

# **SUMMARY REPORT OF THE FOCUS GROUP ON CLUSTERS**

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## 1. Cluster analysis and the system of innovation approach

Understanding technical change and innovation is crucial for understanding the dynamics of ‘knowledge based economies’ (OECD, 1996) and ‘learning economies’ (Lundvall and Borrás, 1997). Differences in innovation performance and the related institutional setting of a country, partly explain variations in economic performance. In modern innovation theory the strategic behaviour and alliances of firms, as well as the interaction and knowledge exchange between firms, research institutes, universities and other institutions, are at the heart of the analysis of innovation processes. Innovation and the upgrading of productive capacity is seen as a dynamic social process that evolves most successfully in a network in which intensive interaction exists between those ‘producing’ and those ‘purchasing and using’ knowledge. As a result both innovation researchers and innovation policy-makers increasingly focus on the efficiency and efficacy by which knowledge is generated, diffused and used and on the dynamics of the related networks of production and innovation. Increasingly the notion **National Innovation System (NIS)** is used as conceptual framework for discussing these type of linkages and interactions among the numerous actors involved in processes of innovation.

Edquist (1997) pointed out that the NIS concept is in fact a specific type of a much larger family of ‘systems of innovation’ approaches which have system analysis as their common starting point but differ in the object and level of analysis (supranational, regional, sectoral or technological systems of innovation, clusters).<sup>1</sup> In this paper we discuss a perspective on the innovation system approach which focuses on networks of production and value chains. This paper reviews the **cluster perspective on innovation** as developed in the OECD Focus Group on Cluster Analysis and Cluster-based Policy (CACP). The cluster approach provides quite a number of advantages over the traditional sectoral perspectives when analysing innovation and innovation networks. These advantages are not limited to the analysis of innovation processes, but extend to the realm of innovation policy-making as well. Cluster-based policy aims at removing imperfections of innovation systems (systemic imperfections) by facilitating the efficient functioning of these systems. The main aim of this study is reviewing cluster methodologies, cluster analyses as well as cluster-based policy initiatives in the participating OECD-countries.

## 2. What is new in cluster analysis?

In this research programme economic **clusters** are defined as being networks of production of strongly interdependent firms (including specialised suppliers) linked to each other in a value-adding production chain. In some cases clusters also encompass strategic alliances with universities, research institutes, knowledge intensive business services, bridging institutions (brokers, consultants) and customers. Successful and innovative firms have become more dependent upon knowledge and know-how in organisations other than their own. The cluster concept focuses on the linkages and interdependence between actors in the value chain when producing products and services and creating innovations. The cluster concept goes beyond ‘simple’ horizontal networks in which firms, operating on the same end product market and belonging to the same industry group, co-operate on various aspects (like joint R&D, demonstration programmes, collective marketing or joint purchasing policy).

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<sup>1</sup> Edquist (1997), p. 3-15.

Clusters most often are cross-sectoral (vertical and/or lateral) networks and contain dissimilar and complementary firms specialised around a specific link or knowledge base in the value chain.<sup>2</sup>

By specifying strict boundaries for industries or sectors (mostly based on some statistical convention), the traditional research approach fails to take into account the importance of interconnections and knowledge flows within a network of production (Rouvinen & Ylä-Anttila, 1997: 20). Compared to the traditional sectoral approach, which focuses on strategic groups of similar firms with similar network positions, the cluster concept offers a new way of looking at the economy and is more in line with the modern and interactionistic innovation theory, with changed market developments and with the changing character of market-based capitalism (Dunning, 1997; Roelandt et al, 1997). The sectoral approach focuses on horizontal relations and competitive interdependence (relations between direct competitors with similar activities and operating in the same product markets) whereas the cluster approach in addition focuses at the importance of vertical relationships between dissimilar firms and symbiotic interdependence in the value chain (Pfeffer and Salancik, 1978). Although, innovations are stimulated by the horizontal struggle between competitors operating on the same product markets, vertical relations between suppliers, main producers and users are also important for creating innovations.

Table 1 adopted with changes from Porter’s work (1997), summarises the main differences between the traditional sectoral approach and the cluster-based approach.

