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## PANEL I
## INNOVATION AND CLUSTERS

## CONFERENCE DOCUMENT

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## PANEL I: INNOVATION AND CLUSTERS

The aim of this paper is to provide a framework for discussion on 'Clusters and Innovation'. In the modern economy, the cornerstone of economic development is innovation – economic growth of national economies depends on their effectiveness in creating, diffusing and implementing new knowledge. The Bologna Charter on SME policies, adopted in June 2000, recognises the vital contribution of innovation to SME competitiveness, the central role played by SMEs in national innovation systems and the importance of improving access to information, financing and networking in facilitating the innovation process. In this respect, clustering can bring a wide range of benefits to both business and the wider economy: clusters increasingly determine the innovation performance of firms by becoming incubators for specific skills and knowledge. This paper first provides a general introduction to the topic of clusters. Then, the innovative potential of SMEs will be presented leading up to the crucial role of clusters in the process of innovation. The paper concludes with several questions for debate and discussion.

## THE NATURE AND IMPORTANCE OF ENTERPRISE CLUSTERS

### What are enterprise clusters?

Clusters have been defined (Porter 1998) as 'geographic concentrations of interconnected companies and institutions in a particular field'. Physical proximity facilitates the transmission of knowledge and enhances the development of institutions, which in turn enhance cluster effectiveness. A cluster can contain a small or a large number of enterprises and firms of different size. Porter counts institutions (formal organisations) such as universities as integral parts of a cluster. The agglomeration of firms and their suppliers permits the creation of locally concentrated and sometimes specialised labour markets. For Porter, clustering can encourage an enhanced division of labour among firms with physical proximity among numerous competing producers fuelling innovation.

Clusters spontaneously occur in the presence of several factors, such as: the proximity to markets, the existence of a pool of specialised labour, the presence of input equipment suppliers, the availability of specific natural resources and infrastructure, low transaction costs due to geographic proximity among actors and access to information, as can be the case in the vicinity of universities and research institutes. On some occasions, firms may decide to base co-operation on more formal arrangements to foster the exchange of information and learning by creating a regional innovation network (European Commission 2002).

Policymakers are aware that polices sustaining clusters can enhance productivity, the rate of innovation and the competitive performance of cluster firms. Cluster policies share several characteristics: in general, cluster policy demands a shift from focusing on individual firms to local/regional systems of firms and firms' value adding environment. It commands more interest in the

local agglomeration of SMEs and an improvement of regional potential. In addition, cluster policy tries to stimulate social cohesion encouraging trust-based interaction to increase the flow of knowledge. Public actors should play the role of a facilitator creating an environment conducive to endogenous cluster growth (Ionescu et al. 2001).

## INNOVATION AND SMES

### What is innovation?

In this paper, we consider innovation as the introduction of practical applications of a new idea to the marketplace. An innovation may be a new or improved product or service, a process or a management improvement, or it may impact on a small part of an already existing product. An innovation influences company competitiveness: it increases the firm's capacity to rapidly answer to new market demands and competitors by improving the effectiveness of the production process and speeding up its adaptation to changes in the environment.

### What is the contribution of small firms to innovation?

SMEs are a very heterogeneous population of firms and, therefore, contribute to innovation in very different ways. On the one hand, in recent years, there has been a propensity to spend more on Research and Development (R&D) by SMEs. On the other hand, SMEs still struggle to find other ways to compensate for a lack of resources dedicated to R&D to achieve innovation (OECD-DATAR 2001).

Empirical studies relating R&D to firm size suggest that SMEs play an increasingly important role in R&D activity. Investment in innovative activities seems to be on the rise in SMEs. The National Science Foundation of the United States shows that the total expenditures for industrial R&D by SMEs has increased almost three-fold between 1985 and 1995 in the United States, while in the largest firms, the increase has been only about 20%. The National Science Foundation also found an increase in the R&D-sales ratio from 3.4% in 1985 to 3.9% in 1995 for SMEs, whereas the R&D-sales ratios of the largest corporations fell from 3.5% to 3.1%. Evidence also shows that the propensity to patent, which is a measure of the production of new technological knowledge, tends to increase as firm size decreases (OECD 2001 b).

Relying on a minimum of internal R&D, SMEs can create innovative products by using non-R&D inputs. So, while, some SMEs in high-tech sectors can make intense use of science-based knowledge and are active technology developers, most SMEs operate in medium- to low- technology environments and innovate without using formal R&D inputs. In a more systematic approach to understanding innovation in SMEs, the European Community Innovation Survey distinguishes between R&D and non-R&D investment. For SMEs, non-R&D inputs are important and can be of two types: a) capital equipment or input-embodied innovation; and b) design innovation. In the first case firms acquire new process technologies or intermediate products which allow them to benefit from innovations developed elsewhere. In the second case, design innovation refers to incremental improvements in products that do not radically change their function or technological base but allow firms to better meet customer requirements (OECD 2001 b).

