. In 2004, Japan's national universities – under central government control for more than a century – were reformed as independent administrative (public) corporations. Prefectural universities will undergo a similar re-organisation in 2005. Selective university mergers to create economies of scale and other changes in academic incentive and evaluation systems are also under way. Universities are also rapidly establishing Technology Licensing Offices, incubators, collaborative industry-research centers, and other programs to promote research commercialisation and regional development.

2. Japan has a long-established and extensive system of small business support. This system provides an array of services including information supply, business and machinery credit insurance and loans, tax credits, R&D subsidies, management training, support for new business creation, assistance with technical upgrading and internationalisation, mutual insurance schemes, assistance with succession, mergers, and the avoidance of bankruptcy, and support for SMEs in specific industries (for example, in textiles). Administratively, the system is complex.

Bibliography

Kitagawa, Fumi (2007), "The Regionalisation of Science and Innovation Governance in Japan?", *Regional Studies: Special Edition, Regional Governance and Science Policy*, forthcoming.

Kodama, Toshihiro (2004), "Cluster Promoting Initiatives in Japan", presented at the conference *Innovation and Regional Development* sponsored by the OECD, EU Erik Network and the Tuscany Region, Florence, Italy, November 2004.

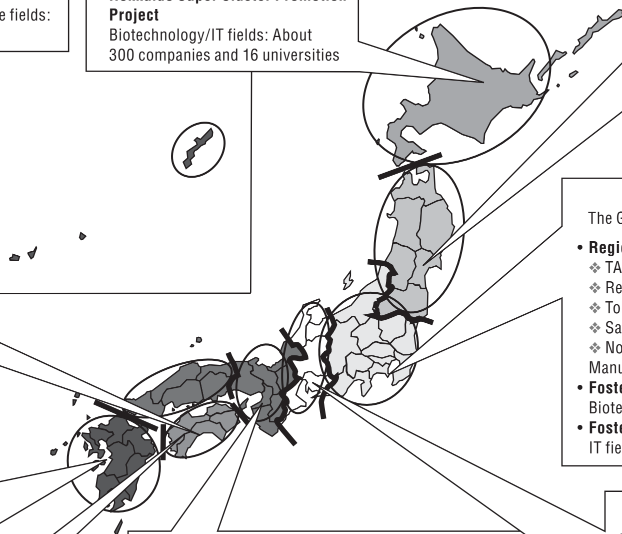
Ministry of Economy, Trade and Industry (METI) (2005), "Report on Industrial Cluster Programme", evaluation report submitted to METI by the Industrial Cluster Study Group.

OECD (2004), *OECD Territorial Reviews: Japan*, OECD Publications, Paris.

ANNEX 13.A1

Figure 13.A1.1. **Map of Japan's Industrial Cluster programme**

19 projects



Department of Economy, Trade and Industry, Okinawa General Bureau

- **Okinawa Industry Promotion Project**
  Information/health/environmental/processing trade fields: About 150 companies and 2 universities

Hokkaido Bureau of Economy, Trade and Industry

- **Hokkaido Super Cluster Promotion Project**
  Biotechnology/IT fields: About 300 companies and 16 universities

Tohoku Bureau of Economy, Trade and Industry

- **An Industry Promotion Project for Information Technology, Life Science and Cutting-edge Manufacturing**
  IT/Health/Manufacturing fields: About 230 companies and 21 universities
- **An industry promotion project for a recycling-oriented society**
  Environmental/Energy fields: About 280 companies and 20 universities

Chugoku Bureau of Economy, Trade and Industry

- **Project to Newly Generate the Machinery Industry in the Chugoku Region**
  Manufacturing fields: About 110 companies and 10 universities
- **Project to Form a Circulative Type of Industry**
  Environmental fields: About 90 companies and 9 universities

Kanto Bureau of Economy, Trade and Industry

The Greater-Kanto region Industrial Cluster Promotion Network

- **Regional Industry Revitalization Project**
  - TAMA
  - Region along the Chuo Expressway
  - Tokatsu/Kawaguchi areas
  - Sanennanshin district
  - Northern Tokyo metropolitan area

  Manufacturing fields: About 1 720 companies and 56 universities
- **Fostering Bio-Ventures**
  Biotechnology fields: About 210 companies and 13 universities
- **Fostering IT-Ventures**
  IT fields: About 200 companies

Kyushu Bureau of Economy, Trade and Industry

- **Kyushu Recycle and Environmental Industry Plaza (K-RIP)**
  Environmental fields: About 200 companies and 18 universities
- **Kyushu Silicon Cluster Project**
  Semiconductor fields: About 150 companies and 23 universities

Chubu Bureau of Economy, Trade and Industry

- **Project to Create Manufacturing Industry in Tokai Region**
  Manufacturing fields: About 650 companies and 29 universities
- **Tokai Bio Factory Project**
  Biotechnology fields: About 30 companies and 34 universities
- **Project to Create Manufacturing Industry in Hokuriku Region**
  Manufacturing fields: About 140 companies and 12 universities

Kansai Bureau of Economy, Trade and Industry

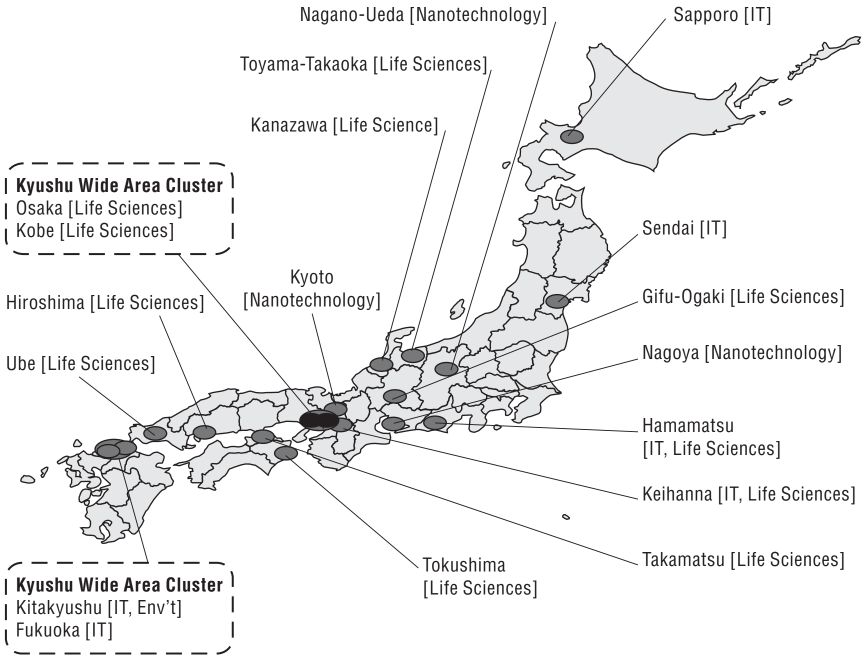
- Bio Five-Star Company and Tissue Engineering Project
  Bio-related fields: About 220 companies and 36 universities
- **Active Manufacturing Industry Support Project**
  Manufacturing fields: About 460 companies and 26 universities
- **Kansai Information Technology Cluster Promotion Project**
  IT fields: About 300 companies and 12 universities
- **Kansai Energy and Environment Cluster Promotion Project**
  Energy fields: About 110 companies and 23 universities

Shikoku Bureau of Economy, Trade and Industry

- **Shikoku Techno Bridge Plan**
  Health and welfare/Environmental fields: About 290 companies and 5 universities

Source: Government of Japan, Regional Economy and Industry Group of the Ministry of Economy, Trade and Industry.

Figure 13.A1.2. **Map of Japan's Knowledge Clusters**



Source: Government of Japan, Ministry of Education, Culture, Sports, Science and Technology.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 14

Korea

This case study covers Korea's Innovative Cluster Cities programme. It is an important initiative for the country and is linked with three policy streams. The programme seeks to assist a group of large industrial complexes in selected regional centres convert from manufacturing centres to regional innovation systems.

1. Programme(s) and their goals

Korea's Innovative Cluster Cities policy is part of the country's Plan for National Balanced Development. It seeks to transform seven key regional industrial complexes from manufacturing centres into more innovation-oriented regional hubs. The purpose of the innovative cluster policy is to strengthen the industrial complexes, in the first stage seven, which are mainly focused on manufacturing by systematic integration of R&D intensity (infrastructure) and development of networking among academia, industry and research institutions (management tool). It is expected that this pilot experience will be transferred later to several other industrial complexes and expanded to all National Industrial Complexes. The cluster cities selected specialise in fields consistent with national priority industries. The ultimate goal of this policy is to raise Korea's annual per capita income to USD 35 000.

Korea has a number of other policies that support regional specialisation through an infrastructure of various large and small industrial complexes, technology parks and business incubators. A separate track of research specialisation includes a number of different research centres known as Centres of Excellence.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Korea has experienced strong annual growth rates over 5% for several years and foreign direct investment is on the rise. While the Korean industry conglomerates (chaebol) continue to dominate South Korea's economy, their importance has been reduced with several of the largest and least sound having been dismantled. SME sector performance has deteriorated recently (OECD, 2005a). Much of industrial activity is organised around industrial complexes. According to the country's industrial complex agency (KICOX), the 30 manufacturing oriented national industrial complexes under their management account for 30% of production and 43% of exports.

The country has a high level of R&D investment, although most R&D is concentrated in a few regions and is not performing to potential. Korea does not generate as much codified knowledge (patents and publications) as models

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

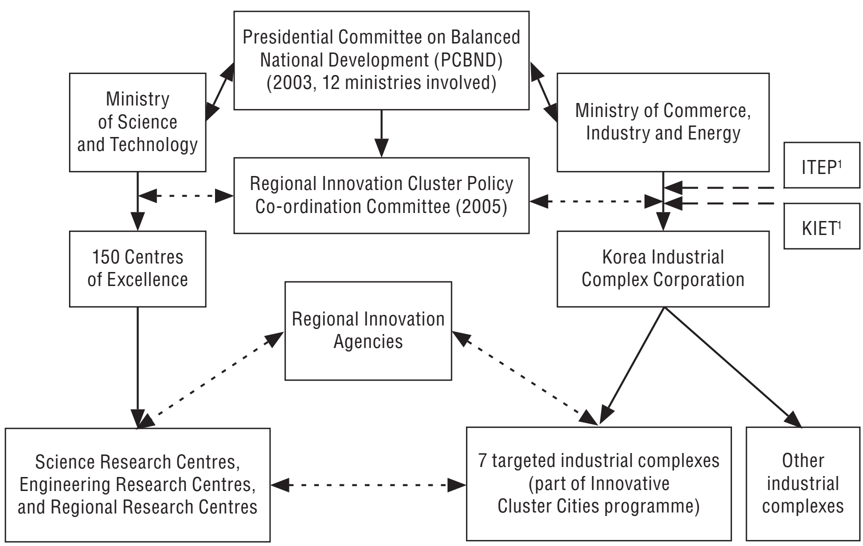
would predict given its level of R&D intensity. Sources of this under-performance include the need to take into greater account the business sector in the design of linkages with research as well as university incentives for R&D (OECD, 2005a). Per the EU Trend Charts, the science-industry links are considered very weak in Korea despite these strong technology and innovation investments (EC, 2005).

Historical development/evolution – where the programme came from in the context of other policies

Korea has a long history of spatial/industrial planning. The industrial complexes that serve as the base for the innovative cities have been in place for decades. By 2003, Korea housed 525 industrial complexes, of both small and large scale. Often these complexes focus on production with R&D out of corporate headquarters in Seoul. Korea had also launched in 2001 a plan to support four industrial clusters in nine cities outside of the Seoul area. The most notable include Daedok Science Town, Osong Health and Medical Science Complex, Songdo Intelligent City and Digital Media City.

Description of programme's place in governance framework

Figure 14.1. **Organisational chart: Korea**



1. ITEP: Korean Institute of Industrial Technology Evaluation and Planning.
2. KIET: Korea Institute for Industrial Economics and Trade.

The Korea Industrial Complex Corporation (KICOX) has been designated the supervising agency of the Innovative Cluster Cities programme by the Ministry of Commerce, Industry and Energy (MOCIE) that implements the programme. KICOX manages 29 large industrial complexes throughout the country. The kinds of services it provides include: development of an integrated information network, management and operation of the complexes, services (including loans to firms for specific programs), and support for factory development. Implementation and policy achievements are reviewed by other professional organisations such as the Korea Institute of Industrial Technology Evaluation and Planning (ITEP) and the Korea Institute for Industrial Economics and Technology (KIET). The seven targeted industrial complexes are building a stronger industry, research, and university collaboration network by linking local authorities and signing memoranda of understanding with regional research centres.

Institutional frameworks and regional development policy

Korea is a centralised unitary country where top-down relations tend to prevail and local governments tend to rely on direction from the central government. Decentralisation is still relatively new to Korea and is being implemented in phases. Regions are being given a more active role in their economic development. For example, a number of Regional Innovation Agencies have been created to complement efforts of regional development. Large municipalities like Seoul and Busan have also developed a number of initiatives to promote local and regional economic development.*

The current President's policy platform has made what is termed balanced national development a top priority to combat the concentration of activity in the capital region of Seoul. This concentration has been a concern of regional policy for years, which seeks to strengthen regional growth poles and revitalise depressed areas. It was recognised that merely restricting entry to the Seoul area was not sufficient to promote economic development in other regions. This policy has been most recently codified in the Five-year Plan for Balanced National Development. The Presidential Committee on Balanced National Development (PCBND) includes representatives from 12 ministries to oversee the Plan's implementation. Regional innovation systems are an explicit part of the Plan. It focuses mainly on regional innovation, delocalising public offers to other regions (including a massive new administrative capital away from Seoul), and quality improvements to metropolitan areas. The timeframe of the Plan and its strategies is illustrated in Table 14.1.

* For more information on this topic, see several territorial reviews on Korea, Seoul and Busan by the OECD as sourced in the bibliography.

Table 14.1. **Planning phases for Korea's Plan for Balanced National Development**

Plan Period	Objective	Enforcement Strategy
1st Plan 2004-08	Create and expand innovation	• Set up regional innovation system • Promote an innovation cluster • Transfer public organisations to local areas
2nd Plan 2009-13	Establishment of innovation	• Promote the next generation growth engine industry as a key sector • Move into the world class innovative cluster • Construct a new administrative capital complex
3rd Plan 2014-18	Advanced innovation	• Enhance the regional innovation system • Compete with world class clusters • Maximise the national growth potential

Source: www.pcbnd.go.kr.

Role of programme in the context of science and technology (or innovation) policy

Korea is in its third generation of the national innovation system (Hong, 2005). The first phases in the 1960s and 1970s used a linear approach. In the 1980s and 1990s, the policy supported large firm groups and established links to promote industry, research and university collaboration. The third generation seeks to promote coherence among different policies as well as national and regional economic integration.

Korea has made substantial investments in STP/innovation policy. The country's strategy is codified in the National S&T Promotion and Development Plan, the latest being for the period 2003-07. It includes a goal of doubling R&D investment from 2001 to 2007. The Ministry of Science and Technology, MOCIE, and the Ministry of Information and Communications finance most of the country's R&D. Through the university and research system there are approximately 150 Centres of Excellence for basic research. The Science Research Centres and the Engineering Research Centres were created in 1989 to focus on innovation and the Regional Research Centres in 1995 to promote collaboration between universities and firms on a regional level. For decades, Korea has also promoted private R&D investment through fiscal incentives and other forms of financial support. To encourage greater foreign investment, foreign R&D centres are given opportunities equal to those of domestic R&D centres.

The Innovative Cluster Cities programme is consistent with this new approach but with a strong regional dimension. The S&T Plan does include a goal of better organising and thus reinforcing regional innovation capacity. Given the concentration of R&D in the capital Seoul and one other region Daejeon, the national government will increase spending considerably elsewhere. It will also develop for each region an annual roadmap for science and technology through at least 2012 so as to strengthen research institutes in the areas of regional strength. Korea has also created a special R&D Zone in Daedeok.

Role of programme in the context of industrial policy

Korean industrial policy has undergone several waves since the 1960s. In the first wave, the goal was to increase exports in light manufacturing and strengthen infrastructure industries to reduce imports. This goal was supported by the construction of several industrial complexes. In the 1970s, the policy shifted from a focus on light industries to a focus on heavy and chemical industries, requiring the development of additional industrial complexes. In the 1980s, the national policy sought to better distribute economic activity across the country to balance development, by adding mid-scale industrial complexes to other regions and large-scale complexes in regions where land was still available. In the 1990s, the national government recognised the importance of the knowledge economy and began to promote the designation of "advanced science industrial complexes" (Park and Hong, 2005).

Korea has developed its 2010 Industrial Vision to be one of the top four world industrial superpowers, an effort spearheaded by the Ministry of Commerce, Industry and Energy. To achieve that vision, Korea has designated a number of strategic industries with goals in terms of international market share. The Innovative Cluster Cities specialise in some of these targeted national industries.

Table 14.2. **Targeted areas in Korea's 2010 Industrial Vision**

Basic Industries	Future Strategic Industries	Service Industries
Shipbuilding	Digital electronic industry	Business services
Semiconductors	Electronic medical equipment	e-business
Automobile	Bio industry	
Textiles	Environment industry	
Petrochemicals	Aviation industry	
Steel		
Machinery		
Parts and materials		

Source: www.mocie.go.kr.

All local governments must also now identify their strategic industries. The first round of this process took place 2000-03, and a second round in 2004-08. These plans are used to solicit funds from the national government. Another industrial policy used in Korea is that of free economic zones with major tax breaks for large foreign investors to attract FDI. Three opened in 2003: Incheon, Gwangyang and Busan-Jinhae. Finally, there are a number of services for enterprise support, but one of the major gaps has been the lack of services to encourage inter-firm linkages (Jeong and Kim, 2002).

Cluster studies conducted

MOCIE commissioned a study by the KIET on the competitiveness of 38 industrial complexes nationwide from December 2003 to April 2004. From March to May 2004, MOCIE evaluated regional competitiveness and identified innovation tasks by conducting on-site inspections and surveys with KICOX. Based on these studies, MOCIE reported results to the President on 3 June 2004, who confirmed the decision to transform industrial complexes from manufacturing centres into more innovation-oriented regional hubs. Experts from industry, research, and university were convened to form a task force and advisory body (consisting of an average of 30 experts per complex) and design detailed strategies for each complex.

In order to complete the innovative cluster in industrial complexes, Sub-Clusters (each with specialized businesses) have been made and they are promoting the particular strategy. Sub-Clusters, which are in seven targeted industrial complexes, are adjusted to Korea's industrial environment. In particular, plans for mini-clusters were designed by benchmarking models of the University of California San Diego's "CONNECT" in the United States and TAMA in Japan. Mini-clusters are small-scale consultative bodies consisting of industry, research, and university experts in each complex, formed to strengthen mutual networking among clusters.

Thanks to such preliminary processes, the Basic Framework for the Innovative Cluster City programme was established 17 January 2005, an ambitious initiative seeking to revamp the simple production-based industrial complexes. The plan covered detailed strategies such as promoting networking (among industry, research and university), strengthening R&D capabilities, securing capable human resources, improving the working environment, and fostering co-operation with international clusters. Seoul has conducted its own cluster mapping study to identify clusters using a location quotient analysis.

3. Details on programme budget and timeframe

The Innovative Cluster City programme for the seven targeted complexes was initiated in April 2005. The programme will be carried out over a four-year period, from 2005 to 2008. The 2005 budget amounted to KRW 29.7 billion, increasing to KRW 46.2 billion (a 55.8% increase) in 2006 (see Table 14.3).

The 2005 budget was used in joint projects (KRW 1.7 billion) and support for the seven complexes in the amount of KRW 4 billion each (see Table 14.4). The joint projects included e-cluster network establishment, international exchange and co-operation, project evaluation and management. Support for the complexes included the operation of task force and consultative bodies (of industry, research and university), technology projects and R&D infrastructure establishment.

Table 14.3. **Multi-year budget for Korea's Innovative Cluster Cities**
KRW 0.1 billion

	2005	2006	2007	2008
Total estimated need	200	1 771	1 880	1 720
Allotted budget	297	462.5	520 (estimated amount)	–

Source: Government of Korea, Ministry of Commerce, Industry and Energy.

Table 14.4. **Budget breakout 2005, Korea's Innovative Cluster Cities**

Main projects			Total (KRW million)
Joint projects		1. Cluster Integration Network	500
		2. International exchange	600
		3. Project evaluation and management	600
		Subtotal	1 700
Programmes per unit	Task Force Management	1. Labour costs	1 946
		2. Operational costs	1 650
		Subtotal	3 596
	Expanding R&D capabilities	1. Operating consultative body of industry, research, and university,	1 720
		2. Support for Technology Projects of the industry, research, and university	20 286
		3. Building R&D infrastructure	2 400
		Subtotal	24 406
Total			**29 702**

Source: Government of Korea, Ministry of Commerce, Industry and Energy.

With the exception of corporate matching funds for the category "technology projects of the industry, research, and university", the project was almost entirely financed by the government. For example, business consulting costs for the technology projects were entirely covered by the government, whereas co-R&D activities received government support only up to 75%.

Spending on related programmes

For reference, the budget for the Daeduk Science Town project, carried out by the Ministry of Science and Technology (MOST), was KRW 10 billion in 2005 and KRW 25 billion in 2006. Korea plans to increase the public R&D budget in the provincial cities from 27% in 2003 to 40% of R&D spending in 2007. The National Balanced Development Plan budget is the equivalent of approximately USD 100 billion over a five-year period.

4. Targets and scope

Targets and selection criteria

The seven Candidate sites for the Innovative Cluster City programme were limited to complexes with over 100 companies and two regional complexes that focused on strategic industries in the region. The seven complexes were chosen in terms of competitiveness, influence on the regional economy, concentration on a main industry, policy consistency and investment expectancy.

Details for selection criteria are:

1. Competitiveness: industry development level and innovation capacity.
2. Influence on the regional economy: contribution to the regional economy.
3. Concentration on main industry.
4. Consistency with policy: consistency with the policies of the central and regional governments.
5. Investment expectancy: well-equipped infrastructure for cluster and leading company.

The overall cluster focus by city is illustrated in Table 14.5. Within these seven industrial complexes, over 40 mini-clusters were identified based on industrial categories and related technologies.

Table 14.5. **Cluster focus by city: Korea**

City	Cluster focus
Gumi	Digital electronics industrial cluster
Changwon	Advanced appliance cluster (strong presence of heavy industry already)
Ulsan	Automotive components cluster
Banwol Sihwa	Advanced component material cluster
Gwangju	Photonics industry cluster
Gunsan	Automobile appliances components cluster
Wonju	Advanced medical industry cluster

Source: http://english.e-cluster.net/.

Cluster selection process

The clusters were selected by the national government based on the criteria described above. Cluster participants have been located in proximity but may or may not have worked together.

Number of cluster participants

As of 21 April 2006, the number of participants in the Innovative Cluster City programme is 2 632, which includes 1 859 companies, 606 universities and research centres, and 167 supporting institutions. Table 14.6 shows the number of participant per complex.

Table 14.6. **Innovative Cluster City participants**

Region	Company		University		Research centre		Supporting institutions		Total
	Employee	Ratio (%)	Employee	Ratio (%)	Employee	Ratio (%)	Employee	Ratio (%)	
Changwon	391	78	57	11	33	7	23	5	504
Gumi	405	69	134	23	13	2	35	6	587
Ulsan	157	81	14	7	16	8	6	3	193
Banwol Sihwa	582	74	101	13	44	6	59	8	786
Gwangju	154	80	18	9	13	7	7	4	192
Gunsan	52	76	9	13	1	1	6	9	68
Wonju	118	39	152	50	1	0	31	10	302
Total	**1 859**	**71**	**485**	**18**	**121**	**5**	**167**	**6**	**2 632**

Source: Government of Korea, Ministry of Commerce, Industry and Energy.

Cluster institutional status, governance and linkages

There is a task force for each Innovative Cluster City complex, composed of 14 to 44 people (194 people in total). The task forces consist of employees from KICOX and local authorities as well as new recruits. They are divided into sub-units: Head of Task Force, Planning and Evaluation Team, Industry and University Co-operation Team, Technology Support Team, Management Team, and Enterprise Support Team. They are linked via consultative channels of MOCIE, the Presidential Committee on Balanced National Development, and the Regional Innovation Cluster Policy Co-ordination Committee. They are also linked via business support organisations and they discuss and modulate business support policies in each of the seven targeted industrial complexes.

Administrative boundaries

The selection criteria and public support in general are based on pre-existing administrative boundaries given the location of industrial complexes but do not always take into account functional economic regions. The industrial clusters are also building up strong relationships with global cluster organisations abroad, such as SEEDA in England and TAMA in Japan.

5. Instruments

Korea's policies to support industrial complexes tend to use instruments such as firm subsidies and investment in hard infrastructure. There has also been increasing emphasis on bringing research, industry and universities together to better capitalise on R&D investments. In general, initiatives in Korea are public instead of private-led. Please refer to the Annex 14.A1 for more details on the specific Innovative Cluster Cities plans.

- *Identification and benchmarking:* Korea benchmarks the performance of its national industrial clusters on an international basis, and these Cluster Cities are an important component of national performance.

