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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.

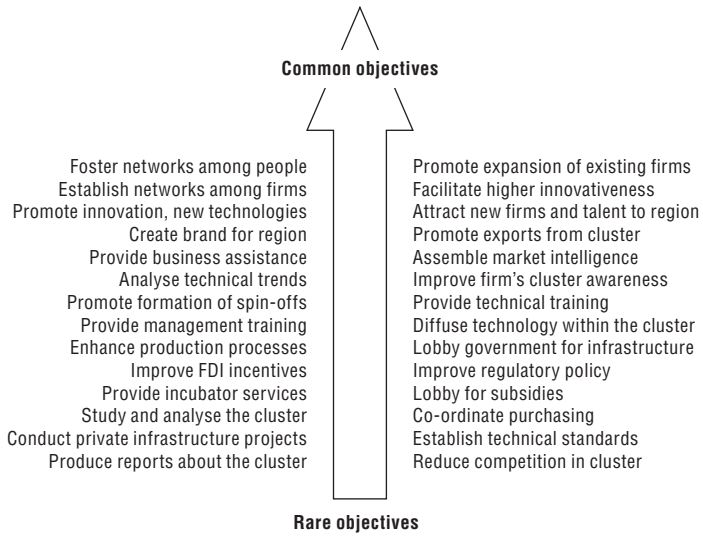
Building common goals. Potential members of a cluster need tools to motivate participation and guide common action. Programmes that bring actors together usually start with some form of study. Often this can be a mapping of cluster linkages, a competitiveness analysis, and/or the development of strategic 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,

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**

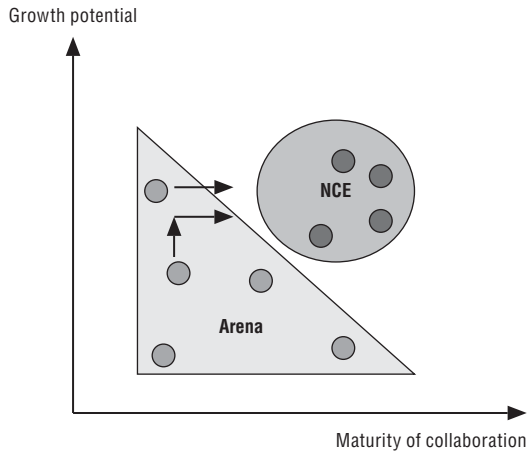
	Japan		Sweden	
	Knowledge Clusters	Industrial Clusters	VINNVÄXT	Visanu
Ministry/Agency	Ministry of Education, Culture, Sport, Science and Technology (MEXT)	Ministry of Economy, Trade and Industry (METI)	VINNOVA (Innovation Agency)	Nutek (National Agency for Economic and Regional Growth, VINNOVA, Invest 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).

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