<b>Table 1 – Traditional sectoral approach versus Cluster-based approach</b>	
<i>Sectoral approach</i>	<i>Cluster-based approach</i>
<ul style="list-style-type: none"> <li>• Groups with similar network positions.</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic groups with mostly complementary and dissimilar network positions.</li> </ul>
<ul style="list-style-type: none"> <li>• Focus on end product industries.</li> </ul>	<ul style="list-style-type: none"> <li>• Include customers, suppliers, service providers and specialised institutions.</li> </ul>
<ul style="list-style-type: none"> <li>• Focus on direct and indirect competitors.</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporate the array of interrelated industries sharing common technology, skills, information, inputs, customers and channels.</li> </ul>
<ul style="list-style-type: none"> <li>• Hesitancy to co-operate with rivals.</li> </ul>	<ul style="list-style-type: none"> <li>• Most participants are not direct competitors but share common needs and constraints.</li> </ul>
<ul style="list-style-type: none"> <li>• Dialogue with government often gravitates towards subsidies, protection and limiting rivalry.</li> </ul>	<ul style="list-style-type: none"> <li>• Wide scope for improvements on areas of common concern that will improve productivity and raise the plane of competition.</li> <li>• A forum for more constructive and efficient business-government dialogue</li> </ul>
<ul style="list-style-type: none"> <li>• Looking for diversity in existing trajectories</li> </ul>	<ul style="list-style-type: none"> <li>• Looking for synergy and new combinations</li> </ul>

Source: Adapted from Porter, 1997.

<sup>2</sup> Clusters defined in this way can be interpreted as innovation systems at a reduced scale level. This implies that similar dynamics, system characteristics and interdependencies as described for national innovation systems exist for specific clusters. This also implies that the idea of systemic imperfections can be used as a starting point for developing cluster-based innovation policies (see section 4 of this paper).

The main goal of first stage of the research programme of the OECD-focus group on “cluster analysis and cluster-based policy” was to gain a better understanding of successful innovative behaviour in various clusters. Box 1 summarises the common starting points of the focus group work. The empirical work done in this field seems to support these central starting points<sup>3</sup>. Most research reported in the CACP research group focus on mutual interdependency and interaction between actors in the value chain when analysing innovation. They have in common their focus on networks of strongly interdependent firms and linkages between business and the knowledge infrastructure (universities, research institutes). This interdependency is in some cases based on trade linkages, sometimes on innovation linkages, sometimes on knowledge flow linkages and sometimes based on a common knowledge base or common factor conditions.

**Box 1: Starting points of OECD Focus Group on Cluster Analysis & Cluster Policies**

- Firms rarely innovate in isolation but in networks of production (OECD, DSTI/STP/TIP[97]13). Most innovative activities involves multiple actors and stems from combining complementary and specialised competencies and knowledge of various actors.
- The synergy that arises from the combination of complementary knowledge of dissimilar firms and knowledge organisations and the need for firms to cope with the increasing dependency upon their environment are the driving force for the emergence of innovative collaborative agreements and cluster formation.
- The common theoretical starting point lies within the interactionistic innovation theory and the innovation system approach, stating that innovation basically is an interactive learning process and demands knowledge exchange, interaction and co-operation between various actors in a network of production or value chain.
- Important innovations stems from “new” combinations of complementary and dissimilar knowledge and competencies.
- Different types of networks and markets ask for different innovation styles.
- Cluster initiatives originate from a trend toward governance forms based on networks and partnerships. It coincides with a trend in policy making from direct intervention towards creating mechanisms and incentives of indirect facilitating the networking process. The role of the government needs to be redefined as a facilitator of networking and as a catalyst, broker and institution builder.

Theory and practice have revealed that the interaction between the different agents involved in the process of innovation is quite important for successfully innovating (see Morgan, 1996; Lagendijk & Charles, 1999). Firms almost never innovate in isolation (DeBresson, 1996). Networks of innovation are the rule, not the exception, and most innovative activity involves multiple actors (OECD, 1997, p. 3). Figure 1 illustrates the importance of network relations in clusters when innovating.<sup>4</sup> Most of the innovative firms in the clusters are co-operating with suppliers, competitors, clients or equipment suppliers. Innovative firms need tight relations with suppliers and clients, which have complementary technology and competencies.

