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CLUSTER and INNOVATION as REGIONAL DEVELOPMENT

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ABSTRACT

Innovation in clusters has a key role for competitive advantage of enterprises. In terms of regional economic development, cluster structure and innovation have widely been examined in literature. Enterprises in cluster, especially small and medium sized enterprises (SMEs) are likely to have more benefits than larger firms. It is found that clusters' effects on SMEs are, increased profits and exports, faster economic growth, stronger competitive advantages, more innovations, faster diffusion of knowledge, faster technological growth and increased productivity growth. This paper presents a literature review with concepts and arguments on cluster and innovation as regional development. The study focuses on cluster practices in developed and developing countries. As a conclusion, the research proposes government cluster policy options which support the emergence of clusters. It is thought that this comparative literature review serves as the basis for academicians, practitioners and policy makers.

Key words: Cluster, innovation, small and medium sized enterprises, regional development, competitive advantage

INTRODUCTION

For last decades, regional concentration and competitiveness of small enterprises are important discussion subjects in the field of managerial economics. The discussions aim to understand how to develop the ability of small enterprises in rivalry with the large enterprises on the market. It is defined that clusters have many positive effects on regional and national development. The main idea behind cluster is to combine competition and cooperation, use them simultaneously to reach a specified objective, generally, maximizing the revenue. SMEs operating under network interaction within industrial cluster have opportunity to increase competitive ability. Cluster and innovation in SMEs are important regional development tools. This comparative literature review contributes to the theoretical part of the subject.

The paper is arranged as follows. It begins with a literature review of clusters, innovation and regional development concepts. The study then presents cluster practices in developed and developing countries. Finally, the research proposes government cluster policy options which support the emergence of clusters in developing countries.

CLUSTERS

Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, enterprises in related industries and associated institutions (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate (Porter, 2000b). Industrial clusters, or geographical concentration of firms and ancillary units engaged in the same sector, can generate various advantages for small enterprises, from agglomeration economies to joint action benefits (UNIDO, 2004).

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Clusters, broader than traditional industry categorizations, capture important linkages, complementarities and spillovers in terms of technology, skills, information, marketing, and customer needs that cut across firms and industries. Such connections across firms and industries are fundamental to competition, to productivity, and to the direction and pace of new business formation and innovation (Porter, 2000b).

Industry clusters are defined from two main frameworks in theoretical literature (Braunerhjelm and Carlsson, 1999). Firstly, it is about supply and demand linkages, where market proximity is viewed as facilitating access to suppliers and customers. Second, the possibility of reaping spillovers which are sticky in nature fosters spatial concentration. Clusters have been described as groups of interconnected businesses that form a significant economic unit (Morfesis, 1994); or a geographic concentration of competitive firms or establishments in the same industry that either have close buy-sell relationships with other industries in the region, use common technologies, or share specialized labor pool that provide enterprises with a competitive advantage over enterprises from the same industry located elsewhere (Hill and Brennan, 2000). One of the most inclusive definition of a cluster may be the one provided by National Governor Association (2002) where they define cluster as a geographically bounded concentration of similar, related or complimentary businesses, with active channels for business transactions, communications and dialogue that share specialized infrastructure, labor markets and services, and are faced with common opportunities and threats. Swann and Prevezer (1996) define clusters as groups of firms within one industry based in one geographical area.

In classifying the clusters, various cluster types are defined. Three types of classification by Porter (2003) are generally used on regional economic field. The first type consists of local industries. In local industries employment is generally distributed across all regions and is roughly proportional to the regional population. The second type consists of resource dependent industries where employment is located primarily, and the natural resources are found. The third type consists of traded industries. Traded industries are not resource dependent and sell products/services across regions and sometimes across countries. Another method for classifying the clusters is called 5Ls model developed by Scheel (2002). In his model, a systematic knowledge model is comprised of education, banking, industry, and government for the purposes of forming clusters of technological innovation systems based upon the coordinated actions of these parties to develop world-class value systems. Porter (2003) attempted to describe sub-clusters as well as main clusters. Sub-clusters are subgroups of industries within clusters whose locational correlation with each other is higher than remaining cluster industries (Porter, 2003). In literature there is another attempt to define cluster classified as micro-clusters and meso-clusters. While micro-cluster is a group of firms located, the so called meso-cluster is a group of related sectors. Since theoretical analyses generally refer to micro-clusters, the word 'clusters' refers to 'micro-clusters' (Hoen, 2001).