The European Commission (European Commission 2001) have classified SMEs in relation to their approach to innovation. The study shows that there are three types of firms. Firstly, there are the *technology developers*, which make up only 1-3% of the total population of SMEs who invest significantly in research (75% of those invest more than 20% of their turnover in research), young companies that include spin-offs from universities and research laboratories. Secondly, there are the *leading technology users* who invest on average about 11% of their turnover in R&D covering 10-15% of SMEs. Thirdly, there are firms falling into the category of *technology followers* who invest less than 5% of their turnover in R&D. This category represents 80-85% of the SME population which in turn can be divided into potential innovators (40%) and non-innovators (60%).

### What are the obstacles for SME innovation?

The development of SMEs increasingly depends on their capacity to put innovation in their business strategy and implement innovative processes. Access to information, financing and networking between firms, and the ability to manage innovation are indispensable conditions in fostering SME competitiveness. Many studies, however, reveal difficulties and impediments to SMEs in implementing innovative processes.

While SMEs may enjoy an edge in flexibility and adaptability, they have limited financial resources and many have not yet developed a culture of innovation. In addition, SMEs suffer from a lack of highly-trained personnel: This is due to deficiencies in linking universities with firms, in improving education and in harmonising the vocational training system with technological change. Another obstacle is inadequate access to technological know-how: Links between firms and research centres, as well as information networks on technological know-how, need to be improved. Last but not least, high costs and/or complex procedures to register or defend patents represent an additional burden (OECD 2001 a).

In the following paragraphs, clustering (and networking) will be presented as a tool to overcome hurdles to SME innovation outlined above.

## CLUSTERS AND INNOVATION

### What is the innovative performance of clusters?

Clusters create favourable conditions for the creation and spreading of innovations. According to Kantor (Kantor 1995) there are three dimensions to improving competitiveness of cluster firms: innovation, imitation-competition and entrepreneurial energy. Innovation is necessary to generate new ideas, to find more efficient production processes and to open up new markets. Universities and research centres may attract governmental funds, but the most valuable innovations are perfected by businesses. Imitation and competition help to circulate new concepts and practices among cluster companies' thereby further spurring innovation. And lastly, entrepreneurial energy is the fuel that drives cluster growth.

When SMEs are located in proximity with competitors, clustering allows them to take advantage of knowledge spill-overs, especially in the early stages of the cluster life cycle. The diffusion of innovation by clusters will be discussed further (OECD 2001 b) below.

**How do clusters diffuse innovation?**

Firms in a cluster constantly innovate due to competitive peer pressure and the flow of information between firms clustering together. In general, the growth of regional clusters results from the ability to innovate based on local environment conditions: innovative performance depends on investment in innovation, on technological opportunities and on the effectiveness and the focus of innovative activities. The effectiveness of innovative activities is a function of the skills and knowledge of researchers, managers and workers, the information available to them, and the firm's ability to bring innovations to the marketplace (OECD 2001 a).

Ideas and information, basic tools of innovation, often flow easily in clusters. Many studies on the geography of innovation (Enright 2001) demonstrate that the innovation process in general tends to be highly localised. Information flows occur formally and informally. Informal and oral communication proves to be a critical aspect for diffusing innovation. The geographic concentration of firms, suppliers and buyers found in many clusters provide short feedback loops for ideas and innovations. This is very important for products and services that emerge through an interactive process between customer and producers or in industries in which suppliers or buyers are important sources of new products or services.

Clusters often become repositories for industry-specific skills and capabilities that add to the innovation process. Over time, knowledge cumulates, skills are handed down from worker to worker, and industry-specific knowledge becomes common knowledge within the cluster. Regional clusters often provide focal points for investments and new business activities. Local industry associations play a role in fostering innovation by providing commercial information on foreign markets, research for example. In addition, local governments often make contributions to industry-specific infrastructure to encourage innovation.

**What innovation styles exist in clusters?**

Type, characteristics and the way in which knowledge is diffused account for differences in cluster innovation style. The type of knowledge may differ between clusters in the sense of the relative importance of tacit and codified forms of knowledge or the degree to which knowledge is science-based or more application-oriented. An important variable that often makes cluster innovations so different from one another is the considerable variation in networking practices shaped by national and local culture (Kantor 1995).

**What is the role of innovation in the life of a cluster?**

Innovation is one of the elements responsible for the growth of clusters. Innovators generate and commercialise new ideas, find more efficient processes or create new markets. Although university and advanced research centre-based R&D attract much of the resources and attention of governments, many of the most valuable innovations are improvements in business and production routines, devised by employees, such as in application of existing technologies, design production and management, marketing of products, and organisation of labour. Customers, suppliers, competitors and tool builders are important sources for this innovation. New ideas and new enterprises generate clusters growth (Rosenfeld 2002).

