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# Ch.2

## The emergence of a knowledge-based view of clusters and its implications for cluster governance <sup>5</sup>

### **Abstract**

*This chapter examines 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. Given the increasing interest in clusters as knowledge repositories, and the apparent conviction among policy-makers of the manageability of clusters, lessons learned from knowledge management (KM) practices in organizations might well be applied to the many policy efforts aimed at governing clusters. We argue that introducing KM-initiatives on a regional level should be accompanied by an understanding of the possible downfalls that are associated with KM failures.*

### **2.1 | Introduction**

The knowledge component of clusters to which, among others, Breschi & Lissoni (2001a, 2001b) refer is of central interest in this chapter. 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 chapter will respond. First of all, given the recent emergence of the knowledge-based

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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. A historical approach towards the concept of clusters is adopted in order to deal with the apparent incoherence of cluster related thinking.

Second, it raises the issue of governance, for policy makers increasingly appear to be preoccupied with stimulating clusters in order to enhance their 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 policy-makers are associating with clusters. Their interest went beyond the number of jobs directly associated with the establishment of the firm to "future economic benefits of a knowledge-based, entrepreneurial industry, sparking regional transformation by transplanting a cutting-edge firm" (Francis, 2004: 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 notable schools of thought on the role of knowledge in regional development starting with Marshall's seminal observations on "the localization of industries" (Marshall, 1920) and the notion of knowledge spillovers. We will see slow but steady progression from Marshall's theory of industrial districts to a knowledge-based view of clusters. The 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. However, this literature review is not all encompassing because of space limitations, which is as an important limitation of this chapter. The major schools that have been left out include, 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, 2002). On the other hand, careful readers among us might notice that these and other schools of thought are incorporated in this chapter indirectly, that is, through references to important representatives of these schools of thought. The theoretical perspectives that are

explicitly incorporated in this chapter, 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. It is argued that, given the increasing interest in clusters as knowledge repositories, lessons learned from Knowledge Management (KM) practices in organizations could be fruitfully applied to the efforts to develop knowledge clusters.

## 2.2 | 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. Subsequently, pioneering work of Jacobs (1969), the Italian district school, Piore & Sabel (1984), GREMI <sup>6</sup>, and Porter (1990, 1998) are all widely acknowledged for their contributions to the literature (Glaeser et al., 1992; Bramanti & Ratti, 1997; Giuliani, 2005). Figure 2.2 (page 50) illustrates the trajectory towards a knowledge-based understanding of clusters.

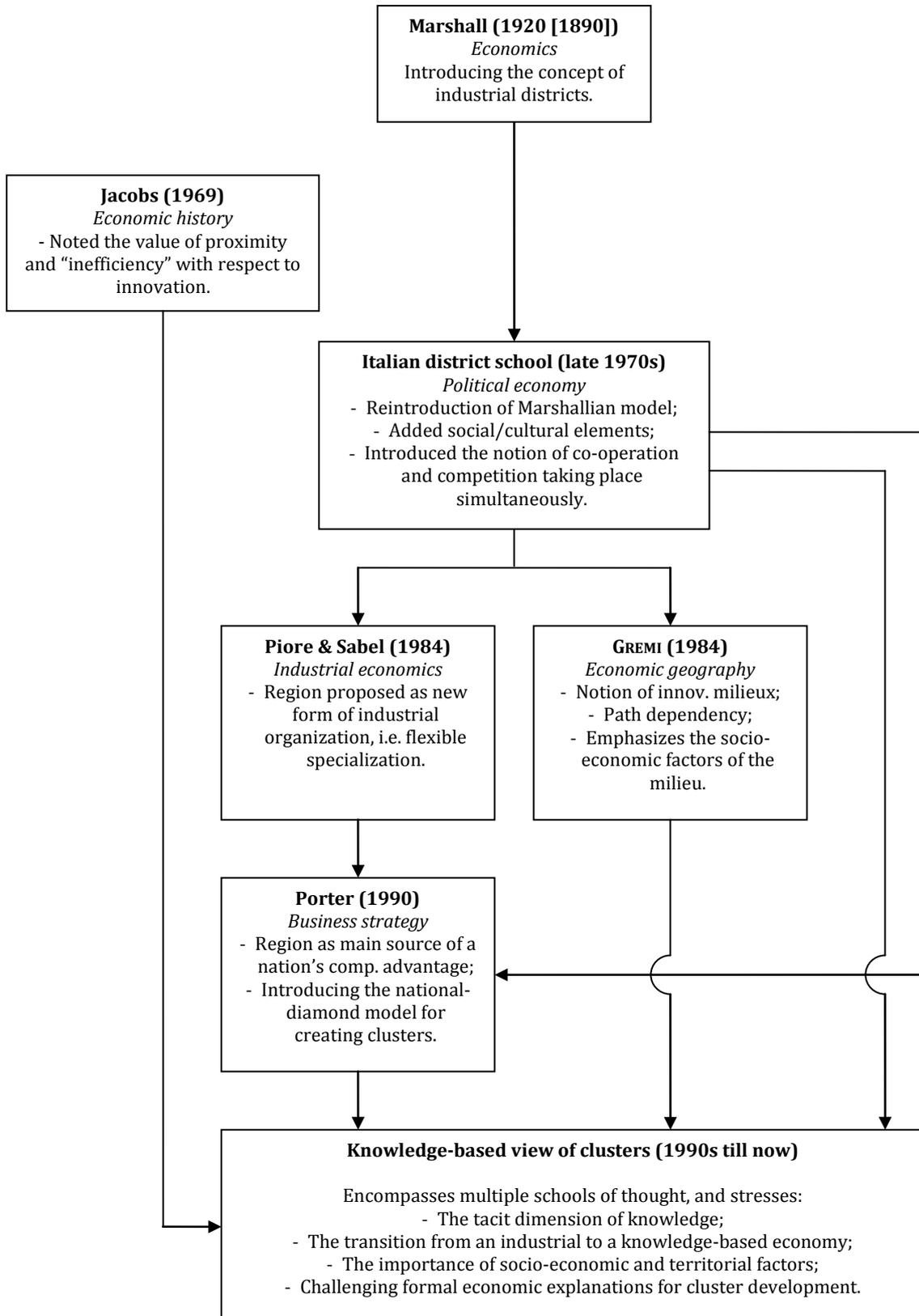
### 2.2.1 Marshall's contribution to a new stream of literature