Industrial Clusters: Determinants and Effects

The emergence of clusters is defined by several theoretical approaches. In the literature, studies by Krugman (1991) and Porter (1990) are well known as fundamental sources about the emergence of clusters. While Krugman attempts to stress the role of interaction between factors that cause localization; Porter stresses positive effects of "agglomeration economies" which may explain the existence of clusters (Hoen, 2001). A model designed by Krugman (1991) put the emergence of clusters on the transportation costs, mobile production factors and economies of scope and scale. On the other hand, Porter (1998) defines several positive effects of agglomerations as effective communication technologies, sharing infrastructure, availability of inputs and access to output markets. Another attempt to explain the emergence of cluster is clearly seen on the study by Baptista and Swann (1998). Factors on the demand and supply sides are distinguished in their model which causes clusters. Factors at the demand side are advantage of strong local demand, market share by moving close to a rival, decreasing cost of customer search and exploiting easily flows of information. On the supply side, labor market pooling, provision of related inputs and knowledge spillovers are factors defined by Baptista and Swann (1998) backing to the study of Marshall.

Theories about clusters differ in terms of determinants which explain the emergence of clusters. In the most theories, cluster determinants are defined as factors explaining the existence of clusters. According to the literature the determinants are as follows (Porter 2000a, Krugman 1991, Baptista and Swann 1998, Hoen, 2001): Economies of scale and scope; transportation costs to the consumer market; transportation costs of inputs; search and transaction costs; availability of production factors or (intermediate) inputs at a specific location; knowledge, information and technological spillovers; cooperation between firms. More importantly, related to innovation, the degree of spillovers in clusters resulting in great diffusion of technologies and knowledge increase innovations. Cluster determinants are certain to cause effects of clusters. Since most of

the effects follow directly from the cluster determinants (Hoen, 2001); cluster effects can be explained as the result of cluster determinants. Lower costs of firms locating in a cluster enable them to get increased profits. At regional or national level, increased production in clusters enhances economic growth. Besides, the theory developed by Porter (1990, 1998) reveals that clusters increase the competitive advantage of an enterprise in micro level and of a country in macro level, because enterprises together in a cluster cooperate easily in terms of the process of receiving inputs and sending outputs.

Conditions for Clustering

Several theories related to clusters and their structures are found in the literature. “Diamond of competitive advantage” theory proposed by Michael Porter identifies four main conditions in order to form a cluster. These are:

- *Factor conditions* such as costs, resource, infrastructure, research and technological knowledge in the region,
- *Demand conditions* related to strength of local demand and foreign demand,
- *Supporting industries* providing local sources,
- *Firm strategy and rivalry* referring to cooperative and competitive relationships among firms. (Porter, 2000a)

Another theory about cluster fact and formation is “a knowledge-based theory” proposed by Maskell (2001). According to that approach, enhanced knowledge creation and innovation’s vertical and horizontal dimensions would enable cluster exist. Maskell (2001) stated that a cluster’s horizontal dimension is defined as firms in a cluster engaged in similar processes while vertical dimension is composed of cluster firms which are linked through input/output relationships.

In cluster development, multinational enterprises are found to play an important role due to necessity of local enterprises for supporting their businesses and processes, and bringing new knowledge and technologies to a region (Birkinshaw and Hood, 2000; Enright, 2000).

The conditions for clustering are not elaborated in order to predict where a cluster will develop, but to indicate which types of business are more likely to cluster-somewhere (Steinle and Schiele, 2002). In their study, Steinle and Schiele (2002) attempted to define conditions for in which activities a cluster form as necessary conditions and sufficient conditions.

1. *Necessary conditions*: First of all, specialization into different activities along the value-chain must be possible and the final product of the system has to be transportable. These requirements can be considered as necessary conditions, for their absence in an industry makes clustering “technically” impossible.
2. *Sufficient conditions*: It is about flexible co-ordination of several distinct actors. Several conditions are defined as sufficient for cluster formation. The first two sufficient conditions for clustering draw upon Richardson’s distinction between complementary activities, which succeed each other in the value-chain and similar activities, requiring similar competencies (Richardson, 1972). Sufficient conditions are:
 - Long value chain: co-ordination of multiple components to form one final product,
 - Diversity of competencies: multiple dissimilar, but complementary competencies,
 - Importance of innovation: network-innovations as a motor for agglomeration, and
 - Volatility of market: rewarding flexible adaptation.

