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## **Networking, Clusters and Human Capital Development**

by

**Diane-Gabrielle Tremblay  
Canada Research Chair on the  
Socio-organizational Challenges of the Knowledge Economy  
Université du Québec à Montréal**

### **Skills and Knowledge for Canada's Future: Seven Perspectives Towards an Integrated Approach to Human Capital Development**

The opinions expressed herein are those of CPRN,  
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## Executive Summary

Theories on regional specialization, agglomeration and clustering have in a certain way existed for quite some time, over one hundred years if we go back to the Marshallian district (Marshall 1889). However, they seem to have been rediscovered in recent years. The last two decades there has been much interest from researchers, but also from government and public policy analysts. Some consider that the cluster theory re-emergence can be attributed to work done by Porter (1990, 2003), while others attribute this re-emergence to interest in the industrial districts and in what have been called “innovative milieux” in the French and Swiss literature. As Cassidy et al. (2005) indicate, many governments and public policy organizations were very interested in the concept of clusters and many adopted it as a public policy instrument in order to increase local and regional (and eventually even national, in some cases), competitiveness, innovation, and growth (OECD 1999, 2001).

But why this interest? It is largely because of the importance of innovation and creative capacity, which are seen as fundamental factors of economic development and prosperity in the knowledge economy. Over recent decades, theories on innovation systems and clusters have put forward the idea that territory is important in shaping innovative and creative capacities (or human capital, although innovative and creative capacities appear to constitute a more encompassing concept).

In our paper, we start by defining the concepts of industrial districts, local systems of production, “innovative milieux” and clusters, and we look into the links between these concepts and human capital development or learning. We observe that while the industrial districts theory stresses the importance of skills, and thus human capital development and availability, cluster theory is more centred on governance processes and innovation or performance outcomes, while nevertheless including skills, competencies or human capital among the factors contributing to firms’ performance. If the skills dimension appears less central in the clusters theory than in the industrial districts theory, it has nevertheless been studied by a few researchers and seems to be attracting more and more attention. Over recent years, cluster theory has highlighted the following findings:

- Cluster development is a long-term process and is based on the mobilization of key stakeholders in the community, local or regional territory.
- One of the main functions of clusters is to furnish human capital and social capital, as well as financial capital and resources, in order to support firms that are part of the cluster.
- It is through interactions that representations and ideas are exchanged and knowledge is developed, and this supports firms and entrepreneurs in a given cluster (Julien 2005; Stolarick, Florida, and Musante 2005; Florida, 2004; Ketels 2003; Gertler and Wolfe 2005).

- Local buzz and global pipelines both contribute to knowledge creation and exchange, although this was object of debate for some time (the importance of local versus global sources).

The cluster literature highlights the importance of information, knowledge and interaction. When information is rich (especially implicit or tacit information, rather than explicit codified knowledge), interrelation and exchange can offer an excellent way to transfer this information to various actors. This facilitates production of meaning, since knowledge is shared in a more or less diffuse way. In this context, the cluster is seen as a very efficient mode of access to interpretation of information and to learning.

Let us add that the main difference between the cluster view and other views of economic development or growth is the fact that the cluster view highlights the social and territorial nature of the innovation process, what we have called elsewhere “socio-territorial capital” (Fontan, Klein, and Tremblay 2005a), which is seen as playing as important a role as the economic or financial factors (price factors, financial support, and so on). The territory is seen here as being more than a simple repository for economic activity, and the role of social relations of production and interactions is highlighted.

We look into governance issues and highlight the fact that many researchers, in addition to cluster theorizing, consider that governance processes are the institutional bases of cluster development. For many authors, governance can be seen as the central concept which brings together many dimensions of cluster or industrial district analyses. Governance processes and modes are seen as the source of information flows, as the places where public and private actors can be brought together to design and support cluster development. There are various forms of governance, but partnership-based or joint governance appears to be the most promising from the point of view of competencies or human capital development. Indeed, the plurality of actors brought together in this context would favour a more diverse knowledge base, and thus a richer learning process.

We then look at the issue of proximity, because the basis of the cluster literature is that proximity matters. Actors looking for solutions proceed by trial and error and these processes are all the more likely to produce solutions as they are conducted in a spatial reference at various levels (local, regional, national). The principal vehicle of this learning becomes the so-called local physical proximity, which allows multiple contacts (Colletis and Pecqueur 1993), while combining with other forms of proximity (organizational, relational, and institutional). Beyond proximity, trust between the various actors is important in order to develop interactions and knowledge. The territory is thus considered to be a scene where the social link between production firms and other types of organizations can be developed. This link appears to be strengthened in a local framework, but the exact scale of the “local” or the “territory” is difficult to determine. Over the years, the cluster literature has stressed the fact that depending on the sector of activity, what authors have referred to as “local buzz” (local activity and interactions) and global pipelines of information and knowledge flows will have more or less importance. In science based sectors in particular, global knowledge flows are extremely important, while in more traditional clusters such as clothing, leather and ceramics, they may be less so.

After we looked at clusters and other concepts essentially from a regional or local level, we were reminded that much of learning and human capital development happens within or between firms, and therefore at a more micro-economic or micro-social level, and this brought us to the issue of communities of practice. While communities of practice have not attracted attention in the context of clusters, probably because it is a theory that has developed and circulated in the fields of education or management studies, we feel there is a close connection that should be investigated. Indeed, communities of practice could be viewed as a form of learning or human capital development within clusters. Cluster research has not envisaged this possibility to date, and while some government or private actors have shown interest in this concept, it has generally been at the level of one firm or organization, rather than at the level of sectors, clusters or groups of firms. Nevertheless, it appears that in the context of partnership-based or joint governance, communities of practice might be a useful tool not only to analyze cluster development but also to support its development, therefore rendering it useful as a policy tool.

The main elements stressed in most work on communities of practice are the sharing of a concern, or a set of problems; and the ongoing interaction between the group, that is, the ongoing sharing and learning. In our view, these dimensions should be the subject of future research, since the human resources dimension – the sharing and concrete learning that occurs within a cluster and that can contribute to innovation and performance – has not been the object of much attention (Tremblay 2002a). It has pretty much remained a “black box,” and in order to better understand cluster development as well as human capital development in the present socio-economic context, a deeper analysis of the dynamics of sharing and learning within cluster communities of practice would be a useful avenue. Indeed, this would shed light on the micro-foundations of cluster dynamics, which are often neglected when analysis is concentrated on institutional and organizational dynamics or governance processes at a higher level.



## Introduction

Theories on regional specialization, agglomeration and clustering have in a certain way existed for quite some time: over one hundred years if we go back to the Marshallian district. However, they seem to have been rediscovered in recent years. In the last two decades there has been much interest among researchers, governments and public policy analysts.

Some consider that the cluster theory re-emergence can be attributed to work done by Porter (1990, 2003), while others attribute it to interest in the industrial districts and in what were called “innovative milieux” in the French and Swiss literature.

As Cassidy et al. (2005) indicate, many governments and public policy bodies were very interested in the concept of clusters, and many adopted it as a public policy instrument in order to increase local and regional (eventually even national in some cases) competitiveness, innovation, and growth (OECD 1999, 2001).

So why this interest? It is largely because of the importance of innovation and creative capacity, which are seen as fundamental factors of economic development and prosperity in the knowledge economy. Over recent decades, theories on innovation systems and clusters have put forward the idea that territory is important in shaping innovative and creative capacities (or human capital, although innovative and creative capacities seem to be a better, and larger concept).

As Cassidy et al. (2005) remind us, “The development of clusters promised a seemingly easy answer to the challenges created by increased international competition and the growing importance of innovation in the knowledge economy – particularly for smaller regions tied to traditional industries. Policy analysts, academics, and industry were happy to follow as it simplified their task of explaining and promoting regional development economics. This enthusiasm was further fuelled by the significant amounts of public money that flowed to cluster development initiatives.” This surely explains much of the interest in the idea of clusters. However, despite the interest, there has been some criticism over the years.