- *Engagement of actors:* Industrial complexes are seeking to improve linkages among business and universities as well as with regional entities. A couple of cluster plans specify collaborative initiatives between universities and firms. The final objective of the programme is to formulate and develop mechanisms for interchange and co-operation among small and medium-sized enterprises in an industrial complex.
- *Government service delivery:* The system of organising industrial production in spatially concentrated zones, such as industrial complexes, serves to facilitate government service delivery, notably infrastructure.
- *Skilled HR:* Workforce development and education are part of Korea's general policies. For example, there is a project to strengthen innovation resources for universities located in the regions (the NURI project) that is supported by Ministry of Education. Several of the specific cluster plans include training initiatives.
- *Entrepreneurship and innovation:* The development of regional innovation systems is the priority of this policy. The cluster plans place the greatest accent on developing incubators and other services to support entrepreneurship as well as the development of technical expertise centres within the clusters.
- *Resource allocation and investment (including branding):* The promotion of these innovative cluster cities to foreign investment is an expected component of the overall initiative to support balanced regional development.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

Programme evaluation and monitoring activities are conducted by two independent expert groups: ITEP and KIET. ITEP evaluates the management and implementation of the program while KIET assesses the accomplishments of the programme.

Results of evaluations, if any

The first round of evaluations was carried out in April 2006. However, it was at a stage too early to discuss production, exports, and other economic results. The programme is nevertheless encouraging competition among the different complexes by allocating budgets according to the primary evaluation results. During the second round of evaluations in 2007, the evaluation system and criteria will be developed and adjusted, establishing the "Korean cluster evaluation system".

One assessment of Korea's industrial parks (techno parks) noted a few areas for improvement that are relevant for the current set of initiatives. First, they recommend a comprehensive national master plan to integrate all innovation cluster related policies. Second, they suggest that policies should strengthen "soft" support and secondary functions (value chain) including specialised services such as information, consulting and financing. A third recommendation concerns the need to bring in business-oriented leadership in these arrangements. A final conclusion is to help techno parks be more outward focused, instead of only inward, in terms of resources (Hong *et al.*, 2003).

Bibliography

European Commission (EC) and Enterprise Directorate General (2005), "Annual Innovation Policy Trends Report for Japan, China, Korea, Taiwan, Singapore, India, Malaysia, Thailand, Indonesia".

Hong, Sung Bum, Deok Soon Yim and Ki Kook Kim of STEPI (Science and Technology Policy Institute) (2003), abstract "Characteristics and Types of Chinese Innovation Clusters in Comparison with Korean Cases".

Hong, Yoo Soo (2005), "The Third Generation of NIS and the Case of Korea", KIEP Korea, Paper presented at the ASIALICS Conference, 19 April 2005.

Jeong, Jun Ho and Kim, Sun Bae (2002), "Boosting Enterprise-Support Services for Regional Industrial Development in Korea", *Journal of the Korean Geographical Society*, Vol. 37, No. 5 (Series No. 39), December.

Ministry of Commerce, Industry and Energy (*http://english.mocie.go.kr/*, *http://english.e-cluster.net/*).

OECD (2002), *OECD Territorial Reviews: Korea*, OECD Publications, Paris.

OECD (2004), *OECD Territorial Reviews: Busan, Korea*, OECD Publications, Paris.

OECD (2005a), *OECD Economic Surveys: Korea*, Vol. 2005/21, November 2005, Supplement No. 3, OECD Publications, Paris.

OECD (2005b), *OECD Territorial Reviews: Seoul, Korea*, OECD Publications, Paris.

Park, Hyung Jun and Jin-ki Hong (2005), *Industrial Cluster Policies in Korea*, Institute for Industrial Economics and Trade.

ANNEX 14.A1

Table 14.A1.1. **Projects for Innovative Cluster Cities**

City	Cluster Focus	Innovation task/Cluster promotion
Gumi	Digital Electronics	● Spread technical human resource training program: model – Youngjin College (Compose and manage educational- industrial co-operation system with enterprises within the complex and nearby universities; Induce early spreading of the model Gyungbuk University and Youngjin College) ● Create accumulated area for digital electronics and information technology: Regional promotion business (Support business incubation and construct co-research equipments) ● Recommending establishment of Gumi Industry Support Examination Analysis Evaluation Center ● Promoting establishment of Electronics Components Materials Innovation Center ● Promoting construction of Geumhyeong Innovation Technology Support Center ● Supporting bottleneck technology of the small and medium enterprises ● Promoting construction of Gumi General Support Center ● Managing IT field forums with technical advice from University professors ● Publicizing human resource applications and school training equipments ● Accumulating of small and medium venture enterprise of display and mobile in Gumi Complex No. 4
Changwon	Advanced Appliance Cluster	● Promote development of the core appliances technology of the next generation (Focus on the core technology field such as NC engineering work, ultra-high manufacturing technology, etc.) ● Construct innovated network of appliance components enterprises mainly from small and medium enterprises (Fixed R&D through conferencing with universities/research labs/large enterprises) ● Provide general service such as human resource training, market information, etc. ● Construct immediate solution system for bottleneck (Ultra high speed technology clinic) ● Supporting enterprise-initiated technical human resource training such as Employment Reservation System ● Expanding support service for small and medium enterprises ● Creating Inno-core Park based on foundation of R&D and manufacture of preproduction ● Accumulating information, S/W, various equipment possessed by Regional Innovation Organisation ● Employing and train technical equipment co-ordinator (Intermediate educational-industrial co-operation, technology guide) ● Training technical ability through inviting foreign technical experts ● Support human resource of small and medium enterprises in studying abroad
Ulsan	Automotive Components	● Strengthen co-R&D between universities, research labs and components manufacturers (Organize Technology Research Association to strengthen co-operation in Educational-Industrial R&D, M&A; Consulting, technology transfer and business incubation establishment; Activate between various components manufacturing enterprises) ● Construct General Support System to modulise automotive components through formation business of Auto Valley: Automotive Components Complex (160 000 pyong), Modulisation Complex (250 000 pyong), Co-construction of Equipments (Automotive Components Innovation Center) ● Settle co-operative Labour and Management relationship

Table 14.A1.1. **Projects for Innovative Cluster Cities** *(cont.)*

City	Cluster Focus	Innovation task/Cluster promotion
Banwol Skhwa	Advanced Component Material	● Create mini cluster of component material of advanced fields – Promote advanced component material cluster such as Nano Material Analysis Support Center, precision photonics cluster based on advanced enterprises and Korea Polytechnic University – Increase individual new product development ability from R&D to mass-manufacturing through connection of component material industry and manufacturing equipment industry ● Construct component material network (Construct human training-centred educational-industrial cluster by connecting with Hanyang University, Saenggiwon, Gyunggi TP) ● Increase locations for advanced enterprises ● Environmentally friendly eco-industrial complex ● Establishing Model Design Center in Korea Polytechnic University ● Establishing Model Nano Analysis Support Center in Korea Polytechnic University ● Establishing Precision Photonics Model Center in Korea Polytechnic University ● Developing and manage Intern Training Program ● Providing location by creating model compound rental complex ● Establishing Model Regional Innovation Center in Korea Polytechnic University
Gwangju	Photonics Industry	● Construct photonics technology development network ❖ Global standard examination, certification and evaluation system enforced by Korea Photonics Technology Institute ❖ Found LED relevant special school subject to educate expert human resource (in Jeonnam University) ❖ Educational-industrial infra shared (TIC, RRC, etc.) by attracting educational-industrial organisations to the complex (Jeonnam University, Chosun University, etc.) ❖ Support in technology development and manufacturing improvement for each enterprise through "Private Technology Treatment" system ● Secure spontaneous ability of components manufacturing enterprises by supporting business incubation establishment ● Possess technology to attract leading enterprises ● Contracted with Chosun University Educational-industrial Co-operation Association in moving into the complex ● Attracted Korea Institute of Industrial Technology, Gwangju Institute ● Composing Photonics Industry Association for inspecting and evaluating photonics industry ● Photonics Internet Research Association, Advanced Component Industry Research Association ● Introduced 543 items of 327 types of research equipments ● Developed LED field with establishment of LED Valley in the cluster ● Founded LED relevant school subject in Jeonnam University ● Began composing and distributing Gunsan National Industrial Complex ● Composition in progress of automobiles components industry accumulated complex ● Constructing Automotive Components Industrial Innovation Center ● Constructing guesthouse ● Organized and managing Investment Promotion Division Organisation ● Amending Gunsan Investment Promotion Regulations
Wonju	Advanced Medical Industry	● Attract leading enterprises and create new business – Co-operate with ODM and global enterprises such as GE, etc. – Develop Donghwa Agriculture Industry Complex to be designated as a complex exclusive for foreigners – Develop core technology of medical appliances for both western and Chinese medicine, fusing silver industry and IT industry – Amend medical law regarding promotion for Tele-Med industry and develop medical appliances for both western and Chinese medicine ● Construct manufacturing foundation for medical appliances ● Construct medical appliances support network such as Wonju Medical Industry Foundation, etc. ● Completed construction of Medical Appliances Production Manufacturing Facilities ● Constructed and managing advanced Medical Appliances Techno Tower ● Constructing leased factory for attracting medical appliances enterprises. ● Preparing equipments for Medical Engineering Education Center and training expert human resource ● Constructing Advanced Medical Appliance Venture Center Promoting establishment of Medical Appliances Manufacturing Technology Research Labs and Medical Appliances (Examination Organisation)

Source: Government of Korea, Ministry of Commerce, Industry and Energy.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 15

Netherlands

This case study covers two approaches in the Netherlands that have a cluster-based component. Peaks in the Delta is the nation's new regional policy that promotes economic development in regions, with funds channeled in part to clusters selected by these regions. The Key Innovation Areas are part of the nation's innovation strategy but also have a strong regional impact. The goal of this approach is to strengthen those areas of competence important to the Netherlands with a strong role for innovation.

1. Programme(s) and their goals

The Netherlands has increasingly supported the concept of regional specialisation through its Ministry of Economic Affairs in two distinct programme approaches. Although supported by the same Ministry, there are no explicit links between the programmes.

- *Peaks in the Delta*, the new approach to regional policy, seeks to exploit "region-specific opportunities of national significance" by reorienting pubic policy to build on the nation's strengths (peaks). This is a geographic strategy, rather than a specific set of instruments or sectoral approach, that acknowledges the overall competitive advantages of the different parts of the country. Within this context, six broad regions that possess a regional specialisation of national significance (covering approximately 70% of the population) identify a spatial economic development strategy, including their own priority clusters for support, and national level funds for these regions are provided as a block grant. The goal is to meet the economic development needs of regions in coherence with national goals.
- *Key Innovation Areas* are part of the national innovation strategy but also have a strong regional impact. The goal of this approach is to strengthen those areas of competence important to the Netherlands based on characteristics including the role of innovation, internationally strong performance and commitment of stakeholders. These key areas are now developing formal cluster governance mechanisms to develop a shared vision and strategic planning. The first set of programmes developed by these organisations (including financial and non-financial instruments) are designed for a four to five-year time horizon with a roadmap, active private sector participation and critical mass with a potential for impact.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

While the Netherlands illustrates positive performance on a number of economic indicators, its position has been slipping on international competitiveness and innovation rankings. After peaking in 1998, the economic growth rate for the Netherlands plummeted from over 4% to less then –1%

OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

in 2003. While the growth rate is now improving (between 2% to 3% for 2006), the country took several years to recover from this downturn. The high general level of productivity (GDP per hour worked) in the Netherlands is tempered by one of the lowest growth rates in labour productivity (1.1% for the period 1995-2000 and 0.9% for the period 1995-2005). As a gateway to Europe and an economy very open to international trade, the Netherlands has a notable share of global trade and a strong capacity to attract FDI. The Netherlands ranked sixth in attracting FDI among OECD countries from the period 1996-2005, and its relative position when adjusted for GDP is even stronger (OECD, 2007).

Assessment of the innovation system shows some strengths in research quality but average innovation performance and several weaknesses. Strengths include the quality of research, a high number of patents, a relatively high level of public co-financing for applied research by the business sector, good use of ICT, and a high number of knowledge workers. Weaknesses include lagging R&D intensity of Dutch firms (1% *versus* an OECD average of 1.5%) and a growing shortage of science related knowledge workers, as well insufficiencies in innovative entrepreneurship, the use of scientific research and the interaction between knowledge infrastructure with firms (EZ, 2006a). The below average R&D intensity is attributable approximately 60% due to the sectoral specialisation of Dutch industry (less R&D intensive than in many other countries) and 40% by other factors, such as the low rate of foreign R&D funds despite the openness of the economy (OECD, 2006). Half of firm funding is concentrated in seven multinationals but that share has been on the decline in favour of greater diversification. Of firm R&D spending, manufacturing firms are responsible for the predominant share at 77%, albeit this includes a large share of electrical and optical equipment (EZ, 2006a).

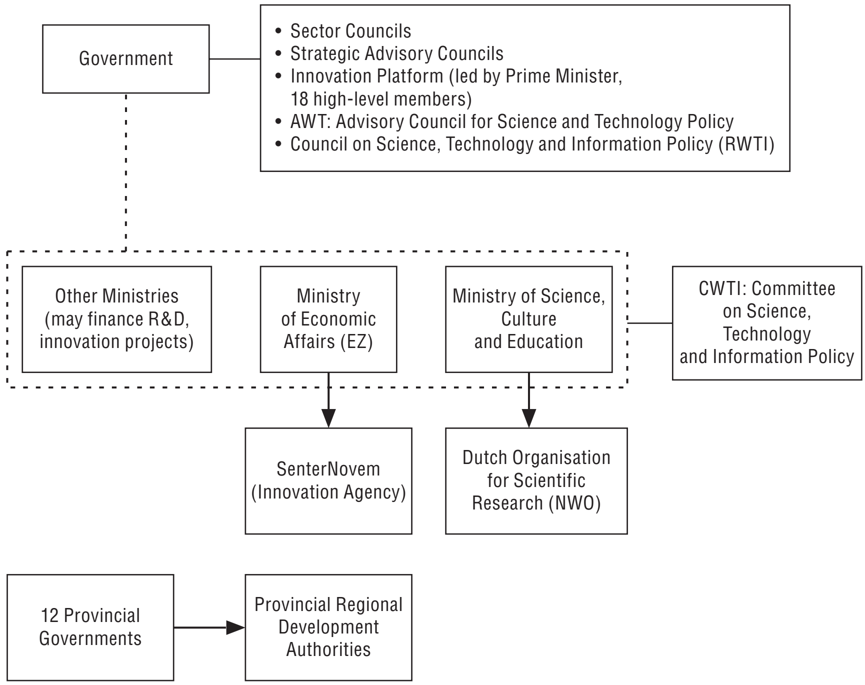
Historical development/evolution – where the programme came from in the context of other policies

The Netherlands has a history of general business support but has transitioned to an approach that favours concentration on geographic or thematic areas. In the past, the cluster concept was more explicit and is now referred to in the context of innovation. In 1997, a Government White Paper outlined a series of initiatives to support cluster policy. This emphasis on clusters changed after a 2002 evaluation by a private firm (Technopolis). The study noted that a vague approach to the term cluster in the Netherlands resulted not in specific cluster-type policies but rather a recasting of existing instruments (EC, 2003).

Description of programme's place in governance framework

The two programmes supporting regional specialisation for the Netherlands are both originating from the Ministry of Economic Affairs. This

Figure 15.1. **Organisational chart: Netherlands**



Source: Simplified version, from EC and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: The Netherlands 2004-05*.

Ministry's main implementation agency is SenterNovem. The Ministry of Education, Culture and Science is responsible for the four-year period science policies, and the Dutch Organisation for Scientific Research (NWO) serves as its funding agency. The ministry oversees the governance of public universities and many research organisations. There are also a series of high level advisory groups, like the Advisory Council for Science and Technology Policy (AWT). Created in 2003, the Innovation Platform is another advisory group with the Prime Minister as chairman and is composed of representatives of government, science and big corporations.

At the sub-national level, the country is divided into 12 provinces. Their responsibilities are mainly land use planning and physical infrastructure such as planning, building and operating regional roads. Municipalities actually have a greater set of responsibilities than the provinces. Several of these provinces have a regional development agency that supports economic development efforts and receives some co-financing from the Ministry of Economic Affairs.

Institutional frameworks and regional development policy

The Dutch approach to regional policy has recently shifted from a focus on supporting the lagging Northern regions to supporting the economic strengths of regions that serve as national drivers of growth. In 2004, two key papers on regional policy were issued. The report Peaks in the Delta outlines a new strategy for taking advantage of region-specific opportunities of national significance and to make use of the regional potential to create an internationally competitive investment climate. The result is six regions in total (five new areas plus the previously existing programme for the Northern provinces) (EZ, 2004). An interdepartmental review of the country's regional policy also noted that there is a justification for future national regional policy if it is focused on supporting regional strengths of national importance (Yuill, 2006).

The six regions are not a new layer of government but rather an area for spatial economic planning. These regions span administrative boundaries (12 provinces) that retain their existing functions. For these regions, a strategic planning body was created, a Programme Commission, to devise a coherent programme with priorities and results to be achieved in four years. Within this context, clusters for priority support were selected. The result has also been the development of joint central-regional programme teams between the national and sub-national level (regional) level. As such, the region became the level around which the spatial economic policy within the Ministry of Economic Affairs is now organised (OECD, 2007).

Role of programme in the context of science and technology (or innovation) policy

The main axes of the country's current science, technology and innovation policy were set forth in 2003. The Ministry of Economic Affairs elaborated "Action for Innovation: Tackling the Lisbon Ambition" to strengthen the climate for innovation, encourage firms to be more innovative and to focus more resources in strategic areas. This approach was complemented by three subsequent policy documents. Peaks in the Delta, part of the new regional policy approach, outlines an agenda for six areas in the Netherlands to focus resources on their strengths (mainly in terms of key industries/clusters as described above). A second document highlighted the country's commitment to innovation "focal points" in addition to the more general innovation policies in terms of business climate, strengthening particular key areas, and a more custom-made approach to specific sectors or company groups. Finally, a third paper highlighted instruments for entrepreneurs. The Ministry of Education, Culture and Science also developed the 2004 Science Budget "Focus on Excellence and Greater Value" to promote research in national priority areas (ICT, genomics and nanotechnology) as well as those important for societal needs (water, logistics, traffic management, etc.) (EZ, 2006a).

The programmes flowing from this innovation policy can be broken out into a basic package of general support to firms and a programme package that is more tailored on specific areas. The basic package for entrepreneurs includes various support mechanisms, notably to SMEs, through tax schemes, vouchers and advice. Part of this general approach is to reform the instruments available to be more flexible, tailored and focused. Financial incentives for firms to innovate accounted for 47% of government funds for innovation in 2006. The programme package is designed to focus on a more limited set of issues, better link policy and implementation, increase public/private collaboration, make room for tailored approaches and allow for varied approach by policy area (EZ, 2006a). The Dutch advisory council on innovation policy also proposed that policy be more directed to key sectors. A relatively large part of the innovation budget (around 50%) has therefore been directed at specific enterprises which fit this category.

Role of programme in the context of enterprise policy

The Dutch approach to industrial policy has been progressively replaced by regional economic policy and innovation policy. The Ministry of Economy's 2004 Memorandum "Heart for Industry" supports the concept of moving beyond a generic innovation policy that includes a concentration of resources on "focal points". The idea to focus on groups of companies to identify specific bottlenecks to economic growth is one vehicle for reorienting to a certain degree public sector attention to these key industries. The bottlenecks for economic growth they identify are often related to capital market access and facilities from the government (EZ, 2006a). As part of the Peaks in the Delta regional approach, there is also an accent on industrial estates.

Cluster studies conducted

There is no explicit national mapping study.

3. Details on programme budget and timeframe

Peaks in the Delta: The total budget for the programme from 2007-10 is EUR 216 million. This amount excludes spending for the Northern region as well as funds for industrial estates. Of that amount, 86 million is dedicated to projects that have a national interest to be allocated on a discretionary basis and EUR 130 million is dedicated directly to one of the five regions (approximately 32.5 million per year for region-specific projects). The breakout by region for the total over four years is planned to be: 23 million for East Netherlands, 42 million for the North Wing of the Randstad area, 30 million for the South Wing of the Randstat, 8 million for Southwest Netherlands, and 27 million for Southeast Netherlands.

Key Innovation Areas: Total funding is approximately EUR 1 billion or EUR 200 million per year (minimum 5 years 2006-10). Financing for the additional innovation programmes comes from the Fund Enhancing Economic Structure (FES) which is funded from the country's national gas revenues.

Spending on related programmes

In comparison, funding for spatial economic programmes is outlined in Table 15.1.

Table 15.1. **Netherlands: funding for region-specific economic policy**
Ministry of Economic Affairs, in millions of euros

Category	2004	2005	2006	2007	2008
Industrial estates	22.9	22.9	23.1	22.9	22.9
Region-specific budget	74.1	74.1	75.3	69.1	69.1
of which:					
REON-Northern Development Compass	61.1	61.1	61.1	–	–
IPR Central	13.0	13.0	13.0	TBD	TBD
Co-finding for ERDF projects	–	–	1.2	11.0	11.0
Peaks in the Delta, including future regional policy	–	–	–	58.1	58.1
Tourism	21.9	20.7	19.5	21.9	21.9
Regional development companies	7.3	7.2	7.0	6.9	7.3
Urban economy	–	153.9	2.0	2.0	–
Total	**126.3**	**278.7**	**126.8**	**119.1**	**118.0**

Notes: In 2005, the Ministry of Economic Affairs will allocate funding for the economy policy component to the major cities for the entire 2005-09 covenant period in a single payment. Funding for the IPR Central programme has not been confirmed beyond 2006 and is therefore to be determined. IPR = Investment Subsidy Scheme; ERDF = European Regional Development Fund.
Source: Ministry of Economic Affairs (EZ), Government of the Netherlands (2004), *Peaks in the Delta: Regional Economic Perspectives*.

4. Targets and scope

Targets and selection criteria

For *Peaks in the Delta*, selection was based on quantitative criteria and a SWOT analysis (at the national and regional level). While the overall regional assessments were made with the national interest in mind, the cluster selection process was developed at the regional level only with some overlap. There is no national level prioritisation among the sectors selected by the regions (for example four of the six regions selected life sciences).

Key Innovation Areas were selected for national level interests. Criteria included: an important role for innovation, a strong industrial commitment with the relevant stakeholders involved and a potential for international outstanding performance. The selected areas are: 1) water and civil engineering; 2) high-technology systems and materials; 3) flower and food; 4) creative industries; and 5) chemistry.

Cluster selection process

Peaks in the Delta: Selection was based on analyses but not a self-selection or application process. The sectors receiving support may or may not become formal cluster initiatives.

Key Innovation Areas: Selection was based on analyses but one of the criteria was important industrial involvement. These groupings are required to develop a cluster initiative structure. The firms may or may not have worked together before.

Number of cluster participants

In both cases the priority sectors are not yet organised into cluster initiatives, therefore this information is not available.

Cluster institutional status, governance and linkages

Peaks in the Delta: No cluster initiative status is required.

Key Innovation Areas: The clusters are now in the process of developing a formal structure and action plan. In the case of Point One, the first cluster to become formalised, the legal structure is a Dutch Foundation (see Box 15.1).

Administrative boundaries

Peaks in the Delta: Financing will be channelled through these six regional demarcations, albeit within a region the cluster may span municipal and provincial boundaries.

Key Innovation Areas: Given the national perspective on these key areas, there are no *a priori* administrative boundaries. One active area for trans-national co-operation is the triangle of Eindhoven (Netherlands), Aachen (Germany) and Leuven (Belgium). This transational region is working to develop an "innovation eco-system" and their several joint actions should contribute to the cluster supported under the Point One programme.

5. Instruments

The two policy approaches to support regional specialisation leave open the possibility of a range of instruments depending on the needs of the particular cluster.

- *Identification and benchmarking:* For *Peaks in the Delta*, the identification process for priority clusters was up to the regional Programme Commission.

Box 15.1. **Point One: nanoeletronics and embedded systems (Netherlands)**

The Point-One programme is the first (pilot) innovation programme launched under the new "programmatic package" of the Ministry of Economic Affairs. The vision of Point-One is to create a world class ecosystem in terms of nanoeletronics of "Silicon Valley" reputation. The mission is therefore to exploit the Dutch position in this field and create an academic, industrial and institutional R&D infrastructure that can outperform the world's best in a sustainable manner.

The Point-One programme was developed in close collaboration between the Ministry of Economic Affairs and industrial parties in order to create a cluster for nanotechnology and embedded systems with partners from industry and knowledge institutes. The Minister of Economic Affairs announced a support programme of EUR 50 million at the launch of the programme (on top of the budget of more than EUR 600 million which was already made available for this technology field for the period 2004-10). At this point, over 30 companies and knowledge institutes already participate in Point-One and have made a financial commitment, including ALSI, ASML, Anteryon, Boschman, Bruco, C2V, Cavendish Kinetics, IMEC Nederland (Holst), Limis, Lionix, MA3 Solutions, Philips, Phoenix, TNO, and the technological universities of Delft, Eindhoven and Twente. The organisational structure has an Executive Committee and Programme Board that includes the CEOs of industry, government entities and research institutes. To better involve SMEs, there is a special SME Council in addition to the Science Council.

The activities of the programme and supporting schemes will cover a wide range of areas (strands), including strategic research initiatives, formation of open innovation institutes, encouraging knowledge interaction between academia and industry, and SME development.

The Point-One programme consists of the following elements:

- Two strategic R&D collaboration platforms, also open for SMEs (contribution of the Ministry of Economic Affairs: EUR 29 million).
- The establishment of a widely shared strategic innovation agenda and international profiling and collaboration (contribution of the Ministry of Economic Affairs: EUR 1 million).
- R&D projects: two tenders in 2006 and 2007 to broaden the technological base and the involvement of innovative SMEs (contribution of the Ministry of Economic Affairs: EUR 14 million).
- Establishment of a Venture Capital Fund with EUR 50 million by 2009 to support start-ups in nanoelectronics and embedded systems (no contribution by the Ministry of Economic Affairs).
- Establishment of road maps, coaching programmes and upgrading activities for SMEs, international grants for students, and an industrial PhD programme (contribution of the Ministry of Economic Affairs: EUR 6 million).