In addition to conditions above, from the view of industrial district, Piscitello ve Sgobbi (2003) identify some benefits as several intertwined factors characterize industrial districts’ intimate nature:

- a. *Flexible specialization*. District enterprises specialize horizontally in one or a few products and/or vertically in a phase of production along the value-added chain. Such a specialization pattern allows external economies of scale and scope, which are economies that are external to the enterprises but internal to the system of enterprises.
- b. *Inter-firm cooperation and competition*. Specialization has implications for inter-firm relations, as specialized enterprises have an incentive to cooperate and to share information, knowledge and technologies thus leading to collective learning by doing and interacting, and innovation advantages (Lundvall, 1993). Additionally, industrial districts are also characterized by a “vigorous domestic

- rivalry”, which allows them to sharpen the local firms’ competitive advantage at home, but also to train them for successful international competition (Porter, 1990).
- c. *Geographic proximity*. Territorial clustering offers information externalities by enabling enterprises to learn more readily about new technologies and market opportunities. It also allows district enterprises to obtain easier access to high quality skilled labor and specialized machinery, encourages face-to-face interaction and the circulation of new information, and serves as a basis for trust on which enterprises can always draw.

INNOVATION IN INDUSTRIAL CLUSTERS

In literature, technology system is defined as a form of clustering economic functions. That approach is closely related to Erik Dahmen’s concept of development blocs (Dahmen, 1989) and similar in many ways to the type of clusters studied by Michael Porter (2000a) in his “Competitive Advantage of Nations” (Braunerhjelm and Carlsson, 1999). From that view, Braunerhjelm and Carlsson (1999) in his study of comparing clusters in Ohio and Sweden stated that technological framework includes not only market interaction among enterprises but also non-market interaction (especially in the form of knowledge spillovers) among enterprises on the one hand and various components of the infrastructure (e.g., academic institutions, research institutions, government agencies, and industry associations) on the other hand.

The importance of knowledge spillovers and innovative inputs suggests that enterprises’ research and development activities do not proceed in isolation, but are supported, in each stage, by external sources (Nelson, 1993). Various studies in the literature have determined the direct relationship between innovation level and the presence of research and development in industry clusters (Braunerhjelm and Carlsson, 1999; Baptista and Swann, 1998; Steinle and Schiele, 2002).

In a comparative study of USA and UK computer sectors, Baptista and Swann (1996) found that strong clusters are more likely to attract new entrants, and also that firms in strong clusters tend to grow faster. Baptista and Swann (1998) explained the success in field of innovation achieved by enterprises in cluster through pervasiveness of knowledge externalities and spillovers. Innovative activity will tend to geographically concentrate close to agglomerations of this infrastructure, which is relatively immobile and place-specific in order to benefit from spillovers (Baptista and Swann, 1998).

A study conducted by Hoen (2001) found that clusters generally lead to more innovations, knowledge spillovers and faster diffusion of technologies, knowledge and competitive advantages. If the transfer of technological knowledge works best with geographical proximity, then any supply-side spillovers that might be gained from a strong core of manufacturing and research and development activities will be easiest to exploit if the receiver of such spillovers locates near this core (Baptista and Swann, 1998). Likewise, studies conducted by Jaffe (1986) and Jaffe et al. (1993) found what extent spillovers associated with research and development activity are geographically localized, thereby playing an important role in the clustering process. The nature of the clustering process, technology, innovative process, and economic growth are also important. An argument concerning the location of innovative activity stems from the fundamental nature of the innovative process (Baptista and Swann, 1998). This argument is drawn on five stylized facts developed by (Feldman, 1994) about the industrial innovation process: uncertainty, complexity, reliance upon basic research, importance of learning by-doing and cumulateness.

Enterprises in clusters with a single-strong industry are more innovative (Baptista and Swann, 1998). That means a firm is more likely to innovate if located in a region where the presence of enterprises in its own industry is strong. The effects of the proximity of enterprises in other industries do not appear to be significant, perhaps suggesting the presence of congestion effects, but this is highly conditioned by the level of industry aggregation. Compared to an isolated location, cluster participation offers many potential advantages in innovation and upgrading through rapidly perceive new buyer needs, perceiving new technological and operating, or delivery possibilities (Porter, 2000b).