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. Other causes that he thought attract firms to a specific region/ location include the availability of specialized labor and knowledge (see also Krugman, 1991).

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<sup>6</sup> 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>.

**Figure 2.2:** Towards a knowledge-based view of clusters

Interestingly, thus, it seems that Marshall already was aware of a phenomenon which nowadays is referred to as *knowledge spillovers*<sup>7</sup> (e.g. Jaffe, 1986; Stewart & Ghani, 1991; Jaffe, Trajtenberg, Henderson, 1993; Audretsch & Feldman, 1996; Breschi & Lissoni, 2001a/b; Caniëls & Romijn, 2003).<sup>8</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” (p. 308). Scott continues by stating that the knowledge that is associated with these processes is often of a tacit nature, and thus occurs as an “*atmosphere* of agglomeration-specific information and accumulated experience” (emphasis added, Scott, 1996: 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 mysteries of the trade become no mysteries; but are as it were in the air”*

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<sup>7</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, 2004). Feldman (2001), in addition, relates Marshall’s quote to the concept of social capital.

<sup>8</sup> Much more scholars have published on the concept of *knowledge spillovers*. The ones mentioned above serve to illustrate this notion.

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 as an *externality* because it can be attained without any payment (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 ways, is quite different from today’s economy.<sup>9</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>10</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>11</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

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<sup>9</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>10</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 milieu” (...), 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>11</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.

organization, combined with the prevalence of standardized goods and predictable markets (Rocha, 2004). This apparent prevalence of “efficiency” over craftsmanship<sup>12</sup> justifies a small detour, thus incorporating the field of economic history.

### 2.2.2 *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 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” (Jacobs, 1969: 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 spotlighted 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

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<sup>12</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 chapter) 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).

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” (Jacobs, 1969: 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 celebrated as 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 economy. Rather, the different branches present in the Birmingham region operated in a fragmented manner as spin offs emerged constantly, i.e. 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.*).

*“After all, intellectual breakthroughs must cross hallways and streets more easily than oceans and continents”*

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.

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, then 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.

### 2.2.3 *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 Becattini was able to convincingly propose the Marshallian model (i.e. the industrial district) as opposed to the more traditional Fordist perspective<sup>13</sup> (Giuliani, 2005). For many Italian scholars (e.g. Bagnasco, Dei Ottati, Brusco, Bellandi, et cetera) Marshall's rationale, as proposed by Becattini, proved to be useful in explaining the dynamics of the Italian district (Amin & Robins, 1990); hence, the *Italian district school* was born.