<sup>3</sup> Roelandt & Den Hertog (eds.) (1999), DeBresson (1996), European Commission (1997), Hagendoorn & Schakenraad (1990).

<sup>4</sup> Van den Hove, et al. (1998).

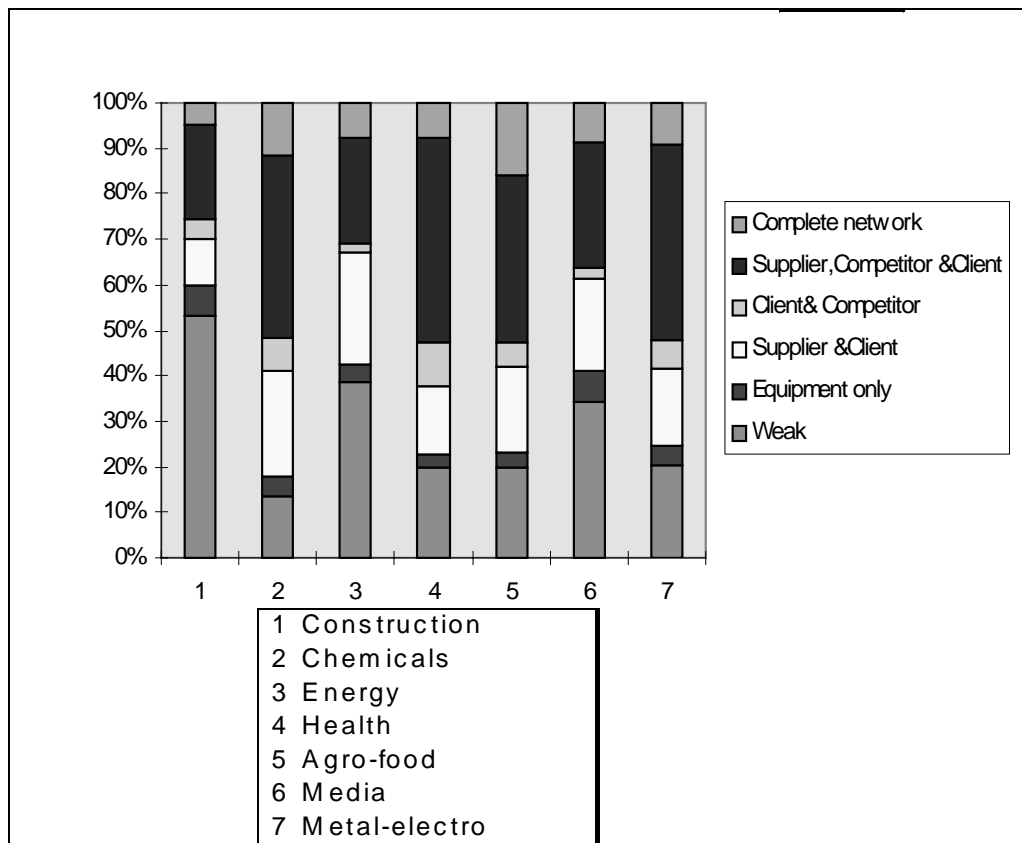


Figure 1 - Networks of Innovation in clusters in the Netherlands, 1992 <sup>5</sup>

For successfully innovating companies are becoming more dependent upon complementary knowledge and know-how in companies and institutions other than their own. Innovation is not so much the activity of a single company (like the ‘heroic Schumpeterian entrepreneur’), but requires an active search process to tap new sources of knowledge and technology and to apply them to products and production processes. A firm’s competitiveness is becoming more dependent upon the ability to apply new knowledge and technology in products and production processes. At the same time, the rate of specialisation is also on the increase (Yoshitomo, 1997). Companies are developing strategies to cope with the increasing dependency upon their environment by a more flexible organisation and the integration of various links in the production chain through entering strategic alliances, joint ventures and consortia. This process of division of labour between dissimilar and complementary firms is based on the strategic choice firms have to make between internalising knowledge or sharing information with external actors. The main goals of most strategic alliances has been to gain access to new and complementary knowledge and to speed up the learning processes. There has been a shift by firms towards dis-internalising activities along and between value chains and towards specialisation on those activities that require resources and capabilities in which firms already have or can easily acquire competitive advantage. In the literature the concept of “*alliance capitalism*” (Dunning, 1997) is used to indicate this new stage in the development of modern economic systems: the co-existence of competition, sharpened by globalisation and liberalisation, with an increasing number of network relations and strategic alliances.