Since clustering is the process of development of locally rooted value-creating system, firms located in industry clusters obtain cost advantage through coordination of efficiency and innovation (Steinle and Schiele, 2002). On the other hand, innovative clusters are not a simple concentration of independent economic agents, but display at an inter-industrial level, underlying networks of interrelated co-operating businesses (De Bresson, 1996). An innovative cluster is not possible to come into existence itself. Without the intensive interaction that exceeds traditional market exchange, the advantages of proximity would basically confine to lower costs of transportation and lower switching costs for employees only. However, if

actors have developed a milieu, which allows for an interaction that is simultaneously co-operative and competitive, a localized value-creating system can reach its full potential, i.e. transform into an “innovative cluster” (Steinle and Schiele, 2002). In clusters, the relationships that exist between customer and supplier industries and the organizations that support them create synergies that result in more innovation (Austrian, 2000).

Freeman and Soete (1997) summarize the evolution of the process of innovation as: inventor–entrepreneur, large in-house research and development, network-innovation. On the contrary to the research and development activity organized well, network innovations develop without planning. These three types of innovation-design do not claim exclusivity for their period of time (Freeman and Soete, 1997). Networks in innovation are not a new phenomenon, but have only been neglected in the past due to insufficient intellectual lenses (DeBresson and Amesse, 1991).

Steinle and Schiele (2002) stressed that in the case of network-innovations, the constitution of the whole value-creating system, the sum of all actors involved in the process of innovation, is of critical importance. In the development of innovation in industry, the necessity of an effective coordination for all components should not be neglected.

REGIONAL DEVELOPMENT

Researches pay attention mainly on how the localization of firms in geographical clusters enables cooperation among the enterprises concerned, fostering their ability to create and sustain competitive advantage (Boari et al., 2003; Porter, 2000a; 2000b; Lazerson and Lorenzoni, 1999; Liparini and Lomi, 1999; Liparini and Sobrero, 1997; Lorenzoni and Liparini, 1999; Saxenian, 1994; Lorenzon, 1998)

For economic performance of regions, the necessity of industrial clusters has generally been accepted. (see; Anderson, 1994; Bresnahan et al., 2001; Colgan and Baker, 2003; Porter, 2003; Singh and Jain, 2003; Waits, 2000). Networks are formed to reduce a community’s susceptibility to changing demand, stagnation and to plan and prepare for change, to fight threats collectively, so that rural networks were found to be frequently responses to real and potential threats or crises or to distinctive needs and limitations of rural communities (Rosenfeld, 2001).

Over the past decade, virtually every state and large city has conducted some sort of cluster analysis, and many have instituted programs to support clusters (Rosenfeld, 1996). At first glance, clusters appeared to be less applicable in rural areas simply because concentrations of similar and interdependent companies are less obvious to the data-clouded eyes of analysts (Rosenfeld, 2001).

A key process of change within clusters comes through local upgrading and these results in enhanced human capital, improved technological capacities for enterprises, enhanced capabilities of workers and small producers are important (UNIDO, 2004).

In the study of rural development from approach of network and clusters, Rosenfeld (2001) stated that the aims of rural networks were quite similar to the aims of cluster strategies since they were to create a social infrastructure and build trust, provide the scale of economies to attract specialized services and reduce costs, and encourage members to cooperate.

The presence of trade clusters which affects wage form in local industries of regional economic performance is affected through wage level of clusters including of dynamic and intensive innovation activity and a systematic structure (Porter, 2000). Since locating with supplier in the same region has effects the factors forming innovation process, the input suppliers provide better meet the enterprise’s requirements and as finally enterprises in a cluster do get closely involved in the innovation process more than firms dispersed (Porter, 2000)

CLUSTER and INNOVATION AS REGIONAL DEVELOPMENT IN DEVELOPED COUNTRIES

In developing regions for activities of improving entrepreneurship, network and cluster structures are used as strategic means. A study conducted by Regional Technology Strategies (2001) in USA stated that as nations began to acknowledge the value of learning organizations, communities, and regions to economic

development, they turned to networks and clusters for their mechanisms. In 1970s Scandinavian network program called “Knowledge Networks” is very important starting point for learning communities. In Norway and Denmark groups of enterprises come together under a network structure in order to share information and solve common problems.

Cluster policy which started in USA has gained great acceptance and put in practice. According the report of European Commission (2002), although majority of cluster initiatives has been applied in terms of regional development; some European Union (EU) countries like Denmark and United Kingdom (UK) have attempted national cluster initiatives. Also, there are some cross-border cluster cases available in the EU: biotech sector between Sweden and Denmark, plastic sector between Netherlands and Germany, and automotive sector between Spain and Portugal. Similar to USA, European clusters are found in old and established cities and regions: London, Helsinki, Munich, Dublin, Frankfurt, Milan, Oslo (McDonald and Vertora, 2001). As done in USA, many European clusters have formed around an initial large company motivated by the size of the market associated with pioneering economy (Pandit and Cook, 2003; Koski et al., 2002; Sternberg and Tamasy, 1999). While national and regional cluster policies in European Countries is developing in various forms; national level policies provide the structural and financial frameworks and region governments adopt these frameworks and implement them (European Commission, 2002).