An ideal-type model exists to delineate the steps of emerging and growing clusters. In the beginning, the birth of a cluster is often determined by historical conditions, such as specific knowledge present in R&D organisations, traditional know-how or new technological innovations. Once an agglomeration of firms and its support institutions are in place, learning and technological spill-overs take on a role of primary importance. In this phase, localised forms of knowledge are able to supply cluster firms with professional knowledge that small firms seldom acquire by themselves, but which are vital to achieve further innovation. After a phase of cluster growth attracting outside firms and skilled workers follows a period of decline blocking further innovation due to rigid specialisation and 'lock in' syndrome (OECD a 2001).

**What strategies can be pursued to foster innovative clusters?**

In the following paragraphs, several avenues of policy support, such as the provision of advice and technical support to firms, the creation of science parks and the fostering of ties with research institutes will be presented. Different strategies need to be tailored to the different stages of the life-cycle of a cluster.

Governments sometimes provide business services ranging in sophistication from basic research to advice on book-keeping. Well-known examples of such service provision include technical extension centres in Northern Italy, Germany Steinbeis Foundation centres and the Manufacturing Extension Partnership (MEP) in the United States.

In addition, various sub-national bodies have sought to develop technopoles, a generic term covering a spectrum of initiatives from technology incubators, to science parks and even larger agglomerations. Such programmes have been driven both by the expectation that economic benefits will follow from bringing together firms in 'high-tech' fields, and by the desire to realise commercial returns from investment in scientific and technological research. These initiatives are implemented by local government bodies whose economic development strategies are based on the exploitation of existing university and other research potential. This is motivated by a desire to stimulate the expansion of the local high technology base, either by the creation of new companies or attracting existing ones (Nolan 2002).

Another strategy to facilitate cluster innovation is to foster the links between universities and firms. A number of internationally renowned clusters have developed around institutions of higher education and technical training. In addition to facilitating access to research, proximity to universities and training institutions can be important in recruiting highly qualified graduates, creating prestige and accessing information. University/industry partnership mechanisms can range from grants and fellowships to targeted research contracts, collaborative research and consortia agreements, training, mobility and networking programmes. In terms of functional goals, such partnerships often seek to enhance the commercialisation and diffusion of technology, create enterprise spin-offs and support strategic research and technology objectives (Nolan 2002).

**QUESTIONS FOR DEBATE**

1. How can innovation policy to increase cluster growth be implemented?

2. How can policy makers help develop the strategic links between firms and universities/research institutes?

3. How can technological and non-technological knowledge in clusters be improved?

4. How can vocational training be adapted to innovations and technological change?

5. How can the burden of high costs or complex procedures be removed from the implementation of an innovative process?

6. How can the formal and informal communication flow in a cluster be improved to foster the circulation of new ideas?

## BIBLIOGRAPHY


European Commission (2001), *'Regional Clusters and Networking'*, Observatory of European SMEs, Co-ordinated by Agder Research Foundation, Arne Isaksen, Elisabeth Hauge.

European Commission (2002), '*Regional Clusters in Europe'*, Observatory of European SMEs – Enterprise Publications- 2002/N.3.

Enright J., Ifor Ffowcs W., *'Local Partnership, Clusters and SME Globalisation'*, background report, OECD

Enright J. (2001), *'Regional Clusters: what we know and what we should know'*, Innovation Clusters and Interregional competition, International Workshop, Kiel Institute of World Economics, Institute of regional research, OCDE.

Ionescu Dina, Alistair Nolan and Jonathan Potter (2002), *'Local networks of enterprises in the world economy: some key issues and policy questions'*, Working Papers, Territorial Development Service, OCDE

Kantor Moss R. (1995), '*World Class'*, New York: Simon & Schuster, 1995.

Nolan Alistair (2002), *Public Policy on enterprise Clusters and Networks*, in: Bartlett Will et al. (eds.) Small Enterprise Development in South-East Europe: Policies for Sustainable Growth, Kluwer Academic Publishers, Boston

OECD-DATAR (2001), *'World Congress on Local Clusters- Local Networks of Enterprises in the World Economy'*, (Paris: OECD-DATAR).

OECD a (2001), *'Enhancing SME Competitiveness'*, The OECD Bologna Ministerial Conference. Callan B., Guinet J., *'SME innovation in a global economy'*, Background paper.

OECD b (2001), *'Innovative Clusters-Drivers of innovation system'*, Pim den Hertog, Bergman. E., Charles D., Chapter 22: *'Creating and sustaining innovative clusters: towards a synthesis'*.

Porter M. (1998), *'Clusters and the new economics competition'*. Harvard Business Review, November-December: 77-90.

Rosenfeld S. (2002*), 'A guide to cluster strategies in less favoured regions'*, Creating Smart System, European Union-Regional Technology Strategies.