

**THE EMERGENCE OF A KNOWLEDGE-BASED VIEW OF CLUSTERS AND ITS IMPLICATIONS  
FOR CLUSTER GOVERNANCE**

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**Abstract**

*This article serves the purpose of understanding the knowledge component in cluster literature from its origins to the present. A chronological perspective is deployed in order to shed light on how the concept of clusters has evolved into a knowledge perspective. Given the increasing interest in clusters as knowledge repositories, and the apparent conviction among policy-makers of the manageability of clusters, lessons learned from KM practices in organizations might well be applied to the many policy efforts aimed at governing clusters. We will argue that introducing KM-initiatives on a regional level should be accompanied with an understanding of the possible downfalls that are associated with KM failures.*

**Key words:** Clusters, ICT, knowledge-based view

## 1. Introduction

The knowledge component of clusters to which, among others, Breschi & Lissoni (2001a/b) refer, is of central interest in this article. In doing so, a clear path to the current, rather dominant, knowledge based view of clusters is identified and analyzed. This development raises a number of interesting questions to which this article will respond. First of all, given the recent emergence of the knowledge based view of clusters, it is interesting to take stock of the role of knowledge (or the lack thereof) throughout the development of cluster literature. This will specifically enhance our understanding of the true contributions made by this new turn in cluster literature. As this literature review will show, the “cluster brand” has been applied and interpreted in a multiple of fashions. A historical approach towards the concept of clusters is adopted in order to deal with the apparent incoherence of cluster thought.

Second, it raises the issue of governance, for policy makers increasingly appear to be preoccupied with stimulating clusters in order to enhance its knowledge potential. For example, Feldman & Francis’ (2004) description of a ‘battle’ between two American states over the location of a biotech firm exemplifies the value that is being associated by policy-makers with clusters in which knowledge is perceived as the main asset. At stake was not the number of jobs directly associated with the establishment of the firm. Rather, it was the perceived “future economic benefits of a knowledge-based, entrepreneurial industry, sparking regional transformation by transplanting a cutting-edge firm” (*ibid.*: 127). We draw a comparison with the emergence of knowledge management practices, which we define as “organizational practices that facilitate and structure knowledge sharing among knowledge workers” (Huysman & De Wit, 2004: 81-2), and its implications for governance.

We will start the discussion with a number of interesting schools of thought with respect to cluster literature in relation to the concept of knowledge, starting with Marshall’s seminal observations on “the localization of industries” (Marshall, 1920: 223), and the notion of knowledge spillovers. Furthermore, this section shows the slow but steady progression from Marshall’s theory of industrial districts to a knowledge-based view of clusters. It should be noticed that this literature review is not all encompassing, which can be regarded as an important limitation of this paper. A main goal of the literature review is to show how the field of cluster research developed into a multidisciplinary field of study, encompassing multiple schools of thought. In particular, an interest is conveyed in the development of cluster literature starting at Marshall’s seminal work and ending at what is termed the knowledge-based view of clusters. Several schools of thought have been *highlighted* in the process of showing how cluster literature developed; hence, not all schools of thought that might be considered part of this development are taken into account, mainly for reasons of article length. Most notably it concerns, among others, the Californian School (e.g. Scott, 1996), New Economic Geography (e.g. Krugman, 1991), and the Nordic School of

Innovation and Learning (e.g. Lundvall, 1996; Lundvall, Johnson, Sloth Andersen & Dalum, 2001). However, careful readers among us might notice that these and other schools of thought are incorporated in this paper indirectly, that is, through references to important representatives of these schools of thought. The theoretical perspectives that are explicitly incorporated in this paper, thus, serve the purpose of exemplifying and explaining the trend towards a knowledge-based view of clusters.

After the literature review, the emergence of the knowledge based view of clusters is compared to that of the knowledge based view of the firm by critically reflecting on the manner in which policy makers nowadays tend to handle the cluster brand. It is argued that, given the increasing interest in clusters as knowledge repositories, lessons learned from the knowledge based view of the firm and related Knowledge Management (KM) practices in organizations might well be applied to such policy efforts aimed at managing clusters. With this in mind, section three serves the purpose of showing the lessons learned for the field of KM. Section four (the conclusion) explicitly deals with issues for cluster governance.

## **2. Cluster literature and the concept of knowledge**

For a proper understanding of the concept of clusters it is useful to become aware of the key insights that shaped this field of study, beginning with Marshall's seminal observations. A number of contributions are recognized as significant for the development of the field of cluster theory since Marshall. Pioneering work of Jacobs (1969), the Italian district school, Piore and Sabel (1984), GREMI <sup>1</sup>, and Porter (1990, 1998) are all widely acknowledged for their contributions to the literature (Glaeser et al., 1992; Bramanti & Ratti, 1997; Giuliani, 2005). Addressing these authors also illustrates the diversity of economic localities that have been studied, with Marshall's work serving as a crucial conceptual antecedent. Figure 1 illustrates the trajectory towards a knowledge-based understanding of clusters.

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Figure 1 about here (see final page)

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<sup>1</sup> GREMI stands for *Groupe de Recherche Européen sur les Milieux Innovateurs*, and consists of a group of European and North-American economic geographers: <http://www.unine.ch/irer/Gremi/accueil.htm>.

## 2.1 Marshall's contribution to a new stream of literature

Alfred Marshall (1920) is generally regarded as the first to conceptualize what he referred to as *industrial districts*, and his seminal contribution has served as a crucial starting point for many scholars in the field of clusters (e.g. the *Italian district school*).

Marshall defines his notion of industrial districts – in his book *Principles of Economics*, which was first published in 1890 – as “(...) the concentration of large numbers of small businesses of a similar kind in the same locality” (Marshall, 1920: 230). He distinguishes a number of causes for “the localization of industries” (*ibid.*: 223) to occur; the chief causes, he believes, are of a physical nature, such as the presence of natural resources (e.g. mines and quarries), the quality of the climate and soil, et cetera.<sup>2</sup> Other causes that Marshall recognized to attract firms to a specific region/ location are the availability of specialized labor and knowledge (see also Krugman, 1991).

Interestingly, thus, it seems that Marshall already was aware of a phenomenon which nowadays is referred to as *knowledge spillovers*<sup>3</sup> (e.g. Jaffe, 1986; Stewart & Ghani, 1991; Jaffe, Trajtenberg, Henderson, 1993; Audretsch & Feldman, 1996; Breschi & Lissoni, 2001a/b; Caniëls & Romijn, 2003).<sup>4</sup> As he writes:

“When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighborhood to one another. *The mysteries of the trade become no mysteries; but are as it were in the air*, and children learn many of them unconsciously” (emphasis added. Marshall, 1920: 225).

Even more interestingly, Marshall apparently also noted the *importance* of knowledge spillovers taking place, as he describes the process of people (craftsmen) getting inspired by each other, resulting in a process of embroidering on each others' ideas which ultimately lead to novelties, i.e. innovations. It seems that Marshall perceived these ideas to be *floating in the air*; a way of expressing the *tacitness* of this process. This was also observed by Scott (1996), who describes dynamic processes that “revolve around learning and innovation” (*ibid.*: 308). Scott continues by stating that the knowledge that is associated with

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<sup>2</sup> For instance: the Californian climate is, among other factors, supposed to have played a role in the establishment of military and aircraft firms in Silicon Valley, for it enabled “all-year round testing” (Swann & Prevezer, 1996: 1140).