Besides European countries, European Union Commission (EC) plays an important role for cluster development. EC collects information for different strategies and policies applied by various European countries. It also provides training and consultancy services for developing countries (EC, 2002). According to the report of EC, problems related with clustering in EU countries arise when cluster characteristics and its economic activities present the lack of harmony with region and its culture.

Enterprises in EU have strategic benefits of locating in a cluster which provide access to knowledge, innovation, and competitiveness. In Greece, firms in the cluster of Solarnet is likely to benefit such as: import and transfer of high-tech and new technology as a means of enhancing competitive advantage and recognition; development of both new/innovative products; developing systems to enhance extension of collaborative measures among network enterprises; development and promotion of international partnership agreements (European Commission, 2002).

In terms of innovation creating and enhancing competitiveness, clusters in USA and EU are seen as core competence. Italian networks have become an important experience for small enterprises supported as a public policy to survive their presence in increased competitive global economics. European Commission has developed some Regional Innovation Strategy projects aiming to improve the region’s abilities to integrate innovation and technology transfer in their economic development and to stimulate innovation among SMEs. Clusters are seen as entities that create knowledge and expertise spillover as well as stimulate businesses for learning and innovation (European Commission, 2002; Steinle and Schiele, 2002). NorCOM, Wireless Communications cluster in Denmark together with Aalborg University, the regional county council and a major local bank had established a Science Park, NOVI, which has attracted well-known multinational firms such as Motorola, Texas Instruments, Nokia, Ericsson, Siemens and Flextronics in the region. That cluster structure has presented opportunity for Danish-owned development enterprises to have a research joint venture with these firms, which increases competitiveness. On the other hand, a cluster of digital signal processing sector in Belgium can enable some firms (such as Philips, Alcatel, Agfa-Gevaert) to reach industrial leadership through promoting the region as a center of excellence and attract new enterprises’ research and development activities and stimulating enterprises’ growth by fostering synergy and complementarity. It seems that cluster applications have become very common in rural areas of USA and Europe and have been used as important term for regional development. One of the considerable study in field of cluster role in regional development is the study conducted by Porter (2003) aiming to investigate the role of clusters in USA economy.

In UK, government identified cluster development and growth as a key element in promoting regions’ economic prosperity which identifying and buildings links with important regional clusters and using clusters as the vehicle for wider economic development initiatives (European Commission, 2002). Similar to UK, Germany also uses regional initiatives and competitions to increase innovation and cluster development. For example, in the cluster of BioRegio in Munich, a network organization called BioM is structured for the development of biotechnology in the region. Likewise, the set up of Centuria Science and Technology Park, a cluster form of agricultural and food industry in Italy, has been considered as a tool to help the economic growth of the region and the competitiveness of its enterprises since Romania has become one of the most important agri-food districts in Europe.

CLUSTER and INNOVATION AS REGIONAL DEVELOPMENT IN DEVELOPING COUNTRIES

Similar to EU, United Nations Industrial Development Organization (UNIDO) has played an important role in the establishment cluster policies and applications in order to enable developing regions gain benefits which developed region gain from cluster practices. UNIDO has initiatives to support the industrial development of developing countries such as India, Indonesia, Brazil, Mexico and Korea by the help of strengthening industrial capacities through promotion of investment and institutional capacity building. The Brazilian authorities appear to be using clusters as part of industry policy framework. They are particularly interested in further strengthening their capabilities and spinning off new activities in the automotive sector (Sao Paulo etc.), as well as some of the high-tech industries (Brown, 1999). Clustering sets into motion a range of potential benefits that can directly affect the poor, both as waged workers, home office workers, own-account workers as well as small entrepreneurs; so this can be through externality gains, joint action, and local social capital (UNIDO, 2004). In a study by UNIDO (2004) addressing the relationship between industrial cluster development and poverty, it is found that cluster development initiatives need to distinguish between incipient clusters where poverty incidence is high, and growth engine clusters that can generate incomes both directly and indirectly for the poor, and have strong local institutions that strengthen the ability of clustered actors to engage in pro-poor collective action.