Source: EC and Enterprise Directorate-General (2006), "Netherlands: Reviewed innovation policy mix gets going", TrendChart Newsletter, June 2006 and Point-One.

The national *Key Innovation Areas* of the innovation strategy were selected based on the role of innovation, internationally strong performance and commitment of stakeholders.

- *Engagement of actors:* The innovation programme approach seeks to formalise the engagement of actors in a cluster initiative.
- *Government service delivery:* While there is not an explicit change in government service delivery, both programmes are supporting a more cluster-oriented approach. This principal is behind the idea in the 2004 Industry Memorandum "Heart for Industry" to focus on groups of firms and sectors to identify how policy can address obstacles for economic growth. The *Peaks in the Delta* approach has also resulted in a restructuring of the internal organisation of the Ministry of Economic Affairs along geographic, albeit not specifically cluster, lines.
- *Skilled HR:* Improving the size of the skilled labour pool in general is a concern for the country given the current deficit of skilled Dutch labour in key fields. This is part of the nation's overall approach to innovation but is not a key component of the newly forming cluster initiatives. These clusters may promote more cluster-specific strategies in the context of their individual programmes.
- *Entrepreneurship and innovation:* Supporting innovation is an explicit goal for the *Key Innovation Areas* of the innovation policy. The regional programme does not specifically address these areas but is more focused on industrial parks and bottlenecks for the development of these areas.
- *Resource allocation and investment (including branding):* The labelling in both cases is designed to increase visibility and support of these priority clusters. With the focus coming from the Ministry of Economic Affairs, it does not necessarily result in other ministries redirecting their existing funds towards these selected cluster groups.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

There are no current pre-defined evaluation mechanisms.

Results of evaluations, if any

In 2002, an evaluation study of the country's prior cluster policy was conducted by an outside firm (Technopolis). They noted that the definition of cluster was vague and that as a result the policies promoted by a 1997 Government White Paper were the same instruments that existed in the past but that they had been merely relabelled (EC, 2003).

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

Bibliography

European Commission (EC) and Enterprise Directorate-General (2003), *Thematic Report: Cluster Policies*, Brussels.

EC and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: The Netherlands 2004-2005*.

EC and Enterprise Directorate-General (2006), "Netherlands: Reviewed innovation policy mix gets going", TrendChart Newsletter, June 2006.

Ministry of Economic Affairs (EZ), Government of the Netherlands (2004), *Peaks in the Delta: Regional Economic Perspectives*.

Ministry of Economic Affairs (EZ) and Government of the Netherlands (2006a), *Science, Technology and Innovation in the Netherlands: Policies, facts and figures 2006*.

Ministry of Economic Affairs (EZ) and Government of the Netherlands (2006b), "Innovation policy in the Netherlands", presentation by Hans de Groene, 26 January 2006.

OECD (2006), *OECD Economic Surveys: Netherlands*, OECD Publications, Paris.

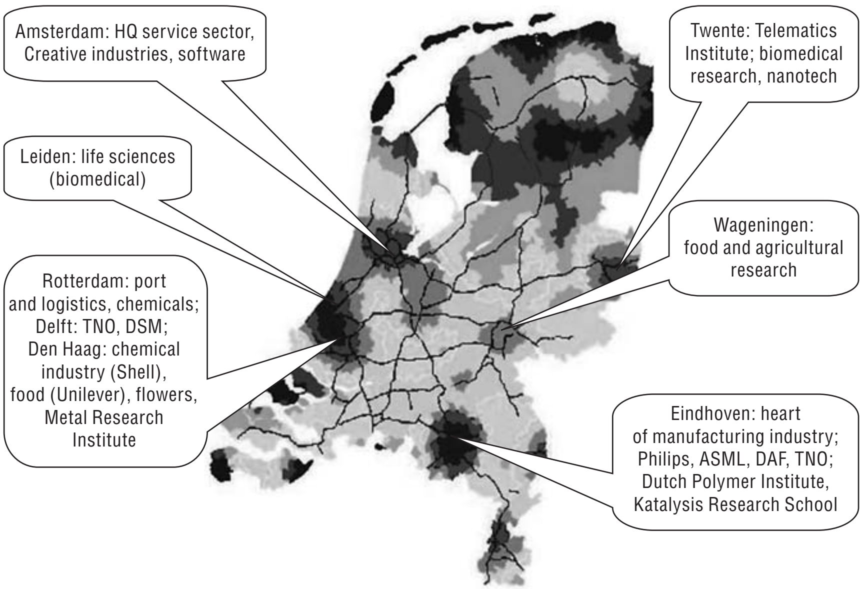
OECD (2007), *OECD Territorial Reviews: Randstad, Netherlands*, OECD Publications, Paris.

Severijns, Jean (2006), "Cluster Policy in the Netherlands and Surrounding Areas: Strategic Innovation as Multi-Dimensional Cluster Model", presented at the Summer University conference for Local production systems, clusters and competitiveness centres, Bordeaux, France, 11-13 September 2006.

Yuill, Douglas (2006), "Policy Developments in the Netherlands", in *Regional Policy Developments in the Member States and Norway: Country Reviews 2005-06*, EoRPA Paper 06/2, European Policies Research Centre.

ANNEX 15.A1

Figure 15.A1.1. **Selected clusters in the Netherlands**



Note: Areas listed above do not map exactly to the regional categories of the Peaks in the Delta programme but indicate some of the nation's key clusters.

Source: Ministry of Economic Affairs (EZ), Government of the Netherlands (2006b), "Innovation policy in the Netherlands", presentation by Hans de Groene 26 January 2006.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 16

Norway

This case study reviews two complementary cluster programmes in Norway. The Arena programme supports innovative networks to strengthen the interaction between the business sector, knowledge providers and the public sector using a flexible approach with respect to sector, region and cluster development stage. The Norwegian Centres of Expertise programme seeks to initiate and enhance co-operative innovation and internationalisation processes in a limited number of clusters of national significance with potential for innovation-led growth.

1. Programme(s) and their goals

Norway is now on its third generation of explicit ("core") cluster programmes. The first programme REGINN ended in 2001. The programme's strategy was to increase network-based innovation in functional regions using the triple helix model through collaborative R&D projects. Regional R&D institutions were contract partners and acted as facilitators. The second and third generation are:

- *The Arena Programme* was launched in 2002, based on several regional pilot projects. An end date has not yet been set. By supporting regional cluster initiatives through network development, the programme's goals are to increase innovation and value by strengthening the interaction among firms, knowledge providers and the public sector. It has a flexible approach and is open to cluster initiatives of varying degrees of advancement in any region and offers financial and knowledge support for the planning and implementation of long-term development projects. A mid-term evaluation that will be presented February 2007 will be an important input for discussions and decisions on the programme's further role.
- *Norwegian Centres of Expertise (NCE)* is the most recent programme starting in 2006 and seeks to strengthen clusters with an international orientation and potential for innovation-led growth by increasing value creation and initiating and enhancing co-operative innovation and internationalisation. Secondary objectives are to create interest in and commitment to cluster development, to generate concrete results at cluster and company levels and to provide greater insight into co-operative development processes. The programme is more selective than *Arena* as it targets the strongest clusters in the country through competitive selection but there is nevertheless a strong accent on the regional knowledge environment in which these clusters operate.

In addition to the three aforementioned cluster programmes, other "support" programmes address specific issues for clustering and co-operation. Two such programmes sponsored by the Research Council of Norway include MOBI (Mobilisation for R&D-Related Innovation) and Value Creation 2010. MOBI is an umbrella programme with an experimental approach that seeks to support training, innovation and increasing value added in firms with little R&D experience, notably SMEs. Some of the sub-programmes include industry-college collaboration and research-based competence brokering. Value Creation 2010 is a research programme to involve all parts of an organisation in the innovation process with a focus on labour-management relations at the firm level. The programme is supported not only by the Research Council but also Innovation Norway and federations of unions and firms. In 2007 the Research Council of Norway will launch a new programme for regional innovation, including main activities from MOBI and Value Creation 2010 together with several new instruments. The new programme will offer more comprehensive support for regional development activities as prioritised by regional partnerships. Another supporting programme to develop incubators, through physical infrastructure and local firm networks, is managed by the Industrial Development Corporation (SIVA).

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Norway, with a population of 4.5 million, is characterised by strong macroeconomic performance and a predominance of SMEs. The Norwegian economy has experienced a healthy recovery after a slowdown in 2002-03. The key drivers of this recovery include: low interest rates, competition-induced productivity gains, high investments by the booming oil sector, terms-of-trade gains and supportive macroeconomic policies. Furthermore, the country has kept inflation low and continues to increase labour inputs (*i.e.*, hours worked) (OECD, 2005).

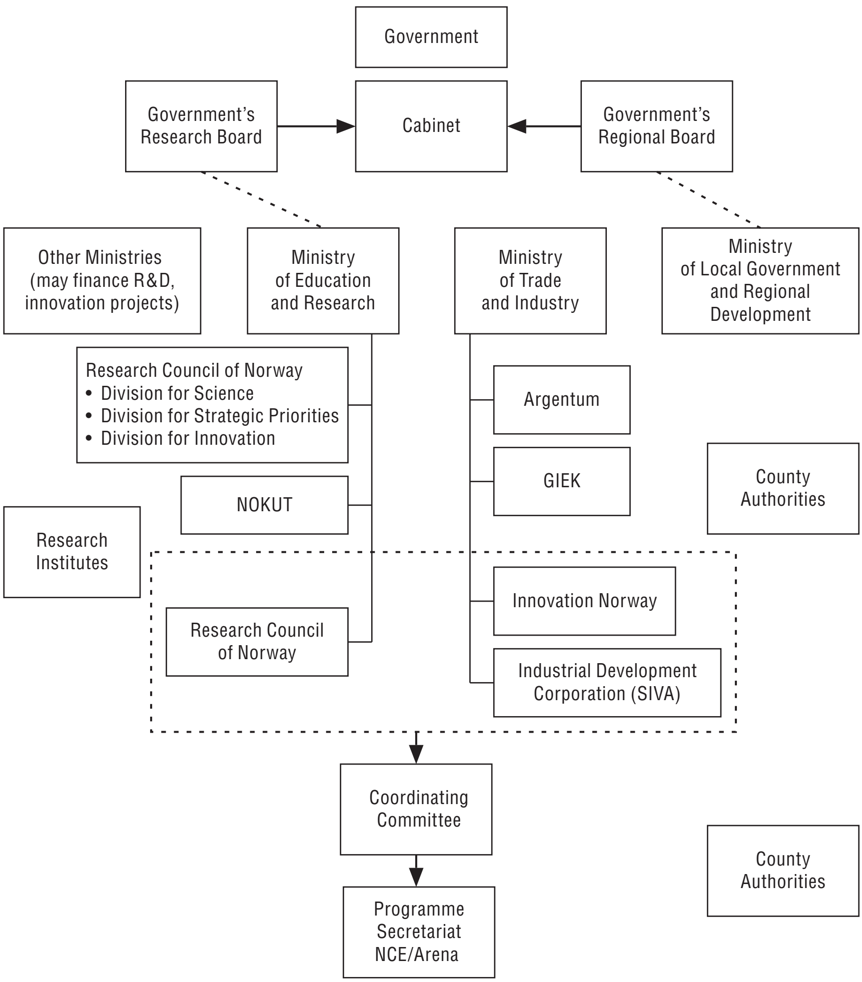
However, the country's innovation performance actually lags relative to its macroeconomic performance. For example, R&D investment as a per cent of GDP is only 1.64% *versus* for example 1.92% for the EU25. The country has been characterised as a paradox opposite to that of Sweden, where innovation indicators are stronger than macroeconomic performance. For example, Norway's GDP per capita is one of the world's highest and the 2005-06 Global Competitiveness report ranked Norway 9th but on the European Innovation Scoreboard Norway is ranked only 16th out of 33 countries. Some of the innovation challenges for Norway include a below average business investment in R&D and innovation, low public R&D funding and insufficient levels of new science and engineering graduates (EC, 2006). The predominance of SMEs is another factor contributing to the lower levels of innovation investment.

Historical development/evolution – where the programme came from in the context of other policies

The different "core" cluster programmes are at the intersection of industrial, technology and regional policy, with some of the "support" programmes being more focused and coming from one of these three policy families. Key white papers on innovation policy and regional policy also support the further promotion of regionally embedded clusters and their knowledge environment. The programmes are therefore consistent with the nation's evolving strategies in these areas.

Description of programme's place in governance framework

Figure 16.1. **Organisational chart: Norway**



Source: Modified from EC and Enterprise Directorate-General (2006), *Annual Innovation Policy Trends and Appraisal Report: Norway 2006.*

The Ministry of Trade and Industry as well as the Ministry of Local Government and Regional Development are the most active in supporting clusters with additional support from the Ministry of Education and Research.

In 2004 an Innovation Board, akin to the government's Research Board, was created to co-ordinate innovation policies but it was not renewed by the incoming government in 2005.

The Ministry of Local Government and Regional Development has been active in promoting innovation through a variety of instruments. As its functions have expanded, it is now responsible for matters such as housing policy, regional and district development, local government and the administration of elections. The Regional Development Department within the ministry promotes economic development to preserve the country's basic population settlement pattern and ensure equal living conditions throughout the country.

The Ministry of Trade and Industry acts through several agencies, but has also established a Department for Research and Innovation Policy. Innovation Norway, a state-owned company, was created in early 2004 to bring together non-R&D aspects of innovation policy, formerly under four separate agencies, all under the same agency. The R&D aspects are handled by the Research Council described below. Its mandate is to support knowledge flows, networks and venture capital by working with entrepreneurs and small and medium-sized enterprises to support innovation, internationalisation and commercialisation. Also under this ministry is the Industrial Development Corporation (SIVA) that co-owns 60 science parks, incubators and investment companies.

The Ministry of Education and Research oversees key actors in research policy. The Research Council of Norway, under this ministry, now includes a special Division for Innovation. Its regional representatives are housed in regional Innovation Norway offices.

Norway has also sought a tri-partite agency sponsorship approach to co-ordinate cluster policies at the central level. Both the *Arena* and *NCE* have used the same strategy. In fact, the three agencies signed in 2005 a joint venture agreement for "closer and more binding co-operation" so as to provide "unified service for users throughout the country". The sponsors are Innovation Norway and SIVA (the Industrial Development Corporation of Norway) both under the Ministry of Trade and Industry, along with the Research Council of Norway under the Ministry of Education and Research. This co-ordination goes beyond these two programmes to include Incubator Initiatives, Value Creation 2010 (a programme for in-firm and network based innovation), and MOBI for R&D-based innovation, among others.

Institutional frameworks and regional development policy

Like several Scandinavian countries, Norway is a decentralised unitary state. There are 19 regional level governments (counties) that contain 431 municipalities. The Ministry of Local Government and Regional Development is seeking to delegate greater responsibilities and resources to counties, including for matters of innovation policy. In fact, the regional offices of Innovation Norway are mainly funded by the counties. The most prominent aspects of Norway's new regional strategy are: a stronger emphasis on regions/centres that show growth potential, prioritising measures to strengthen innovation and firms and greater decentralisation to regions. The *Arena* and *NCE* programmes both seek to promote coherence across levels of government by requiring that these national programme participants be linked with regional development plans and regional actors.

A 2004/5 White Paper on regional policy emphasized regional development, innovation and internationalisation. It suggested that the country's regionally focused innovation policy should: support local opportunities and remove local barriers to innovation, exploit regional competitive advantages, promote co-operation at the local level across different actors (firms, government, and research) and strengthen knowledge about technology, products and markets. There is a strong accent on the need for regional specialisation as a national policy approach. In 2006, the Government declared that there will be a regional reform for 2010 to replace county councils with new regional entities.

Role of programme in the context of science and technology (or innovation) policy

The Unified Innovation Policy Plan (HIP) of 2003 outlined a strategy to support the conditions for innovation. This strategy includes: increased interaction between firms and their knowledge environment, greater focus on commercialisation, higher skilled labour, network building and greater coherence among public agencies. A subsequent 2005 White Paper on research policy, *The Will to Engage*, also supports the concept of clustering. It includes a strategy that seeks to strengthen relationships between firms and knowledge producers in a given region. The *NCE* is a core programme in support of this agenda.

Role of programme in the context of enterprise policy

N.a.

Cluster studies conducted

There are no specific cluster studies conducted in conjunction with these programmes. However, Innovation Norway's approach to clusters follows this definition: "a geographical concentration of specialised companies and related companies, R&D and knowledge providers, financial institutions and public sector partners that includes interaction and collaboration between these actors".

3. Details on programme budget and timeframe

Arena: Most programmes take a year for the initial stage(s) before getting funded for a main project that lasts typically for three years. A project may apply for further funding for up to two more years. The annual programme budget is EUR 4 million for 18-20 cluster projects (approximately EUR 200 000 per cluster per year).

NCE: This programme has a ten-year cycle, albeit the timeframe is broken up into three stages with minimum milestones to continue receipt of funding. The annual programme budget is EUR 4.5 million in the first year for six clusters (approximately EUR 625 000 per cluster per year). In 2007-08 four new NCE-projects will be selected.

Spending on related programmes

In comparison, the budget for other entities and programmes is:

- Innovation Norway at EUR 508 million, of which EUR 242 million is used for loans (2004).
- State allocations to SIVA, the Industrial Development Corporation, of approximately EUR 7.3 million (2004).
- Value Creation 2010 programme, which runs from 2001 to 2010 was approximately EUR 3.4 million in 2004 for ten regional projects (approximately EUR 341 000 per region that year).
- Research Council of Norway at EUR 560 million in 2005.

4. Targets and scope

Targets and selection criteria

Arena: This programme has a highly flexible procedure for selection that allows different points of entry. If an idea for a project needs development, the group may enter at Stage A and receive funding for a preliminary study. If the group is a bit more advanced, it may enter at Stage B directly with a preliminary project. If the initiative is truly advanced, it may enter at Stage C for funding of a main project.

NCE: It is designed to select internationally oriented clusters with high potential for innovation-led growth that seek to increase the level of R&D collaboration. The main targets are cluster firms, be they core companies, related companies or new business activities linked to the cluster's core business area. Secondary targets include R&D institutions, educational institutions, joint ventures, public agencies and financiers. Specific criteria for selection cover: the cluster's resources base, the maturity of the development process, the level of innovation, the international orientation, the project quality and the development potential.

Cluster selection process

Arena: Clusters self select and apply to the programme. Applications are considered through an annual call for proposals.

NCE: Clusters self select but there is an annual competitive selection process.

Number of cluster participants

Arena: In 2006, approximately 330 firms, 55 R&D and educational institutions, and 60 public sector institutions (for a total of 17 main projects) are actively involved.

NCE: In 2006, approximately 110 firms, 35 R&D and educational institutions, and 30 public sector institutions are involved in the six clusters.

Cluster institutional status, governance and linkages

For both *Arena* and *NCE* programmes, the cluster participants (*e.g.*, firms, educational institutions, knowledge parks, intermediaries) must use a legal entity that will keep clear and separate finances from other projects or established services. The main project manager should be hired on a full-time basis with the possibility of a secondary project manager on a full or part-time basis. The scale of a project is not constrained by administrative boundaries and may span several counties (regional units). An agreement is signed with a contract partner/facilitator that in turn has a steering committee of actors from the cluster and a contract with the programme.

Administrative boundaries

For both *Arena* and *NCE*, the scale of a project is not constrained by administrative boundaries and may span several counties (regional units).

5. Instruments

Both programmes are focussed mainly on the engagement of actors through network development with a goal to improve innovation. For *NCE*, up to 50% of funding is for financial support (process management, network building, idea and project development, analysis and strategy processes, and communication and branding). The other instruments include professional support (networks between NCE projects, joint development projects and learning activities, linkage to international networks and marketing).

- *Identification and benchmarking:* For the *NCE* projects a standardised baseline study is carried out, funded by the programme. In addition, most of the *Arena* projects are based on cluster analyses in different forms, and several projects are supported by benchmarking and other research projects.

- *Engagement of actors:* This is the primary goal of the *Arena* programme's initial phases as items that may be funded include project management, consultancy services, and travel and meeting activities. It is also strongly supported within the *NCE* programme to develop collaborative projects such as process management, networking building, analysis and strategy processes and concept/project development. The *Arena* programme plays in part a role of engaging actors who may then graduate to the *NCE* programme.
- *Government service delivery:* Greater co-ordination among public actors in support of clusters is an implicit goal of both programmes as they are co-funded and co-managed across different entities. With the *Arena* programme, there is an explicit goal to have more proactive and better co-ordinated involvement of the public sector. Additionally, initiatives under both programmes must be in line with regional development plans. The two programmes, and especially the *NCE* programme, also have a strong learning component which is hoped will provide information to improve government programmes. *NCE*s are required to incorporate the offers from relevant other national programmes when applicable, thereby serving a co-ordination role to channel funding from various national programmes.
- *Skilled HR:* One of the goals of the *Arena* programme is to develop educational programmes better adapted to the needs of the business community, so this is an option that a cluster may or may not pursue. While skilled HR is a goal within the country's innovation strategy, it is not a primary goal of the *NCE* programme but is a possibility.
- *Entrepreneurship and innovation:* There is not an accent specifically on entrepreneurship and the development of spin-offs in the "core" cluster programmes. Support specifically to spin-offs through incubators is offered by a separate programme from the Industrial Development Corporation, and this entity is a co-manager of the core cluster programmes. Innovation is a primary goal of both programmes. For example, the *NCE* programme seeks to promote innovation through joint projects related to a particular type of technology or expertise, a limited business sector, or co-operation within an efficient value chain.
- *Resource allocation and investment (including branding): Arena*-funded initiatives are incorporated into regional development plans and involve the county authorities as key partners in the network. This serves to direct resources from different levels of government to the same clusters. The *NCE* programme has a clear branding strategy for marketing those clusters with the strongest international potential as well as links with regional bodies for funding.

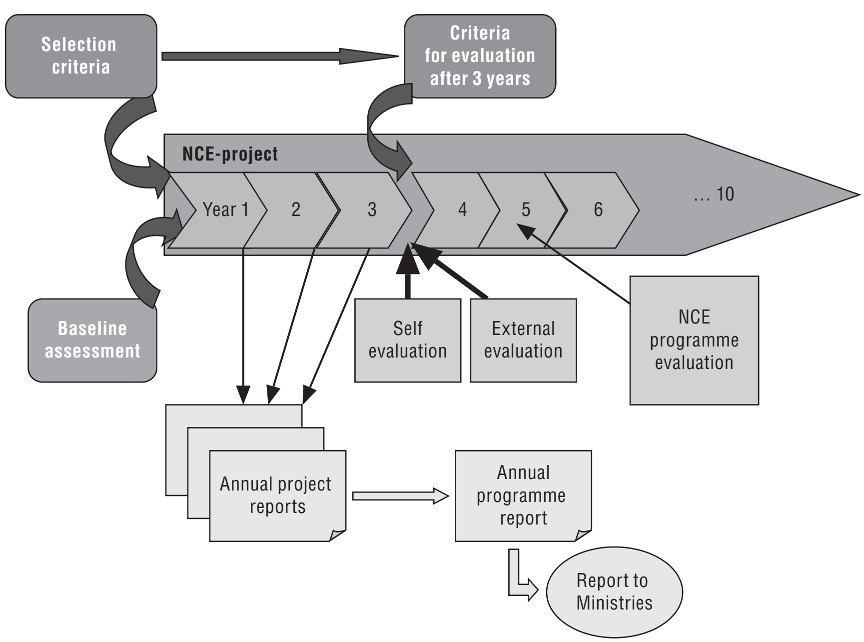
6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

All three Norwegian cluster-type programmes have sought to include policy learning and evaluation. For the *REGINN* programme, several learning tools were put in place including manager seminars, participant seminars, yearly reporting on general and specific project goals and a process consultant followed the programme for three years. The *Arena* programme includes an active monitoring system, two evaluators acting as advisors (in the period 2003-05), and cluster project level work such as benchmarking and active discussions with clusters on the progress and quality of clustering.

The system for the *NCE* programme, which is just getting underway, will include the steps outlined in Figure 16.2. Even before it began, the *NCE* programme had a one-year pilot stage. Note that for each *NCE*, a baseline analysis will serve as the basis for later evaluations. Indicators common to all projects as well as specific goals per individual project will be tracked. Common indicators include increased co-operation, increased innovation and increased international involvement, among others. Individual Centres have specific targets and an assessment of such targets will be based on the project's own scale, level of development, challenges and potential. The programme also

Figure 16.2. **Evaluation system for the Norwegian Centres of Expertise**



Source: Government of Norway, Innovation Norway.

includes three stages of evaluation and reporting requirements: 1) a management evaluation; 2) a main evaluation after five years on results; and 3) annual reports, based both on project annual reports as well other information such as the management reports. Furthermore, the two interim steps for project monitoring and assessment within the ten-year cycle offer to project participants a long-term funding time horizon, but at the condition that they perform successfully.