In practice the incentives for cluster formation differ quite considerably. The **principle incentives for cluster formation** <sup>6</sup> are: (i) to gain access to new and complementary technology; (ii) to capture

<sup>5</sup> For further details, see: Van den Hove et al. (1998).

<sup>6</sup> In fact the incentives mentioned apply for creating cross-border strategic alliances as well (Dunning, 1997; Boekholt & Thuriaux, 1999; Porter, 1997; Hagendoorn, 1993)

economics of synergy or economies of interdependent activities; (iii) to spread risks; (iv) to promote joint R&D efforts with suppliers and users; (v) as a defensive strategy to reduce competition; (iv) to obtain reciprocal benefits from the combined use of complementary assets and knowledge; (v) to speed up the learning process; (vi) to lower transaction costs; and, (vii) to overcome (or to create) entry barriers in markets.

### 3. The scope of cluster analysis

In the various countries in which cluster analysis is practised it resulted in useful information about the actors involved in clusters, value chain relations of firms, innovation interaction linkages as well as the institutional setting of clusters' innovation systems and imperfections of these cluster-based innovation systems. Most of the countries' contributions have in common that they are *on networks of strongly interdependent firms or industry groups*,

- in some cases based on *trade linkages* (Hauknes, 1999; Roelandt et al., 1999; Bergman & Feser, 1999),
- sometimes on *innovation linkages* (DeBresson & Hu, 1999),
- sometimes on *knowledge flows linkages* (Viori, 1995; Poti, 1997; Roelandt et al., 1999; Van den Hove et al, 1998), and
- sometimes based on a *common knowledge base or common factor conditions* (Dreijer et al, 1999)

The common starting point of all these perspectives is the assumption that firms need a network of suppliers, customers and knowledge producing agents to innovate successfully. Most cluster analyses use a combination of different techniques at different levels of aggregation. Table 2 summarises how the variety on both level of analysis and cluster techniques as well cluster concept used works out for a number of countries. Most countries combine various techniques to overcome the limitations of using one single technique as different methodologies answer different questions and provide different sorts of information.

#### *What do we learn from cluster analyses?*

The various countries' cluster analyses also have revealed the **value added of using cluster analysis**<sup>7</sup>. In the CACP focus group the following advantages of cluster analysis have been indicated:

- It offers a new way of thinking about the economy and organising economic development efforts and it is a useful alternative for the limitations of the traditional sectoral analysis.
- Cluster analysis has better aligned with the changed nature of competition and market-based innovation systems and the main sources of competitive advantage. Cluster analysis capture important linkages in terms of technology, skills, information, marketing and customer needs that cut across firms and industries, Such linkages and interdependencies are fundamental to the direction and pace of innovation.
- Cluster studies have improved the understanding of innovation systems at a reduced scale level, including systemic imperfections and policy options.

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<sup>7</sup> See more in particular the contributions of Dreijer et al (1999); Roelandt et al.(1999); Rouvinen and Ylä-Anttilla (1999); DeBresson & Hu (1999), as well as DeBresson (1996) and Porter (1997).

**Table 2 – Level of analysis, Cluster technique and cluster concept adopted in various countries**

Country	Level of analysis			Cluster technique				Cluster concept
	micro	meso	macro	I/O	Graph	Corres	Case	
AUS		x	x	X		x	x	networks of production, networks of innovation, networks of interaction
AUT		x	x				x	Patent data & trade performance Marshallian industrial districts
BEL	x				X			Sciento-metrics networks or chains of production, innovation and co-operation
CAN		x	x	X			x	systems of innovation
DK	x	x		X	X		x	resource areas
FNL	x	x					x	clusters as unique combinations of firms tied together by knowledge
GER	x	x		X		x		similar firms and innovation styles
IT		x		X				inter-industry knowledge flows
MEX		x	x				x	systems of innovation
NL		x	x	X			x	value chains and networks of production
SP		x		X			x	systems of innovation
SWE		x					x	systems of interdependent firms in different industries
SWI	x	x				x	x	patent data networks of innovation
UK	x	x					X	regional systems of innovation
USA		x		X			X	chains and networks of production