For example, Martin and Sunley (2003) are somewhat skeptical of the concept, nowadays, saying that “clusters have gate-crashed the economic policy arena” and that “the cluster concept should carry a public policy health warning.” Cassidy et al. (2005) also indicate that a seminar held on government cluster intervention concluded that “ultimately, cluster initiatives have become a sort of ‘magic recipe’ to meet the challenges of the new economy, to the point that they have become dangerously fashionable” (Andersson et al. 2004).

Beyond this criticism, and beyond the possibly overplayed public policy attraction, researchers have highlighted elements of interest over recent years. Thus it does appear useful to look into the concept and perhaps go beyond the general definitions and research on clusters per se and highlight the elements that this strand of literature has contributed. Therefore, we will first present the concepts of industrial districts, innovative milieux and clusters, which have very much in common. We will then go on to the issue of governance, which is essential in the cluster literature and highlights the type of transformations in public governance that can support cluster policies. We will also dwell on the concept of proximity, since the basis of the cluster literature

is the idea that “proximity matters” (Gertler and Wolfe, 2005). Since we were asked to look into the human capital dimension in relation to clusters, we have chosen to present a review of the concept of communities of practice, which is a concrete example of a human capital development format that can be adapted to the cluster environment and that may therefore be useful for policy. We will conclude on some general elements in terms of research issues and policy issues to be looked into.

# 1 Industrial Districts, “Innovative Milieux” and Clusters: Members of the Same Family?

We begin here by examining the concepts of “industrial districts”, “innovative milieux” and “clusters.” These concepts are useful for the study of the role of interfirm relations in innovation and territorial development, and they have grown in popularity over recent years. The concept of the cluster appeared most recently, but it is, in our view, part of the same family of concepts.

Indeed, in recent years a number of theories, particularly those describing innovative milieux and localized systems of production, have addressed how geographical proximity between firms impacts innovation (Gertler and Wolfe 2005; Ketels 2003, 2004; Storper and Scott 1995; Klein, Tremblay, and Fontan 2003a,b, 2001; Tremblay and Fontan, 1994; Fontan, Klein and Tremblay 1999; 2005b).

## 1.1 Industrial Districts

Alfred Marshall put forward the concept of industrial districts at the end of the 19th century (1890-1920). It surfaced again in work by Italian economists studying the so-called Third Italy, a number of small territories that were very dynamic and innovative in the 1980s (Garofoli 1985; Beccattini 1991; Brusco 1994; Benko and Lipietz 1992). An industrial district is a geographically concentrated production system that is created through a division of labour among several small, specialized businesses. The division of labour element is the characteristic of the industrial district, but the cluster concept is quite similar. These districts are usually specialized in one field of activity; in Italy, it was the clothing, leather, ceramics industries that were first noted, but these were soon to be overtaken by many other sectors, including many modern sectors, not only in Italy, but also in France, Germany, and Denmark (Benko and Lipietz 1992).

This cooperation between firms creates the potential for strong endogenous growth in the system. Growth is further encouraged when firms cooperate with non-productive organizations such as industry associations and financial institutions. It can also rest on the particular skills and knowledge of the local labour force, as was the case in the Italian industrial districts.

Successful districts are characterized by a few organizational principles: (1) significant business exchanges between firms, and between associations and firms, based on a high level of *cooperation* and on strong social cohesion; (2) the existence of trust relationships that foster the exchange of information and collaboration between firms; (3) constant access to a skilled labour pool and opportunities for specialized training; and (4) the existence of local institutions, either public or private, that monitor industry developments and disseminate information to firms (Garofoli 1985; Beccattini 1991; Brusco 1994; Benko and Lipietz 1992; Klein, Tremblay, and Fontan 2003, 2001; Tremblay et al. 2003, 2002). As can be seen, the human capital dimension is important in this theory, since Marshall as well as Italian authors insist on the importance of constant access to a skilled labour pool. This skilled labour appears to constitute a key resource in the industrial district theory and in the writings of Alfred Marshall himself. Cluster theory has

somewhat neglected the contribution of Marshall and particularly this labour or human capital dimension.<sup>1</sup>

Basically, this theory of industrial districts stresses the importance of an “industrial atmosphere” that contributes to skill development, supports firms and makes them more competitive, even if cooperation with other firms and institutions actually contributes to competitive success. In traditional economics theory, the environment or surrounding atmosphere is not considered an actor of development, except by a few institutionalist economists such as Veblen or Commons at the beginning of the 20<sup>th</sup> century (Tremblay 1995a,b, 2002; Julien 2005: 154). The territory (or *milieu* in the French literature) was generally considered as a neutral space where entrepreneurs and firms intervened. Entrepreneurship was traditionally seen to be a purely individual phenomenon as was innovation, except by some authors such as Veblen and others, who write from a sociological rather than an economic perspective (Fontan, Klein, and Tremblay 2004).

As Marshall did, Thorstein Veblen also refers to an “economic ambiance” in his *Place of Science in Modern Civilisation* (1915). As Julien (2005,154) indicates, this ambiance facilitates the formation of ideas and the sharing of information and the good ideas that are “*in the air*” thus multiply and can be appropriated by some entrepreneurs who are well embedded in this environment. Veblen also refers to intangible assets that are present in the environment and can be useful to entrepreneurs and to groups of firms, now known as clusters, which can favour these firms’ innovation and performance (Julien 2005, 154; Tremblay 2002, 1995).

John R. Commons also rejects the traditional economic view of the individualistic firm and highlights the importance of institutional elements (Tremblay 2002; Julien 2005). He stresses the importance of “rules” that are characteristic of a given territory and that facilitate economic activity and innovation on that territory. As can be seen, all these elements are very close to Alfred Marshall’s “industrial atmosphere” and can be considered to be the origins of the cluster theory. These original theoretical perspectives were unfortunately somewhat forgotten over most of the 20<sup>th</sup> century until they were rediscovered by authors writing on the Italian industrial districts (Garofoli 1985; Beccattini 1991; Brusco 1994; Benko and Lipietz 1992).

As mentioned previously, cluster theory may be centered somewhat more on technological innovation and firm performance, but some recent work highlights skills and labour as a key dimension. Skills and labour have been stressed as determinant in the innovation process, whether it be technological or product innovation by Tremblay (1989, 1992, 1995, 1995a); the industrial districts theory has the advantage of stressing this dimension, and cluster theorists are paying more attention to it in recent years.

## 1.2 Local Systems of Production and Innovative Milieux

In contrast with theories of industrial districts, theories of local systems of production (Courlet 1994) or innovative milieux generally are not limited to one sector as are clusters and industrial districts. In the same way, however, local systems of production highlight the importance of formal and informal relations for circulating information, which in turn promotes the

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<sup>1</sup> We mention human capital here since this expression was used in the CPRN’s call for papers, but the expression is more frequently associated with neoclassical economics, and thus is not much used in geographical economy, economic geography, or theories of industrial districts or clusters.

development of competencies and innovation. Indeed, information exchanges appear to play an *essential* role in innovation and thus in innovative milieux. The *milieu innovateur* theory developed by the GREMI group from Switzerland (see Julien 2005 on this) stresses the socio-cultural more than the skills dimension, although skills and labour appear to be crucial in the development of innovative milieux in specific territories. These theories also suggest that regions (at various geographical levels) are dynamic actors, not passive receptacles of economic activity, and that close proximity among actors multiplies their learning capacity and hence their ability to innovate (Veltz 1996)

In our view, North American scholars became interested in these European perspectives on industrial districts and innovative milieux when Piore and Sabel's *The Second Industrial Divide: Possibilities for Prosperity* (1984) appeared. This work emphasized the link between the transformation of productive systems and the socio-economic embeddedness of regions. However, other authors (Cassidy and al. 2005) consider that the interest stems from Porter's work (1990). In recent years, growing interest in the connection between geography and innovation has led to new research into the local region's role in innovation and economic development and into the cluster or innovative milieux perspective in general. We will treat these two approaches simultaneously since in our view they are quite similar, except that the Gremi group's innovative milieux theory (see Julien 2005 on this) stresses socio-cultural factors and has had more success in the European and francophone environment, while clusters stress the technological and performance dimensions and have become more popular in Anglo-Saxon literature. Also, the interest in developing a typology of governance and proximity may have been more present in the European and francophone literature, although governance and proximity are generally considered to be the institutional and organizational bases of the clusters (see Gertler and Wolfe 2005, among others).