Brown (1999) highlighted that the interest of developing countries such as India, Morocco, Jordan, Ukraine and Georgia is in using clusters to identify and build on competitive advantage. In Jordan, one of her key industries is potash and related chemical manufacture, and that the establishment of a cluster is a possibility. Joint action of small enterprises in developing regions has become a strategy to survive in competition. In a study of the Brazilian shoe cluster of the Sinos Valley, Schmitz (1999) revealed that pointed to local cooperation increased as small enterprises faced up to global challenges, especially from low priced Chinese competitors. Nadvi(1999), in his study of cluster-wide institutional joint action in the context of the Sialkot surgical instrument cluster in Pakistan has found that through compliance with global quality assurance standards, came about through the catalytic role of the local trade association in channeling new know-how on quality management practices to the cluster, the vast majority of SMEs in the cluster could comply with international standards over a relatively short period of time.

In the European Charter for Small Enterprises all countries including Turkey commit themselves to take actions at national and regional levels aimed at developing inter-firm clusters and networks. Cluster approach has been used as a tool for increasing competitiveness of the Turkish economy in global arena. Porter's methodology is used in textile, leather products, automotive, information and technologies, marble, and tourism sectors in which Turkey may have competitive advantage in global market. These sectors are started to be analyzed by using Porter's cluster approach (Bulu, Ozben and Eraslan, 2004). The relationship between firms and related organizations is determined to have effect on productivity and innovations of firms in information and technologies cluster in Turkey. The formation of organized industry districts in manufacturing sector aims to fulfill cluster advantages for these firms. Due to the structural barriers and ineffective relationship among firms, related sectors, universities, knowledge institutions and related public-private organizations, the expected competitive advantage for enterprises in these districts has not been reached yet.

CONCLUSION

The aim of this paper is to highlight the importance of cluster and innovation as regional development. The literature agrees that, the clusters provide innovation capability and competitive advantage for regional development. There is a general consensus that clusters represent concentrations of highly specialized skills and knowledge, institutions and related businesses in a particular region or nation (Porter, 2000a). Therefore, enterprises in cluster, especially SMEs are likely to have more benefits than larger firms. It is found that clusters' effects on SMEs are, increased profits and exports, faster economic growth, stronger competitive advantages, more innovations, faster diffusion of knowledge, faster technological growth and increased productivity growth. Besides, clustering brings advantages especially for small enterprises during the trade

liberalization phase. The cost reductions and information spillovers through inter-firm linkages are the key advantages (Visser, 1999).

The main question is whether successful cluster model of developed countries can deliver its benefits to less developed countries. Generally, the economic, social and political differences can not reveal an easy transplant of the developed model; but a comprehensive understanding and appreciation must be developed for best features of the model which surely provide strong view of integrated and innovative industry structure. Benefits from cluster must be revealed and accepted by less developed countries through experiencing successful cases from developed countries.

European Commission (2002) has attempted to raise awareness of the potential offered by clusters and networks to SMEs through:

- Organizing exchange of information through annual meetings with specific sector focus, promotional actions, press media, associations of enterprises, ministries, special training programs, other clusters, trade fairs... etc,
- Using other means such as recruitment of training facilitators, coordinators, project managers,
- Conducting ongoing research on clusters, mainly in the area of cluster policy (efficiency and improvement) and in the detection of indicators assessing the impacts on cluster co-operation,
- Encouraging co-operation between enterprises, universities and public research institutions,
- Including guidelines for forming alliances and co-operation,
- Establishing a long-term and consistent strategy focusing on pragmatic benefits for companies.

In terms of cluster policies and initiatives for developing countries, the experience of UNIDO (1999) related to distinguishing four methodological phases is very important: (a) the promotion of networks, (b) the restructuring at the firm level, (c) the improvement of the institutional environment, and (d) the improvement of the dialogue between the public and private sector.

For government policy, clusters may be useful if the government wants to increase the number of innovations, the diffusion of technologies and knowledge, or if the government wants to enhance the competitive advantages or even take over a new market. Supporting cooperation between firms in order to stimulate the emergence of clusters is a very important policy option. Most authors argue that the government should provide for the infrastructure which makes the emergence of clusters possible. Clusters need skilled labor and competition. The government should look after a system of universities that produces highly educated and skilled workforce, and stimulate competition by opening markets for foreign competitors. These policy options support the most important cluster determinants and will therefore support the emergence of clusters.

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