- Cluster studies have been the corner stone of industrial policy making in a lot of countries. Cluster studies not only provide an analytic tool to analyse systems of innovation, but can also be used as a working method for policy making in this area and as an economic development tool for strategic business development, in industrialised countries as well as in developing countries (Ceglie, 1999).
- Cluster analysis provides options for recasting the role of the private sector, government, trade associations and educational and research institutions and brings together business development opportunities of firms of all sizes and across traditional industry lines.
- Cluster analysis provides a starting point for creating a forum for constructive business-government dialogue. Not only common problems have been identified, but basically cluster analyses identify common development opportunities and highlights attractive public and private investment opportunities.

#### **4 Countries' strategies in cluster-based policy**

Clustering and networking basically is a bottom-up, market-induced and market-led process. Following the classical line of reasoning the primary task of government should be to facilitate the dynamic functioning of markets and make sure that co-operation does not lead to collusive behaviour which restricts competition. This classical line of reasoning can be criticised for its limited scope and has not aligned with the changing character of market-based innovation systems, the growing understanding of the functioning of market-based innovation systems and insights derived from modern innovation theory. Nevertheless, cluster studies have also revealed the need to redefine the role of the government as a facilitator of networking, as a catalyst of dynamic comparative advantage and as an institution builder, creating an efficient incentive structure to remove systemic inefficiencies in systems of innovation.

Four rationales for innovation and industrial policy-making can be identified in the various countries' contributions: (i) creating favourable framework conditions for an efficient and dynamic functioning of markets; (ii) externalities associated with investments in knowledge; (iii) the economic role of government as a demanding customer, and (iv) systemic imperfections. Most countries' industrial and innovation policy-making actually focus on improving the efficient functioning of their systems of innovation. The latter rationale is increasingly seen as the key rationale for systemic innovation and industrial policies.

In practice countries' cluster policy approaches differ. One fundamental difference refers to the distinction between a *bottom up approach* on the one hand and a more or less *top down approach* on the other.<sup>8</sup> The first approach basically focuses on fostering dynamic

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<sup>8</sup> Boekholt & Thuriaux (1998).

market functioning and removing market imperfections and the starting point lies in market-induced initiatives with the government acting as a facilitator and moderator without setting national priorities (like for instance in the USA and The Netherlands). In the latter approach government (in dialogue with industry and research agencies) sets national priorities, formulates a challenging view for the future and - before starting the process of dialogue - decides on the actors to be involved in the dialogue process (like for instance in some of the Nordic countries). After having set national priorities and having initiated the dialogue groups the clustering process further is a market-led process without much government interference.

What countries' strategies in cluster-based policy can be discerned? Policy researchers<sup>9</sup> mention various government roles in cluster-based policy, for example:

- establishing a stable and predictable economic and political climate.
- creating favourable framework conditions for a smooth and dynamic functioning of markets (infrastructure, competition policy and regulatory reform, providing strategic information),
- creating a context that encourages innovation and upgrading by organising a challenging economic vision for the nation or region,
- raising awareness of the benefits of knowledge exchange and networking,
- providing support and appropriate incentive schemes for collaboration and initiating network brokers and intermediaries that bring together actors,
- acting as a facilitator and moderator of networking and knowledge exchange,
- acting as a demanding and launching customer when addressing needs,
- facilitating an arena for informal and formal exchange of knowledge,
- setting up competitive programs and projects for collaborative research and development,
- providing strategic information (technology foresight studies, strategic cluster studies).
- government should ensure that (public) institutions (especially schools, universities, research institutes) cultivate industry ties,
- governments can assure that rules and regulations maximise the flexible adaptation to changed market conditions and stimulate innovation and upgrading processes.