### 1.3 Clusters

Both clusters (single sector) and "*innovative milieux*" (multisector) are geographic concentrations of firms and supporting organizations that "trust" one another and frequently exchange knowledge. The theory of innovative milieux emphasizes the role of the milieu as a source of innovation and industry growth: the proximity of competencies<sup>2</sup> promotes the creation of new innovative firms (Aydalot 1984).

Cassidy et al. (2005: 5) state that "whether the cluster concept is useful, whether cluster development is possible, or whether government intervention is warranted, are matters for evaluation. The cluster concept is not being discredited, but faith is not enough. As with any investment, particularly involving public funds, there is a need for accurate and ongoing measures of success – evidence that the investment is having, or will have, net positive benefits. Unfortunately, there is a scarcity of comprehensive evaluations of clusters, and cluster benefits are still often taken for granted rather than systematically documented"

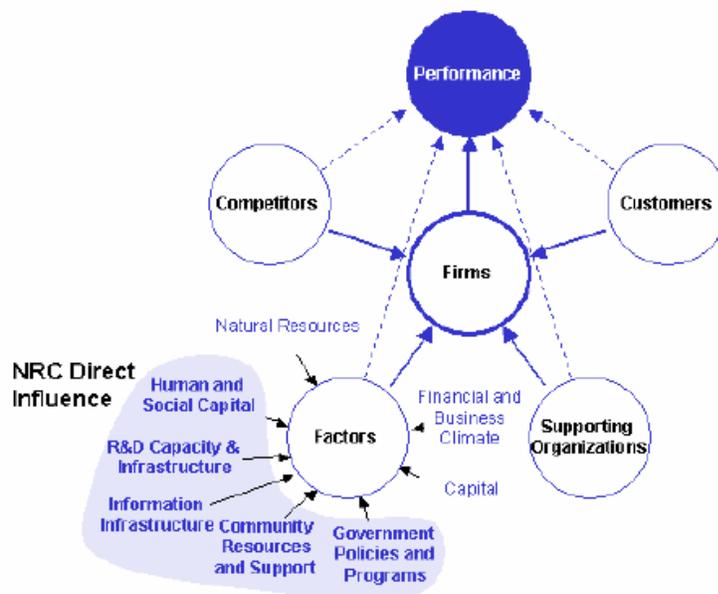
The cluster model developed in Canada (by the National Research Council as well as the Innovation Systems Research Network) is centred on the idea of the performance of firms and tries to understand the various factors that might explain this performance. As is true of other

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<sup>2</sup> Note here again the human capital dimension, which is referred to as "competencies"; human capital refers to a different theoretical strand.

concepts mentioned previously, firms are at the centre of the model; that is, firms that are part of a cluster. The performance of the cluster is seen as being dependent on the performance of the individual firms, and this performance is moderated by cluster conditions and the environment of the firms. Amongst the factors which are seen as having an impact on the firms, let us mention human and social capital, R&D capacity and infrastructure, information infrastructure, community resources and support, as well as government policies and programs. This model is presented in a figure by Cassidy et al. (2005) (see Figure 1 below), but many authors have the same or very similar views (Julien 2005; Holbrook and Wolfe 2002; National Research Council 1998, Nauwelaers 2005; Padmore and Gibson 1998; Wolfe, Davis, and Lucas 2005). Cassidy relates the model to the various factors included in the Porter Diamond of performance, but highlights the fact that Porter's definition of related and supporting industries has been enlarged to include public and non-profit organizations that support cluster development; these are known as supporting organizations. This is similar to the industrial districts and innovative milieux literature, since these writings include many organizations that can act as supporting organizations.

**Figure 1: Cluster model**



Source: Cassidy et al. (2005, 7).

In all writing on clusters, it is recognized that cluster development is a long-term process that is based on the mobilization of key stakeholders in the community, or the local or regional territory. In this context, Cassidy et al. (2005) identify four stages: latent, developing, established and transformation. While the words are not the same in all publications or research, there is a clear observation by many that clusters can be at different stages, and particularly that many are in the latent or developing stage (for example, in the new media industry in Canada; see Britton and Légaré 2004; Smith et al. 2004; Tremblay, Chevrier, and Rousseau 2004; and Tremblay and Rousseau 2005; also, more generally, Gertler and Wolfe 2005).

It is also interesting to see how the various concepts present in cluster theory have been operationalized in different research projects. The Innovation Systems Research Network (ISRN) is probably the most important source of operational research on the subject of clusters in Canada (Holbrook and Wolfe 2002; Nauwelaers 2005; Wolfe, Davis, and Lucas 2005). A group of ISRN researchers looked in more detail into the new media clusters in Canada (Britton and Légaré 2004; Smith et al. 2004; Tremblay, Chevrier, and Rousseau 2004; Tremblay and Rousseau, 2005). While the bulk of French publications on innovative milieux is centred less on operationalization of the concept, the work by Julien (2005) also is very much centered on operationalization of the concept of endogenous development and is very close to the work presented by the ISRN group and Cassidy (2005). Since the table presented by Cassidy summarizes the various concepts and constructs of the cluster model very well, we include it here.

**Table 1: Cluster model constructs**

Concepts	Constructs	Sub-Constructs*	Indicators
Current Conditions	Factors	Human Resources	Access to qualified personnel
			Sources of qualified personnel
			Distance of qualified personnel sources
		Transportation	Quality of local transportation infrastructure
			Connections to national / international transportation systems
			Quality of local lifestyle
		Business Climate	Business costs relative to competing regions
			Innovativeness relative to competing regions
			Contribution of NRC to ideas, knowledge and innovation
	Supporting Organizations	Innovation	Contribution of local institutions to ideas, knowledge, and innovation
			Adequacy of regional development support
		Community	Local availability of materials and equipment
		Suppliers	Local availability of business services
Services		Local availability of capital	
Competitors	Distance of most important competitors		
Customers	Distance of most important customers		
Current Performance	Significance	Diversity	Number of cluster firms
		Size	Size of cluster firms (employees and revenue)
		Responsibility	Scope of responsibilities of cluster firms (strategy, research, production, sales)
		Reach	Export orientation
	Interaction	Identity	Internal awareness by cluster members
			External recognition by others
		Linkages	Partnerships and alliances
			Involvement in local clustering activities
	Innovation	Inputs	R&D spending
			Business development capabilities
			Product development capabilities
Outputs		Revenue from new products and services	
Dynamism	New firms within the cluster		

\* Shaded boxes indicate areas in which NRC has an influence

Source: Cassidy et al. (2005, 9).

Table 1 highlights various factors that are put forward in much of the literature on clusters; that is, the factors that contribute to performance, the supporting organizations, as well as various ways to measure current performance. As can be seen, access to qualified personnel, sources of qualified personnel and distances of qualified personnel sources are elements related to human capital that influence cluster conditions and performance. As well, partnerships and alliances and other forms of linkages and interactions can contribute to developing human capital. While there has been some qualitative research on the factors that contribute to performance, and access to qualified personnel; quality of local lifestyle; innovativeness; and local availability of material and equipment and services have been highlighted in this research (Julien 2005; Britton and Légaré 2004; Smith et al. 2004; Tremblay et al. 2003, among others), there has been less research trying to link the various factors to performance and to measure the impact of each one. It must be recognized that this is not easy to achieve, since the very measurement of the factors is not obvious (access, sources, distances, quality, connections, etc.). This makes it extremely difficult to test the model, as we verify for three sectors in Montreal (Tremblay et al. 2003; Klein, Tremblay, and Fontan 2003), and as can be seen in the ISRN research (Gertler and Wolfe 2005; Wolfe, Davis, and Lucas 2005).