Results of evaluations, if any

The results of policy learning and evaluations in Norway have informed their cluster policy programmes. For the *REGINN* programme, the lessons learned were the importance of time and that firms see the benefit to their participation. Time was needed for creating trust among the different actors in the collaborative processes, as a fundamental condition for mutual learning and joint innovation projects. This also implies that cluster development often needs a long-term perspective, because trust must be developed gradually. The links between the programme and project levels also needed to be tighter because most of the learning happened on the project level. For the *Arena* programme, lessons learned include the need to set clear as well as dynamic goals, the importance of "stories" in addition to traditional reporting indicators, appreciating the importance of trust, and the need to combine actions with short-term measurable impacts alongside longer-term goals. Policy lessons included a need for a longer-term perspective on cluster development with respect to goals, indicators and reporting procedures. A second policy lesson concerned the importance for a programme to recognise the level of social capital and the innovation culture in a cluster. A final policy lesson from the *Arena* programme is that regional development, innovation processes and international competition must be seen as a whole. The *NCE* programme is just getting under way.

Bibliography

European Commission (EC) and Enterprise Directorate-General (2006), *Annual Innovation Policy Trends and Appraisal Report: Norway 2006*, *http://trendchart.cordis.lu/*.

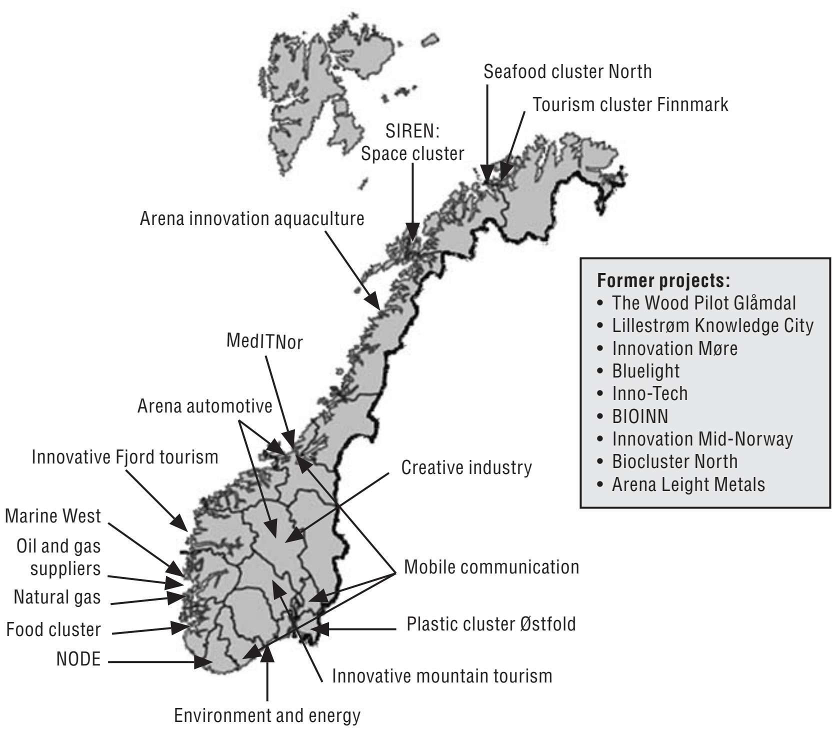
OECD (2005), *OECD Economic Surveys: Norway*, Vol. 2005/17, October 2005, OECD Publications, Paris.

Senneseth, Knut and Olav Bardalen (2005), "Evaluation as a policy learning tool – three generations of Norwegian cluster programmes", Presentation made at the 8th Annual Conference of the Competitiveness Institute, Hong Kong, 8-11 November 2005.

ANNEX 16.A1

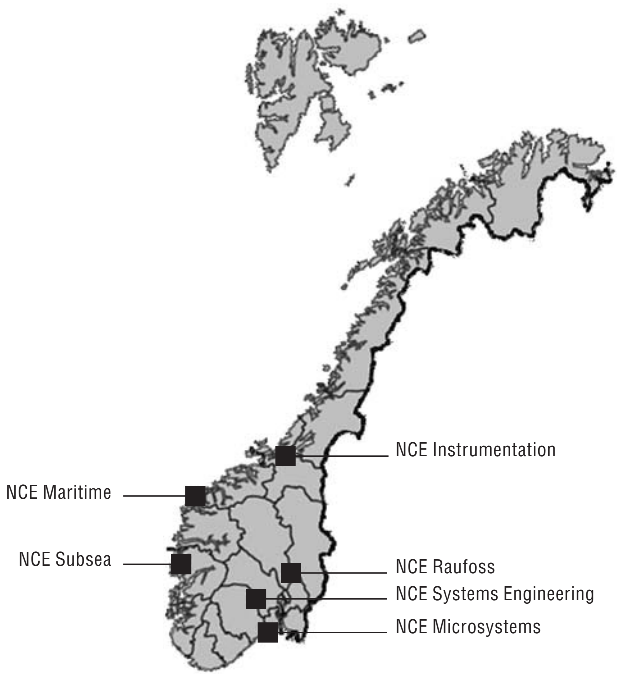
Figure 16.A1.1. **Norway Arena programme clusters**

As of 2007



Source: Government of Norway, Innovation Norway.

Figure 16.A1.2. **Norway NCE programme clusters**
As of 2007



Note: Four more clusters are expected to be added by 2008 for a total of 10.
Source: Government of Norway, Innovation Norway.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 17

Spain: The Basque Country

This case study explores a programme to support clusters by the Basque Country Government in Spain. This on-going cluster policy to develop the Basque Country's competitiveness began in the early 1990s and focuses on the development of cluster initiatives in the largest industries in the region.

1. Programme(s) and their goals

The Basque Country Competitiveness programme to support clusters seeks to improve the competitiveness of firms, and thus the competitiveness of the region as a whole. The goal of the programme is to promote active co-operation among firms and to incite them to focus on their competitive strategic challenges. The underlying problem prompting the programme was general industrial decline and the region's anticipated (back in the early 1990s) decline in competitiveness (low cost labour, currency) in light of upcoming EU changes. The programme was also designed to respond to weaknesses in competitiveness identified in a report by Michael Porter. One weakness was the inability to market products effectively thereby allowing foreign firms to benefit from the region's technical expertise and efficiency in production. Another weakness was the lack of co-ordination among firms and other institutions.

2. Context: Situating the programme in the governance framework and policy strategy (ies)

Features of the economy that have an important impact on cluster development generally

Spain overall scores below average on the vast majority of the EU Innovation Scoreboard measures. The country has a 20% lower productivity than the European average despite a greater number of hours worked. Average firm size in Spain is smaller and in general, Spain is not as knowledge intensive as many other European countries. The innovation system has been characterised as having a low level of development (EC, 2005).

Within Spain, the Basque Country performs above and below national averages depending on the indicator. This region of 2.1 million inhabitants has a higher than national average per cent of GDP in industry as opposed to other sectors. It has lower rates of FDI and penetration by multi-nationals but does have a higher patent per capita rate than the national average. Within Spain, it is the third region in terms of regional government budget devoted to R&D (1.37%) (EC, 2005). The strong sense of cultural identity and existing culture of firm co-operation support cluster initiatives. The region has strong interconnections between the three key cities and the industrial towns. Economic performance has also considerably improved, with GDP per capita as a per cent of the European average growing from 89.7% in the 1990s to 105% in 2002 (Aranguren and Navarro, 2003) and Basque Country estimates put that figure more recently at 112% of the EU15 average and 123% of the EU25 average.

Historical development/evolution – where the programme came from in the context of other policies

The Competitiveness programme offered a new approach to be used as a part of the region's industrial policy. It nevertheless was built on a prior tradition of firm co-operation. The region had already built up an infrastructure of sectoral support mechanisms through technology and business support centres. Another system of Local Development Agencies (LDA) had evolved to address unemployment at a localised level. The LDAs, in contrast with the Competitiveness programme, are more bottom-up (municipal and provincial authorities) and are based on a local endogenous development point of view (Aranguren *et al.*, 2003). Another famous example of successful economic development in the Basque Country is the *Mondragón Corporación Cooperativa*, but this co-operative conglomerate of over 68 000 employees has a unique structure and is therefore difficult to replicate as a general public policy.

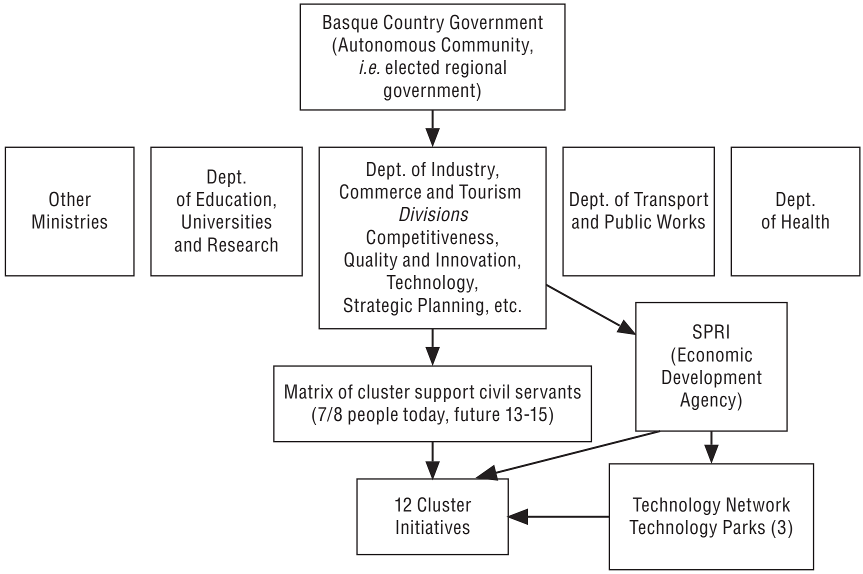
The idea for the explicit cluster approach came from a contact between a high level official in the Basque Government and Michael Porter. Porter's consulting firm Monitor was subsequently hired jointly by the Basque Government, a province and the *Sociedad Promotora Bilbao Plaza Financiera* to study the region's competitiveness issues. The 1991 study included a statistical analysis and other competitiveness analysis criteria to select target clusters. The study prompted a public/private debate that led to the current programme.

Description of programme's place in governance framework

The Competitiveness programme falls under the region's Department of Industry, Commerce and Tourism. A team of seven to eight civil servants across different divisions serve as liaisons with the cluster initiatives. The number of dedicated staff is expected to double over the next couple of years. Their duties are conceived in the context of an organisational matrix. They ensure that all the meetings of a cluster are attended by the same person, and that all the meetings on a particular horizontal common theme across clusters are attended by the same person (internationalisation, technology and quality/ excellence in management). As a result, there is very active contact between the cluster initiatives and civil servants. Other ministries may get involved in promoting clusters directly, such as the Ministries of Transport and Health.

Founded in 1981, the *Sociedad para la Promoción y Reconversión Industrial* (SPRI) is also an important actor in the Basque Country. SPRI is the umbrella for a group of firms that seek to support technology projects through from the birth of an idea to its commercialisation using technology parks, venture capital funds and innovation centres, among other means. The agency is assigned to the Department of Industry, Commerce and Tourism of the Basque

Figure 17.1. **Organisational chart: Spain (Basque Country)**



Government. Its operative structure is defined based on industrial policy priorities, which are currently: innovation, internationalisation, industrial development and information society.

At the national level, leading ministries working on innovation issues include, since 2004, the Ministry of Education and Science and the Ministry of Industry, Tourism and Trade. Fiscal incentives for R&D are designed by the Ministry of Economy and Finance. There is a goal to revive an inter-ministerial Commission on Science and Technology that helps to co-ordinate innovation policies across the central level ministries. The Scientific Policy General Council seeks to co-ordinate across regions their policies in the matter of science.

Institutional frameworks and regional development policy

Spain has increasingly decentralised responsibility and taxing authority to its regions, including several policy areas related to competitiveness and the business environment. For example, a constitutional jury has ruled that innovation is a matter for regional governments while R&D is a matter for national governments but with a goal of effectively co-ordinating with the regions. The Basque Country has nearly exclusive domain over education, health, culture and housing. While the central government took the lead in industrial policy until the 1990s, a high degree of regional autonomy now exists with respect to industrial policy, transport and communications. The funds for some of these policies are financed by an Economic Agreement with

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1

the central government (Aranguren *et al.*, 2003). Within the Basque Country, there are three historical provinces that have certain policy mandates and taxing authority.

Role of programme in the context of science and technology (or innovation) policy

The Basque Government has had several important regional plans to support its technology policy. The Industrial Technology Plan 1993-96, was succeeded by the Science and Technology Plan 1997-2000. This plan took into account the cluster-specific technology plans developed as part of the industrial policy Competitiveness (cluster) programme. The 2001-04 Plan (BSTP 2000), part of the EU Fourth Framework programmes, worked to encourage a systems approach (regional innovation system) among the firm, university and government sectors via the Basque Technology Network and a greater participation of firms in the governance of technology centres. Other goals included focusing more on demand driven services and ensuring greater information on the supply of services. This 2001-04 plan also included input from cluster-specific technology plans.

Institutional supports for these plans include technology networks and parks. The Basque Technology Network includes ten technology centres, four universities, four sectoral research centres, 13 R&D business units, four research laboratories, two public research organisations and 14 intermediary innovation organisations. There are three technology parks that account for approximately 35% of Basque firm R&D spending. In the Basque Country, the technology centres tend to be more R&D rather than service oriented. There are other institutions to support firms including the Basque Quality Foundation and the Basque Council for Science, Technology and Innovation. This Council is designed to promote discussion among different stakeholders. There is also an interdepartmental Commission of Science and Technology with representatives from across all of the Government Departments. The Business Innovation Centres and four universities also are involved in meetings to support the regional innovation system.

At the national level, Spain's National R&D and Innovation Plan for 2004-07 seeks to better plan nationally financed programmes as well as facilitate greater co-operation and co-ordination among the regions. This plan serves to address weakness in the national innovation system, including the lack of common strategic framework of both the central and regional levels (EC, 2005).

Role of programme in the context of industrial policy

Through the mid-1980s, the region's industrial policies were focused on reconverting mature and declining sectors that had large levels of employment and included many state-owned firms. During the late 1980s and the 1990s, the region's industrial policy promoted the development of several institutions to improve firm and regional competitiveness. Technology policy at the regional level expanded in the 1980s with a strong focus on high technology and included several programmes for high-technology applications to local firms. It was also at this time that the system of technology parks grew in prominence and was successful, albeit remaining somewhat as enclaves. The focus exclusively on mature industries gave way to a goal of industrial diversification through a supportive environment for the growth of newer activities (Torres and Lagendijk, 2000).

The Competitiveness programme was introduced in the region's 1991-95 Industry Policy plan along with nine other priorities. A subsequent Industrial Plan for 1996-99 was focused on improving co-operation among firms and between government and industry. At this phase, cluster associations were asked to develop their first plans and to have the formal committees on the cross-cutting themes for each cluster. The 2000-03 Industrial Policy Plan integrated other areas and was designed to align activities at the regional and provincial (sub-regional) level. It was in this stage that: *a)* cluster agreements became annual and included Strategic Action Plans per each of the three horizontal themes; *b)* support would be limited financing; and *c)* the government developed the organisational matrix of civil servants to work with clusters (Ahedo Santisteban, 2006). During this phase they rethought the programme to focus more on strategic challenges. Another serious policy reflection took place in 2004.

While the Competitiveness programme remains only one component of the industrial policy, it covers firms responsible for approximately 80% of manufacturing GDP and 30-40% of overall GDP for the region. Support has been less prominent than other innovation and R&D policies. The goal for the programme is to go deeper and wider by working with a few more clusters and strengthening the relationships with (and within) each cluster. Going forward, the Basque Government is working on an overall Competitiveness Plan expected to be enacted in the summer of 2006. This approach will be more comprehensive than the prior industrial policy plans given its multi-sectoral orientation.

Cluster studies conducted

The 1991 Monitor study identified a series of clusters based on a multi-stage process. First using industry data, 50 clusters were identified to have a potential for competitiveness at an international scale. The list was then refined based on a series of additional criteria including their weight in the economy, linkages, nature of competitive advantage and costs to improve over the short and long term, etc. Finally, the results by industry were classified into specific clusters. The study identified six clusters with the strongest potential and another five with clear potential. The government sponsored public/private dialogue that followed the study identified nine clusters using other criteria, which included only three overlapping between the Monitor and Basque selected clusters.

3. Details on programme budget and timeframe

Overall annual spending on the programme ranged over the last few years from EUR 2 to 2.4 million per year, which is approx. EUR 180 000 to 220 000 per year per cluster (maximum of EUR 240 000). On 28 November 2000, the current structure for the cluster programme was enacted with an annual call for proposals regarding funding. Given the focus on engaging actors (intensifying communication and interaction among members), the approach is to have a modest cash outlay but to devote time and energy in support of a catalytic function.

Cluster projects may be grant funded for a portion of eligible costs. Internal cluster initiative costs are reimbursed at 60% and external costs at 50%. Firms finance the rest. Cluster initiatives may also receive funding from other Basque Country programs for specific projects, such as technology centre linked projects (in that case reimbursements may go as high as 90%).

4. Targets and scope

Targets and selection criteria

The targets are sectors of importance to the Basque Country, but not only in terms of weight in the economy. Given the large manufacturing base, this implies that many of the cluster sectors are restructuring in the context of globalisation but that there is a potential for growth. The second set of clusters also sought to strengthen economic diversification away from declining manufacturing fields (see Annex 17.A1 for a listing of clusters). The Department of Transportation is creating the transport and logistics cluster initiative and the Department of Health is considering supporting a cluster in that sector. A formal tourism cluster initiative is also being formed. The result of these multiple phases of selection has been two types of cluster configurations, vertical (sector) and horizontal (cross-cutting theme) forms.

Cluster selection process

The clusters have been selected over time through public/private dialogue following a cluster mapping exercise by Porter's consulting firm Monitor. The dialogue included work groups of firm leaders, business leaders and other stakeholders. Given their different approaches, only three of the clusters on the Porter list were chosen, along with five additional clusters selected by the Competitiveness programme. The initial selection was criticised for being secretive and top-down which led to the addition of newer sectors such as telecom and energy (Torres and Lagendijk, 2000).

Upon being identified, firms were responsible for deciding if they would go forward as a formal cluster. Interestingly, one cluster that was identified had originally declined to participate in the first round of selection but later sought and received priority cluster designation. Clusters benefited from facilitators and working groups were required to use a common approach to launching activities. They had to prioritise options, define a plan of action, and develop an overall strategic plan that, upon negotiation/approval with the Basque Government, served as a basis for the accords between the government and the cluster. Clusters that now present themselves may have self-identified and, if convincing, become part of the cluster programme. The cluster initiatives being promoted by the Transport and Health departments will fall under a different selection mechanism.

Cluster participants in most clusters may or may not have been formally linked before, however the industrial landscape is characterised by firm co-operation generally. Two cluster initiatives had already been involved in a common industry association that was absorbed into the cluster program.

Number of cluster participants

No cluster association has more than 200 members or represents more than 25 000 jobs. As illustrated in the Annex 17.A1, for the first 11 clusters the number of firms in each cluster initiative range from 13 to 160 (four with fewer than 50 firms, three with between 50-100 firms and four with over 100 firms). While the civil servants are in active contact with clusters, the public sector is not a member of the associations, nor are other local stakeholders. The cluster initiatives interact formally with other stakeholders such as educational institutions and technology centres but they do not play an official role in the governance of the clusters. The clusters tend to be composed of SMEs. The Aeronautics sector does have a large firm subgroup and SME firm subgroup but over time they have found opportunities for common action.

Cluster institutional status, governance and linkages

Clusters are private, non-profit entities. Governance typically involves a General Assembly of association members, a Board of Directors, and a small staff typically of two to three people. There are a couple of initiatives that also serve as a sectoral association that may have additional staff for other purposes. The clusters share a set of common work groups that cover the three themes of internationalisation, quality/excellence in management and technology. The government preferred that clusters be open to all related firms, but many associations are restrictive about membership with a goal of greater efficiency and efficacy. Nevertheless, they are required to engage in projects that could produce benefits to the cluster, regardless of membership.

The Basque Country has promoted cluster knowledge sharing through its civil servant liaisons. The matrix approach requires that the same person attend meetings across all cluster initiatives on the same cross-cutting themes.

There have also been concrete inter-cluster collaborative projects, such as "electronics for the automotive sector", "automotive sector-machine-tool" and "energy-environment".

Administrative boundaries

The clusters served are not constrained to any sub-regional districts. Trans-national co-operation is not a focus of the programme.

5. Instruments

The instruments promoted by the Competitiveness programme are centred on engaging actors and promoting strategic planning and competitiveness assessments for the clusters. They may as a cluster pursue projects sponsored by other departments or agencies that offer additional instruments, such as those related to technology.

- *Identification and benchmarking:* This, along with engaging actors, is one of the core sets of instruments. The focus is on the competitiveness challenges of a particular sector.
- *Engagement of actors:* The programme seeks to use cluster initiatives and a strong co-operation with the public sector to engage actors not only within a particular cluster but also across clusters on key themes. Starting in 2001, cluster initiatives have had to submit strategic plans with explicit attention to three horizontal themes. As a result of their collaboration, several clusters have created an Export Consortia as well as inter-cluster projects.
- *Government service delivery:* The designation as a priority cluster may promote greater support by other public and private entities. For example, the region's technology plans include input from the cluster-specific technology plans which has also reoriented technology centres to be more focused on priority clusters.
- *Skilled HR:* Some of the clusters may be involved to a greater or lesser extent in sector specific training programmes but these are not instruments typically funded by the programme directly.
- *Entrepreneurship and innovation:* The programme is not designed to explicitly support the creation of new firms. The strategic plans for the clusters and their horizontal theme groups may highlight innovation needs for the cluster. Collaboration may occur with Basque technology centres on a case-by-case basis. The programme is not designed to fund directly significant innovation projects.
- *Resource allocation and investment (including branding):* The designation as a priority cluster may promote greater support by other public and private entities but this is not an explicit component of the programme.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

Annual reporting serves as a measure of progress towards established plans, with a focus on the cluster progress towards goals and cluster economic, as opposed to organisational, performance. Indicators of success as viewed by the Basque Government include intangible results such as confidence among agents, public/private collaboration, collaboration among competitors and a strategic cluster orientation. Tangible results noted by the programme staff include the creation of various export consortia and technology projects across clusters as well as on-going tracking of sectoral and export data.

Results of evaluations, if any

There is no evaluation of the impact of cluster activities and their impact. However, one evaluation using a European Foundation for Quality Management (EFQM) model noted positive results, with larger companies serving as a positive influence on smaller firms.

The Basque Country views this programme as a modest policy in the overall picture but important in terms of increasing co-operation. It is also highly convenient because the government can reach almost half of the Basque Country industry through an email to 12 cluster initiatives.

Bibliography

Ahedo Santisteban, Manu (2006), "Business Systems and Cluster Policies in the Basque Country and Catalonia (1990-2004)", *European Urban and Regional Studies*, Vol. 13, No. 1, pp. 25-39.

Aranguren, Mari Jose *et al.* (2003), "Cluster *versus* spatial network supporting policies: learning from experiences in the Basque Country", Presentation to the Workshop on clusters and spatial networks, Universidad Rovira I Virgili (Reus).

Aranguren, Mari Jose and Itziar Navarro (2003), "*La política de clusters en la Comunidad Autonoma del País Vasco: una primera valoración*" (Cluster Policy in the Basque Country: a First Assessment), *Ekonomiaz*, 53 (2 Cuatrimestre).

Esteban, Juan Manuel (2005), "Basque Country Cluster Policy: A brief outlook", Presented in Brussels, Belgium, October 2005.

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Spain 2004-2005.*

Poncela, Maria (2006), Presentation at the conference *Innovation and Regional Development* sponsored by the OECD, EU Erik Network and the Tuscany Region, Florence, Italy, November 2004.

Porter, Michael (2002), "Basque Competitiveness", PowerPoint presented in Bilbao Spain, 18 April 2002.

Taylor, Sandra and Philip Raines (2001), "Learning to Let Go: The Role of the Public Sector in Cluster Building in the Basque Country and Scotland", Regional Industrial Policy Research Paper #48, European Policies Research Centre, University of Strathclyde, September.

Torres, K. and Arnoud Lagendijk (2000), "Industrial policy in the Basque Country", in A. Giunta *et al.* edition, *Restructuring Industry and Territory: the Experience of Europe's Regions TSP*, London, pp. 143-161.

ANNEX 17.A1

Table 17.A1.1. **Cluster associations in Spain (Basque Country)**

Sector (Association Name)	Year began	No. of firms	Jobs	Turnover (M EUR)/ % sales in exports	Description
Household appliances (ACEDE)	1992	13	9 200	1 430 45%	Includes final producers and specialised component suppliers. One firm has a 35% market share in Spain
Machine tools (AFM)	1992 (1946)	68	4 602	612 64%	National-state-level industrial sector association, has the task of co-ordinating and stimulating the field, (85% of the sector is in the Basque country)
Automotive (ACICAE)	1993	49	15 560	2 243 60%	Relevant automotive suppliers to stimulate the whole automotive cluster of approx. 300 SME component suppliers, contributing 10% of Basque GDP
Bilbao Port (Uniport)	1994	138	4 300	839 n.a.	The existing associational body has integrated the different firms, organisations and institutions involved in the activities of Bilbao harbour and become the co-ordination organisation of the Bilbao Port cluster
Telecommunications (Gaia)	1994 Gaiai (1983 AIEPV)	160	8 000	1 600 34%	The existing association AIEPV had the task of organising the cluster and more recently with the name Gaia it has worked as the telecommunications cluster within the cluster policy, and as the association of the electronic and information technologies of the Basque Country
Eco-industry (ACLIMA)	1995	64	2 888	695 19%	Working to structure the emerging environment industry (mainly, service and engineering consultancy firms) both socially and institutionally
Management knowledge	1996	160	n.a.	n.a.	Due to the lagging association of Basque engineering and consultancy firms, some consultancy firms and private business schools created this association with heterogeneous members

Table 17.A1.1. **Cluster associations in Spain (Basque Country)** *(cont.)*

Sector (Association Name)	Year began	No. of firms	Jobs	Turnover (M EUR)/ % sales in exports	Description
Energy	1996	76	25 000	10 000 22%	Heterogeneous members, in which Iberdrola, one of the two largest Spanish electricity producers, has occupied a central position, along with various capital-goods firms, engineering firms, etc.
Aeronautics (HEGAN)	1997	24	4 732	674 n.a.	An engineering consultancy, Sener, brought together: *a)* ITP, an engine turbine producer owned partly by Rolls Royce; and *b)* Gamesa, a plane-component producer of the IBV group and its web of SME suppliers
Shipbuilding industry (Adimde-Foro Marítímo)	1997	116	14 000	682 78%	4 small private ship-builders created the association of the Basque ship-building industry, integrating later about 100 individual and collective members in its long value chain, and formed a strategic institutional lobby; in 1999 the public ship-building firm Izar agreed to collaborate with ADIMDE in a Forum
Paper-pulp (Cluspapel)	1998	19	2 059	526 46%	Under the leadership of an engineering firm, Coinpasa, firms joined the association comprising 12-13 specialised capital-goods firms and 7-8 paper and pulp producers
Audiovisual	2006	n.a.	n.a.	n.a.	n.a.