In most countries with cluster-based policies these initiatives have originated from a trend towards designing governance forms and incentive structures to reduce systemic imperfections within their systems of innovation. These policy responses to systemic imperfections can be categorised as follows: (i) establishing a stable and predictable economic and political climate, (ii) creating favourable framework conditions for the efficient and dynamic functioning of free markets, (iii) stimulating (the lack of)

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<sup>9</sup> See for example Boekholt & Thuriaux (1999); Heath (1999); Rouvinen et al (1999); Roelandt et al. (1999); Legendijk & Charles (1999); Ormala (1997), Held (1996) and Porter (1997).

<b>Table 3 - Cluster-based policy response to systemic imperfections</b>		
<i>Systemic imperfections</i>	<i>Policy response</i>	<i>Countries' focus in cluster-based policy making</i> <sup>10</sup>
I. inefficient functioning of markets	<ul style="list-style-type: none"> <li>• competition policy and regulatory reform</li> </ul>	<ul style="list-style-type: none"> <li>• most countries</li> </ul>
II. informational failures	<ul style="list-style-type: none"> <li>• technology foresights</li> <li>• strategic market information &amp; strategic cluster studies</li> </ul>	<ul style="list-style-type: none"> <li>• Sweden, The Netherlands, Germany</li> <li>• Canada, Denmark, Finland, The Netherlands, USA</li> </ul>
III. limited interaction between actors in innovation systems	<ul style="list-style-type: none"> <li>• broker and networking agencies and schemes</li> <li>• provide platforms for constructive dialogue</li> <li>• facilitating co-operation in networks (cluster development schemes)</li> </ul>	<ul style="list-style-type: none"> <li>• Australia, Denmark, The Netherlands,</li> <li>• Austria, Denmark, Finland, USA, The Netherlands, UK, Sweden, Germany</li> <li>• Belgium, Finland, UK, USA, The Netherlands</li> </ul>
IV. institutional mismatches between (public) knowledge infrastructure and market needs	<ul style="list-style-type: none"> <li>• joint industry-research centres of excellence</li> <li>• facilitating joint industry-research co-operation</li> <li>• human capital development</li> <li>• technology transfer programmes</li> </ul>	<ul style="list-style-type: none"> <li>• Belgium, Denmark, Finland, Spain, Sweden, Switzerland, The Netherlands, Germany</li> <li>• Spain, Finland, Sweden,</li> <li>• Denmark, Sweden</li> <li>• Spain, Switzerland</li> </ul>
V. missing demanding customer	<ul style="list-style-type: none"> <li>• public procurement policy</li> </ul>	<ul style="list-style-type: none"> <li>• Austria, The Netherlands, Sweden, Denmark</li> </ul>
V. government failure	<ul style="list-style-type: none"> <li>• privatisation</li> <li>• get out of subsidy business</li> <li>• horizontal policy making</li> </ul>	<ul style="list-style-type: none"> <li>• Most countries</li> <li>• Canada</li> <li>• Denmark, Finland, Canada</li> </ul>

<sup>10</sup> This table intends to indicate the most important characteristics of a country's cluster-based policy. A more comprehensive study to fill in the policy matrix is conducted by Technopolis. See: Boekholt & Thuriaux (1998) and Boekholt & Thuriaux (1999).

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- |                                      |                           |
|--------------------------------------|---------------------------|
| • public consultancy                 | • Canada, The Netherlands |
| • downsizing government interference | • Canada, USA             |
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interactions and knowledge exchange between the various actors in systems of innovation, (iv) removing informational failures by providing strategic information, (v) removing institutional mismatches and organisational failures within systems of innovation, like for instance mismatches between the (public) knowledge infrastructure and the private needs in the market or a missing demanding customer in the value chain. (vi) removing government failures and government regulations that hinders the process of clustering and innovation. Table 3 summarises the countries' cluster-based policy responses to systemic imperfections.

In general in a lot of countries the clustering process have been initiated by the establishment of forums, platforms and regular meetings of firms and organisations related to a particular network of production the value chain. Strategic information (technology foresight studies and strategic cluster studies) is often used as an input to the process of dialogue. The way this is actually organised differs between countries, depending on national traditions and culture in policy making, the way dialogue between industry, research and governments have institutionalised in a country, the scale and cope of the country and a country's level of government interference and the specific composition of economic activities and relevant technologies in a country's economy.