The main difference between this cluster view and other views of economic development or growth is the fact that it highlights the social and territorial nature of the innovation process; what has been called elsewhere “socio-territorial capital” (Fontan, Klein, and Tremblay 2005a,b). This socio-territorial capital, or the territory itself, is seen as playing as important a role as economic or financial factors (price, financial support, and so on). The territory is seen here as being more than a simple repository for economic activity, and the role of social relations of production and interactions is highlighted.

#### **1.4 The contribution of Human and Social Capital to Clusters**

It is one of the main functions of clusters to furnish human capital and social capital, as well as financial capital and resources, in order to support firms that are part of the cluster. Beyond the human resources necessary for production, firms need moral and general support for their activity, and this often comes through social capital. Indeed, it is through interactions that representations and ideas are exchanged, and this supports firms and entrepreneurs in a given cluster (Julien 2005, 170).

The concept of human capital is well known,<sup>3</sup> but that of social capital is less well known. While the origins of the concept are unclear, some believe that it originates in Jane Jacob’s work, *The Economy of Cities*. Others attribute it to Lyda Judson Hanifan in a 1920 work, but Julien (2005) insists on the definition given by the French sociologist Pierre Bourdieu, while recognizing the two previous contributions. In the work of Bourdieu, social capital is defined as the set of resources that are related to the possession of a durable network of relations, more or less institutionalized, with “interconnexions” and “interexchanges”; in other words, this capital is related to the fact that one belongs to a group, as a group of agents who are not necessarily characterized by common properties. . . but by permanent and useful links (Bourdieu 1980, cited in Julien 2005,170).

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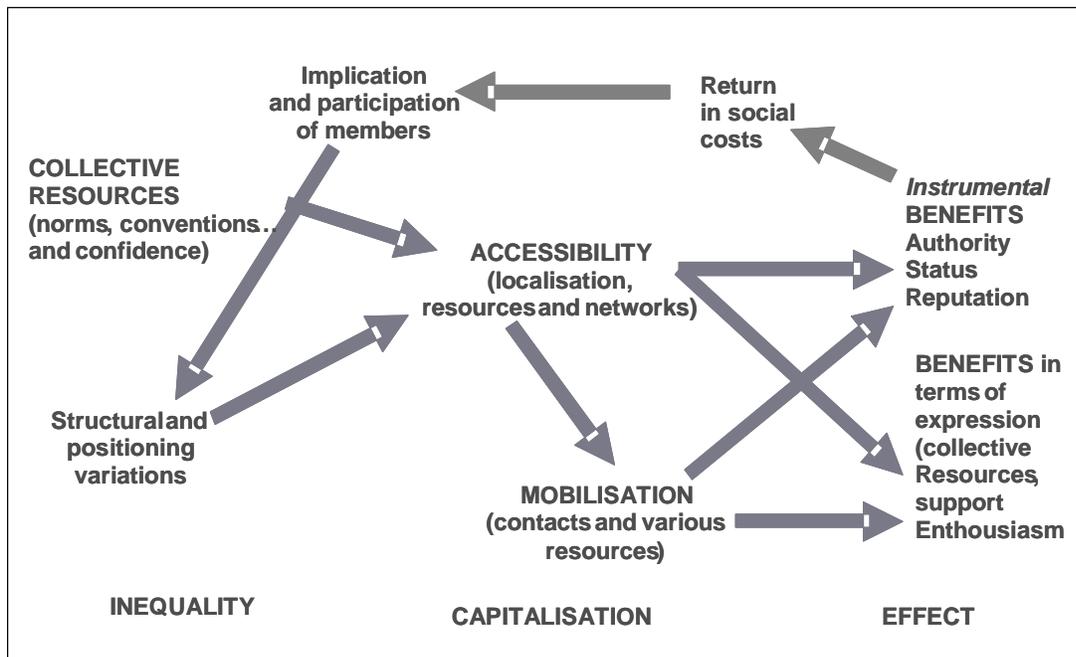
<sup>3</sup> Definitions were provided by the CPRN project, so we do not go into this here.

Some refer to the image of “glue” to indicate how these links and “interconnexions” can act, since they can actually reinforce the relations among members of a group or a cluster; others refer to the idea of a “lubricant” that accelerates the interrelations by instituting a climate of trust between the actors and imposing specific rules that are known and accepted by all. When information is rich (especially implicit or tacit information, rather than explicit codified knowledge), interrelations and exchanges can offer an excellent way to transfer this information to various actors; this facilitates the production of meaning, since knowledge is shared in a more or less diffuse way. In this context, the cluster is seen as a very efficient mode of access to interpretation of information and to learning (Julien 2005,171).

As was highlighted in research on districts and on clusters, these links can be stimulating and can contribute to innovation, but they can also limit creativity if they are too strong, and if cluster members limit themselves to the cluster rather than also being open to “global pipelines.” (Tremblay 2005e; Julien 2005). It is thus important for these links and relations to be at a given level, not too high, and not too low, although there is no clear indication in any work or research of how this correct level can be determined to ensure fruitful knowledge flows within the cluster.

On the basis of Lin’s work (1999), Julien highlights how human and social capital functions to support cluster development. Basically, the idea is that collective assets such as norms, conventions and confidence will facilitate accessibility and exchanges, and that these will in turn favour mobilization of cluster members. Accessibility and mobilization will bring various benefits to cluster members; as is indicated in Figure 2, benefits can take the form of status or reputation effects as well as collective resources or support for given projects. This in turn will favour engagement and participation by members.

**Figure 2. Functioning of social capital**



Adapted from Lin (1999), «*Building a network theory of social capital*», *Connexions*, vol. 22, no. 1, p-28-51.

Source: Julien (2005, 173).

## 1.5 The Impact of Networks and Clusters on Learning and Human Capital Development

In the context of the knowledge economy, knowledge and learning are seen as determinant in the economic development and prosperity of regions and nations, as well as in the competitive success of firms. Learning is thus considered one of the main social processes that give access to knowledge. Acquisition of knowledge through traditional means (buying licences or patents, etc.) is also possible, but does not provide access to a constantly renewed knowledge stock as learning does. Learning is an ongoing process that enables individuals, firms or territories to change and adapt to constantly changing conditions in their environment (Davel and Tremblay forthcoming).

Various works have looked into the impacts of networks, districts or clusters on learning. The work done by Jacob, Julien, and Raymond (1997, cited in Julien 2005, 276) highlights four sources of learning that are related to the clustering process:

- 1) Clusters accelerate the circulation of information between members, especially when trust is important, and this makes analysis of information much easier and quicker, favouring business and cluster development.
- 2) Clustering helps firms to compare themselves, and this leads to a more competitive attitude between firms and to continuous learning and more innovation.
- 3) Clusters offer new and non-routine information and facilitate multiplication and exchange within the group. The observation of others and the concentration of information from many sources favour the active search for new information (especially tacit information) and multiply the new ideas that support innovation.
- 4) When useful or needed, the cluster can transform competitive relations into cooperative relations, without completely eliminating competitive relations (Julien 2005, 276).

Creative capacity and innovation thus largely determine interactions between socio-economic agents, social learning in a given territory, and socio-territorial capital development. (Fontan, Klein, and Tremblay 2005a)

Many authors highlight the fact that social capital should be varied, in the sense that learning will be much richer if members of the network come from different environments, different backgrounds (Tremblay 2003a). Also, for a cluster to be successful, it needs to offer a variety of sources of social capital, some contributing to financial start-up capital, some to psychological or social support, and others to new ideas and innovation.