<sup>3</sup> In the literature available on this topic, Marshall's notion of *local atmosphere* has been referred to as ‘local broadcasting’, ‘noise’, or ‘buzz’ as well (Bathelt, Malmberg & Maskell, 2002). Feldman (2001), in addition, relates Marshall's quote to the concept of social capital.

<sup>4</sup> Much more scholars have published on the concept of *knowledge spillovers*. The ones mentioned above serve to illustrate this notion.

these processes is often of a tacit nature, and thus occur as an “*atmosphere* of agglomeration-specific information and accumulated experience” (emphasis added, *ibid.*: 308). Marshall’s notion of knowledge spillovers would eventually constitute the so-called Marshall-Arrow-Romer (MAR) externality, which builds on the observation that the concentration of a particular industry in a particular city fosters knowledge spillover among firms, and therefore influences the growth of cities (Glaeser, Kallal, Scheinkman & Shleifer, 1992).

The concept of knowledge spillovers refers to a process that can be described as flows of knowledge (Jaffe *et al.*, 1993) that circulate within an industrial cluster or network. It is assumed that companies which operate “nearby important knowledge sources (...) introduce innovations at a faster rate than rival firms located elsewhere” (Breschi & Lissoni, 2001b: 975). Knowledge thus is being viewed upon as an *externality* for no payment is associated with obtaining it (Glaeser *et al.*, 1992).

Although valuable lessons can be derived from Marshall’s observations, one obviously should keep in mind that he observed an economic reality which, in many perspectives, is quite different from today’s economy.<sup>5</sup> Globalization has entered the equation quite dramatically, especially with the introduction of the Internet, shaping the way in which people both act upon and perceive reality.<sup>6</sup>

However, although people nowadays tend to speak of a global economy, according to Porter “enduring competitive advantages (...) lie increasingly in local things – knowledge, relationships, and motivation that distant rivals cannot match” (1998b: 77), referring to the apparently successful agglomeration of industries in specific locations. Furthermore, the globalization thesis tends to overlook the dominance of the national state/ government in shaping the structure of the economy (Castells, 1996). It is even suggested that regions should be perceived as the “vehicles for globalization” (Florida, 1995: 528).

The dominance of the globalization thesis might have prevailed because of the impasse in cluster literature for almost half a century. Cluster literature appeared virtually absent during this period,<sup>7</sup> as the economic scientific community shifted its attention to other areas of interest. This shift in attention is probably due to the dominance of mass production (or Fordism) and vertical integration as ideal types of organization, combined with the prevalence of standardized goods and predictable markets (Rocha, 2004).

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<sup>5</sup> Just to illustrate, one of the examples to come under discussion in Marshall’s *Principles of Economics* (1920) involves a perceived cluster that consists of a conglomeration of over five hundred small Russian villages dedicated to various branches of woodwork: “one village makes nothing but spokes for the wheels of vehicles, another nothing but the bodies and so on” (Marshall, 1920: 223).

<sup>6</sup> Nevertheless, Marshall’s contributions still are at the forefront of academic debate on clusters. Or as Brown & Duguid (2000: 16) so eloquently put it: “Despite all the recent insightful writings on “clusters” (...), “technopoles” and “innovative milieux” (...), and “regional advantage” (...) it can feel as though researchers are only adding footnotes to Alfred Marshall’s magisterial economic exploration of “localization,” written more than a century ago.”

<sup>7</sup> Not to say that the interest in industrial districts or regional economies disappeared entirely. Surely, a number of scholars kept challenging the concept of Fordism during this period of time.

This apparent prevalence of “efficiency” over craftsmanship<sup>8</sup> justifies a small detour, thus incorporating the field of economic history.

## 2.2 Jacobs: *The economy of cities and the cluster concept*

An important contribution to the field of cluster theory comes from the field of economic history. Jane Jacobs, here regarded as a main representative of this field, added an important and useful historical perspective to the cluster literature, by studying “the economy of cities” (1969). Cities seem to be fertile grounds for innovations to occur (Jacobs, 1969; Glaeser *et al.*, 1992). The close proximity of people is believed to foster the interaction process, thus advancing the pace by which ideas and innovations disseminate, as well as furthering the development of new ideas (*ibid.*). In fact, perceiving cities as successful learning environments partly explains why people prefer working in cities, despite of the high rents involved (*ibid.*). These rents relate to the inefficient character of big cities as opposed to towns and villages, in terms of energy use, transportation means, et cetera (Jacobs, 1969). However, it is argued that it are these inefficiencies that make cities “uniquely valuable to economic life” (*ibid.*: 86).

The relation between innovation and the city is a dynamic one, as innovations are argued to foster the growth of cities, for “[i]nnovating economies expand and develop. Economies that do not add new kinds of goods and services, but continue only to repeat old work, do not expand much nor do they, by definition, develop” (Jacobs, 1969: 49). This process of adding new kinds of goods and services to old ones is incremental rather than revolutionary, although one does not exclude the other. Jacobs is of the opinion that the process of adding new kinds of work to old ones is the focal element in the development of cities.

Having briefly illuminated on Jacobs’ vision on how new work arises upon old work and its significance for the development of the city, it seems appropriate to return to the crucial observation that inefficiencies are crucial for the development of economic life in the city. This notion can be understood as a conflict between *efficiency* on the one hand and development on the other. Jacobs exemplifies this conflict by referring to two nineteenth century cities: “Efficient Manchester [and] inefficient Birmingham” (*ibid.*: 86).

Back in the 1840s Manchester was perceived as the city of the future due to its stunningly efficient textile industry (Jacobs, 1969). Manchester, in those days, was regarded to be the most advanced city of its time, and thus became one of the success stories of the industrial revolution. Birmingham, on the other hand, was perceived as typically outdated compared to Manchester. Most of Birmingham’s manufacturing consisted of small to medium sized organizations, that didn’t seem to result in a coherent and efficient

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<sup>8</sup> This so-called prevalence of mass-production over craftsmanship, to which Piore & Sabel refer to as the first industrial divide (nineteenth century, see later part of this paper) is not to be mistaken for the rise of the Industrial Revolution (late seventeenth, early eighteenth century), but which also has been referred to as the “substitution of machines – rapid, regular, precise, tireless – for human skill and effort; (...)” (Landes, 2005 [1998]: 186).

economy. Rather, the different branches present in the Birmingham region operated in a fragmented manner as spin offs emerged constantly (*ibid.*), meaning that workmen would break away from their employer to start their own business. In addition, the Birmingham economy was hard to classify as it comprised a diverse set of crafts and industries. Although Manchester was predicted a promising future, a century later in fact Birmingham and London were Britain's most economically vigorous and prosperous cities (*ibid.*).

According to Jacobs, this example shows the true value of being inefficient (as a city). Manchester's "stunning" efficiency and focus stood in the way of adding new goods to old ones, i.e. being creative. Birmingham, on the other hand, was able to retain a high level of development work (*ibid.*).