Source: Ahedo Santisteban, Manu (2006), "Business Systems and Cluster Policies in the Basque Country and Catalonia (1990-2004)", *European Urban and Regional Studies*, Vol. 13, No. 1, pp. 25-39 and Esteban, Juan Manuel (2005), "Basque Country Cluster Policy: A brief outlook", Presented in Brussels, Belgium, October 2005, with updates.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 18

Sweden

This case study for Sweden discusses three programmes developed at the national level. VINNVÄXT is the leading programme of VINNOVA, the Innovation Agency, to support collaborative research with a strong potential for innovation. Visanu is a joint programme across three Swedish agencies to engage actors and promote knowledge sharing across clusters. The latest programme, sponsored by Nutek, the Swedish Agency for Economic and Regional Growth, is the Regional Cluster programme for clusters seeking to increase their international competitiveness.

1. Programme(s) and their goals

Sweden has implemented three national level cluster policy programs thus far, each with different programme goals: VINNVÄXT, Visanu and the Regional Cluster Program.

- The first programme, VINNVÄXT, seeks to support regional innovation systems to make them internationally competitive and sustainable over the long term. The goal is therefore to contribute to the development of problem-oriented research. The focus is a triple helix model of collaboration between the public, private and research/academic sectors. The programme is managed by VINNOVA, the Swedish Agency for Innovation Systems.
- The second programme, Visanu, running between 2002-05, sought to support a wider range of clusters through "soft" infrastructure (knowledge development, financial process support and international marketing) that have promise as sources of growth for a region. The programme was open to supporting a wider range of regions and clusters than VINNVÄXT. The programme was jointly managed by Nutek, VINNOVA, and the Invest in Sweden Agency.
- The Regional Cluster Program was launched at the end of 2005 through 2010 and focuses on international competitiveness and international market development initiatives. It is managed by Nutek.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Sweden is well known for being highly ranked on a number of innovation indicators and for its strong knowledge economy. However, the "Swedish Paradox" reveals that, despite very high levels of R&D spending as a per cent of GDP relative to other countries, economic growth has lagged its peers with lower levels of R&D intensity. Furthermore, key parts of the innovation system are now owned by multi-national corporations, which could change the nature of the system for the future. Sweden's innovation capacity has been characterized as relatively less efficient in the forms of innovation related to start-ups and SMEs as opposed to large firms, while SMEs are increasingly important in knowledge-driven economy models. Sweden also has a low rate

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

of entrepreneurship as a result of institutional barriers to small business start-ups and an industrial composition where the key sectors gravitate around large firms.

Historical development/evolution – where the programme came from in the context of other policies

Local and regional level governments of Sweden were the first to promote cluster policies, while national level involvement started after 2000. In fact, municipalities have sponsored a number of well-known cluster initiatives and sector-specific science parks such Kista. It was felt, however, that national level policies were too fragmented by the multiple "stovepipes" coming from the different ministries and their respective agencies. Nutek had, for many years, managed a number of network programs for technology transfer and business development. The Invest in Sweden Agency (ISA) used a cluster perspective in developing strategies for international marketing of regions. In 2001, the newly established agency VINNOVA, with the mission to promote sustainable growth by developing effective innovation systems and funding problem-oriented research, initiated VINNVÄXT to develop regional innovation systems.

Based on a proposition from the Ministry of Industry, Employment and Education in late 2001, a national program for development of cluster and innovation systems was proposed to address this fragmentation. The three agencies ISA, Nutek and VINNOVA were asked to develop a joint program from 2002-05. In parallel, regions were asked to include cluster and innovation systems as part of their regional growth programs (RTPs).

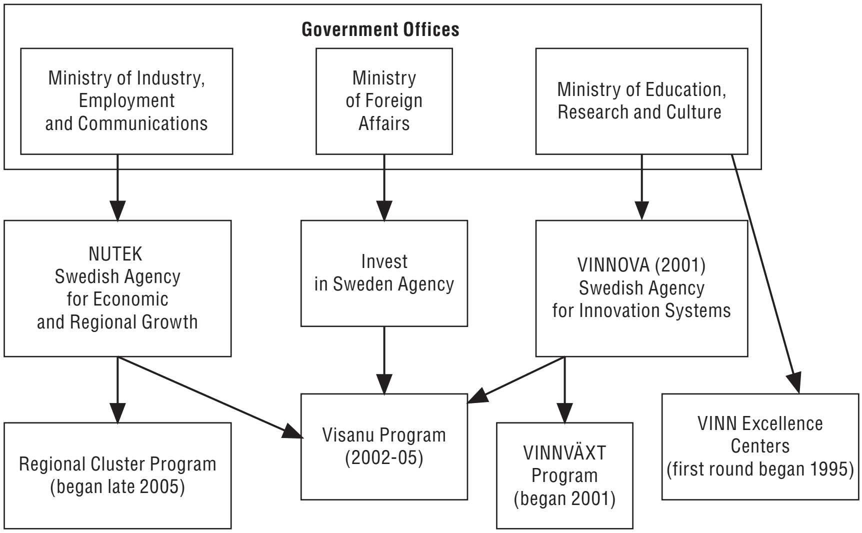
After an extensive period of program development, Visanu was launched in 2003. The program focused on clusters identified by RTPs, and was therefore consistent with regional planning goals. It was felt by certain national actors that in the past, Sweden had already made considerable investments in "hard" investments such as universities, incubators and roads, therefore Visanu would focus on the "soft" investments. The greater complexity of large urban areas made it more difficult for projects in the Stockholm and West Gotia regions to be selected under VINNVÄXT given the importance of regional consensus on priority sectors to the selection process. Therefore, Visanu directed a considerable amount of process support to clusters and innovation systems in these urban areas.

Based on experience from VINNVÄXT and Visanu, Nutek launched the Regional Cluster Program in late 2005.

Description of programme's place in governance framework

The VINNVÄXT program is an initiative of VINNOVA, the Agency for Innovation Systems. This agency is under the Ministry of Education, Research

Figure 18.1. **Organisational chart: Sweden**



and Culture. The programme is focused on supporting problem-oriented research, using a triple helix model to promote innovation. The program was organised as a competition, with a strong focus on research. The first two generations of the program focused on well-established initiatives with a high level of R&D, while the third generation is directed to regional innovation systems in early stages.

The Visanu program was implemented by three agencies, each reporting to a separate ministry as illustrated above. For practical reasons, the budget was administrated by Nutek, but all three agencies were involved in planning and implementation. For example, the three General Directors had regular meetings and personnel from all agencies were part of the steering committee and the working groups. The process support and knowledge development components were mainly administrated by Nutek with support from VINNNOVA, while international marketing was led by ISA.

The orientation of the Visanu program is therefore a bit broader than VINNVÄXT and covers the areas addressed by all three agencies given their respective missions of regional development, foreign investment and innovation systems. Between the two programmes, there is a strong link on several aspects such as personnel, exchange of experience and financing. For example, several persons have been involved in the selection procedure of VINNVÄXT and Visanu and several joint activities have been arranged such as reports and seminars. Both programs have also used consultants and researchers from Dahmén Institute (a spin-off from VINNVÄXT) and four Centres of Excellence on Research on Innovation Systems (with funding from VINNOVA) for interactive research.

There is also a strong link between VINNVÄXT, Visanu and the new Regional Cluster Program in terms of joint development projects and exchange of personnel.

Institutional frameworks and regional development policy

Prior to the late 1990s, the Swedish regional approach was much more focused on equalisation policies to support lagging and sparsely populated regions. The current strategy has both devolved more responsibility to the regions for developing their own strategies and been more explicit in supporting regional growth generally, as opposed to in specific regions only. Therefore, in 2001, the central government launched a regional growth initiative that required regions to develop regional growth programmes. The first iteration of these plans, known as regional growth agreements or RTAs, were rather open ended with regards to their performance outcomes and were therefore considered vague.

In a second iteration that started in 2004, the regional growth programs, known as RTPs, are used to assess areas needing structural impact to create growth as well as areas for increasing added value through collaboration across different sectors. The RTP must follow precise guidelines, the central government must approve the plans, and the results are to be used to more effectively to channel resources to the priority areas. Although the instructions for an RTP are more detailed, the RTP itself is not mandatory. Categories for national funding via the RTP include: regional competency and labour supply, cluster and innovation system, regional attractiveness, entrepreneurship/business development/business climate and infrastructure. Evaluations by external reviewers are required for the RTPs.

It should be noted that in Sweden, regional governments (21 counties) are much weaker than the central and municipal level in terms of political power, strategic capabilities and finance. County expenses are mainly related to health care. Therefore, the regional governance is a challenge for the effective implementation of regional level planning and development (OECD, 2006).

Role of programme in the context of science and technology (or innovation) policy

Sweden has a long history of strong support for science and technology; however the concept of innovation policy came into being after 2000. Traditional support has been through education, R&D policy and even industrial policy support of science/technology-oriented national champion firms. In 2000 the R&D co-ordination responsibilities were assigned to the Education Ministry. In 2001 Sweden created VINNOVA to direct sectoral focused problem-oriented research that combines both scientific and strategic needs of Sweden. As a flagship programme of VINNOVA, VINNVÄXT is integral to the country's innovation approach. The Visanu program is a joint program with VINNOVA, but is not a core programme of the innovation policy. In 2004, Sweden developed a national strategy entitled Innovative Sweden through its new Innovation Policy Council. The strategy born from both the Ministry of Education and the Ministry of Industry seeks to develop an innovative social climate through four categories of actions: a knowledge base for innovation, innovative trade and industry, innovative public investment and innovative people.

Another important element of Sweden's STP policy includes the Centres of Expertise. The first ten-year round from 1995-2005 went to 30 centres (now 28 centres located in eight universities). The selection process elicited a strong response, as initially 300 centres applied. In 2003 another round was proposed under the new title of VINN Excellence Centres. Four new centres (including the areas of transport and working life) were financed. A new call for proposals aims to establish 15 VINN Excellence related to VINNOVA'S target areas.

Role of programme in the context of industrial policy

Industrial policy, previously focused on developing Sweden as a nation for manufacturing exports, is now more closely linked to innovation policy and broad sectoral policies. The Innovative Policy Council, for example, is led by the Ministry of Industry. As part of national industrial policy in the context of the Innovative Sweden strategy, Sweden has selected six key sectors for sectoral strategy plans to be developed through national dialogues or *Branschsamtal*. This 2005-08 program involves government, industry and labour unions in a dialogue for the following sectors: automotive, aviation and space, life science (pharmaceuticals and biotech), ICT, mining and metal, and tree and pulp. The cluster programs have included initiatives in these key sectors of the national industrial strategy but their selection for both VINNVÄXT and Visanu predated the dialogue. This programme builds on a prior round of public/private dialogue known as *Tillväxtsamtal* that focused in 2003-04 on matters relevant to industry in general, such as taxes, employee sick leave and business moral.

Cluster studies conducted

In 2003, a quantitative study on clusters in Sweden, using a methodology developed by Michael Porter, was presented as part of the planning process of Visanu. The results identified a total of 38 clusters, measured by an agglomeration coefficient greater than 0. In total, these clusters accounted for 37% of national employment. The rest of the labour force was involved in what is termed local employment (56%), public administration (5%) or natural resource-driven employment (2%). Clusters had to meet two sets of criteria. Criterion A of absolute importance was determined by: *a)* a minimum of 15% of the cluster's workforce; *b)* a minimum of 1 000 employees; and *c)* a minimum of two work sites. Criterion B of relative importance was determined by: *a)* a minimum location quotient of 5 (region's share of a cluster's workforce divided by the region's share of the total national workforce); *b)* a minimum of 100 employees; and *c)* a minimum of two work sites. The criticism against this methodology was that it presents agglomerations of companies that are not necessarily organised in cluster initiatives.

In parallel, a qualitative study of networks, clusters and innovation systems on the regional level was undertaken by Visanu. The study was based on a survey to representatives of the RTP and a compilation of on-going activities, such as sector studies of ISA and VINNVÄXT initiatives. Overall, this resulted in a list of more than 250 regional initiatives. The list was used in the Visanu dialogue with regional RTP representatives for prioritising between regional initiatives. A follow-up study in 2005 gave a similar result.

3. Details on programme budget and timeframe

VINNVÄXT is a program that provides grant funding to recipients over a ten-year period (initial round 2003 to 2013, second round 2004 to 2014, third round 2005-08/2006 to 2016). The first round consisted of two phases. First, a limited planning grant to 25 of more than 150 applicants, second, full funding of three projects and a more limited grant to an additional seven initiatives out of 50 applicants. The second round resulted in five additional projects out of 23 applicants. Applicants may receive up to EUR 1.1 million per year over the ten years. The EUR 65 million allocated to the first two rounds (each with a maximum of ten-year funding for a total of eight projects) are going to be matched with regional funding of the same amount.

The third round is expected to allocate additional funds but for only a two-year period at first. In the first phase, ten initiatives out of 86 applicants received a limited planning grant (SEK 100 000 or approx. EUR 11 000). In the second phase, a maximum of five initiatives will be selected for a two-year support. After that, two initiatives may be upgraded to regular VINNVÄXT funding. A minimum of 50% of the budget is to be used for R&D. Other eligible expenses are organisational development and process management, mobilisation, competence supply, brand creation, strategic work and follow-up. All VINNVÄXT funding requires at least a 50% regional co-financing.

Visanu funding was EUR 7.5 million for three years (2002-05) from the national government allocated to process support (EUR 3 million), knowledge development (EUR 1.5 million), inward investment (EUR 1 million) and support activities (EUR 2 million). The 30 clusters benefiting from process support received an average of EUR 33 000 per cluster per year in national public grant funds. Process support was mainly used for process management and joint business development activities, such as commercial co-operation, education and competence development, development of new products and processes, cluster expansion, networking, analysis and lobbying. A 50% regional co-financing was required. Clusters may have received additional support if they participated in the other funded activity areas.

The Regional Cluster Program is a six-year program with a total budget of EUR 7.5 million. A regional co-funding of 50% on process support is required. In total, 80% of funding is directed to initiatives having participated in Visanu. The remaining 20% are to be directed to new or less-developed initiatives. The funding is to support market-related process support, development of business plans or competitive analysis, participation in EU programmes and development of knowledge and methods.

Spending on related programmes

There are several areas of spending with which the Visanu, VINNVÄXT and Regional Cluster programme budgets could be compared. The Ministry of Industry's regional development budget totalled SEK 3.3 billion in 2006 (approximately EUR 350 million). National public sector R&D (2005 data) totalled EUR 2.7 billion (EC, 2005). The national budgets of sponsoring agencies include Nutek EUR 50 million and VINNOVA EUR 150 million. Table 18.1 provides additional comparisons.

Table 18.1. **Spending on business policy and related economic development: Sweden**

	SEK millions	EUR millions
Business policy	1 970	211
Research policy	1 142	122
International trade, export and inward investment	488	52
Total 24 Business policy	**3 600**	**385**
General regional dev.	1 461	156
EU, regional funds	1 132	121
Transportation subsidiary	404	43
Reorganisation of military regions	300	32
Rural area loan	99	11
Rural development agency	26	3
Total 19 Regional development policy	**3 422**	**366**
Start-ups	848	91
Total 13 Labour market	**848**	**91**
Total	**7 870**	**842**

Source: Government of Sweden (Government Bill 2005/06:1, expense categories 13, 19 and 24).

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

In the first ten-year round (1995-2005), the 28 VINN Excellence Centres received on average EUR 1.6 million per year, EUR 575 000 from VINNOVA or the Swedish Energy Agency, EUR 575 000 from the university and EUR 650 000 from industrial partners. In the next round, the four new VINN Excellence Centres received a budget of approximately EUR 412 000 per year for ten years, 187 000 from VINNOVA and 225 000 from participants.

4. Targets and scope

Targets and selection criteria

The VINNVÄXT program has been using an open competitive selection process to target high growth sectors that can benefit from innovation, more so product than process innovation. In the first two rounds, the clusters selected were already developed (see Table 18.2). The third round will be focusing on clusters that are in a more embryonic form but with a strong innovation focus.

Table 18.2. **VINNVÄXT clusters: Sweden**

Topic	Region	Description
ProcessIT Innovations	Luileå/Umeå	Combining companies from the ICT sector with manufacturing companies and researchers, both in the academy and the business community (ex. mining, steel and paper industries)
Biotechnology	West of Sweden and Göteburg	Developing tools, platforms and processes for transforming research in the area of biomaterial to applications and innovations in two clusters: *a)* biomaterial and cell therapy; and *b)* treatment of cardiovascular metabolism such as diabetes, obesity and strokes
Triple Steelix	Bergslagen	Increasing competitiveness within the steel industry by co-operating in R&D of new products, services and new companies (ex. competencies in materials, steel manufacture, nanotechnology, industrial IT, environment and energy efficiency)
Fiber Optic Valley	Hudiksvall	Creation of a new centre for state-of-the-art broadband solutions by taking advantage of business networks and a close collaboration with researchers
The New Tools of Life	Linköping/Norrköping	Developing of individually designed products for best possible health. This includes new solutions for the health care sector as well as innovations in the market for health-related products
Uppsala Bio	Uppsala	Internationally recognised centre of biotechnology research with successful innovations in pharmaceuticals, diagnostics and medical technology
Food Innovation	Scania	Goal of raising the return on investment in agribusiness to create the "health food of the future" with multi-disciplinary and cross-border research
Robot Valley	Målaren lake valley	Seeking to be leader in research and development and manufacturing of industrial robots, field robotics and robotics for medical/health care

Source: www.VINNOVA.se.

Visanu's selection process was more flexible. Instead of a competitive process, Visanu used a selection process by dialogue, requiring that clusters be well-established (in most cases acknowledged in the regional growth programme), clearly company managed and have the potential to be internationally competitive. The Regional Cluster programme also used a dialogue approach to select clusters based on its selection in a regional innovation strategy or regional growth programme as well as a focus on business and market needs as reflected in a strong business plan. Please refer in the Annex 18.A1 to a map of clusters selected under the Visanu and VINNVÄXT programmes.

Cluster selection process

Since VINNVÄXT required triple helix participation for funding, all initiatives had to be supported not only by academia and business, but also by regional policy makers. This, in combination with the demand for 50% regional co-financing, resulted in an inclusion of many VINNVÄXT applicants in the regional growth programs (RTP).

In Visanu, the selection of clusters was based on a two-step dialogue: 1) a prioritisation dialogue with representatives of the regional growth programs (RTP); and 2) negotiations on specific activities with each of the cluster initiatives. In some cases, clusters were selected prior to regional dialogue – including the Stockholm biotech cluster, Kista IT-cluster and three experience industry clusters to be included in a knowledge development project on this issue. Similarly, the Regional Cluster Program used a combination of direct dialogue with regional and cluster representatives of a limited number of pre-selected initiatives before a formal application (business plan) was provided for final selection.

There is an overlap between the programs, with half of clusters selected by Visanu having already received some early stage funding from the VINNVÄXT program. The VINNVÄXT call for proposals and its significant funding had actually served to bring actors together within different clusters, and the momentum of working together was in many cases built upon to subsequently apply to Visanu, or re-apply to VINNVÄXT. The clusters in the first round of Nutek's Regional Cluster Program had all previously been part of Visanu. All three programs were primarily directed towards clusters with participants that had already some experience of co-operation, even if a formal organisation had not yet been established. Still, a number of new or re-oriented initiatives were also included.

Number of cluster participants

Based on Visanu internal compilations, 1 226 companies were involved in the 30 initiatives that received process support (for an overall average of approximately 41 firms per initiative). Among them, 52% were small companies

(1-49 employees), 15% were middle-sized companies (50-249 employees), 11% were large companies (250+ employees) and 22% were not classified. Of participating firms, 23 were foreign.

Several companies, universities and institutions are involved in each initiative within the VINNVÄXT programme with different degrees of engagement. The objective regarding number of firms and educational institutions involved varies depending on the conditions for each VINNVÄXT initiative and also the sector that is represented. For example in the Robot Valley they are working among others with "Robots everywhere" which means that they are implementing robotics in small and medium-sized companies. This project has already generated a number of new jobs. The target for the Robot Valley is 30 new products, 30 new companies and about 1 000 new jobs in a ten-year period. The initiative has already created 14 new products and 12 new companies. Another example is the initiative Fiber Optic Valley, which has already generated about 25 new companies within the initiative and sector.

Cluster institutional status, governance and linkages

Not all of the clusters supported by VINNVÄXT or Visanu had a formal governance structure prior to the call for proposal, and some never formalised their institutional status. A number of different organisational forms were applied, ranging from informal networking and non-profit associations to the establishment of centres or corporations. Please refer to Box 18.1 for an example cluster from the VINNVÄXT and Visanu programmes.

Box 18.1. **BioFuel region**

The BioFuel region had an initial network that expanded to include new actors after several "triggers", notably the VINNVÄXT call for proposals, and ultimately developed a formal structure. Although it was not selected for VINNVÄXT, it was subsequently selected in the Visanu dialogue process. The formal structure includes a non-profit association with a process manager and team, a management team and a Board as well as a limited corporation structure to which the association assigned the task of leading the development process. Government actors were therefore involved in a management group since they can not sit on the Board of companies they finance. The initiative helped bring together municipal and county actors despite some mild local tensions across administrative units. Staffing included 2.4 full-time equivalents across six individuals with seven separate working groups. The structure has continued to operate after the end of its Visanu grant.

Source: Christensen, Lars (2005a), *Formation for Collective Action: The Development of the BioFuel Region*, prepared for the VISANU programme publication 2005:10, Sweden.

Visanu placed a high priority on creating linkages across sectors and clusters. Cross-sectional cluster initiatives, such as packaging (pulp and paper, design, ICT, surface technology, etc.), were encouraged. Several cluster initiatives participated in joint knowledge development project concerning the integration of horizontal aspects, entrepreneurship in the creative industry, interactive research on cluster development, etc. A national network was also created to help cluster initiatives with skill development and experience sharing of the process managers engaged in the programme.

Administrative boundaries

Regions map to the 21 administrative counties in Sweden, although in the case of VINNVÄXT the program used functional as opposed to administrative units. There are examples of clusters that cross administrative borders that are not selected in their entirety (funding of biotech in one county but not the adjoining counties) as well as examples of initiatives that span several administrative regions (three in the case of Robot Valley).

Visanu promotes a number of other cross-cluster initiatives, such as co-operation between four manufacturing industry clusters spanning at least three counties. As an outcome of Visanu, several cluster initiatives in the packaging area initiated a National Packaging Project, run by STFI Packforsk (*www.stfi.se*), a national research institute. The project was initially co-financed by Visanu.

While the national programs have not specifically targeted any trans-national clusters, firms may be involved in such initiatives. One important trans-national cluster success, supported by the EU INTERREG program, is in the Öresund region that includes the Copenhagen metropolitan area in Denmark and the neighbouring southern Sweden. Medicon Valley is a cluster encompassing firms, universities and research institutions across both countries that is considered an internationally leading biomedical research zone. The national cluster programmes have not funded Medicon Valley.

During fall 2005, the Regional Cluster Program, run by Nutek, attempted to promote international co-operation between Swedish clusters and other European clusters by stimulating participation in various EU-projects. A limited budget for financing an application was provided. In early 2006, the Sörmland initiative biotechvalley.nu became part of a successful application, NetBioCluE.

5. Instruments

VINNVÄXT emphasises instruments that both develop the cluster around collaborative R&D projects and provide business support. The aim of the VINNVÄXT programme is to achieve efficient collaboration in each region among companies, research institutes and public organisations. The goal is to develop dynamic innovation systems in functional regions which are able to give the region international competitiveness through specific growth areas. This will be done through both strategic measures for developing an efficient innovation system and through financing of problem-oriented research and development. VINNVÄXT also comprises a number of support activities such as seminars, training/education, exchanges of experience and the extension of knowledge and research.

Visanu's ultimate objective was to create conditions for innovation systems and cluster processes and learning which strengthen sustainable growth. More specifically the goal was to help key public and private stakeholders to develop knowledge and competence about innovation systems and clusters, provide financial support for the development of process leadership and learning, and create conditions for appropriate clusters to be marketed internationally. Nutek's Regional Cluster Program instruments are designed to serve the needs of mature cluster initiatives in growth industries with a well-developed strategy (business plan) and ambitions of increased international activities.