In order for industrial clusters to develop new ideas and innovation, they must be capable of adapting ideas according to their business needs. The ideas must also be compatible with the values and norms of the present and future members of the clusters, while being innovative and supporting the evolution of values. Finally, the networks must be linked to other networks from other regions or localities in order to increase the richness and variety of information they offer and to help entrepreneurs join more complex networks (Julien 2005, 288). Here again, we find the idea that local buzz and activities are not sufficient, but access to global knowledge flows is important.

Research also highlights the fact that collective learning and the appropriation of rich information within clusters requires a specific atmosphere that is without uncertainty and ambiguity and that generates social capital, and a culture that supports creativity. Social capital is thus the basis for the territorial embeddedness of firms and clusters, which is why it can be referred to as socio-territorial capital (Fontan, Klein, and Tremblay 2005a; Tremblay forthcoming)

One of the questions that appears not to be resolved is whether diversification or concentration in one sector is preferable for information sharing and knowledge development within the cluster. As mentioned previously, the district model is usually concentrated in a specific sector, while local systems of production or innovative milieux can be composed of various sectors, and diversity may here be supportive of innovation and performance. Still, the issue of whether diversification or concentration is preferable is unresolved. Recent research seems to focus on sectoral clusters, but these clusters sometimes include a few different sectors and certainly most are not in a territory reserved for a given sector (Holbrook and Wolfe 2002; Padmore and Gibson 1998; Wolfe, Davis, and Lucas 2005; Britton and Légaré 2004; Smith, Mc Carthy and Petrusovich 2004; and Tremblay and Rousseau 2005).

We have defined the concepts of industrial districts, local systems of production, and clusters, and we have looked into the links between these concepts and human capital development or learning. We have observed that both the industrial districts theory and some of cluster theory stress the importance of skills, and thus human capital development and availability; skills, competencies and human capital are amongst the factors contributing to firms' performance in the cluster model (see Figure 1).

## **1.6 Clusters and Human Capital Development: What We Learned and What is Still Debated**

While research does not give a clear answer on the direction of the effects between clusters and human capital development, it seems that most considers it to be bidirectional. Indeed, the theory stresses the importance of an "industrial atmosphere" that contributes to skill development and supports firms. In turn, this skill development makes firms more competitive, while cooperation with other firms and institutions contributes to competitive success.

Researchers agree on the definition of clusters as geographic concentrations of interconnected companies, suppliers, associations, institutions, usually in one sector. They can be value chains with subcontracting links between firms. The cluster model is centred on the idea of performance of firms and tries to understand the various factors that can explain this performance: firms are at the centre of the model. The performance of the cluster is seen as depending on the performance of the individual firms that make it up, and this performance is moderated by cluster conditions and the environment of the firm. Amongst the factors that are seen as having an impact on the firms are human and social capital, R&D capacity and infrastructure, information infrastructure, community resources and support, and government policies and programs

Research on clusters has clearly shown that cluster development is a long term process that is based on the mobilization of key stakeholders in the community or the local or regional territory. One of the main functions of clusters is to furnish human capital and social capital, as well as financial capital and resources, in order to support firms that are part of the cluster. It is also

agreed that it is through interactions that representations and ideas are exchanged and knowledge is developed, and this supports firms and entrepreneurs in a given cluster (Julien 2005; Stolarick, Florida, and Musante 2005; Florida 2004; Ketels 2003; Gertler and Wolfe 2005). Also, while there was much insistence on the local dimension in the beginning of cluster research, over the years there has been recognition that local buzz and global pipelines (Gertler and Wolfe, 2005; Fontan, Klein and Tremblay, 2005b) both contribute to the creation and exchange of knowledge, although this has been for quite some time, and appears to be still, the subject of debate. The question is more and more centred on the importance of local versus global sources for specific clusters.

There is agreement on the fact that knowledge and human capital play a role in cluster development; however, the type of knowledge varies according to type of cluster (or sector). ISRN work has identified three types of knowledge: synthetic, hybrid, and analytical, and maintains that one or the other type dominates in a given cluster (Wolfe, Davis, and Lucas, 2005). The predominance of a given form of knowledge may not be specific to clusters, but rather characteristic of firms or economic sectors in general. Nevertheless, it has been highlighted in recent work on clusters.

Some research has also shed light on the role that human capital development plays in the formation of clusters. Richard Florida's "creative cities" thesis (2002, 2004, 2005) is centred on "talent attraction and retention." Florida's theory and the cluster and industrial district theories basically present the following view:

- Density (or proximity) and diversity of talent or human capital contribute to an increase in volume and rapidity of circulation of knowledge
- This contributes to innovation and employment, with Florida and Stolarick's work showing that it contributes to employment of better quality (better wages and increase of percentage of workers in the creative sector – technology, arts and culture professionals, managers, and education and training – TAPE)
- Innovation spurs new business creation

In this context, some authors have stressed the importance of post-secondary institutions, as well as research centers and educational institutions of various types, in developing and accelerating the circulation of knowledge. Some research has analyzed the role of post-secondary institutions in clusters and in the economic development of cities or regions, and it has been observed that it is mainly in science- or technology- based clusters that these institutions play a dominant role.

The creative cities thesis has sparked much debate; however, there has been some discussion of the vagueness of the concept and the difficulty of measuring talent: many authors believe that the talent concept does not add much to the human capital analysis. Some have questioned the impact of the creative cities thesis on "untalented" workers, and some consider that it offers justification for the extension of privileges to the talented, since it tends to lead cities to offer the amenities that talented professionals look for, rather than the amenities that the working class needs. Another criticism of the creative cities thesis is the "chicken and egg" problem: Does the offer of jobs in a city attract talent and Human Capital? Or does talent stimulate growth, as Florida indicates? Over the years, many have argued this may be the wrong question to ask: it

may be that the two come together in successful places, as is proposed by Florida's response to his critics (2004).

Among the other debated issues, many researchers and policy-makers wonder how to foster density and diversity of human capital or talent, if this is the source of competitiveness and growth. This is where governance and institutions come in: many support the view that forms of joint governance, including R&D organizations and educational institutions (as well as arts and cultural institutions, in Florida's view), with the participation of a diversity of social actors, will foster density and diversity of human capital, thus favouring innovation and employment.

We will now turn to an analysis of the issue of governance. Indeed, since many private sector as well as public sector, or governmental, organizations are interested in developing governance mechanisms in order to develop clusters, governance processes are considered crucial as an institutional basis for creating clusters, but also more and more in theories on clusters. As we saw earlier, various actors can participate in clusters, and some authors consider that a diversity of actors promotes better performance and innovation. These actors, who are brought together by governance processes, are seen as being crucial in the development of information flows and knowledge transfers.

## 2. Governance and Clusters

Today, governance is a well-established term in the vocabulary of the social sciences, and in the field of the local development of cluster analysis. This interest in the notion of governance is explained by recent approaches that consider the importance of the local community as an agent of development and change in our societies, approaches that help to define new forms of public action (Jouve, 1995). In fact, since what has been described by some authors as the crisis of Fordism and recomposition of modern states (Jouve, 1995) the local community has been increasingly called upon to contribute to economic development. In the face of the failure of modes of regulation, new approaches to public action have emerged,<sup>4</sup> and governance based on the interaction of a diversity of actors seems to constitute an effective response (Fontan, Klein and Tremblay, 2005a,b), especially in the context of cluster development.

In the cluster literature, governance processes appear as the institutional bases of cluster development as well as cluster theorizing. Governance processes and modes are seen as the source of information flows, as the place where public and private actors can be brought together to design and support cluster development – thus a mode of knowledge development, an element that favours organizational proximity between actors. As we will see further on, there are various forms of governance, but partnership-based or joint governance appears to be the most promising from the point of view of competencies or human capital development. Indeed, the plurality of actors brought together in this context would favour a more diverse knowledge base and thus, a richer learning process and more innovation.