Jacobs' view matches a distinct part of the cluster literature. Her observation that innovation seems to occur more often in cities fits with the idea of knowledge spillovers as engines for growth (Glaeser *et al.*: 1992). If ideas are believed to flow more easily in cities due to proximity, than knowledge spillovers (or knowledge externalities) must play a significant role in cities as well. Or, as Glaeser *et al.* note: "[a]fter all, intellectual breakthroughs must cross hallways and streets more easily than oceans and continents" (1992: 1127). The presence of different "forms" of knowledge, as a consequence of "inefficiency", makes this process ever more conducive to innovation. Jacobs's work also reflects the value of knowledge heterogeneity. Knowledge heterogeneity, in this case, must be understood as a function of the diversity of crafts and industries present in early nineteenth century Birmingham.

### 2.3 *The Italian district school*

Long after Marshall's important contributions the Italian district school with Giacomo Becattini as one of its main representatives, raised interest in the industrial district issue again at the end of the 1970s (Giuliani, 2005), Becattini (re-)applied Marshall's concept of the industrial district to Italian districts – until then viewed upon as territorially demarcated production systems (Brusco, 1990: 14) – thus changing the unit of analysis from the single firm to clusters of interrelated firms located in small areas. By means of this analysis Beccatini was able to convincingly propose the Marshallian model (i.e. the industrial district) as opposed to the more traditional Fordist perspective <sup>9</sup> (Giuliani, 2005). For many Italian scholars (e.g. Bagnasco, Dei Ottati, Brusco, Bellandi, et cetera) Marshall's rationale, as proposed by Beccatini, proved to be useful in explaining the dynamics of the Italian district (Amin & Robins, 1990); hence, the *Italian district school* was born.

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<sup>9</sup> The so-called Fordist perspective (or Fordism) on industrial organization refers to Henry Ford, and basically entails the separation of conception and execution of tasks (Piore & Sabel, 1984). It is a "system based on the production of long runs of standardized commodities for stable 'mass' markets, (...)" (Tomaney, 1994: 159).

The main object of analysis in the Italian district school obviously is the Italian industrial district of which most are located in the Northern half of Italy (Sforzi, 1990<sup>10</sup>). Typical Italian industrial districts can for instance be found in (1) the fashion industry (including textile, footwear, and clothing), which is mainly located nearby Milan, Venice, and Firenze; (2) the engineering industry (including metal goods, mechanical engineering, and electrical and electronic engineering), which is mainly located nearby Turin and Bologna; and (3) the interior industry (including wooden furniture and ceramic goods), which is located at (among other places) Venice and Firenze (*ibid.*).

The notion of Italian districts is very much related to the difference in prosperity of the overall region, that is, the relatively rich Northeast and center parts of Italy (also referred to as ‘Third Italy’), as opposed to the relatively poor Southern parts of Italy (‘Second Italy’) and the traditionally industrialized Northwest of Italy (‘First Italy’) coping with recession. The perceived prosperity and growth of ‘Third Italy’ as well as the crisis of mass production in the early seventies (Rocha, 2004), inspired scholars to investigate the economic and social characteristics of these clusters (Enrico & Grandi, 2005).

For a more comprehensive description of a typical Italian cluster (in ‘Third Italy’) we might turn to Lazerson<sup>11</sup> (1990; 1993). He describes a cluster also known as the Modena knitwear industry; an industrial cluster in the Northern part of Italy (the Emilia-Romagna region) employing about 16,000 people divided among well over 4,000 firms, making the average firm size thus about four people per firm. The main focus of Lazerson’s study involves how so many small and specialized firms are able to form an efficient production system, for at that time the cluster was recognized for contributing to Italy’s second place standing with respect to world-clothing exports. According to Lazerson, the answer is not to be found at the firm level, but rather “within the community, where public and private organizations create a framework for ordering the multitude of private transactions that occur in the knitwear district” (1993: 205).

The community is hence perceived as the driving force of the typical ‘Third Italy’ district. In the case of the Modena knitwear district, thirty-nine per cent of the entire workforce constitutes artisans and their families/ relatives. This has a distinctive impact on the local culture, for one of the most important characteristic of such a community is its relatively homogeneous system of values and perspectives, which affect the ethic of work, family, reciprocity, and change (Becattini, 1990).

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<sup>10</sup> Derived from figure 3 and 4, p. 83 and 85 (Sforzi, 1990).

<sup>11</sup> This example only serves to provide in a more vivid description of the Italian cluster from an *Italian district school* perspective. Other examples as observed by other scholars would suffice as well. Thus, the decision to discuss the Modena knitwear industry, as observed by Lazerson, is just a matter of choice.

Together with the presence of institutions that heavily support the dissemination of these community values <sup>12</sup> (*ibid.*), the strong community structure with its homogeneous value system is recognized as one of the main drivers of the success of the so-called *putting-out* network (a means of subcontracting work) which, in the Italian district, still prevails over large scale factory organization (see also Rosenfeld, 1997).

From Lazerson's description of the Modena knitwear district two important general characteristics can be derived: (1) the presence of a community (-like) structure upholding a homogeneous value system, and (2) the presence of institutions and rules that have a supportive influence on the development of the district. In addition to these general features, other characteristics can be recognized from Lazerson's description that fit the theoretical description of the typical 'Third Italy' district. According to Pyke & Sengenberger (1990) a significant feature of the 'Third Italy' district involves the very high proportion of small firms. Secondly, according to the Italian district school, districts should be understood as having both social and economic dimensions, meaning that the functioning of one is shaped by the other. This notion points to interrelationships occurring between different spheres; the social, the economic, and the political (*ibid.*), fostering hence both competition and co-operation simultaneously. Other factors believed to influence the success of Italian clusters are the focus and investments in innovation, and the emphasis put on delivering quality products (Rosenfeld, 1997).

To conclude, in addition to re-introducing Marshall's model of the industrial district, the Italian district school is recognized for making the following contributions to the field of clusters: (1) changing the unit of analysis by accepting the district as a unit of investigation. The industrial district thus is assumed to be a meso-economic entity; (2) recognizing that a district incorporates both social and economic elements; and (3) the notion of both co-operation and competition taking place simultaneously (Bramanti & Ratti, 1997). In doing so, the Italian district school extended as much as adopted the Marshallian model, especially shifting attention towards the "historical and territorial specific socio-cultural factors driving external economies" (Rocha, 2004: 372). The unit of analysis, in fact, involved the intertwining of a "community of people and a population of firms in one naturally and historically bounded area" (Becattini, 1990: 38). Local networks, in addition to entrepreneurship, trust, collectivity and flexibility, formed the basic principles believed to stimulate local development (Pyke & Sengenberger, 1992).

Although the knowledge component is not prominently present in Italian district school-literatures, its on the rise of the knowledge-based view of clusters is not to be underestimated. In particular, its adoption of the network dimension, in combination with the perceived importance of the community, paved the

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<sup>12</sup> The more or less traditional artisan structure of the district was for instance heavily supported by the Italian government. Artisans were granted a legal status which enables them to profit from all kinds of tax benefits and financial support, such as subsidized loans (Lazerson, 1993).

way for other schools of thought central to the rise of the knowledge-based view (Rocha, 2004), such as GREMI and the Nordic school of innovation and learning. These will be discussed later.