- *Identification and benchmarking:* The national level programs do not seek to identify the clusters, rather they work with clusters that self-identified through an open application process or were identified though a regional dialogue, but were supported by their regions. In the context of both programs, the evaluation components attempt to collect data for benchmarking, albeit more with other clusters within Sweden across sectors than with clusters in similar sectors internationally. Important factors for the Visanu evaluation were growth potential, regional commitment and presence of engaged individuals.
- *Engagement of actors:* Programs emphasise the engagement of actors of these self-defined clusters. Therefore knowledge sharing among firms and other stakeholders within a cluster as well as across clusters is of primary importance. In the programmes, part of the financing was used for funding a cluster facilitator/broker (known as the process manager). This was either a public or private sector actor (*e.g.*, university employee, private consultant or County Council representative) with the mission to represent the initiative and increase co-operation among firms and other actors.
- *Government service delivery:* VINNVÄXT, Visanu and the Regional Cluster programme seek to be consistent with the Regional Growth Plans (RTP) by supporting strategic sectors identified in the plans, although RTP inclusion was not an explicit criteria in the VINNVÄXT call for proposals. This approach was used to identify focal points for government service delivery to ensure coherence between the regional and national level. The idea of doing the joint Visanu programme supported by three national agencies was also a strategic choice to overcome programme fragmentation among the agencies and to "learn" to work together despite their very different work cultures. On a

regional level, Visanu initiated several knowledge development projects on the importance of improved regional governance for managing cluster portfolio strategies.

- *Skilled HR:* This is not an explicit focus area of the financing in the three programmes. Nevertheless, more than 40% of the clusters in Visanu used part of the financing for education or competence development, including new university programs, competence centres, and seminars or workshops on specific topics.
- *Entrepreneurship and innovation:* The VINNVÄXT program promotes explicitly the effectiveness of innovation systems for particular clusters and therefore may address in certain projects issues such as start-ups, incubators or the commercialisation of innovation. Alliances have been developed with local and regional actors, including incubators and business plan competition programmes like Venture Cup. Visanu also seeks to promote innovation, however unlike the R&D-focused VINNVÄXT it emphasised engagement and learning. In some cases, investments have been made in pre-studies for developing a shared physical infrastructure, such as a laboratory, testing facility or research centre.
- *Resource allocation and investment (including branding):* Again, since the programmes work with clusters identified in regional growth plans, they serve to reinforce resource allocation at both national and regional levels. In VINNVÄXT there are internationally competitive clusters whereas in Visanu many of these clusters are less prominent internationally but important for their region. The Regional Cluster programme selects the strongest of the former Visanu participants. The Invest in Sweden Agency's role in Visanu was to support clusters in branding to attract foreign investment. Presumably the greater investments and higher selectivity of the VINNVÄXT program serve as a stronger branding mechanism.
- *Innovative activities:* A limited amount of funding in Visanu as well as in Nutek's Regional Cluster Program is directed to new or cross-sectional initiatives with an interesting growth potential but relatively limited experience of co-operation. In VINNVÄXT, the third round of calls was directed specifically to innovation systems in early phases.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

In VINNVÄXT there are very ambitious strategies for evaluation and learning including yearly assessments (monitoring) made by VINNOVA and three-year evaluations made by an international panel.

Apart from stimulating international competitiveness in clusters and innovation systems, an important objective of Visanu was to develop knowledge on clusters and innovation systems as instruments for regional development. Therefore, a number of evaluations/monitoring activities were undertaken: interactive research projects, an external monitoring report focusing on dialogue as a selection mechanism, co-operation between three national agencies and the relation between regional needs and national interest, a self-evaluation based on an e-mail survey to cluster facilitators, a compilation of data on actor participation and a summary of final reports from cluster initiatives. No external *ex post* evaluation has been decided.

Results of evaluations, if any

VINNVÄXT was designed to include regular evaluations of projects funded to determine eligibility for additional funding. The eight VINNVÄXT initiatives will be evaluated every third year. Based on the evaluation results, a decision will be made if VINNOVA will continue financing the initiative. Three first winners will soon be evaluated by an international panel. Preliminary reports within the VINNVÄXT programme have shown several results. The programme helps regions to go from words to action. It is giving a stronger role for regional politicians in issues concerning regional growth and has resulted in greater co-ordination for regional "joint" leadership with a focus on growth. The competition format has also required that regions prioritise their support with a focus on growth. Furthermore, it is leading to strategic research that is useful to firms. Participation in VINNVÄXT has also been noted to give credibility for regional initiatives.

The Visanu programme included several studies to ascertain the success factors of different clusters in their development process.

- A lot of knowledge was developed on how to develop clusters and innovation systems, including the importance of process facilitation, a combination of soft and hard infrastructures, methods for including horizontal aspects as a driving force for development, the need for regional cluster portfolio management, etc. In total seven interactive research projects, including eleven cluster initiatives, were co-financed by the programme to obtain detailed studies of these initiatives.
- According to internal data collection, more than 1 200 companies, mainly small or medium-sized, were part of the network activities of Visanu. The total process support financing to clusters and innovation systems amounted to over EUR 7 million from a EUR 3 million investment of national funds: one third from Visanu, 23% private financing (mainly in time) and 40% regional co-financing.

- The external monitoring of the program was positive both regarding the ambitions of agency co-ordination and the use of dialogue as a selection mechanism. However, the time frame was considered too short for more extensive impact from a systems perspective.
- The e-mail survey indicated that the process facilitators of the clusters were particularly positive to the combination of learning, exchange of experience, contact creation and "soft" investments in networking and process facilitation. The national funding has also been important since it contributes to increased legitimacy of the regional initiative.

Bibliography

Christensen, Lars (2005a), *Formation for Collective Action: The Development of the BioFuel Region*, prepared for the VISANU programme publication 2005:10, Sweden.

Christensen, Lars (2005b), *The Packaging Arena: The Development of an Innovative Cluster*, prepared for the VISANU programme publication 2005:11, Sweden.

Eurofutures (2005), *Dialog och samverkan för kluster och innovationssystem – erfarenheter från Visanu* (Dialogue and Co-operation for Cluster and Innovation Systems – Experiences from Visanu).

European Commission (EC) and Enterprise Directorate-General (2005), *Annual Innovation Policy Trends and Appraisal Report: Sweden 2004-2005*.

Larsen, Kristina *et al.* (2005), "Towards the Information Society: the Case of Sweden", in *Governance of Innovation Systems: Case Studies in Cross-sectoral Policy*, OECD Publications, Paris.

Lindquest, Goran *et al.*, "Swedish Clusters", Presentation dated 17 February 2003 accessed from *www.isc.hbs.edu/pdf/Swedish_Clusters_(Feb_2003).pdf*.

Nutek (*www.Nutek.se*).

Nutek (2005), *Näringspolitik – politikområde och aktörsstruktur – preliminär version* (Business policy – policy area and actor structure – preliminary version).

OECD (2003), *OECD Territorial Reviews: Öresund Denmark/Sweden*, OECD Publications, Paris.

OECD (2006), *OECD Territorial Reviews: Stockholm*, OECD Publications, Paris.

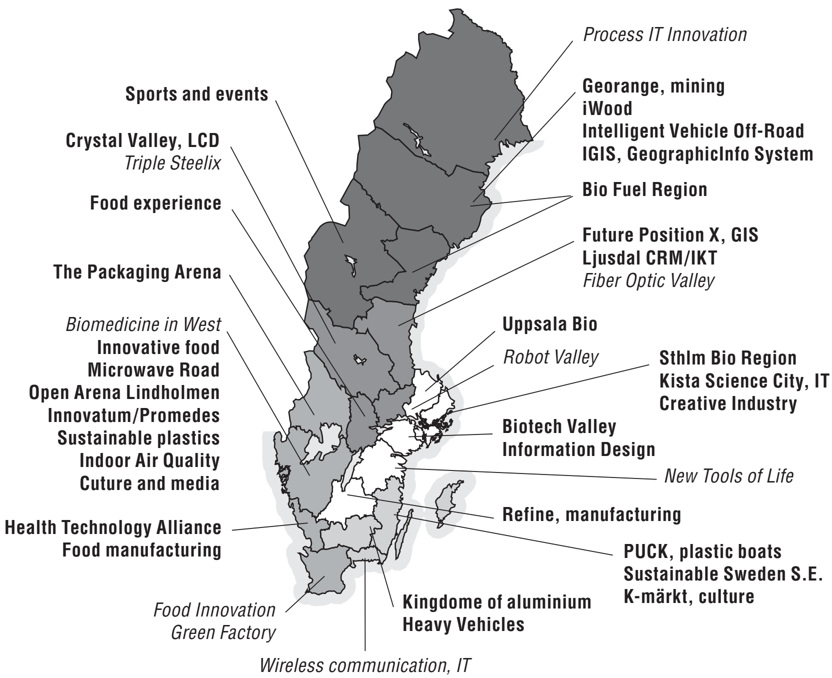
Thorsland, Jennie Granat *et al.* (2005), "The End of an Era? Governance of Swedish Innovation Policy", in *Governance of Innovation Systems: Case Studies in Innovation Policy*, OECD Publications, Paris.

VINNOVA (*www.VINNOVA.se*).

Visanu (2005), *Slutrapport för det nationella programmet för utveckling av innovationssystem och kluster* (Final Report for the National Programme for the Development of Innovation Systems and Clusters).

ANNEX 18.A1

Figure 18.A1.1. **Map of Swedish cluster programme participants**



Notes: **Bold = Visanu**, *Italic = VINNVÄXT* (except for Green Factory, which received some VINNVÄXT funding).

Source: Government of Sweden, Nutek.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 19

United Kingdom

As there is no nationally managed cluster programme per se, this case study for the United Kingdom reviews a range of cluster initiatives supported by the Department of Trade and Industry that are designed and implemented by the Regional Development Agencies (RDAs) and the Devolved Administrations (DAs). Programmes vary but have included commissioning regional mapping studies, identifying and building links with important regional clusters and using clusters as the vehicle for wider economic development initiatives.

1. Programme(s) and their goals

The United Kingdom does not have one single overarching programme to support cluster development. UK Government policy focuses on creating the conditions to encourage the formation and growth of clusters, not to artificially create them. National policies such as on innovation, skills and enterprise assist this agenda. Government funding comes in the form of generic business support, such as access to finance grants, innovation support services and capital infrastructure, such as Wet Labs and Science Parks. Specific responsibility for delivering cluster policy rests with Regional Development Agencies (RDAs) and the Devolved Administrations (DAs) of Scotland, Wales and Northern Ireland. The English regions will develop and prioritise strategies for clusters, as part of their Regional Economic Strategy. Finance for the English regions comes from a Single Programme combining funds from central government departments including the Department of Trade and Industry (DTI); the Department for Communities and Local Government; the Department for Education and Skills; and the Department for Environment Food and Rural Affairs.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an impact on cluster development

Although the United Kingdom stands ahead of many member countries on labour productivity, it ranks below its major competitors such as the United States, Germany and France. It has become a priority for the government to boost productivity by addressing the weakness in innovation, skills and infrastructure (OECD, 2005).

Historical development/evolution: where the programmes came from

Clusters were initially identified as an important area of economic development in the December 1998 Competitiveness White Paper. Having led a full examination into the Biotechnology Clusters, it was found that many of the identified issues also arose in other sectors.

As a result, a high-level Clusters Policy Steering Group, led by Lord Sainsbury, was set up to identify barriers to cluster development and recommend appropriate new policy initiatives to Cabinet. This Group, along with a cross-Whitehall officials group, ran between late 1999 and early 2003. The work of both groups was informed by a mapping of existing cluster activity, published in February 2001.

At the same time, a joint DTI and DfEE (Department for Education and Employment) White Paper entitled "Opportunity for All In a World of Change" (the follow up to a 1998 White Paper) recognised the key role cluster development could have on the regional economy. It encouraged Regional Development Agencies (RDAs) to develop existing and embryonic clusters in their region, building on their natural capabilities.

Distribution of roles between the national and regional levels

The process of consultation culminated in the decision that government policy should focus on creating the conditions to encourage the formation and growth of clusters, not to artificially create them. It was also decided that responsibility for taking forward the strategic aspects of cluster policy development would rest with the RDAs and DAs.

Regional development agencies were created to design and manage regional economic strategies, to foster competitiveness (a key issue for the Treasury which had noted that underperformance of some regions, particularly in the north of England, constituted a major drag on national GDP), to lead regeneration projects and to deal with regional employment. Funding was initially directly provided by central government – in most cases between GBP 40 and 100 million, GBP 176 million was the maximum – on the basis of three-year plans approved by the Secretary of State for Trade and Industry. As such, the Regional Development Agencies were regional institutions that were closely linked to and strongly associated with central government.

The Regional Development Agencies are funded by six government departments. Following the Spending Review 2004, the planned contributions are shown in Table 19.1.

Table 19.1. **Funding sources of UK Regional Development Agencies**

Millions GBP

	2004-5	2005-6	2006-7	2007-8
Trade and industry	234	463	476	483
Office of Deputy Prime Minister	1 511	1 568	1 633	1 676
Environment food and rural affairs	46	72	73	74
Education and skills	42	43	44	45
Trade and investment (UKTI)	13	13	13	13
Culture media and sport	2	6	6	6
Total	**1 847**	**2 163**	**2 244**	**2 297**

Source: Government of the United Kingdom (HM Treasury), 2004.

Beginning with modest powers and budgets, Regional Development Agency responsibilities have been gradually increased. In April 2005 they were granted new responsibilities including the management of the Business Links Service, the development of Regional Skills Partnerships, and an increased role in supporting business-university collaboration.

The RDA's work in this area is linked through the DTI-RDA Cluster Liaison Group and various groups which bring together cluster initiatives in the same sector in different regions. For example, the North West Development Agency (NWDA) works closely with Yorkshire Forward and ONE NorthEast through the Northern Way initiative. This includes a workstream focused on cluster development under which several joint projects in chemicals, food and drink and advanced engineering have been developed.

Role of the programmes in the context of science and technology (or innovation) policies

At a national policy level a number of cross-cutting areas have an effect on cluster development. The most critical relate to innovation and skills. The DTI's 2003 Innovation Review identified access to networks and sources of new knowledge as two of the most important determinants of business innovation performance. Because innovation is a complex process, success relies on the coming together of a variety of players, such as suppliers, customers, other firms, universities, research and technology organisations and other intermediaries. Together these players form part of the knowledge transfer system. Many businesses may not make the most of their potential for innovation and often this can be attributed to a lack of awareness and access to the latest technological knowledge and breakthroughs.

The most successful clusters will be those that excel at generating and disseminating knowledge and exploiting it commercially. The UK is encouraging higher education institutes (HEIs) to play a more active role in the business world, primarily through the work of the Office of Science and Innovation (OSI) which is responsible for knowledge transfer/exploitation funding programmes. This is done through the Technology Programme, which provides funding to facilitate further investment in science, engineering and technology with the active participation of business and industry. The Technology Programme is made up of two products: Collaborative Research and Development and Knowledge Transfer Networks (KTNS).

- *Collaborative Research and Development:* The objective of Collaborative Research and Development is to assist the industry and research communities to work together on Research and Development projects in strategically important areas of science, engineering and technology, from which successful new products, processes and services can emerge. It also primes the flow of the

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

latest knowledge and thinking from the UK's science, engineering and technology base to business. Collaborative Research and Development projects must involve two or more collaborators, at least one of which is from industry. The Technology Programme supports three categories of research: pure or oriented basic research, applied research and experimental development.

- *Knowledge Transfer Networks:* are single national over-arching networks in a specific field of technology or business application. It brings together a variety of organisations, such as businesses (suppliers and customers), universities, research and technology organisations, the finance community and other intermediaries who will provide a range of activities and initiatives to enable the exchange of knowledge and stimulation of innovation within this community.

In July 2004, the government published the "Science and Innovation Investment 2004-14" which set out the key targets for science and innovation policy to improve the situation. The main objectives were:

- Raise total UK R&D spending to 2.5% of GDP by 2014, with business R&D rising to 1.7% of GDP.
- Develop stronger knowledge transfer and exploitation of research.
- Position the United Kingdom as an acknowledged leader on science and innovation issues.
- Mainstream science and innovation in decisions across government.

An update of the strategy in 2006 envisaged a much enhanced role for the Technology Strategy Board – a private sector led consultative body set up in 2004 – giving it a lead role in identifying areas for investment and an operating structure independent from the DTI. A full review of current policy, led by the former Industry Minister Lord Sainsbury, will report to the government in mid-2007.

Role of the programmes in the context of skills and education policies

The existence of a strong skills base is critical for the success of a cluster. The UK Government works with employers and individuals to address the demands of business, in particular, by providing support through Learndirect; Learning and Skills Councils; and the Skills for Business Network. Cross-government commitments to the skills agenda are set out in the White Paper entitled "Skills: Getting on in business, getting on at work", published March 2005.

3. Details on programme budgets and timeframes

Two of the main areas of focus of the activities of the RDA are supporting business excellence and promoting innovation. The RDAs allocate resources

Table 19.2. **Budgets for UK Regional Development Agencies**
Millions GBP

Total RDA allocations by region	2005-06	2006-07	2007-08
Advantage West Midlands	272	284	291
East of England Development Agency	129	134	138
East Midlands Development Agency	156	163	167
London Development Agency	373	391	400
North West Development Agency	382	400	409
One North East	240	251	258
South East England Development Agency	157	163	167
South West of England Development Agency	153	159	164
Yorkshire Forward	295	310	316
Total	**2 157**	**2 256**	**2 309**

Source: Government of the United Kingdom (Department of Trade and Industry), 2005.

from the overall budgets shown in Table 19.2 to achieve specific targets in these two fields. Cluster initiatives were promoted by the DTI as one key instrument that the RDAs could use in this regard.

To assist local policy makers, in April 2004 a Practical Guide to Cluster Development was published. It draws on analysis and evaluation material, setting out the critical success factors that can help clusters to flourish. The report provides advice on how to design and measure a cluster strategy and gives examples of the type of interventions that can encourage the successful development of clusters. Nonetheless, the approaches, priority clusters and funding levels vary from region to region.

4. Targets and scope

The following are some specific examples of how the overall framework has given rise to practical cluster initiatives. They show how the DTI-RDA structure has encouraged very different initiatives including single RDA projects and collective cluster initiatives involving several RDAs together, both high-technology and more traditional sector initiatives. Work has included commissioning regional mapping studies, identifying and building links with important regional clusters and using clusters as the vehicle for wider economic development initiatives.

1. *Motorsport Development UK:* is a private/public sector partnership responsible for implementing a five-year investment programme in UK motorsport. Funding comes directly from the DTI and four RDAs, East Midlands, Advantage West Midlands, East of England, and South East, which cover the geographical area known as Motorsport Valley. Since April 2004, it has committed to invest GBP 5.7 million in five key project areas. This investment has been matched by

GBP 7 million of contributions from industry. The aim is that projects commissioned will become financially self-sustainable by March 2009. Motorsport Development UK focuses investment in five areas:

- Energy Efficient Motorsport (EEMS) – Energy efficiency and low carbon emissions may be the most important challenges facing the automotive industry. EEMS aims to demonstrate the UK's engineering expertise in these fields and win a greater share of global business and investment.
- Business Development – projects to assist business to be more productive and innovative. Also focussed on growing overseas markets and sharing technologies and processes with other industries.
- Motorsport Academy – aims to meet skills needs by developing learning resources, assessing training needs, and helping collaboration between employers, universities, colleges and private training providers.
- Learning Grid – a co-ordinated set of activities for students and school pupils, aimed to inspire and encourage them to consider careers in science, technology and engineering.
- Widening Participation – focussed on increasing participation and diversity within the motorsport sector, particularly through volunteers.

2. *North West Development Agency:* The Northwest Regional Economic Strategy (RES) 2006 identifies the development of key internationally competitive sectors as a priority. This RES Priority Action provides the basis for the continuation of the NWDA Cluster Development programme which was formally launched in March 2000. The programme is mainly delivered by Regional Cluster Organisations which are funded by NWDA from its Single Programme through a Service Level Agreement. With the exception of BioNow, the Regional Cluster Organisations are independent not-for-profit companies limited by guarantee with a Board of Directors almost entirely from the sector they cover. The NWDA Cluster Development programme was recently reviewed by independent consultants. Their main conclusions on the programme were:

   - An industry-led solution to the key RES objectives for business development.
   - Provides industry buy-in and intelligence for a range of Agency and other sector led programmes.
   - A widely used methodology for regional economic development, appropriate for the North West, which fits with national policy.
   - The programme has produced positive results with the potential to improve, building on what is now in place.

3. *Northern Ireland: Company of Irish Bakers* is a group of six bakers from independent home bakeries in the northern counties, who collectively share 500 years of skills and experience. The group initially got together informally, four years ago, to share recipes, product ideas, techniques and even customers. Recently they have been working with other Irish artisans such as organic dairies, traditional smoke houses, fruit farmers and millers, to develop a distinctively Irish range of cakes and biscuits for export to other parts of the United Kingdom. Facilitated by Northern Ireland's Centre for Competitiveness (CforC) and Invest Northern Ireland (INI), meetings were formalised with several workshops held to clarify the group's purpose and CforC helped with public relations. The group also participated in the INI's Design Development Programme and obtained Design Consultancy from the Conran Design Group. This led to the development of a new brand "The Company of Irish Bakers", which included a new range of packaging. They have done this with: financial support from INI, facilitation, administrative and public relations support from CforC, an online community administered by CforC, INI/Conran Design Consultancy, INI support to exhibit at Trade Shows and the leveraging of GBP 40 000 of support from INI programmes.
4. *The Cambridge Knowledge-Based Cluster* is made up of a number of overlapping and complementary clusters of firms, public sector organisations and institutions reflecting the outcome of a long process of economic, scientific and technological evolution stretching back more than a century. It has not been driven by the public sector so has not had a top-down infrastructure imposed upon it. The objectives have been determined by the business-led networks and informal groupings and are not aggregated into one set of objectives. However, it does need support. In particular, the East of England Development Agency (EEDA) supports the cluster through the development of a network of enterprise hubs. The Enterprise Hubs programme is an EEDA core activity and the delivery vehicle through which EEDA deploys its interventions in response to the Government's ten-year Science and Innovation Investment Framework, published in 2004.
5. *The North East Process Industry Cluster (NEPIC)* represents four hundred supply chain companies across the North East of England who operate in the process industries sector. Two hundred of these companies would recognise themselves as chemical, pharmaceuticals and biotechnology. As such NEPIC represents 25% of the region's economy and a similar percentage of regional employment. Established less than a year ago, it aims to create more jobs, act as a catalyst for new businesses and enable supply chains in these sectors to be more visible. The initial concept was to find a way to get better co-operation across and between regional firms. It has done this through engagement with the most senior people in each company in each region. Some fifty leading CEOs defined the areas where business improvements would yield the greatest value added, forming themselves into teams to address these needs.

Bibliography

Center for Competitiveness (*www.cforc.org*).

Department for Education and Skills (*www.dfes.gov.uk/skillsstrategy/*).

Department of Trade and Industry (*www.dti.gov.uk*, *www.dti.gov.uk/regional/clusters/index.html*).

Department of Trade and Industry (DTI), United Kingdom (1998), *Competitiveness White Paper: Our Competitive Future – Building the Knowledge Driven Economy*, DTI Publications, London.

Department of Trade and Industry (DTI), United Kingdom (2001), *Business Clusters in the UK: A First Assessment*, DTI Publications, London.

East of England Development Agency (*www.eeda.org.uk*).

East Midlands Development Agency (*www.emda.org.uk*).

Motorsport Development UK (*www.motorsportdevelopment.co.uk*).

North East Process Industry Cluster (*www.nepic.co.uk*).

OECD (2005), *OECD Economic Surveys: United Kingdom – Volume 2005 Supplement 2*, OECD Publications, Paris.

OECD (2006), *OECD Territorial Reviews Newcastle in the North East, United Kingdom*, OECD Publications, Paris.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 20

United States: Georgia

The United States has no national level cluster-based policies, therefore this chapter explores one strategy in the state of Georgia to build strong science-driven clusters. The Georgia Research Alliance is a private sector-initiated entity to channel state R&D funds to industry-research collaborative projects at different stages in the commercialisation process as well as attract top researchers to the state.

1. Programme(s) and their goals

The state of Georgia supports the Georgia Research Alliance (GRA) to bolster technology-based economic development by capitalizing on innovative university research. The GRA is a public-private partnership involving state leaders in the private, higher education and public sectors. The goal of the GRA is to help ensure that "Georgia will be ranked among the top tier of states in the nation with a vibrant, sustainable, technology-rich economy".

The GRA manages a series of programmes. The Eminent Scholars programme is used to attract internationally renowned researchers. The technology transfer programmes support the commercialisation of research applications via technology incubators (with special equipment), VentureLab (seed grants to develop companies), and the GRA Innovation Fund (grants to faculty engaged in collaborative research with industry). It also supports funding for research laboratories and equipment which are accessible to both university and industry researchers.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Of Georgia's 3.5 million workforce (8.8 million residents), 13% are in manufacturing, 28% in business services, and 19% in trade. There are more than 8 600 manufacturers, and 98% of these establishments are SMEs. There are approximately 450 000 manufacturing jobs, 66% of which are in SMEs.

Much of Georgia's industry has been concentrated in traditional sectors such as textiles, food processing or routine branch plants. It has characteristically had poor educational performance, a weak innovation culture and low industrial R&D spending. Public R&D had been dominated in the past by defence procurement (Shapira, 2005a).