This part is made up of two sections. The first section proposes a definition and some general considerations related to the concept of governance. The second section sets out a typology that we feel can be useful in the analysis of factors of performance of clusters, since it highlights elements related to the nature of public policy and support, as well as community resources that can be involved in cluster issues. It goes without saying that this part does not claim to be an exhaustive presentation of the concept of governance. Rather, the aim here is to establish a few reference points to help define the concept in relation to our research.

### 2.1 Origin of the Concept

Although it was recently re-introduced into the social science disciplines, the concept of governance was first used by the American economist Ronald Coase (1937) and later refined by Oliver Williamson (1975). The notion of governance was subsequently broadened and took on various meanings. Today, it is part of the family of concepts of partnership and concertation, which were introduced in regional science over the past decades.

To help us define governance, we are taking the liberty of borrowing the definition proposed by Le Galès:

*the capacity to integrate, to shape local interests, organizations and social groups and, on the other hand, in terms of the capacity to represent them externally, to*

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<sup>4</sup> By public action, we refer to the facilitation, planning, funding or other types of operations that correspond to the collective interest as was shown in various works (Jouve 1995; Grossetti and Bès 2001)

*develop relatively unified strategies in relation to the market, the state, other cities and other government levels. (1995) [translation]*

This construction does not eliminate the possible divergence of interests between the actors, but it refers to the types of action that allow them to achieve common goals by finding compromises among sometimes divergent interests and goals. Governance relies on efforts to find a consensus and creates the possibility of taking action in an environment where uncertainty often reigns.

Governance is also multidimensional in that its field of intervention may cover a vast scope of spatial references. In fact, it is possible to talk about local governance (Stone 1989), metropolitan governance (Bassand 1997), regional governance (Balme 1996), national governance and even international governance (de Alcantara 1998; Valaskakis 1998). These scopes are not exclusive and extend to beyond the context in which they first emerged. Thus, an issue that seems a priori to be local in nature may have national or even international repercussions, and the actors may operate on different levels.

Governance has also adopted a multiform character. It may associate a variety of actors of different origins. In fact, governance mechanisms may be the result of private organizations (firms, associations, etc.), parapublic organizations (for instance, development corporations) or public organizations (government bodies). It may also include individuals who act in their own names. Precise trajectories cannot be inferred from the type of actors involved. In fact, private actors may espouse actions of general interest, and the inverse may also occur. While government action may spontaneously come to mind when the concept of governance is mentioned, it actually refers to a broader vision that goes well beyond the various government or spatial levels (Le Galès 1995).

According to Allemand (2000), governance can have two dimensions: "For some, governance contributes to a democratization of government functioning and thus opens the field to initiatives and to new civic mobilizations. For others, it means first and foremost a reevaluation of the role of economic actors and reappraisal of government intervention." [translation]

## **2.2 Typology of Governance**

The different actors who participate in governance (private and institutional actors) acquire a capacity to pool their resources, know-how and goals (Stoker 1995) in order to create a social response to a given situation. Pecqueur (2001) points out that governance can be characterized by the key actors of territorial coordination or of a given cluster. He proposes a typology of three categories, which we find useful for the analysis of clusters.

The first category is *private governance*. This refers to situations in which an organization is the key actor in the territory or cluster. This actor may be a private firm or a government enterprise (Crown corporation), or a group of private firms that belong to a formal association with goals that stem from its members' concerns (sectoral association, chamber of commerce, and so on). Pecqueur refers to the latter form as *private collective governance*.

The second category is *institutional governance*. This category may bring together one or more institutions as key actors. These actors may come from the government sphere (for example, government departments) or from a more broadly defined public sphere, for example, from

research centres, universities or even non-private associations, and they will work together on spatial, employment or innovation issues, amongst others.

The third category is *partnership-based* or *joint governance*. This category appears when private actors and (generally) public organizations co-operate and jointly constitute the key actors of the territory or cluster. This form of governance may be more complex, because it may consist of a group of actors with individual and sometimes divergent goals. It is normally more demanding, because it may require concessions and compromises on the parts of the participants.

It should be mentioned that these categories are not exclusive. In fact, governance is recognized as a dynamic process. Thus, underlying the construction of this governance, there are key actors onto which organizations may be grafted, thus changing the form from the first to the third governance category. In addition, the initiators of a given process of governance can be replaced: they may give up their place to other actors or be abandoned or even ousted. In fact, the original goals of a process of governance may also undergo changes. These changes may result from environmental stimuli and usually give way to some form of innovation, or social innovation (Fontan, Klein, and Tremblay 2004, 2004a).

Having developed the issue of governance in the context of clusters, let us now turn to the issue of proximity, which is one of the main dimensions of analysis over recent years. Indeed, the basis of the cluster idea is largely based on the idea of proximity, but there has not necessarily been much systematic analysis of the proximity issue, which we looked into and present in the next section.

### 3. Proximity and Cluster Issues

“Proximity matters” is often cited as the basis of the cluster concept and literature (Gertler and Wolfe 2005; Pecqueur 1996; Amin and Thrift 1992,1002). Since the 1980s, there has been increasing interest in proximity and its potential effects on innovation as well as on the development and structuring of economic space. Authors such as Brusco (1994), Becattini (1991), and Garofoli (1985) emphasize the importance of geographical proximity in the success and development of spaces characterized as Marshallian industrial districts, as we saw earlier. Various authors, including Piore and Sabel (1984, 1989) and Benko and Lipietz (1992), have also highlighted the importance of districts and proximity as the source of innovation and the foundation of the development of “winning regions,” as Benko and Lipietz (1992) called them.

However, the effect of proximity on development has been called into question in recent years, as cluster theories were also questioned. Several authors identify the importance of unformalized compromises between actors (Salais and Storper 1993), institutional density (Amin and Thrift 1992) and the university-firms link (Grossetti and Bès 2001; Klein, Manzagol, Tremblay and Rousseau, 2005) in the differentiated trajectories of local milieux within a largely globalized economy. Storper (1997) even advances the hypothesis of a new winning configuration for the third millennium – a configuration based on innovation, organizations and territory. Must we therefore conclude that the simple concentration of actors coupled with physical proximity should be the principal bases for strategic action at the local level? Nothing could be less certain, according to Markusen (2000) who, like other authors, suggests that while relations between actors (firms, decision-makers, technology producers) are important, they are not the result of simply being closer together. In other words, the mere fact of cohabiting in the same territory is not a sufficient condition for actors to have relations with each other, as is observed in recent work on Montreal clusters (Tremblay, Chevrier, and Rousseau 2004; Tremblay and Rousseau 2005a,b,c; Tremblay, Klein, Fontan and Rousseau 2003) Moreover, actors develop proximity relations without cohabiting in the same territory. This finding raises the question of the scale of the “local.” What is the scale of the local as defined by actors when they characterize the network of their proximity relations?

The concept of proximity is a key indicator for determining what socio-economic actors mean by “local space or local cluster.”

In general, there is more and more agreement on the fact that while physical proximity does not appear to automatically have an influence on a sector or a firm’s capacity to innovate, access to information networks and personal interactions are key when a firm decides to develop innovations. (Tremblay, Chevrier, and Rousseau 2004; Julien 2005). In other words, although the fact of physically cohabiting with other firms is apparently of less importance than what was originally thought, it can have an influence on a firm’s capacity to innovate if it also translates into relational or organizational proximity. The social, cognitive and communicational aspects of a territory are considered by entrepreneurs to be vital in explaining the innovation taking place within firms of their sector (Fontan, Klein and Tremblay 2004; Julien 2005).

Territory was long perceived as a neutral geographical space. Firms are located next to each other but their proximity by itself has little influence on their capacity to innovate. However, territory is now more and more perceived as a determining geographical environment when it is

invested with resources – for example, a workforce and a climate conducive to communications – which can have a positive bearing on the development of firms. The geographical environment is what the population, organizations and institutions that occupy it have made of it. Distance in quantitative terms is supplanted by the “proximal” quality of resources that are made available to the entrepreneur.