#### *2.4 Piore and Sabel and the Second Industrial Divide*

During the 1980s, an important contribution to the field of economic clusters was provided by the field of industrial economics. One of the most influential works from this perspective comes from Piore & Sabel's book *The Second Industrial Divide* (1984).

By 'industrial divide' Piore & Sabel refer to a social process that "determine[s] the direction of technological development for the following decades" (Piore & Sabel, 1984: 5). The first industrial divide relates to the emergence of mass production technology in the nineteenth century, and hitherto its "victory" over craft production as the dominant form of industrial organization in the beginning of the nineteenth century (Piore & Sabel: 1984). As mentioned before, mass production entails the separation of conception and execution of tasks (*ibid*, and footnote 9). This technology has been the dominant one throughout the nineteenth century, as well as a large part of the twentieth century. Piore & Sabel, however, notice the emergence of a second industrial divide, which they call 'flexible specialization' or 'craft paradigm'. This second industrial divide can be understood as a new form of industrial organization which is supposed to have an influence on all facets of economic activity (Tomaney, 1994). This new industrial paradigm ultimately is believed to replace the present one (i.e. mass production). The emergence of "regional conglomerations" (Piore & Sabel, 1984: 265) of companies are one form of the emergence of the second industrial divide.

Central to their rationale is the notion of world markets becoming more fragmented and volatile during the 1970s (Piore & Sabel, 1984; Sabel, 1994). This would have encouraged organizations to experiment with more flexible forms of organization in order to increase flexibility in terms of output. In doing so, "they encouraged the reconsolidation of the region as an integrated unit of production" (Sabel, 1994: 103).

A number of developments are suggested to have contributed to the reconsolidation of the region as an integrated unit of production. The most notable one from the perspective of this literature review, is, what Sabel (1994: 106) calls, the "revitalization of regional economies", which he regards to be a reaction to the enduring instability of global markets.<sup>13</sup> By regional economies Sabel refers to economic localities such as 'Third Italy', Silicon Valley, Route 128, Baden-Württemberg, et cetera, which exemplify a trend toward smaller business units (Piore, 1990). Ultimately, these flexible regions are believed to evolve into knowledge and resource sharing entities characterized by high levels of solidarity:

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<sup>13</sup> Besides the *revitalization of regional economies*, Sabel mentions four other developments that are assumed to have played a role in this case. In order not to deviate too much from the subject at hand, I have decided not to discuss these developments. For an extensive discussion see Sabel, 1994: 103 and further.

“If the pooling of knowledge succeeds, it can easily become the political metaphor and matrix for the pooling of other resources as well. The more knowledge available to each industrial district, the less the probability of any being tripped up by costly ignorance; the greater the number of prosperous industrial districts, the more likely that each can draw on the resources of the others in its moments of distress” (Sabel, 1994: 145).

Hence, Piore & Sabel look upon the concept of flexible specialization as the next industrial paradigm. They expected this paradigm to become the dominant one, and perhaps even ultimately replacing mass production. Problematic in this perspective is the fact that they abandon the notion of mass production entirely and, consequently, the concept of economy of scale.

### *2.5 Economic Geography: the GREMI approach*

Next to the contributions from the field of industrial economics, during the 1980s a second field of study emerged that is being recognized for its important contributions in understanding the cluster phenomenon: economic geography. Within the discipline of economic geography, GREMI is recognized for making an important contribution in understanding spatial economies.

The research group GREMI was founded – and inspired – by Philippe Aydalot, a French professor at l’Université de Paris 1, Panthéon-Sorbonne, in 1984 (Bramanti & Ratti, 1997), and especially focused on how industrial change is influenced by innovation and new technologies (Aydalot & Keeble, 1989). Aydalot is acknowledged for providing this research group with a crucial starting point which, to the group, ultimately would serve as a paradigm. According to Aydalot, the firm is not to be considered an isolated innovative agent. Instead, it is argued, the agent is “part of the *milieu* which makes it [the agent, MDB] act” (emphasis added, Aydalot, 1986 in: Bramanti & Ratti, 1997: 22).

Furthermore, the group moves away from both the idea of perfect competition and agents being rational and uncertain actors in their environment. Thus, the traditional economic belief of firms seeking an optimum is rejected. Instead, concepts such as viability or sustainability are believed to be more appropriate to observe agent behavior, for “[s]ocial rooting, trust, [and] web relations may represent simply an efficient way to reach viability, rather than an inefficient optimizing behavior” (Bramanti & Ratti, 1997, 35).

In addition, to Aydalot the main components of innovation are the “territories’ past, their organization, their collective behavior, [and] the consensus structuring them” (Aydalot, 1986 in: Bramanti & Ratti, 1997: 22). Territories in this perspective should be interpreted as “the physical entity of geographical and socio-cultural space” (*ibid.*: 3). Furthermore, the Gremi literature emphasizes how actors in a given spatial economy benefit from reduced uncertainty. Actors seek support, it is argued, in order to cope with

uncertainty due to the turbulent and unpredictable economic environment in which they act (Beerepoot, 2005).

This means that GREMI first of all intended to move away from a static point of view by stressing the dynamic nature of industrial agglomerations as well as their capability to change. In doing so, it stressed the coherence of these agglomerations in terms of culture, production systems, and actors (Giuliani, 2005). This coherence is referred to by means of the term *innovative milieu*, which is defined as:

“(…) a multi-dimensional reality which links a collective of players for the dynamic realization of productive systems, integrating at the same time the territorial dimension and the techno-industrial paradigms behind the structural changes of the productive apparatus” (Quévit & Van Doren, 1997: 345).

This multi-dimensional reality covers three dimensions: (1) a cognitive dimension, (2) an organizational dimension, and (3) a territorial dimension. The cognitive dimension involves the process of learning within the milieu in order to create generic technologies; the organizational dimension involves the learning processes that govern the interactions among economic and institutional players; the territorial dimension serves to address the notion of spatial proximity (*ibid.*).

This framework also applies to GREMI’s notion of *network of innovation*, which is a construct to account for the “interaction between the innovative milieu’s internal and external dynamic” (*ibid.*). From this perspective the cognitive dimension should be understood as having access to non-materialist resources and know-how; the organizational dimension should be understood as the presence of formal linkages (e.g. partnerships) with individuals and parties external to the milieu based on trust and reciprocity.

This shift from a static (economic) point of view to a much more dynamic approach, thus, is one of GREMI’s greatest contributions to the literature. Or, as Maillat *et al.* (1997) put it:

“A milieu is not immutable, it is not defined *a priori*, once and for all. On the contrary, it constitutes a dynamic complex which in the course of time has had to change and evolve through a continuous process of resource creation, innovation and adaptation to external constraints” (Maillat, Léchet, Lecoq & Pfister, 1997: 109).

Central to the GREMI approach in studying *innovative milieux* is focusing on the following elements which are believed to be the constituent elements of the milieu: (1) know-how, (2) standards, rules, and values, (3) relational capital, (4) human and material resources, and (5) an outward perspective to its environment (*ibid.*). In addition, the focus on the supposed dynamic character of the innovative milieu is reflected in the attention paid to its history as well. The history of a milieu is considered to be important to its

development. The perceived “weight of the past” (*ibid.*: 114) is assumed to limit the possible paths by which a milieu might develop (i.e. path dependency).