Over the past few years there has been a noticeable increase in technology spending by the state government. Innovative companies and technology jobs are also growing. Georgia has made great strides in technology job growth over the last decade, but still has a small share of overall technology jobs in the US. There is an increasingly rich intellectual property

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 –

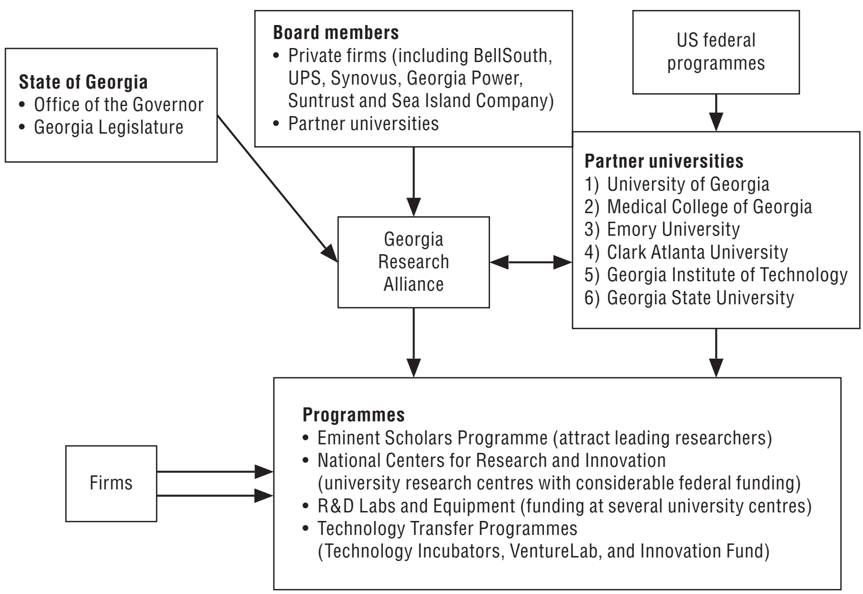
environment at the universities as well as a growing network of technology incubators. Many challenges remain, not the least of which are a shortage of entrepreneurial talent and private equity capital.

Historical development/evolution – where the programme came from in the context of other policies

In 1990, a group of Georgia's industry leaders brought together business, research universities and state government players to support technology-based economic development. A major component of their overall strategy was to attract the world's pre-eminent scientists to Georgia's universities to lead research and development in areas which were felt to have the most potential for generating new high-value companies that would lead to new high-wage jobs. The GRA initiative was initially included in the early 1990s in the Governor's Economic Recovery Program.

Description of programme's place in governance framework

Figure 20.1. **Organisational chart: US (Georgia)**



GRA is a collaborative initiative among six research universities in Georgia, the private sector and the state of Georgia to use research knowledge and infrastructure invested in targeted high-technology areas. The several programmes listed above offer support to attract skilled researchers, develop research centres or transfer technology via support of commercialisation through research financial support, the development of an idea to company formation and finally company incubation. The GRA also works closely with related stakeholders such as the Georgia Biomedical Partnership and the Technology Association of Georgia.

Institutional frameworks and regional development policy

US federal programmes

Unlike most other OECD countries, the US does not have an overarching regional policy. Given the federal structure and the country's sheer size, the policy instruments and resources to promote clusters and economic development are generally the realm of state policy. In terms of economic development funding at the federal level, one recent study noted that it is highly fragmented and that spending is mainly directed to physical infrastructure (Drabenstott, 2005).

Federal level programmes that directly support regional specialisation and clusters are rare, involve minimal funding and tend to focus on lagging regions. A handful of federal level regional commissions support regional economic development in lagging regions and some have actively supported clusters. One example is the Appalachian Regional Commission, a federal-state partnership to create opportunities for self-sustaining economic development.

A number of federal departments have programmes that support place-based economic and community development and may in some cases have initiatives that include cluster development. The Departments of Commerce, Health and Human Services, Housing and Urban Development, Treasury, and Agriculture all have economic and community development programmes. The Economic Development Administration (EDA) of the Department of Commerce, in particular, has sponsored several research reports on the importance of clusters and regional innovation systems in economic development. The EDA is paying increasing attention to regions, as opposed to the city and county government levels, in its programmes. In fact, EDA has recently aligned its programs to emphasize regional economic development that fosters innovation and promotes entrepreneurship to enable distressed communities to achieve competitiveness and participate in the nation's growing economy. EDA has refined its funding priorities to promote more directly the development of functioning economic regions focused on developing regional competitive advantage through collaboration and innovation. The objective is to encourage multi-jurisdictional collaboration and co-operation across local political boundaries and focus on the inherent advantages of regional economies.

While the US has tended to avoid industrial policy, it has supported clusters indirectly via federal R&D dollars. Science and technology-related clusters access considerable funds for research and development across a range of federal departments (ministries) and agencies. The National Science Foundation (NSF) and National Institutes of Health (NIH) as well as federal departments allocate billions of dollars in research funds every year. To support R&D lagging regions that don't succeed in the often competitive allocation process, the NSF-sponsored programme EPSCoR (Experimental Program to Stimulate Competitive Research) and NIH-sponsored IDeA programme (Institutional Development Award) seek to broaden the geographic distribution of certain R&D funding to states that under-perform in capturing federal R&D funds. Annual EPSCoR program budgets total in the hundreds of millions of dollars.

While public action to support clusters and innovation systems has originated in the states, the federal level is now beginning to incorporate this approach into policy. Different organisations, such as the private sector Council on Competitiveness, share information on sub-national cluster and innovation initiatives. The new federal level American Competitiveness Initiative follows some of these principals and proposes to increase investments in R&D, to strengthen education and encourage entrepreneurship. The goal is to double the funding for select R&D programmes of ten federal agencies for basic research programmes in the physical sciences and engineering over the next ten years (from USD 10 to 20 billion), make permanent the Research and Experimentation tax credit and improve the nation's math and science skill base. While there is no explicit regional or cluster focus, strong institutions in various regional clusters will seek to tap into these funds should the initiative be implemented. EDA has aligned its programs to support and complement the new American Competitiveness Initiative (ACI) by assisting distressed communities to integrate their development strategies with the activities of the ACI, which include investment in R&D, science, education and workforce training, and support for business environments that encourage entrepreneurship.

In the spirit of this initiative, the Department of Labour has already developed the programme WIRED (Workforce Innovation in Regional Economic Development) to invest USD 195 million over three years in thirteen lagging or dependent regional economies that are in labour markets spanning administrative borders. The targeted regions are those affected by global trade, are dependent on a single industry or are recovering from natural disaster. They must show a strategic partnership that includes regional leaders. Actions to be funded under the program include: *a)* strategy development; *b)* the development of consensus on the agenda with the private sector (civic, business, investor, academic, entrepreneur and philanthropic partners); and *c)* implementation coaching. EDA is collaborating closely with the Department of Labour in the implementation of the WIRED initiative with the understanding that successful workforce development and economic development go hand in hand and must be implemented jointly as part of a cohesive regional development strategy.

The US federal government has a longstanding tradition of supporting small businesses generally. In addition, many SMEs in different high-tech clusters actively pursue federal funds under the SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) programs. They are both competitively awarded, three-phase federal government programs designed to stimulate technological innovation and provide opportunities for small business. Projects funded often link small businesses and the top non-profit research institutions. Six federal agencies reserve a portion of their R&D funds to be awarded via the STTR program, and eleven federal agencies run programmes under SBIR.

Georgia

While the impetus for the GRA stemmed from the efforts of industry leaders, the bulk of its financing is derived from the state government of Georgia. The primary public partners are the Office of the Governor and the Georgia Legislature. Governors have traditionally offered their support to the GRA. Initially included in the early 1990s in the Governor's Economic Recovery Program, GRA has been the driving force behind state-funded economic development initiatives with a strong research component.

Role of programme in the context of science and technology (or innovation) policy

The GRA is a leading component of the state's efforts for the research component of science and technology policy. That strategy includes scholars, research centres, incubators and the centres of innovation. The Georgia Department of Economic Development (GDEcD) includes a specialized Innovation and Technology Office (ITO) aimed at attracting high-technology and biotechnology firms to locate and grow in Georgia. The office works mainly with the GRA and the University of Georgia system, as well as a couple of more specialised organisations, to support growth in Georgia's science and technology industries. The state has a number of programmes to support education and workforce development. Georgia's Intellectual Capital Partnership Program (ICAPP), for example, seeks to link the resources of Georgia's 35 public colleges and universities to the state's business community to provide college-educated employees access to the latest research as well as business and operations advice.

Another programme to support innovation in the state outside of the GRA-supported projects is entitled the Centers of Innovation. The programme was created by the Governor in 2003 to support researchers and entrepreneurs in fields not currently part of GRA programmes, notably aerospace, agriculture, life sciences and maritime logistics. Each centre serves as a link between state leaders, academic and business experts and government organisations and includes outreach specialists to provide hands-on technical expertise and business development mentoring.* The GRA administers an innovation fund which supports research in these targeted areas by academics (at GRA universities) in collaboration with companies.

There are several other programmes within the state. The Georgia Manufacturing Extension programme is a longstanding programme that uses the resources of Georgia Tech to provide technology transfer assistance. The Yamacraw Initiative is a public-private partnership in telecommunications. For example, it supports a high-bandwidth communications cluster, it seeks to expand the number of qualified electrical engineers and it supports an electronic design centre and research group (Shapira, 2005a). The Advanced Technology Development Centers, which began in 1980, are another programme that now has active links with GRA. In a review of over 100 programmes of technology outreach, it was noted that: greater than 70% are focused in the Atlanta area, most were established since the 1990s and most are run by academic institutions (Youtie *et al.*, 2000 as cited in Shapira, 2005a).

As mentioned above, the federal level programmes most important to bringing resources to the clusters supported by the GRA are R&D related.

Role of programme in the context of industrial policy

The work of the GRA to support business is in part related to the state's overall strategy of attracting high-technology firms and supporting small business. Both the University of Georgia's Small Business Center and Georgia Tech's Advanced Technology Development Center (GRA partner universities) support small businesses. The state actively recruits firms and through the Georgia Department of Economic Development (GDEcD) markets the state and its firms.

Another cluster-based programme is GreaterGeorgia. This multi-year program is sponsored by the Georgia Department of Industry, Trade and Tourism in partnership with Georgia Tech's Economic Development Institute and School of Public Policy. It aims to stimulate networking and technology capability development in the state's mid-sized cities of Augusta, Columbus, Macon, and Savannah.

Cluster studies conducted

In the context of this programme there are no specific cluster mapping exercises. However, in the context of the GRA development strategy, a

* These centres are: the Life Sciences Innovation Center (LSIC); Agriculture Innovation Center (AIC); Aerospace Innovation Center; Information Technology Innovation Center (ITIC); Maritime Logistics Innovation Center (MLIC); and the Manufacturing Excellence Innovation Center (MEIC).

McKinsey and Company report suggested that the state give priority to attracting resources in three areas of comparative advantage given existing resources and growth areas. They are telecommunications, biotechnology and environmental technology.

3. Details on programme budget and timeframe

The programme began in 1990 and there is no sunset date.

The investments made by GRA in its programs are part of the budget of the Office of the Governor of Georgia and approved by the Georgia Legislature. Public bond issues are also used to pay for facilities. Industry may provide matching funds for work underwritten through the Innovation Fund. Since 1990, over USD 400 million have been invested by the GRA. Taken over 15 years, this gives a rough average annual spending of USD 26.7 million per year on all of its programmes combined.

Given the wide variety of funded projects and the fact that they are not specifically cluster based, an average annual spending per cluster is not available. Between 1992 and 1997, state investments in the Eminent Scholars programme alone totalled USD 126 million, approximately USD 21 million per year. When the GRA helps finance an Eminent Scholar, matching funds are required from the University. Private donors may also be solicited to finance an endowed chair. The USD 400 million from the state has been calculated to bring in nearly USD 2 billion (approximately half in new federal R&D funds and half from private funds) into the Georgia economy, a leverage effect of one to five. The principal form of financing is through grants and, for facilities, bonds.

GRA has several key programmatic elements, and in all cases the investments are made to participating universities and research centres. Universities may access funds to recruit Eminent Scholars in the three core research area targets. Such scholars are recruited to the university system based in part on a GRA supplementary endowment to be used for facilities, equipment, and other non-salary expenses. Three operating centres administer GRA funds, dispersing them to researchers at the six GRA universities, as well as engaging in auxiliary educational and policy initiatives and programs in their particular target research area. The Technology Development Investment programme funds the university side of industry-university collaborative research projects with significant commercial potential. GRA management acts as a "holding company" for the program, developing strategy and finding financial resources.

Spending in related areas

The GRA and the Enterprise Innovation Institute – EDTV (about USD 9 million in state funds, but USD 24 million in total funds) are the major components of the state's S&T budget. Funding for the state's seed capital fund stands at USD 8 million with appropriations for that in 2000 and 2003. The state's innovation centres (six locations) receive about USD 2.7 million a year from a special state fund (tobacco funds in the One Georgia Authority). Other funding that is considered S&T funding include special research buildings (such as the Nanotechnology Research Building – USD 45 million in state bonds) that are put into the budget by the Governor as part of his economic development program.

4. Targets and scope

Targets and selection criteria

The projects that receive support are for high-growth technology projects to generate economic development in areas such as advanced telecommunications, environmental technologies and human genetics. The universities work with GRA to determine which investments in people, laboratories and equipment, and centres are likely to have the greatest economic impact in Georgia.

While most US states seek to support technology, Georgia was a lagging region when the project began. Projects supported may be in different parts of the state where the participating universities are located. The GRA does collaborate with chambers of commerce, trade associations and civic groups to bring its programs to all regions of the state, but there is no explicit spatial agenda to GRA's allocation process.

Cluster selection process

All funding is based on applications by the six partner universities only, although the work may be linked with other universities. The universities serve as key players in different high-technology clusters. There are active university/firm links in the relevant fields.

Number of cluster participants

Hundreds of firms are involved with the six partner universities supported by the GRA. The firms involved vary between large corporations to start-up technology companies. Per the GRA website, since inception more than 100 technology start-up companies have spun out of university research and are now considered GRA business partners, albeit they did not all originate from the GRA programme. Dozens of established companies throughout the state have also benefited from GRA programs that give businesses access to university research centres and laboratories and foster research relationships between industry and universities.

Cluster institutional status, governance and linkages

GRA serves as the nexus of the regional innovation system across different high-technology clusters with a strong R&D focus. It has a non-profit status and includes industry and university actors on its Board. The GRA and the member universities are therefore aware of the technology and research initiatives across different disciplines.

Administrative boundaries

GRA covers the state of Georgia and therefore goes beyond local and intra-state regional boundaries. However, there is clearly a strong concentration around Atlanta, which at times has raised concerns among advocates for economic development in more rural areas of the state. There is no specific national or trans-national cluster support.

5. Instruments

The GRA's key instruments are used to strengthen research skills and to support entrepreneurship and innovation at different phases but with an accent on the university-industry relationship.

- *Identification and benchmarking:* The GRA works with projects that self-select for application and have the greatest potential economic impact for the state. Benchmarking for clusters is not part of the programme, however there is benchmarking with respect to other states in their ability to capture federal research funds.
- *Engagement of actors:* The GRA plays the role of the leading hub in the state for a number of different stakeholders involved in high-technology research and its applications.
- *Government services delivery:* Participation in a GRA programme does not necessarily imply that other services will be more organised around programme participants.
- *Skilled HR:* The Eminent Scholars programme is considered the flagship programme because it is used to attract renowned, international scientists to the state. They are recruited to the university system based in part on a GRA supplementary endowment. To date, 51 scholars have been recruited. The focus of their research is primarily in advanced communications and computing, as well as in the biosciences from optical systems to structural biology. These research projects in turn help attract the best graduate students.
- *Resource allocation and investment, including branding:* GRA investments are intended to increase resource allocation to the funding projects, through federal R&D funds and private capital. It has been reported that federal

agencies are more willing to fund research centres that have been funded by the GRA. The branding of the various high-technology specialties is actively promoted by the state.

- *Entrepreneurship and Innovation:* This is the other major focus of the GRA. There are a number of different programmes that fall under this category as described below.

Technology Transfer Programs

Technology Development Centers (TDCs), the technology incubators that GRA supports, help emerging companies access the research and development resources of host universities while refining the commercial potential of the technologies under development. TDCs are joint ventures of the host university, the GRA, and, in many cases, the Advanced Technology Development Center (ATDC). The ATDC is a technology business incubator at the Georgia Institute of Technology started in 1981, prior to the GRA's launching but now GRA manages some of its programmes. In addition to specialized equipment and facilities, incubator companies have access to a range of business start-up services and affordable space. To date, nearly 125 companies have graduated from all of Georgia's university-based technology incubators, creating a reported more than 4 000 high-wage, high-technology jobs in Georgia. Please see the Annex 20.A1 for a listing of these centres.

VentureLab was created by Georgia Tech and is supported by the GRA. Its goal is to assist in the development of technology prior to company formation in the commercialisation process. The goal of the program is to enhance and accelerate the process of developing new technology-based enterprises from university research. VentureLab offers pre-incubator services that help universities identify laboratory discoveries that have commercial potential and that guide faculty through the various stages of technology development to the stage of company formation. The programme seeks to provide earlier and increased awareness by the business and investment community of university commercialisation opportunities and to provide an easier and more efficient process for turning these technologies into new companies or new markets for established start-ups. So far this programme has supported 30 projects and 11 fellows, 27 early stage companies with approximately 100 employees, and attracted over USD 35 million in private capital.

GRA Innovation Fund aims to create long-term partnerships between Georgia companies and GRA universities to develop and deploy technologies that could contribute to the state's economic growth. Grants awarded by the GRA Innovation Fund to research faculty in affiliated universities support technology development projects in three areas: advanced computing and communications, bioscience and nanotechnology/advanced materials.

R&D Labs and Equipment

GRA has made investments in university laboratories to equip them to become platforms for the basis of the creation of new companies and to assist existing companies in the development of new products and markets. GRA-supported laboratories and equipment are accessible to both university and industry researchers and cover a broad range of R&D needs. Areas covered include: vaccine development, wireless systems, tissue engineering, digital filmmaking and NMR spectroscopy.

National Centers for Innovation and Research

These centres receive federal funding for specific research topics, and the matching funds typically provided by GRA have been important for these federal awards. Centres cover topics such as engineering of living tissues, behavioural neuroscience, structural genomics and packaging research. Please see the Annex 20.A1 for a listing of these centres.

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

GRA does not have a formal evaluation program in place although on alternate years the program conducts project-by-project reporting and monitoring of macro-level indicators such as research and development expenditures.

Results of evaluations, if any

One outside assessment of GRA noted that it served a clear catalyst role in supporting the state of Georgia's science and technology-related growth. Several success factors were noted. In terms of leadership, the members of the GRA Board were in positions of power and had the authority to engage their own organisation and its resources in the initiative. A second factor was the non-governmental structure that limited the potential political pressures. Thirdly, the strategy to focus on three targeted areas of competitive advantage for Georgia, supported by research from the consulting firm McKinsey and Company, resulted in a successful attraction strategy and a concentration for critical mass. In terms of context, the concentration of activities in the Atlanta area did not prove too politically problematic despite critiques from more rural areas of the state. Finally, this evaluation noted a competitive spirit within the state that supported the initiative's success (Lambright, 2000).

GRA reports a number of intermediate and longer-term outcomes since inception in 1990. In terms of intermediate outcomes, over USD 1 billion in federal funding through research grants as well as another 1 billion in private funds has flowed into the state, 120 new top researchers were brought to the

OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

state, and more than 1 500 high-technology research jobs at universities were created. In addition, over 1 000 publications and 500 Ph.D. and Masters graduates were related to GRA investments. In terms of longer-term outcomes, 100 new companies were spun out of university research creating more than 2 000 new high-technology jobs. Alliance university partners have also increased their research collaborations with industry by approximately 800% since the early 1990s.

These results have contributed to the state's improved economic development. For example, Georgia has moved from the lower or middle tier to the top tier of states on several measures of economic vitality. Georgia is now 9th in the US in the number of biotech companies, increasing this number between 1995 and 2002 by almost 65%, compared to a 37% increase nationwide. Georgia also now ranks 7th in the infrastructure it takes to start new companies, including venture capital (which from 1995 to 2000 grew from USD 100 million to 1 billion).

Bibliography

Georgia

Cassidy, C. Michael (2005), "The Georgia Research Alliance: A strategy for building an innovation economy for Georgia", Presentation made at the State Science and Technology Institute 2005 Annual Conference, Atlanta, GA, 8 September 2005.

Georgia Department of Economic Development (*www.georgia.org*).

Georgia Research Alliance (*www.gra.org*).

Georgia's Intellectual Capital Partnership Program (ICAPP), economic development program of the University System of Georgia (*www.icapp.org*).

Georgia Tech (*www.gatech.edu*).

Lambright, W. Henry (2000), "Catalyzing Research Competitiveness: The Georgia Research Alliance", *Prometheus*, Vol. 18, No. 4, pp. 357-372.

Shapira, Philip (2005a), "Innovation Challenges and Strategies in Catch-up Regions: Developmental Growth and Disparities in Georgia, USA", in Gerhard Fuchs and Philip Shapira (ed.), *Rethinking Regional Innovation and Change: Path Dependency or Regional Breakthrough?*, Springer Publications, New York, NY.

Shapira, Philip (2005b), "Rethinking Regional Innovation", Presentation made at the State Science and Technology Institute 2005 Annual Conference, Atlanta, GA, 20 October 2005.

Youtie, Jan, Barry Bozeman and Philip Shapira (1999), "Using an evaluability assessment to select methods for evaluating state technology development programs: the case of the Georgia Research Alliance", *Evaluation and Program Planning*, Vol. 22, pp. 55 64.

Youtie, Jan, Philip Shapira and Sushanta Mohapatra (2000), *Technology Infusion: Assessing Current and Best Practice Programs*, Atlanta, GA: Georgia Tech Economic Development Institute and the Georgia Tech School of Public Policy, September.

US federal government

Drabenstott, Mark (2005), "A review of the federal role in regional economic development", Report for the Center for the Study of Rural America, Federal Reserve Bank of Kansas City, May.

Economic Development Administration of the US Department of Commerce (*www.eda.gov*).

EPSCoR/IDeA Foundation (*www.epscorfoundation.org/cdi/*).

US Department of Labor Employment and Training Administration WIRED Fact Sheet accessed at *www.doleta.gov/pdf/WIRED%20Fact%20Sheet.pdf*.

US Domestic Policy Council, Office of Science and Technology Policy (2006) *American Competitiveness Initiative: Leading the World in Innovation*, February, *www.ostp.gov/html/ACIBooklet.pdf*.

ANNEX 20.A1

Table 20.A1.1. **Georgia Research Alliance centres**

Centre	Description
National Centers	
Center for the Engineering of Living Tissues	National Science Foundation-supported Engineering Research Center, focused on tissue engineering, is housed within the Institute for Bioengineering and Bioscience at the Georgia Institute of Technology. To date, the Center has attracted USD 20 million in federal funding to Georgia and partnered with some 21 companies in related industries.
The Center for Behavioural Neuroscience	This Center grew out of one of the largest grants ever awarded by the National Science Foundation. The Center, the only NSF Center for Science and Technology in the Southeast, is a multi-institutional effort involving Emory University, Georgia State University, Georgia Institute of Technology, and the Atlanta University Center schools. It has already brought nearly USD 20 million in NSF funding to Georgia and added another USD 17.5 million over the next five years. The Center offers programs for developing new technologies with commercial potential and provides multiple bridges to the private sector.
The Packaging Research Center (PRC)	Housed at Georgia Tech, is led by a Georgia Research Alliance Eminent Scholar. GRA investments in the PRC have helped to generate a cumulative economic impact of some USD 351 million in Georgia. The 25 industry members of the Center include Panasonic, Nokia, Motorola, Sony, Rockwell Collins, Northrop Grumman and National Semiconductor; PRC also has generated 4 start-up companies.
Southeast Collaboratory for Structural Genomics	It was established through a USD 24 million dollar grant (one of only seven awarded nationwide) from the National Institutes of Health's National Institute of General Medical Sciences.
Southeast Collaboratory for Biomolecular NMR	It is co-ordinated by a GRA Eminent Scholar in NMR Spectroscopy at the University of Georgia.
Technology Development Centres	
CollabTech	(Georgia State University) Provides new biotech companies sophisticated equipment and access to the scientific expertise they need to establish themselves.
Georgia BioBusiness Center and the Center for Applied Genetic Technologies	(University of Georgia) These centres house several biotech companies, such as Abeome, AviGenics, BresaGen, ProLinia and rPeptide, to facilitate collaboration and closer access to research and technology at the University of Georgia.
EmTech Bio	A commercial research and development centre formed by Georgia Tech, Emory University, the Georgia Research Alliance and ATDC to bring about breakthroughs for companies focusing on genomics/informatics, drug discovery and vaccine development.
Life Sciences Innovation Center	(Medical College of Georgia) This is a state-wide program associated with the Business Development Center at Georgia's only public medical school. It offers unique resources and programs, along with fully-outfitted laboratories.