## 4. Communities of Practice

Communities of practice (CoPs) have raised interest over recent years in knowledge and human capital development. In this part, we will first present the definition and meaning of the concept and recall the elements highlighted by other researchers as conditions of success for these CoPs. We will then link the concepts and develop future research in CoPs by looking at clusters as a form of community of practice.

### 4.1 Definition

The term “communities of practice” was first used by Lave and Wenger (1991). Many different views and definitions have been presented since then, but most if not all refer to the importance of sharing information within a small group, as well as the value of informal learning for a group and for an organization as a whole. As can be seen, this concept referring to informal learning is close to that of learning in clusters, except that it is more commonly analyzed at the level of a firm or small network (Bourhis and Tremblay 2004). A few definitions of communities of practice are presented in Mitchell (2002):

- “communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, and Snyder 2002, 4; quoted in Mitchell 2002, 12)
- “a group whose members regularly engage in sharing and learning, based on their common interests” (Lesser and Stork 2001, 831; quoted in Mitchell 2002, 12)

Wenger, McDermott, and Snyder describe the CoPs by insisting on the participants, who:

don't necessarily work together every day, but they meet because they find value in their interactions. As they spend time together, they typically share information, insight, and advice. They help each other solve problems. They discuss their situations, their aspirations, and their needs. They ponder common issues, explore ideas, and act as sounding boards. They may create tools, standards, generic designs, manuals, and other documents – or they simply develop a tacit understanding that they share. However they accumulate knowledge, they become informally bound by the value that they find in learning together. This value is not merely instrumental for their work. It also accrues in the personal satisfaction of knowing colleagues who understand each other's perspectives and of belonging to an interesting group of people. Over time, they develop a unique perspective on their topic as well as a body of common knowledge, practices, and approaches. They also develop personal relationship and established ways of interacting. They may even develop a common sense of identity. They become a community of practice. (2002, 4-5)

Let us present a few other definitions, in order to highlight difference in types of communities, which may also raise questions relatively to the conditions of success:

- groups of people informally bound together by shared expertise and passion for a joint enterprise (Wenger and Snyder 2000,139);

- informal clusters and networks of employees who work together –sharing knowledge, solving common problems and exchanging insights, stories and frustrations (Lesser and Prusak, in Lesser et al. 2000, 831; quoted in Mitchell 2002, 11-12).

In the last definition, we again find the elements of knowledge-sharing that are present in cluster definitions. It must however be stressed that these CoPs are generally seen as more than simple teams working together in a work environment. They are seen as a group that has a common mission, that has a common task and must deliver a product based on regular exchanges and information-sharing within the group, as defined by McDermott (1999). Work teams usually have a predetermined goal and schedule and often very clearly defined tasks, and their activities are usually centered on their work tasks and done during working hours; often, work teams disintegrate once the objective is attained, but in the manufacturing sector, they often remain together to assume general work tasks collectively (Tremblay and Rolland 1998). Also, work teams are often characterized by a definite division of labour, whereas communities imply more cooperation between the members. CoPs are seen as having wider and less-defined objectives, as not having a specific schedule and dates for attaining the various objectives (in contrast with work tasks), and usually go on for quite some time (indeterminate often). In this sense, communities of practice can surely be seen as an organizational form that could be useful for learning and human capital development in the context of clusters.

#### **4.2 The Conditions for Working Together and Developing Knowledge (or Human Capital)**

As indicated in much of the literature on work teams and on CoPs, working “together” as a group usually requires some prerequisites, the main one appearing to be trust in other members of the group. This is all the more important in the context of CoPs, since members of the community are expected to share tacit knowledge and to collectively construct new knowledge and possibly new products or services (McDermott 1999, 2000; Wenger and Snyder 2000; Adams and Freeman 2000). It is precisely because of this trust element that many authors recommend that CoPs be developed on the basis of existing informal groups, groups that share values and already trust each other. It is often not possible in firms and is why many CoPs are designed without being based on a previously existing informal work group. This of course represents an additional challenge for CoPs, that is, when previous acquaintance and trust of members has to be developed within the community, and this surely can be a challenge in the context of cluster development.

Among the other main prerequisites often mentioned in the CoP literature (as well as in much of the teamwork literature) are the importance of the leader or animator of the community, the interest and motivation of individuals to work together as a group, and the support received from the organization (Wenger, McDermott, and Snyder 2002; Tremblay 2005a,b,c,d).

To conclude, let us recall that the main elements stressed in most work on communities of practice are thus the sharing of a concern, a set of problems, the ongoing interaction between the group, and the ongoing sharing and learning. These elements can surely be considered as the micro-foundations of the cluster dynamics, although to our knowledge no authors have analyzed clusters as communities of practice. In our view, it might be useful to do so in future research.

This covers very briefly the essence of the literature on communities of practice that is pertinent for our purpose here<sup>5</sup>, and we will now conclude by presenting the gaps we see in research as well as some policy issues, which are sometimes somewhat related.

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<sup>5</sup> For more on this, see the chapter on Communities of practice in Davel, E., and Tremblay, D.-G. (Forthcoming 2006), or in Bourhis and Tremblay (2004), Gherardi and Nicolini (2000), Wenger (1998) or Tremblay (2005a,b,c,d).

## 5. Conclusion

In our paper, we started by defining the concepts of industrial districts, local systems of production, innovative milieux and clusters, and we looked into the links between these concepts and human capital development or learning. We observed that the industrial districts as well as cluster theories stress the importance of skills, and thus human capital development and availability, although cluster theory often appears to be more centred on governance processes and innovation or performance outcomes, while skills, competencies or human capital amongst the factors contributing to firms' performance (see Figure 1).

Nevertheless, the human resources or skills dimension is an identifiable gap in most research on clusters. However, it would be useful to fill this gap by answering a few questions, such as the following: What is the specific contribution of specific or generic skills to cluster development in a given sector? Is the access to a local labour pool an important factor for cluster development, and how does it play out in practice? Do clusters come to places where skills apparently exist, to places where post-secondary institutions have developed – as is the case in science-based clusters – or do clusters largely contribute to the creation and development of the skills? Is the “image of a place” or social representations of possible future jobs important in developing educational institutions and programs, and thus a local labour force in a given field? How precisely are skills developed at various stages of the clustering process? How do they contribute to developing the cluster? What types of exchanges and learning occur at the various stages of cluster development?

We then looked into governance issues and highlighted the fact that many researchers consider that governance processes are the institutional bases of cluster development as well as of cluster theorizing. For many authors, governance is the central concept that brings together many dimensions of cluster or industrial district analyses. Governance processes and modes are seen as the source of information flows, as the place where public and private actors can be brought together to design and support cluster development. As we have seen, there are various forms of governance, but partnership-based or joint governance appears the most promising from the point of view of competencies or human capital development. Indeed, the plurality of actors brought together in this context would favour a more diverse knowledge base, and thus a richer learning process. Quite a lot of research has been done on governance issues, but the skills or human capital dimension has not attracted sufficient attention. This is an important gap that should be filled in the future. What are the skills to be brought to governance processes? What can governance processes contribute to knowledge development amongst the actors in a given cluster? What can they contribute to intercluster knowledge development? These are but a few questions that require some analysis.