Our review of cluster-based industrial policy making experiences in OECD-countries clearly has pointed at some *pitfalls* in cluster-based industrial policy making. These pitfalls indicate leading policy principles when designing a comprehensive cluster-based policy:<sup>11</sup>

- (i) The creation of clusters should not be a government-driven effort but should be the result of market-induced and market-led initiatives.
- (ii) Government policy should not have a strong orientation towards directly subsidising industries and firms or to limiting the rivalry in the market.
- (iii) Government policy should shift from direct intervention to indirect inducement. Public market interference only can be justified if there is a clear market or systemic failure. And if there are clear market and systemic imperfections, it can not necessary be concluded that government intervention will improve the situation.
- (iv) Government should not try to take the direct lead or ownership in cluster initiatives, but basically should work as a *catalyst and broker* that brings actors

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<sup>11</sup> See also Held (1996), Porter (1997), Roelandt et al. (1999), Rouvinen et al. (1999), and Dunning (1997).

together and supplies supporting structures and incentives to facilitate the clustering and innovation process.

- (v) Cluster policy should not ignore small and emerging clusters; nor should it focus only on 'classic' and existing clusters.
- (vi) Clusters should not be created from "scratch" of declining markets and industries. Sometimes the notion of clusters is appropriated by (industrial) policy makers and used as an excuse to continue more or less traditional ways of defensive industrial policy making.

Reviewing the various policy initiatives in the participating countries reveals the following common *features of cluster-based policy* in OECD-countries:

- (i) a vigorous competition and regulatory reform policy (almost all countries),
- (ii) providing strategic information by technology foresight studies (e.g. Sweden, The Netherlands), cluster studies (e.g. Finland, Denmark, Sweden, The Netherlands, U.K., USA, Austria, Italy), special research groups (e.g. Denmark, the Austrian TIP-research programme, the German Delphi-report), or special websites (e.g. like STRATEGIS in Canada),
- (iii) broker and network agencies and schemes (e.g. The Danish network programme, The Dutch Innovation Centres),
- (iv) cluster development programmes (e.g. cluster programmes in Finland and The Netherlands, regional development agencies in UK, USA and Germany and the Flemish R&D-support to clusters),
- (v) initiating joint industry-research centres of excellence (e.g. Belgium, Denmark, Finland, Germany, Spain, Sweden, Switzerland and The Netherlands),
- (vi) public procurement policy (e.g. Austria, Denmark and The Netherlands),
- (vii) institutional renewal in industrial policy making (e.g. Finland and Canada), (viii) providing platforms for constructive dialogue (e.g. the US focus groups, the Danish reference groups, the proposed Swedish industrial system approach, the U.K. regional development agencies, the Dutch broker policy, the Finnish National Industrial Strategy and the German Council for Research, Technology and Innovation).

Most countries use the cluster approach to organise a market-led economic development strategy by initiating dialogue between the various actors in their relevant systems of innovation. In much of the countries participating in the CACP focus group (USA, UK, Finland, Denmark, Sweden, The Netherlands) cluster-based policy is seen as a market-led business development strategy bringing together actors and organisations and fostering knowledge exchange and knowledge transfer. One common lesson from our cluster-based policy review is that cluster studies not only provide an analytic tool to analyse systems of innovation at the reduced scale level of networks, but in practice can also be used as a working method for policy-making and as an economic development tool for strategic business development. Cluster policy-making in that sense is – as many

policy processes – a policy learning process and requires a willingness from the side of policy-makers to see cluster policy-making as a continuing learning process.

Creating incentives for innovative behaviour in the market also requires innovations in policy-making and institutional renewal of government agencies (Ormala, 1997; Sulzenco, 1997; Roelandt et al, 1999). There is a strong need growing for ‘horizontal policy’, integrating the various aspects of functionally-organised policy instruments (e.g. education policy, science policy, trade policy, competition policy, technology policy, public works, fiscal policy and so on). According to Ormala (1997) governments are not necessarily organised to manage innovation policy in the best possible way. Ministries usually have sectoral and functional responsibilities. Innovation policy demands for horizontal policies, which requires a co-ordinated contribution from a number of different sectors. Governments have a key role to play not only in managing knowledge in their ministries and agencies but also in improving the acquisition and application of knowledge on an economy-wide base (Ormala, 1997: 5).

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