Table 20.A1.1. **Georgia Research Alliance centres** *(cont.)*

Centre	Description
Research Laboratories and Equipment	
The Georgia Centers for Advanced Telecommunications Technology (GCATT)	(Georgia Institute of Technology) Designed to allow its 20 affiliated interdisciplinary research centres to work side by side with industry to develop joint projects of economic significance. The technology incubator of GCATT has spawned nearly 25 advanced communications start-up companies that account for some 700 new high-technology jobs.
The Center for Applied Genetic Technologies (CAGT)	(University of Georgia) This centre brings together diverse expertise in plant and animal genomics, DNA markers and transformation and provides state of the art facilities and instrumentation to nurture and stimulate the development and application of these technologies. Within CAGT are research labs and an incubator, the Georgia BioBusiness Center. GBBC enables biosciences start-up companies to accelerate their early growth through access to management expertise and sophisticated instrumentation.
The Emory Vaccine Center	(Emory University) This Center, with 40 affiliated faculty, is dedicated to creating new technologies to prevent emerging infectious diseases and to making the university and Georgia a leader in vaccine research and development. Each year the Center brings in some USD 15-20 million in NIH funding. It also works closely with the pharmaceutical industry to conduct vaccine clinical trials and has launched a start-up company to manufacture and market vaccines developed at the Center.
The Center for Biotechnology and Genomic Medicine	(Medical College of Georgia) The Center was developed to promote interdisciplinary research in genomics, proteomics and bioinformatics. The Center provides sophisticated facilities for microarray analysis, proteomics and computational technologies. The Center focuses its current research on autoimmunity and type 1 diabetes and its complications, and it has established a cancer genomics and proteomics program.
The Center for Biotechnology and Drug Design	(Georgia State University) The Center was established in 1994 to encourage collaboration between the biotechnology industry and the university. The Center comprises 45 faculty members from the Departments of Biology, Chemistry and Psychology and has four goals: *a)* developing strong faculty research programs; *b)* training top-flight graduate students; *c)* attracting biotechnology business to Georgia; and *d)* co-ordinating academic and industrial co-operation. Major emphases are on vaccines and diagnostics, applied genomics, bioinformatics, neuropharmacology, and drug design and synthesis.
The Research Center	(Clark Atlanta University) The Center facilitates interdisciplinary and collaborative research with national and federal laboratories, other universities and industry. The Center encompasses nearly 20 major components including the Army Center of Excellence in Electronic Sensors and Combat; the Center for Environmental Policy, Education and Research; the Center for the Theoretical Study of Physical Systems; the Biomedical Research and Training Program, and the High Performance Polymers and Composites Center.

Source: www.gra.org; www.georgia.org/Business/Innovation/.

ISBN 978-92-64-03182-1
OECD Reviews of Regional Innovation
Competitive Regional Clusters

PART II

Chapter 21

United States: Oregon

This case study of the state of Oregon in the US highlights two separate cluster-based strategies as opposed to programmes. The Oregon Cluster Industries strategy is helping to refocus the state's economic development efforts around the identified industry clusters. The Oregon Cluster Network is a private entity that promotes the cluster concept, supports knowledge sharing among cluster initiatives and serves as a nexus for helping to inform public policy to better serve cluster needs.

1. Programme(s) and their goals

Oregon's most recent approach to cluster policy includes both a strategy to support the industry clusters that could drive the state's economic growth generally (identified via mapping) and a more bottom-up approach through a cluster support organisation open to all cluster initiatives around the state. This approach is part of the Oregon Business Plan (OBP), a state-wide plan to increase prosperity and the number of quality jobs, one of the elements being the development of the state's clusters.

- The Oregon Economic and Community Development Department (OECDD) seeks to refocus its efforts in part around these industries with potential clusters. The goal is to support the state's growth and competitive advantage.
- The Oregon Cluster Network serves to identify industry clusters and assist cluster participants to accelerate innovation and the growth of their industries. While the goal is to support traded industry clusters that are important sources of innovation, entrepreneurship and employment growth for the state, the Network is open to any cluster initiative that seeks to participate.

2. Context: Situating the programme in the governance framework and policy strategy(ies)

Features of the economy that have an important impact on cluster development generally

Oregon, with an economy of over 1.5 million workers, is a state previously heavily dependent on natural resource based industries. After a restructuring of the wood industry and the state's massive employment loss in the early 1980s, a number of other industries have increased in prominence, including those in high technology. Despite progress since the 1980s, some indicators showed deterioration in the 1990s, such as a decrease in per capita income as well as an increase in poverty and unemployment in rural areas.

The state's newly developed Competitive Index 2005 explores a range of areas including well-being, traded sector industry health, pioneering innovation, people, place, productivity and public finance. Oregon scores higher than the median US state on higher annual wage, gross state product, employment growth, exports and several education measures but is near or at the bottom of the rankings for its high unemployment and low productivity growth.

Per the state's Innovation Index 2004, the biggest gap in innovation for the state is in the middle of the process (development and start-up) as opposed to the beginning (research) and the end (growth). Areas of above average performance relative to other US states include: foreign exports as a per cent of Gross State Product, total R&D per capita, patents per capita, awards of science and engineering degrees, jobs in sectors that generate the majority of patents and new products. Areas of below average performance include: the percentage of workers with a Ph.D. in science and engineering, invention disclosures, and university and federal R&D programmes.

Historical development/evolution – where the programme came from in the context of other policies

Oregon's approach to clusters over the last fifteen years has come in waves to help the state recover from various economic shocks. The current approach includes both a sectoral initiative as well as support to business networking and cluster initiatives. Both types of programmes have been tried in the past in Oregon.

Inspired by the lessons of a study trip to Europe, Oregon developed in the early 1990's an SME network programme similar to the model in Denmark. The "flexible networks" could receive grants of USD 10 000 for groups of three or more firms seeking to work on a joint marketing or technology innovation. The programme supported approximately 40 networks involving over 250 firms.

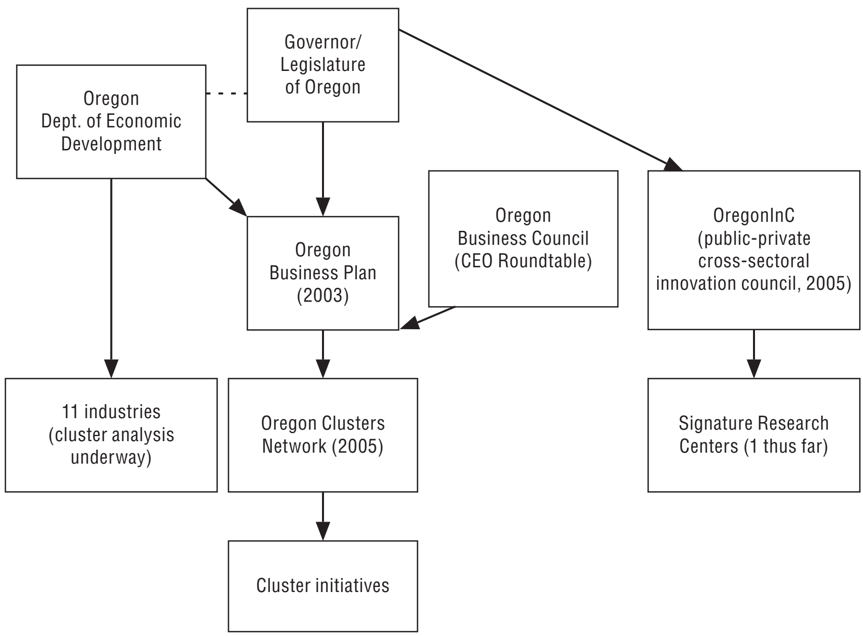
The state also developed a "key industries" sectoral approach after the Legislature identified 13 of them. The idea for such an approach was initially established in a state strategic planning approach entitled "Oregon Shines". A number of initiatives were developed around these industries, notably for wood products, the software industry and tourism. In 1993, the OECDD also re-organised its operations to serve the needs of industries, its "clients". Regional development authorities were also asked to support in their strategies up to three of these industry clusters and to have those clusters comment on the proposed actions. The Key Industry Training programme served as a workforce development complement to this sectoral approach.

By the mid 1990s, such policies that seek to support the cluster concept generally became less prominent, although not as a direct result of any specific evaluations of these programmes. Oregon, unlike many US states, did not experience a recession in the early 1990s. The state also underwent some political changes at the time. For these and other reasons, attention shifted away from key industries and clusters to rural development issues.

A recession in 2001 hit the state, although with a less dramatic job less than the recession of the early 1980s. The political response to this was a much greater interest in the economy and the cluster approach was offered as one way of conceptualising the economy and supporting its growth. The leadership of the Oregon Business Council, a roundtable of prominent business leaders, worked with local economic development leaders on the idea of promoting a very explicit cluster approach. The result of this collaborative initiative is the Oregon Business Plan, a framework for the state to develop an action plan to support economic growth. Both the sectoral clusters and the Oregon Clusters Networks are an integral part of this plan.

Description of programme's place in governance framework

Figure 21.1. **Organisational chart: US (Oregon)**



The two cluster approaches are coming from the private sector-initiated Oregon Business Plan (OBP) entitled "Stepping Up". This Plan is a 12-point programme for the state that covers issues such as innovation, education, economic development, infrastructure and public finance. The goal for the plan is to increase the number of high wage jobs by developing traded-sector industry clusters. The strategy is to develop the four Ps (people, place, productivity and pioneering innovation) using 12 umbrella initiatives to make concrete steps to realise the Plan strategy. Tracking of progress on these initiatives is publicly available on the Internet. The Leadership Committee to spearhead these actions is mainly public sector, but the Steering Committee is private sector. The Steering committee helps gather information via interviews, focus groups, the annual Economic Leadership Summit and written submissions by clusters.

The Oregon Business Council (OBC) helps to develop the Oregon Business Plan Agenda with input from Oregon's clusters. It is an independent and non-partisan association of top business executives that seeks to mobilize business leaders to contribute to Oregon's quality of life and economic prosperity. Founded in 1985, OBC is patterned after the national Business Roundtable and affiliate organisations in a number of other states. OBC members represent Oregon's largest employers, nearly a third of the state's 100 largest companies, but often work closely with other business organisations, nonprofits, and government agencies to promote policies that improve Oregon life.

Oregon InC (the Oregon Innovation Council) is a cross-sector leadership team created in 2005 by the Governor and State Legislature to drive the state's innovation strategy. Oregon InC's mission is to identify Oregon's innovation-driven growth opportunities, maximise the state's competitive advantages and establish Oregon's niche in the global economy. The Council is a coalition of leaders from traded-sector industries, higher education and government.

The Economic and Community Development Department (OECDD) of the state government provides economic and community development targeted at firms, places and people. Oregon's economic development system is designed to meet state-wide needs as well as regional needs, including services for rural and distressed communities. The OECDD provides integrated services to companies and people doing business in Oregon, or looking to make new or further investments, including assistance with areas such as workforce, incentives, data, etc. The department works in partnership with several organisations to offer assistance to communities, counties, ports, tribes, special districts, community colleges and local economic development groups. It also encourages and facilitates public-private partnerships.

Institutional frameworks and regional development policy

US federal programmes

Unlike most other OECD countries, the US does not have an overarching regional policy. Given the federal structure and the country's sheer size, the policy instruments and resources to promote clusters and economic development are generally the realm of state policy. In terms of economic development funding at the federal level, one recent study noted that it is highly fragmented and that spending is mainly directed to physical infrastructure (Drabenstott, 2005).

Federal level programmes that directly support regional specialisation and clusters are rare, involve minimal funding and tend to focus on lagging regions. A handful of federal level regional commissions support regional economic development in lagging regions and some have actively supported clusters. One example is the Appalachian Regional Commission, a federal-state partnership to create opportunities for self-sustaining economic development.

A number of federal departments have programmes that support place-based economic and community development and may in some cases have initiatives that include cluster development. The Departments of Commerce, Health and Human Services, Housing and Urban Development, Treasury, and Agriculture all have economic and community development programmes. The Economic Development Administration (EDA) of the Department of Commerce, in particular, has sponsored several research reports on the importance of clusters and regional innovation systems in economic development. The EDA is paying increasing attention to regions, as opposed to the city and county government levels, in its programmes. In fact, EDA has recently aligned its programs to emphasize regional economic development that fosters innovation and promotes entrepreneurship to enable distressed communities to achieve competitiveness and participate in the nation's growing economy. EDA has refined its funding priorities to promote more directly the development of functioning economic regions focused on developing regional competitive advantage through collaboration and innovation. The objective is to encourage multi-jurisdictional collaboration and co-operation across local political boundaries and focus on the inherent advantages of regional economies.

While the US has tended to avoid industrial policy, it has supported clusters indirectly via federal R&D dollars. Science and technology related clusters access considerable funds for research and development across a range of federal departments (ministries) and agencies. The National Science Foundation (NSF) and National Institutes of Health (NIH) as well as federal departments allocate billions of dollars in research funds every year. To support R&D lagging regions that don't succeed in the often competitive allocation process, the NSF-sponsored programme EPSCoR (Experimental Program to Stimulate Competitive Research) and NIH-sponsored IDeA programme (Institutional Development Award) seek to broaden the geographic distribution of certain R&D funding to states that under-perform in capturing federal R&D funds. Annual EPSCoR program budgets total in the hundreds of millions of dollars.

While public action to support clusters and innovation systems has originated in the states, the federal level is now beginning to incorporate this approach into policy. Different organisations, such as the private sector Council on Competitiveness, share information on sub-national cluster and innovation initiatives. The new federal level American Competitiveness Initiative follows some of these principals and proposes to increase investments in R&D, to strengthen education and encourage entrepreneurship. The goal is to double the funding for select R&D programmes of 10 federal agencies for basic research programmes in the physical sciences and engineering over the next ten years (from USD 10 to 20 billion), make permanent the Research and Experimentation tax credit and improve the nation's math and science skill base. While there is no explicit regional or cluster focus, strong institutions in various regional clusters

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

will seek to tap into these funds should the initiative be implemented. EDA has aligned its programs to support and complement the new American Competitiveness Initiative (ACI) by assisting distressed communities to integrate their development strategies with the activities of the ACI, which include investment in R&D, science, education and workforce training, and support for business environments that encourage entrepreneurship.

In the spirit of this initiative, the Department of Labour has already developed the programme WIRED (Workforce Innovation in Regional Economic Development) to invest USD 195 million over three years in thirteen lagging or dependent regional economies that are in labour markets spanning administrative borders. The targeted regions are those affected by global trade, are dependent on a single industry or are recovering from natural disaster. They must show a strategic partnership that includes regional leaders. Actions to be funded under the program include: *a)* strategy development; *b)* the development of consensus on the agenda with the private sector (civic, business, investor, academic, entrepreneur and philanthropic partners); and *c)* implementation coaching. EDA is collaborating closely with the Department of Labour in the implementation of the WIRED initiative with the understanding that successful workforce development and economic development go hand in hand and must be implemented jointly as part of a cohesive regional development strategy.

The US federal government has a longstanding tradition of supporting small businesses generally. In addition, many SMEs in different high-tech clusters actively pursue federal funds under the SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) programs. They are both competitively awarded, three-phase federal government programs designed to stimulate technological innovation and provide opportunities for small business. Projects funded often link small businesses and the top non-profit research institutions. Six federal agencies reserve a portion of their R&D funds to be awarded via the STTR program, and eleven federal agencies run programmes under SBIR.

Oregon

Oregon's OECDD as described above leads the state's place-based development efforts.

Role of programme in the context of science and technology (or innovation) policy

The second of 12 areas in the Oregon Business Plan is the expansion of the state's innovation capacity, which when addressed is hoped to reinforce the other initiatives related to clusters. To fulfil the recommendations of the Plan and build on the state's prior efforts, Oregon created Oregon InC in 2005 to develop and track the state's Innovation Plan. The first plan is being formulated and will identify "next steps" for Oregon's public and private sectors. The aims of the plan will generally be to: accelerate technology transfer into high value and growth companies, facilitate cross sector collaboration to leverage resources, develop entrepreneurial and workforce talent, and strategically position Oregon so as to increase exports, inward investments and firm recruitment. The Council is also developing an Innovation Network of important stakeholders throughout the state.

Part of this innovation policy is to actively support the commercialisation of research. The state has therefore given a mandate to the Council to "promote investment in specialised research facilities and signature research centres where Oregon has a distinct or emerging advantage for creating new products and businesses". The Council, along with OECDD, plans to have an annual RFP process judging candidates based on their collaboration, commercialisation possibilities, core competencies and competitive advantage. The first Signature Research Center is the Oregon Nanoscience and Microtechnologies Institute.

OregonInC's work is just beginning and spans more than just research. They will be thinking strategically about how the state should best invest its money and make recommendations. They will be overseeing both the Signature Research Centres and other initiatives to support clusters. The Oregon Cluster Network, which supports any cluster, will serve as a pipeline of clusters for the programmes that OregonInC will establish. The OECDD is actively represented on these committees to support the links across state programmes. The Committees of OregonInC are:

● Seeking Input Committee	● Signature Research Center Audit Committee
● Capital and Business Formation Committee	● Innovation Metrics Committee
● Outreach and Communications Committee	● Commercialized Research Committee
● Emerging Industries and Business Growth Committee	

Role of programme in the context of industrial policy

The support of clusters is integral to the state's economic development strategy. The OECDD has embarked on a cluster-based strategy as a basis to promote economic development. This effort, involving an alliance of public, business and not-for-profit entities, has two primary aims: 1) develop a comprehensive understanding of traded industry clusters that are important sources of innovation, entrepreneurship and employment growth in the state; and 2) develop a set of policy initiatives to promote collaboration among businesses, facilitate the development of public-private partnerships and create effective incentives to support the growth of traded industry clusters. A more detailed analysis of the 11 industries with potential clusters in Oregon is underway.

 OECD REVIEWS OF REGIONAL INNOVATION: COMPETITIVE REGIONAL CLUSTERS – ISBN 978-92-64-03182-1 – © OECD 2007

The Oregon Cluster Network serves as a cluster initiative supporter and knowledge-sharing facilitator. Through its Leadership Council meetings, which take place approximately every six weeks, the Network also seeks to improve conditions for the development of clusters. For example, some of the questions that are the focus of these meetings include: What are the needs of traded sector clusters in the area of focus? How well do we currently address those needs? What could be done to improve the relationships? What specific actions would move us forward right away?

Cluster studies conducted

A preliminary cluster mapping study was conducted as a first step in this cluster approach. The criteria explored included industry concentration, average pay levels and differentials in employment growth rates. Current efforts to achieve the project's objectives include the following: 1) identify traded clusters from the set of 11 industries; 2) map their inter-industry and institutional relationships; and 3) hold roundtables with business representatives to discuss unique challenges and opportunities in each traded cluster. The state is in the early stages of trying to build on this initial purely quantitative mapping. The list of identified industries is in Table 21.1.

Table 21.1. **Oregon key industries**

1. High technology/software	7. Recreation
2. Forestry/wood/paper products	8. Metals
3. Food processing	9. Nursery products
4. Apparel/sports goods	10. Professional services
5. Transportation equipment	11. Biomedical
6. Creative services	

3. Details on programme budget and timeframe

Other than financing for the different entities (OregonInC and the Oregon Clusters Network), there is no financing plan. It is expected that these programmes will continue into the future and are not specifically bounded in time.

4. Targets and scope

Targets and selection criteria

The state seeks to support traded industry clusters that are important sources of innovation, entrepreneurship and employment growth for the state. There is no explicit distinction for high-technology *versus* other sectors. There is no stated regional dimension to the targets within the state.

Cluster selection process

- Top state industries with cluster potential to be supported explicitly by the OECD were identified through a mapping process.
- The Oregon Cluster Network casts a very broad net and its purpose is to help support any self-declared cluster initiatives that seek to be involved in knowledge sharing and the identification of policies to support their cluster's development.

Number of cluster participants

In general, both "programmes" have a firm focus, as opposed to a focus on research and educational institutions. The cluster types include both those with a mix of large and small firms as well as SME clusters. The Network involves stakeholders outside of firms in its work. With the launching of the Oregon Innovation Council (OregonInC), the Signature Research Centres and the upcoming Innovation Plan, the links with these non-firm actors may become more explicit in the future.

Cluster institutional status, governance and linkages

The Network serves an important role to promote information sharing and collaboration opportunities across different clusters. The Network's activities are guided by the Cluster Network Leadership Council, a group of thought leaders from diverse professional backgrounds but with a balance of industry, academic, and public agency representatives. An Annual Leadership Summit brings together cluster initiative as well as other leading state stakeholders to discuss important issues of concern to specific clusters as well as those common to many clusters.

Administrative boundaries

The programme is designed to serve clusters found within the state; therefore they may span local administrative boundaries.

5. Instruments

For both of Oregon's initiatives to support clusters, the engagement of actors and the reorientation of government services and policies are the most prominent instruments.

- *Identification and benchmarking:* In the context of the overall policy, the state has identified major industrial clusters in Oregon. The cluster initiatives in the Network go beyond the top 11 industry clusters. There is an active effort to promote benchmarking of cluster (industry) performance in Oregon with national statistics.
- *Engagement of actors:* After analysing the 11 industry clusters in greater detail, the OECDD may promote greater engagement of actors through its initiatives. The Network is specifically designed to bring together industry leaders with university researchers, schools, media, venture capital, and other resources as well as promote cross-cluster knowledge sharing and collaboration. The state has also recently hired consultants to reinforce the training of cluster facilitators, including in rural areas.
- *Government service delivery:* The OECDD is reorganising its orientation to be focused on clusters, and in particular those top clusters driving the state's economic growth. Any cluster may make submissions to the Oregon Business Plan such that the needs of their cluster are taken into account by state policy. Regular Network meetings are designed to identify ways that government policies and service delivery can better serve the development needs of clusters.
- *Skilled HR:* Skilled HR is an integral part of the state's Business Plan. Workforce development may be part of different cluster initiatives but it is not their primary focus at this time.
- *Entrepreneurship and innovation:* Innovation as an explicit goal is addressed by a separate plan under development for the Significant Research Centers that will promote greater research expertise in areas where Oregon has unique opportunities. OregonInC's plans for supporting other innovation initiatives are being defined. The Network is focused on cluster initiatives generally and seeks to promote entrepreneurship or innovation through knowledge sharing.
- *Resource allocation and investment (including branding):* It is expected that in the future the state level industrial clusters will benefit from more targeted resource allocation at the state level. Brand Oregon has launched a new national advertising campaign to promote Oregon's industry clusters. Therefore, being organised into a cluster helps facilitate marketing initiatives supported by the state. The Network is open to all cluster initiatives so the goal is not a competitive selection process that gives clusters a "label".

6. Programme evaluation and monitoring

Nature of evaluation mechanism and definition of success

Since the programme is in a starting phase, there have been no evaluations.

Results of evaluations, if any

There are no formal evaluations. However, initial feedback has shown that the clusters have expressed how helpful the process of providing information to the state and the various entities on their cluster needs. The process has required that they have a much more focused understanding of cluster dynamics which will help them become more effective in and of itself.

Bibliography

Oregon

Cortright, Joseph (1994), "Reinventing Economic Development: Ten Ideas for Market Driven Approaches to Promoting Industrial Competitiveness", Staff Report to the Joint Legislative Committee on Trade and Economic Development, October.

Cortright, Joseph (2003), "Oregon Industry Clusters: A Statistical Analysis", A report prepared by Impresa, Inc. for the Oregon Economic and Community Development Department, May 2003.

Cortright, Joseph (2006), Personal communications, 5th April.

Oregon Business Council (*www.orbusinesscouncil.org*).

Oregon Business Plan (*www.oregonbusinessplan.org*).

Oregon Competitiveness Index (2005) (*www.oregonbusinessplan.org/download/2006_Competitive Index_web.pdf*).

Oregon Economic and Community Development Department (*www.econ.state.or.us*).

Oregon Inc. (*www.oregoninc.org*).

Oregon Innovation Index 2004 (*www.econ.state.or.us/OCKEDrpt_811.pdf*).

Rosenfeld, Stuart (2001), "Networks and Clusters: The Ying and Yang of Rural Development", in the conference proceedings *Exploring Policy Options for a New Rural America*, of the Federal Reserve Bank of Kansas City, September, pp. 103-120.

US federal government

Drabenstott, Mark (2005), "A review of the federal role in regional economic development", Report for the Center for the Study of Rural America, Federal Reserve Bank of Kansas City, May.

Economic Development Administration of the US Department of Commerce (*www.eda.gov*).

EPSCoR/IDeA Foundation (*www.epscorfoundation.org/cdi/*).

US Department of Labor Employment and Training Administration WIRED Fact Sheet accessed at *www.doleta.gov/pdf/WIRED%20Fact%20Sheet.pdf*.

US Domestic Policy Council, Office of Science and Technology Policy (2006), *American Competitiveness Initiative: Leading the World in Innovation*, February, *www.ostp.gov/html/ACIBooklet.pdf*.

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(04 2007 06 1 P) ISBN 978-92-64-03182-1 – No. 55525 2007

OECD Reviews of Regional Innovation

Competitive Regional Clusters

NATIONAL POLICY APPROACHES

In today's globalising world, many nations and regions are struggling to maintain their competitive edge. The regional specialisations built up over decades are transforming rapidly. Many regions that were historically production centres in a given sector are losing out to lower-cost locations and reorienting to higher value-added niches. Yet even some of these upstream activities are being offshored. How durable are the competitive strengths on which regional economies are based?

National programmes to promote cluster-based approaches – linking firms, people and knowledge at a regional level – are being used to meet the challenge. Evolutions in regional policy, science and technology policy and industrial/enterprise policy are converging on the objective of supporting clusters at the regional level. Nevertheless, policy makers face a series of difficult choices given limited resources. For example, they may focus on the leading regions and sectors that drive national economic growth and technological breakthroughs or the lagging regions that need to reorient their economies to preserve jobs and diversify.

This report analyses the objectives, targeting, instruments and inter-governmental role sharing used by 26 programmes in 14 OECD countries. It will be of interest to policy makers, researchers, firms and others active in promoting innovation and competitiveness.

OECD*publishing*

www.oecd.org/publishing

ISBN 978-92-64-03182-1

04 2007 06 1 P

9 789264 031821