Another issue that could be addressed in more detail by research is the issue of human capital attraction to a given territory, which may be called “talent attraction” if one wants to enter the “creative cities” debate that was sparked by the works of Richard Florida. Florida (2002, 2005) considers that talent (or human capital more generally) is attracted to and retained by cities that offer a high quality of life, important cultural activities, many employment opportunities, and social diversity (see, for example, his Bohemian Index). His views have been supported by many, including many urban managers and cities hoping to become “creative cities.” It has also been contested by some, who argue that the thesis is not supported by scientific data, that the

causality link between economic development and attraction of talent is unclear, and that the thesis neglects the problems of those with little human capital and may favour their exclusion from cities. (See Tremblay and Tremblay, forthcoming 2006, for many articles on Florida's views)

As we saw in the part on proximity, proximity can be analyzed in terms of the actors' "spatial intelligibility" (Pecqueur 1996). Actors looking for solutions proceed by trial and error, and these processes are all the more likely to produce solutions as they are conducted in a spatial reference with variable structuration. The principal vehicle of this learning is the so-called local physical proximity, which allows multiple contacts (Colletis and Pecqueur 1993) while being combined with other forms of proximity (organizational, relational and institutional). The territory is thus considered as a scene where the social link between production firms and other types of organizations can be developed. This link appears to be strengthened in a local framework, but the exact scale of the "local" or the "territory" is difficult to determine. This is one of the issues that needs more research. Indeed, in some Canadian clusters, the networks reach as far as Boston, New York, California, and even Toulouse (aeronautics) and many other European cities. Researchers have questioned the precise local scale that is pertinent to the development of clusters, but in our view, the research does not lead to definite conclusions, and this is a question that remains open to this day.

After we looked at clusters and other concepts essentially from a regional or local level, we were reminded that much of learning and human capital development happens within or between firms, and therefore at a more micro-economic or micro-social level. This brought us to the issue of communities of practice. While communities of practice have not attracted attention in the context of clusters, probably because it is a theory which has been developed and circulated in the fields of education or management studies, we feel there is a close connection that should be investigated here. Indeed, communities of practice could be viewed as a form of learning or human capital development within clusters. Cluster research has not envisaged this possibility to date, and while some government or private actors have shown interest in this concept, it has generally been at the level of one firm or organization, less frequently at the level of sectors, clusters or groups of firms. Nevertheless, we think that particularly in the context of partnership-based or joint governance, communities of practice might be a useful tool, not only to analyze but also to support cluster development.

As we saw earlier, the main elements stressed in most work on communities of practice are the sharing of a concern, a set of problems, the ongoing interaction between the group, the ongoing sharing and learning. In our view, these dimensions should be the subject of future research, since we consider that the human resources dimension, the sharing and concrete learning that occurs within a cluster and that can contribute to innovation and performance, has not been the object of much attention (Tremblay 2002a). We maintain it has pretty much remained a "black box," and that in order to better understand cluster development and human capital development in the present socio-economic context, a deeper analysis of the dynamics of sharing and learning within cluster communities of practice would be a useful avenue.

This would shed light on the micro-foundations of cluster dynamics, which are often neglected, analysis being concentrated on institutional and organizational dynamics or governance processes at a higher level. This is not to say these institutional dynamics and governance processes are not important, but it may be time to look in more detail at the exchanges that are

actually happening between actors: their frequency, their content, and their contribution to innovation and performance. This type of work has been done at the level of individual communities of practice within firms, but much less at the level of individual workers in firms that are part of a cluster. In our view, it would be useful to do so in future research.

We have concentrated on research, but let us mention a few elements relative to policy development or implications.

It is clear that the literature offers a very good view of clusters as an empirical phenomenon. There is far less systematic knowledge about turning this into effective policies (Ketels 2003); successes and failures are not always explained, and it appears to be difficult to transpose observations from one context to another. However, there is a good view of the positive impacts of clusters and human capital development that goes on within them: agglomeration and knowledge spillovers translate into innovation, higher employment, better employment, better earnings, and so on (Florida 2002, 2005; Ketels 2003, and so on) Research on specific clusters has highlighted the fact that agglomeration of firms leads to knowledge spillovers through interaction between individuals within the cluster. In turn, these interactions and exchanges can lead to the development of new technologies, products and processes; in short, various forms of innovation. Innovation can in turn contribute to developing employment and to a better quality of employment (more secure, full time and better-paid jobs).

In our view, the cluster, industrial district and communities-of-practice literature leads to the ideal of developing policies that would support inter-organizational cooperation, in a context of joint governance. In this perspective, we think it would be useful not only to support general network development, which is often done with the support of institutions, but also to go into more detail and support concrete systematic interactions between actors. If a good number of organizations and associations exist in many clusters or sectors, this does not necessarily mean that exchanges are frequent and content-intensive. In our view, this dimension should be addressed by policy, especially if one is concerned with the idea of developing knowledge, skills or human capital. Governments can support organizations that bring actors together, develop instruments or platforms to facilitate knowledge flows within the clusters and contribute to strengthening the interactions, and so on.

One of the elements that should be looked at in this context is the extent of business-education cooperation, also taking into account the fact that educational institutions are often considered amongst the most “locally or nationally embedded” organizations. This would thus involve questioning the transferability of various modes of skills development in a given cluster to other clusters in the same country, or to the same sectoral clusters in other countries.

However, some questions remain, particularly with respect to the institutions that can favour the density and diversity of human capital. Clearly, universities can favour the density and diversity of formal knowledge, but we may need more community, informal networks or social institutions for informal, unplanned exchanges of non-codified information or knowledge. Also, we probably need more “institutions for collaboration,” as they are referred to by Porter-Emmons (cited in Ketels 2003); that is, institutions that (1) create platforms for interaction among cluster participants, (2) strengthen the interaction, and (3) facilitate knowledge flows (Saxenian 1997)

In terms of policy issues, industrial policy usually suggests that a few sectors should be supported, because they appear more important than others in investment flows or employment (aeronautics and biotech are often cited). However, cluster-based policy supports the view that all clusters are important, not only high-tech or international clusters, because productivity in all sectors is important for the employment and standards of living in regions and countries. Clearly, cluster policy should not be about targeting, but should be seen as a tool that is open to all clusters, although limited resources may mean concentrating on a few clusters that have a willingness to improve and ability to succeed (Ketels 2003). Many consider that cluster policies aim first at improving innovation and productivity, that employment and market share only come second (Ketels 2003)

Some questions are either not answered or not asked in the cluster literature. This literature advocates the development of policies that would support inter-organizational cooperation – in the context of joint governance or another form that favours interaction between diverse social actors – but it is unclear precisely how to do this. The interaction is formal and informal, often unplanned and often implies tacit (not codified) knowledge. Again, it is unclear precisely how to foster it. Finally, common norms, trust among actors and common habits of work appear to favour the interactions that develop human capital or knowledge (learning through interacting), but again, how to develop them? Is proximity the answer? Are there other elements to consider?

Many questions should be addressed in order to develop a policy for cluster and knowledge development, for example the following:

- How should we pick the winners to be supported because of limited resources? Should the decision be based on present human capital or on promising developments, or another criterion?
- Who should do the selection?
- What should be done with sectors or clusters that are not selected and for the workers in those sectors?

Concerning future research, which we were asked to dwell on, there are a few questions. Once the clusters chosen, how can we facilitate interaction in a given sector-cluster for human capital development? What level (local, regional, national) is the best? Are these levels complementary? Among other questions, we can also ask: How can we favour content-intensive exchanges, not only superficial social interaction, in order to foster knowledge development? Research has shown that it is not sufficient to ensure geographical proximity; relational proximity is important, but can come from geographical proximity. Nevertheless, the process of development is unclear.

Some researchers consider that selection and targeting are not the issue, but rather “cluster activation.” They maintain we need to remove the barriers to mobilizing the capacity of actual cluster participants to exchange information, to act together, to innovate together. Some research identifies the types of activity that can be useful. *The Cluster Initiative Greenbook* (Sölvell, Lindqvist, and Ketels 2003) identifies the following: research/networking; education/training; innovation/technology; investment attraction; and policy lobbying and commercial cooperation. The Competitiveness Institute identifies the empirical activities, but again, there is not much on how the clusters got to the point where they are.

Thus, it appears that the main questions are of the “how to” type:

- How to mobilize the social actors of clusters?
- How to foster and maintain interaction over time?
- How to identify the factors that determine the evolution of clusters over time?
- How to overcome obstacles, actors’ resistance?
- How to evaluate whether the activities improve cluster dynamics (rather than try to measure critical masses as much research does)?

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