The concept of *network of innovation*, which was developed by GREMI and based on the network dimension stressed by the Italian district school, has its influence on the rise of the knowledge-based view of clusters. By means of this concept, Gremi was able to perceive innovation as a socio-territorial phenomenon, for it emphasized the importance of local learning processes, inter-firm relations, and regional (or territorial) socio-economic embeddedness to the process of innovation.

## 2.6 Porter and the notion of cluster competitiveness

Competitive studies, or business strategy, added another perspective on geography, and specifically on clusters, during the 1990s (Giuliani, 2005). Michael Porter generally is recognized as one of the main representatives of this school of thought. In *The Competitive Advantage of Nations* (Porter, 1990) he makes a compelling argument for the cluster phenomenon as the main driver of a nation’s competitiveness. This new perspective on the wealth of nations proved to be groundbreaking; even today Porter’s work on clusters is quite popular among – regional – policy-makers throughout the world as a tool for developing regional competitiveness, innovation, and growth (Audretsch, 1998; Wever & Stam, 1998; Martin & Sunley, 2003), for instance through creating technopoles, science parks, et cetera (Breschi & Malerba, 2001).

“Why do some nations succeed and others fail in international competition?” (Porter, 1990: 1). Although this is a frequently asked question in economic science, it is the wrong one according to Porter. Instead, one must wonder why certain types of industries are based in particular countries, or, as he puts it:

“How can we explain why Germany is the home base for so many of the world’s leading makers of printing presses, luxury cars, and chemicals? Why is tiny Switzerland the home base for international leaders in pharmaceuticals, chocolate, and trading? Why are leaders in heavy trucks and mining equipment based in Sweden? Why has America produced the preeminent international competitors in personal computers, software, credit cards, and movies? Why are Italian firms so strong in ceramic tiles, ski boots, packaging machinery, and factory automation equipment? What makes Japanese firms so dominant in consumer electronics, cameras, robotics, and facsimile machines?” (*ibid.*: 1-2).

In explaining a nation’s competitiveness, multiple driving factors have been offered, such as cheap and abundant labor, specific governmental policies (protection measures, subsidies), natural resources, et cetera. However, as Porter convincingly shows, none of these factors are fully satisfactory in explaining a nation’s main competitive features. Porter thus argues to abandon the notion of a *competitive nation*, and hence not to focus on the economy as a whole, but on specific industrial sectors, for “[m]ost successful

national industries comprise groups of firms, not isolated participants, (...)" (*ibid.*: 10). Globalization, from this perspective, is not to be overestimated. It seems tempting to believe that the process of globalization has diminished the role of nations with respect to a firm's or industries' success; instead, the role of the nation is likely to expand, for it is the main source of skills and technology. Porter regards a firm's or industries' competitive advantage to be the result of "highly localized processes" (*ibid.*: 19).

Porter's philosophy has inspired regional policy-makers world wide. Central to his philosophy, and consequently the main driver for policy makers to act upon, is the *national diamond*-model, which consists of four attributes which are believed to be paramount to creating an entrepreneurial environment and consequently enhancing its competitive advantage. These attributes are: (1) factor conditions, which entail national production factors such as skilled labor, infrastructure, et cetera; (2) demand conditions, which involves the nature of the home market; (3) related and supporting industries, which involve the presence of related and supporting industries which are internationally oriented and competitive; and (4) firm strategy, structure, and rivalry, which entails the internal organization and governance of firms, as well as the characteristics of national competition.

According to Porter, the factors constituting the diamond model are highly interrelated and are supposed to reinforce each other, and are hence believed to be mutually dependent. For instance, the presence of demand conditions doesn't suffice to create a competitive advantage. One also needs a certain amount of competition in order to get firms to respond to the demand innovatively. However, highly knowledge-intensive industries will need to excel in all four factors in order to create sustainable competitive advantage. In addition to the four factors presented above, Porter recognizes two more variables that can influence the national system quite dramatically: chance and government. Chance is referred to as developments outside the influence of firms (e.g. wars, external political developments, breakthrough innovations), but still very relevant in determining the state of competitiveness. In addition, the government too is a factor to take into account as it is able to influence each of the determinants mentioned above. Education policies can affect factor conditions; regulation policies can affect demand conditions, et cetera.

An important element of Porter's philosophy entails the argument that clusters are able to influence the competitiveness of the firm in three ways: (1) increasing its productivity; (2) directing and determining the speed of the innovation process; and (3) stimulating the emergence of new firms (Manuel, 2000).

Porter's influential work on clusters might be regarded a theory of competitiveness in the first place, for clustering is considered to be instrumental in the generation of competitive advantage. Policy makers' interest was mainly spurred because of Porter's diamond model, which one might think of as a policy maker's toolkit.

Despite – or maybe thanks to – Porter’s enormous influence on the development of the concept of clusters, his views are the subject of fundamental criticism among quite a number of scholars. Martin & Sunley (2003) express their concern with respect to Porter’s notion of cluster boundaries. Porter argues that standardized industrial categories do not suffice in denoting a cluster, nor should geographical boundaries play a critical role in establishing the unit of analysis. Instead, he argues, the role of linkages should be of main concern in drawing the cluster boundaries

From this perspective Porter holds the strength of the linkages as the main determinant of cluster boundaries. “The strength of ‘spillovers’, and their importance to productivity and innovation determine the ultimate boundaries” (*ibid.*). Martin and Sunley’s (2003) critique in this matter concerns mainly the problem of measurement, for measuring the strength of the linkages as well as drawing the line between *strong* and *weak* linkages is a difficult and arbitrary task.

Another major point of critique coming from Martin & Sunley (2003) involves Porter’s understanding of geographical proximity. Porter puts great emphasis on the importance of geographical proximity for the formation and identification of clusters (1998a), but fails to specify the notion of geographical proximity (Martin & Sunley, 2003).

Finally, the lack of Porter’s recognition for the importance of socio-economic factors in influencing clusters and their dynamics is another major point of critique. By stressing formal economic factors mainly (i.e. competition), socio-economic and territorial factors are considered to be underrepresented in his work (Rocha, 2004).

### 2.7 Towards a knowledge-based view of clusters

The past fifteen years or so might be characterized by an increasing interest in the cluster brand from a knowledge perspective. Literatures that are considered to contribute to a knowledge based view of clusters, build upon past work of the Italian district school and GREMI mainly, and as such may also be considered a response to the work of Krugman and Porter (and its lack of interest for the socio-economic and territorial facets of clusters). Contributions from Amin & Cohendet (2003; 2004), Maskell (2001), Gertler (2003), Gerter & Levitte (2003), Lundvall (1990) and Saxenian (1990) are worth mentioning from this perspective. In discussing the rise of a knowledge-based view of the region, a distinction is made between two forms of spatial proximity: (1) national systems of innovations (i.e. the learning region), and (2) the “social and cultural dimensions of co-location” (Amin & Cohendet, 2004: 88)

The first noteworthy stream of literature to explicitly emphasize the role of knowledge in the region involves literature on the concept of the learning region or learning economy (e.g. Florida, 1995; Lundvall, 1996), which has its origin in evolutionary political economy (Morgan, 1997). The concept of

the learning region exemplifies the transition taking place from an industrial to a knowledge-based economy (Hassink, 2004).

Learning regions have been described as “(...) collectors and repositories of knowledge and ideas” and are believed to “(...) provide the underlying environment or infrastructure which facilitates the flow of knowledge, ideas and learning” (Florida, 1995: 527). The concept incorporates knowledge and information flows, learning, regionalization, globalization, and capitalism, for knowledge is argued to be the new form of capital, changing everyone’s world (Florida, 1995) and is furthermore argued to be the “fundamental characteristic of contemporary competitive dynamics” (Gertler, 2003: 76).

The concept of the learning region, or learning economy as Lundvall prefers, has grown out of a dissatisfaction with conventional economic theory (Lundvall, 1996), in the sense that it appears to have lost track of current developments, or as Lundvall puts it:

“(...) the growing frequency of so-called paradoxes in economic theory and of unsolved socio-economic problems reflects that neither economic theory nor policy has been adapted to the fact that we have entered a new phase (...)” (*ibid.*: 1).

This ‘new phase’ being the *learning economy*.<sup>14</sup> A prime indicator of a learning economy entails the ability of its participants (whether on individual, firm, regional, or national level) to learn.<sup>15</sup> In addition, a learning economy is characterized by high change and, consequently, a rapid change in required skills and knowledge (Lundvall, 1996; Lundvall, Johnson, Sloth Andersen & Dalum, 2001).

Special attention in this school of thought is reserved for the quality of local institutions on innovation and learning (e.g. Lundval *et al.*, 2001). The quality of these so-called ‘national systems of innovation’ is argued to be of main influence on the (non-) technological innovation and learning capabilities of firms. Institutions that are considered to be part of this national system include the quality of education, a nation’s research and technology base, the ICT infrastructure, policy with respect to trade, innovation, and industry, the willingness of financial institutions to invest in innovative business practices, and the nature of knowledge flows within and between organizational networks (Amin & Cohendet, 2004).

The concept of the learning region or learning economy seems to be, as Hassink (2004) notes, a response to the more prominent role of knowledge as the prime asset in the industrial world as well. The transformation from an industrial-based economy to a knowledge-based economy seems to be the driving factor for the emergence of this niche of literature (*ibid.*). Its main contribution therefore entails making

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<sup>14</sup> A concept, according to Lundvall (1996), not to be mistaken with the concept of *information society*, nor does it necessarily need to involve a high-tech economy.

<sup>15</sup> As well as *to forget*, which is regarded a pre-requisite for learning new skills in particular (Lundvall, 1996; Johnson, 1992).

knowledge and learning the main drivers of successfully operating regions or clusters, as well as linking it to innovation (Lundvall *et al.*, 2001).

The stream of literature concerned with the learning region concept can be considered as one of two important streams that relate knowledge to spatial proximity (Amin & Cohendet, 2004). Whereas the first emphasizes the importance for firms to be embedded in so-called national systems of innovation, the second stream of literature mainly focuses on micro processes taking place within industrial districts, cities, or regions (*ibid.*). An important line of argument within this stream of literature focuses on the role of tacit and explicit knowledge with respect to the emergence and growth of clusters.

In this line of argument, knowledge is believed to manifest itself in different forms (e.g. Lundvall's [1996] know-who, know-what, know-why, and know-how), each form having different characteristics. These characteristics relate to Polanyi's (1967) recognition of the tacit dimension of knowledge. Forms of knowledge that are argued to appeal to Polanyi's tacit dimension, like for instance Lundvall's *know-how* and *know-who*, are assumed to be conducive to cluster formation simply because its tacit nature is inherently context-bound (Brown & Duguid, 2000). This specific line of research therefore focuses on learning and innovation processes based on the tacit dimension of knowledge, which is consequently related to the claimed competitive advantage of the region. These tacit knowledge processes hence are argued to significantly contribute to the emergence and growth of clusters (Gertler 2003).

A nice example of tacit knowledge processes contributing to the emergence and growth of clusters throughout the world is to be found in the work of Saxenian (2006). She compellingly describes how engineers from China, Israel, India, and Taiwan profit from experiencing Silicon Valley by establishing entrepreneurial networks in their home countries, but at the same time transforming Silicon Valley. This process, Saxenian argues, might be interpreted as a shift from *brain drain* to *brain circulation*, meaning that Silicon Valley's 'spin-off regions' contribute to a global knowledge economy of which both Silicon Valley and its spin-off regions profit.

The rise of the knowledge-based view of clusters, treating the knowledge component as a central element in studying clusters, is part of a larger stream of literature that developed in the 80's and 90's of the previous century (Rocha, 2004). Thus, two streams of literatures can be recognized in cluster literature: the first stream of literature builds on the Marshallian externalities (Porter, 1990; 1998; Krugman, 1991); the second stream of literature adopts a socio-economic perspective, thus stressing the importance of innovation and highlighting the social, territorial, institutional, and cultural elements of clusters and cluster dynamics (e.g. Aydalot & Keeble, 1989; Lundvall, 1996; Maskell, 2001; Jaffe, 1989; Saxenian, 1990).

The knowledge-based view of clusters, hence, must be considered in light of its antecedents, like for instance the Italian district school and the GREMI-school of thought, and might be considered a response to

the first stream of literature (here represented by Porter and Krugman). The second stream of literature has also come to be known as the *network approach*, for its antecedent lies in the Italian district school with its emphasis on regional networks and communities. The GREMI group can be considered one of the main contributors to the network approach, for its concept of the innovative milieu opened the door to viewing cluster dynamics from a socio-territorial and –cultural perspective.

Central to the knowledge-based view of clusters are innovation and learning as key processes, and knowledge as main strategic resource. In addition, it adopts Polanyi's notion of the tacit dimension, thus arguing that knowledge and learning are inherently embedded in social and territorial processes. Personal contact, thus, is considered a necessary element in the transfer of knowledge, leading to geographical proximity and concentration of innovative business activity.

By accepting the notion of knowledge having a tacit dimension (Polanyi, 1967), and introducing sociological concepts such as embeddedness (Granovetter, 1985; Uzzi, 1996; 1997), the knowledge-based view of clusters might be considered the result of a strong response to the rather formal economic explanations of cluster dynamics (Porter, 1990; Krugman, 1991). At the same time, this knowledge-based view builds upon prior work of the Italian district school and GREMI.

### **3. Some critical reflections on managing clusters as knowledge assets**

Having established that an influential stream in the field of study concerned with clusters is heading towards a knowledge-based view, some remarks are made with respect to the prevalent conviction among some scholars and the majority of policy-makers that the emergence and growth of clusters is responsive to policy interventions.

Especially Michael Porter advocates this position quite fervently and explicitly, for he regards government capable of affecting each of the four factors of his diamond model. For instance, education policies can affect factor conditions; regulation policies can affect demand conditions; et cetera. An important – and noteworthy – additional suggestion from Porter is the advice for governments not to try creating new clusters (1998b). Rather, governments should “reinforce and build on existing and emerging clusters” (1998b: 89) for “successful new industries and clusters often grow out of established ones” (*ibid.*).

Like Porter, Scott (1996) holds a similar position as he articulates five so-called main (or general) lines of policy interventions which should enable local governments to “stimulat[e] the entrepreneurial and creative capabilities of all local firms” (*ibid.*: 317).<sup>16</sup> First, public investment in technology is required to

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<sup>16</sup> Noteworthy: Scott articulates these five policy interventions with the cultural-products industry of Los Angeles (US) in mind.

stimulate local productivity and growth. Second, local governments can stimulate local clusters by investing in educational institutions aimed at serving specific local needs. In addition, Scott foresees a role for local authorities in stimulating healthy competition i.e. preventing or halt so-called cut-throat competition.<sup>17</sup> Fourth, recognizing that small specialist producers are an essential part of the cluster, government policies should be aimed at responding to some of the significant problems these small producers usually are coping with (raising capital, gathering information, et cetera). Fifth and final, Scott advises local governments to create a local agency that is capable of “coordinating local economic development strategies” (*ibid.*: 318).

A tendency, thus, is notable in which policy-makers are convinced of having a “cluster toolkit” at their disposal (e.g. Porter’s national diamond model) by which they can influence the emergence and growth of clusters. In fact, regional policy-makers seem to be preoccupied in creating competitive regional industries (Saxenian, 1990; Power & Lundmark, 2004; Wolfe & Gertler, 2004) as for instance was observed by Kumar et al (1998) who describe policy interventions in the Prato region to stimulate ICT adoption in order to boost regional activity. In fact, the ‘Prato-case’ showed that all top down, managerial attempts to get companies connected, turned out unsuccessful. That is, unsuccessful in getting the technology adopted. The practice showed that the small firms that made up the textile industry in Prato, were already heavily connected through family and friendship ties, supported mainly by mobile phones. Hence, the introduction of new ICT tools aimed at knowledge circulation by fostering knowledge codification proved to be unsuccessful due to a lack of trust, for “trust does not reside in IT/IS” (Kumar *et al.*, 1998: 215).

From a formal economic perspective, policy interventions with respect to clusters are considered logical and straightforward. However, the issue of (cluster) governance takes quite a different turn in view of the rise of the knowledge-based view of clusters, for creating and stimulating a cluster with formal economic qualities in mind differs from creating a vibrant cluster from a knowledge perspective. With this in mind, a comparison is drawn with the rise of the knowledge-based view of the *firm*, which took place during the 80s and 90s of the previous century and holds a number of interesting parallels compared to the rise of the knowledge-based view of clusters.

### *3.1 The rise of the knowledge-based view of the firm*

Obviously, the rise of the knowledge-based view of clusters (see section 2), in many facets, reminds one of the rise of the resource-based view during the 80s and 90s, later often repackaged as ‘the knowledge-based view’ of the firm. (e.g. Barney, 1991; Grant, 1996; Spender, 1996; Kogut & Zander, 1992). Central

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<sup>17</sup> Michael Porter probably wouldn’t agree with this suggestion. As he sees it, “(...) rigidities tend to arise when government suspends or intervenes in competition (...)” (Porter, 1998b: 85).

to the rise of the knowledge-based view is the introduction of knowledge as the most significant asset and resource of the (knowledge intensive) organization. Given that knowledge of complex production processes is distributed and cannot be fully grasped and controlled by a single individual, the primary role and the *raison d'être* of organizations is to coordinate dispersed knowledge (Hayek, 1937). This resource-based approach to organization, informed by amongst others the sociology of organization, industrial organization and management science, differed from the transaction cost approach as the prevailing economic answer at that time, to the question why organizations exist. This dominant approach is mainly informed by economics and information processing theories, and sees correcting market failures as the most important feature of organizations and in particular of hierarchies. Clearly, this process is similar to that of the rise of a knowledge-based view of clusters which is also regarded a response to a prevailing formal-economic approach (see paragraph 2.7).

While both the knowledge-based approach and the transaction cost approach on organization's *raison d'être* are not necessarily in conflict with one another, and are sometimes even used in combination (e.g. Williamson, 1996), the knowledge-based view is undeniably still rising in popularity. Consider for example the growing amount of articles on organizations based on this approach. The knowledge-based perspective has opened the eyes of many organizational scholars and practitioners to the importance of knowledge; in particular both the need to bring together dispersed knowledge and successfully circulate knowledge in order to transfer individual knowledge to collective knowledge and vice versa. This perspective led to a new field of study, which came to be known as Knowledge Management (KM).

Initially, KM practices were heavily supported by ICT, with a clear focus on knowledge codification, acquisition, storage, and dissemination through technological means (e.g. repository systems). These first KM initiatives proved to be biased in terms of a belief that knowledge sharing can be engineered, in terms of their focus on codification and technology and in terms of a focus mainly on individual or local pockets of knowledge (Huysman & De Wit, 2004). These biases have also been referred to as respectively the management trap, the IT trap and the local learning trap (Huysman & De Wit, 2004).

### *3.2 Lessons from the field of KM*

The growing awareness, especially among regional policy-makers, of the strategic importance of clusters combined with the growing popularity of the knowledge-based view of clusters, has induced many policy makers to manage regional knowledge such that these interventions will help the region to flourish economically. Albeit most regional interventionist do not (yet) adopt the words 'Knowledge Management' to label their activities, this might only be a matter of time. In order to warn them for not falling in the same traps as many managers did in their attempt to introduce KM strategies in organizations, it might be

insightful to draw lessons from the field of management studies and information systems related to KM practices.

The history of KM does not provide a very optimistic picture, though. In fact, more and more, organizations start to question the effectiveness and efficiency of imposing strategies to manage knowledge. Even though more than 80 percent of the larger companies have officially introduced KM strategies (Cabrera & Cabrera, 2002), most of these companies are still struggling how to manage knowledge; it still remains difficult to find best practice stories on KM (Davenport and Prusak, 1998).

In the development of knowledge management, two generations have been identified (Hislop, 2002; Hislop, 2005; Huysman & De Wit, 2002; Scarbrough & Carter, 2000). The first generation of knowledge management literature, research and practices conceptualized knowledge as an object that could be stored, transferred and retrieved with the aid of information technologies (Scarbrough & Carter, 2000). This approach can be labeled the *engineering approach* to KM, as it assumes that knowledge sharing can be managed by providing the appropriate means for people to exchange knowledge – and if these are indeed provided, knowledge will be shared; in short, by offering optimal organizational and technical infrastructures, people will share their knowledge. There is a considerable body of literature that focuses on the analysis of the role (infra)structures play in optimally facilitating the sharing of knowledge among individuals (Alavi & Leidner, 2001; Davenport, De Long & Beers, 1998; Davenport & Prusak, 1998; Egan & Kim, 2000; Ellis & Rumizen, 2002; Gold, Malhotra & Segars, 2001; Hinds & Pfeffer, 2003; Zack, 1999). Technical infrastructure concerns the use of information technologies (IT) such as knowledge repositories, personal yellow pages, e-mail, and bulletin boards in order to facilitate the exchange of knowledge.

The contribution of IT to knowledge management is the subject of many discussions, inducing some writers to critically discuss the managerial and IT determinism (Hendriks & Vriens, 1999; Hislop, 2002; Roberts, 2000; Ruggles, 1998; Scarbrough & Swan, 2001; Spiegler, 2003). These writers also argue that information technology for KM purposes will only be used in situations where people are willing and motivated to share knowledge with others (Huysman & Wulf, 2006). Clearly, such situations are difficult to manage. As a consequence, both in practice and in academic research, the engineering approach yielded disappointing results. Hence, the insight that knowledge is not simply an aggregate of information which can be de-coupled from its context became prominent. The focus of attention shifted towards the tacit dimension of knowledge which is socially embedded in the context in which it takes shape and creates meaning. In this view, knowledge sharing is not stimulated by means of imposing structures and tools but by rich social interaction and by immersion in practice (Hislop, 2005). Communities (or networks) of practice were considered the most appropriate environments for knowledge creation and sharing to take place (Hislop, 2002; Ruggles, 1998; Scarbrough & Swan, 2001). This development created a belief in the

importance of social dynamics resulting in knowledge sharing and a disbelief in the role of managerial interventions (Hislop, 2005).

This so-called *emergent* approach to knowledge embraces the “epistemology of practice” (Cook & Brown, 1999), perceiving knowledge as socially constructed and embedded in the social context (Blackler, 1995; Brown & Duguid, 1991; Brown & Duguid, 2001; Cook & Brown, 1999; Hauschild, Licht & Stein, 2001; Orlikowski, 2002; Robertson & O’Malley Hammersly, 2000; Wenger, 2000). Hence, the process of knowledge sharing should not be conceptualized as transferring one person’s body of knowledge to another person, but as a shared process of knowledge creation, in which participants together make sense of certain events and construct meaning. Central to the emergent approach are the social dynamics between members of a group. In this view, whether or not individuals share their knowledge (or jointly create knowledge) is much more determined by the interpersonal and group relationships than by management interventions, the technical infrastructures, and individual characteristics (Hansen, Mors & Løvås, 2005; Huysman & Wulf, 2004; Smith, Collins & Clark, 2005). Many KM scholars have accordingly adopted the concept of *social capital* as the driving force for knowledge sharing and, consequently, opposed to management and ICT support (Adler & Kwon, 2002; McFadyen & Albert, 2004; Nahapiet & Ghoshal, 1998). Social capital has been defined as “the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (Bourdieu & Wacquant, 1992).

It can be argued that the current dominance of the emergent perspective has chased away some of the initial interesting ideas of KM. In particular, the current debate on KM tends to ignore the potentials of information technology in supporting coordination of knowledge. However, with the growing potentials of Web 2.0 technology,<sup>18</sup> and in particular ‘social software, we might expect a turn in the literature on KM towards a more hybrid perspective in which knowledge sharing emerges with the help of information technology. In fact, typical to social software in relation to KM is that they are particularly helpful in supporting bottom up knowledge sharing processes within communities. Web 2.0 technology, for example, appears to be very popular in connecting professionals within the Amsterdam Interactive Media sector region. In particular, social network technologies, such as *LinkedIn.com* and *Xing.com*, are used intensively within this region, mainly in order to quickly find the right person for a project and *vice versa*.

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<sup>18</sup> The phrase web 2.0 is as common in use as it is ambiguous in its meaning. Basically, it implies a change in web usage, as the average Internet user has obtained more possibilities to contribute to the Internet by supplying content. This, for instance, takes the form of weblogs (e.g. MySpace.com, Blogger.com), social bookmarking (e.g. Del.icio.us, Digg.com, Newsvine.com), social network sites (e.g. LinkedIn.com, Xing.com, Facebook.com), wikis (Wikipedia.org), RSS-feeds, and other forms of social software and applications (such as Flickr.com and YouTube.com).

#### **4. Conclusion: implications for cluster governance**

The concept of clusters from an economic and business perspective has been studied for well over a century, and although Porter's (1998b) definition has become one of the leading descriptions in this specific research area, the concept continues to be subject to ambiguity and doubt, resulting in "conceptual and empirical confusion" (Martin & Sunley, 2003: 10). Developing criteria by which clusters can be pinned down has proven to be complicated (Rosenfeld, 1997).

This controversy can be considered a direct consequence of the fact that cluster literature has evolved from a strictly formal economic discipline into a multidisciplinary field of study, incorporating both socio-economic and epistemological perspectives. The rise of the knowledge-based view of clusters as discussed in this paper, can and should be seen in light of this development.

The knowledge-based view of clusters corresponds to policy makers displaying an increased interest in and awareness of the apparent knowledge potential of clusters (Feldman & Francis, 2004; Kumar *et al.*, 1998). Considering the increased interest in clusters as knowledge repositories (Florida, 1995), it reminds one of the days in which organizations were considered repositories of knowledge as well. And indeed, lessons are to be learned from KM literature, especially for policy makers. KM literature clearly shows the significance of social dynamics in understanding and influencing knowledge processes at the organizational level, and hence warns us for putting too much emphasis on the engineering approach. The possible downfalls associated with the so-called engineering approach to KM are valid in the domain of policy and governance also.

First, a managerial bias within organizations to intervene, engineer and impose structures to bring together dispersed knowledge can also be witnessed in regions where policymakers declare geographic area's as future commercial, industrial and or economic hot spots. The prevailing assumption, inspired amongst others by Porter and Florida, is that clusters as knowledge repositories can be engineered. In line with this engineering approach, is the assumption among regional policy makers that an IT infrastructure will stimulate the flow of knowledge between the small and medium firms that make up clusters. Especially, broadband technology is perceived as the promising technology that will spur development of regions (Steinfield & Scupola-Hugger, 2006).

In addition, the local learning trap that characterizes the first generation of KM, denoting the tendency of managers to look at local pockets of knowledge instead of using a more broader collective lens, can also be recognized in the strategies of regional policy makers. The focus is merely on bringing together small firms in a particular geographic area instead of posing the question whether indeed the firms are willing and in need to learn with and from each other. As we have learned from KM history in organizations, ignoring this (potential) social capital of clusters will most likely hamper development of intellectual capital (Nahapiet & Goshal, 1998).

The literature review not only addressed a rise in a knowledge based view but it also showed the multidimensional nature of clusters. This multidimensional character holds important implications for cluster governance. Policy interventions aimed at either creating or stimulating clusters tend to be inspired by formal economic theories mainly (in line with the Porterian perspective of clusters), thus neglecting important socio-economic and epistemological factors influencing cluster emergence and growth.

The development from a formal economic to a socio-economic and epistemological perspective of clusters parallels the development of the field of knowledge management. The parallel with KM, as discussed earlier in this paper, shows us that when dealing with knowledge in general, inherently sociological elements enter the equation. When striving for clusters that exhibit a social dynamic characterized by knowledge sharing and innovation, policy makers need to realize the potential danger of governing clusters based on formal economic factors only. “Governing” knowledge, both in organizations and clusters, involves at the very least understanding the rich social dynamics to which the concept of knowledge is subject to. Policy designed at influencing formal economic factors (e.g. Porter’s diamond model) needs to take into account the lessons learned from the field of KM, and thus should be aimed at respecting the social characteristics unique to every cluster. A solid understanding of the social dynamics influencing and characterizing cluster emergence and development will enrich governance based on economic factors only. It is important to realize that the economic factors that are believed to influence cluster emergence and growth, do not occur in a vacuum.

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Figure 1: Towards a knowledge-based view of clusters