The main object of analysis in the Italian district school obviously is the Italian industrial district, mostly located in the Northern half of Italy. 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 among other places at Venice and Firenze (Sforzi, 1990). The prosperity and growth of 'Third Italy' (relatively rich Northeast and center parts of Italy) in contrast to that of relatively poor Southern parts of Italy ('Second Italy') and the traditionally industrialized Northwest of Italy ('First Italy') as well as the crisis of

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<sup>13</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).

mass production in the early seventies (Rocha, 2004), inspired scholars to investigate the economic and social characteristics of these clusters.

For a more comprehensive description of a typical Italian cluster (in ‘Third Italy’) we might turn to Lazerson <sup>14</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 about four people per firm. Lazerson focuses on how so many small and specialized firms are able to form an efficient production system that very significantly contributed to Italy’s second place standing in 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 thus perceived to be the driving force of the typical ‘Third Italy’ district. In the case of the Modena knitwear district a sizeable portion of the workforce consists of relatives of the artisans. 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).

Together with the presence of institutions that heavily support the dissemination of these community values <sup>15</sup> (Becattini, 1990), 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

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<sup>14</sup> This example only serves to provide a 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.

<sup>15</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 enabling them to profit from all kinds of tax benefits and financial support, such as subsidized loans (Lazerson, 1993).

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 is 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 – fostering 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; (2) recognizing that a district incorporates both social and economic elements; and (3) highlighting that both co-operation and competition take 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 industrial district was seen as a meso-economic entity with 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 impact 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 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.

#### 2.2.4 Piore and Sabel and the second industrial divide

During the 1980s, the field of industrial economics made an important contribution to our understanding of clusters. One of the most influential works from this perspective is Piore & Sabel's *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 entails the emergence of mass production technology in the nineteenth century, and hitherto its "victory" over craft production as the dominant form of industrial organization (Piore & Sabel: 1984). As mentioned before, mass production entails the separation of conception and execution of tasks (*ibid*, and footnote 9). Piore & Sabel, however, noted 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 will replace mass production (Tomaney, 1994). The emergence of "regional conglomerations" (Piore & Sabel, 1984: 265) is one manifestation of the second industrial divide.

A number of developments are said to have contributed to the reconsolidation of the region as an integrated production unit. The most notable is what Sabel (1994: 106) calls the "revitalization of regional economies" such as 'Third Italy', Silicon Valley, Route 128, and Baden-Württemberg (Piore, 1990).<sup>16</sup> This pushes 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). 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>16</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, we will not 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).*

Thus, 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 replace mass production. What is problematic about Piore & Sabel’s perspective is the fact that they abandon the notion of mass production entirely and the economies of scale that come with it.

#### *2.2.5 Economic geography: the GREMI approach*

Also, during the 1980s, a second field of study emerged that made important contributions to our understanding of the cluster phenomenon: economic geography. Within the discipline of economic geography, GREMI is recognized for making a particularly important contribution for 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 it especially focused on how industrial change is influenced by innovation and new technologies (Aydalot and Keeble, 1989). Aydalot is acknowledged for providing this research group with a crucial starting point. 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).

Thereafter GREMI moved away from both the idea of perfect competition and agents being rational and uncertain actors in their environment. The traditional economic belief of firms seeking optimum positions is rejected. Instead, concepts such as viability or sustainability are believed to be more appropriate for understanding agent behavior. As Bramanti & Ratti (1997) note, “[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 major ingredients for innovation are the “territories’ past, their organization, their collective behavior, [and] the consensus structuring them” (quoted Aydalot, 1986 in Bramanti & Ratti, 1997: 22). Territories in this perspective should be interpreted as “the physical entity of geographical and socio-cultural space” (quoted Aydalot, 1986 in Bramanti & Ratti, 1997: 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 (Quévit & Van Doren, 1997).

This framework also applies to GREMI’s notion of *network of innovation*, which focuses attention on the “interaction between the innovative milieu’s internal and external dynamic” (Quévit & Van Doren, 1997: 345) In this perspective, the cognitive

dimension refers to non-materialist resources and know-how; the organizational dimension refers to 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 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 for studying *innovative milieux* is the focus 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) interaction patterns with the environment external to the milieu (Maillat, Léchet, Lecoq & Pfister, 1997). 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" is assumed to limit the possible paths by which a milieu might develop (i.e. path dependency).

With the concept of *network of innovation*, which was based on the network dimension stressed by the Italian district school, GREMI was able to perceive innovation as a socio-territorial phenomenon. Accordingly, it emphasized the importance of local learning processes, inter-firm relations, and regional (or territorial) socio-economic embeddedness in the process of innovation.

### 2.2.6 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

*“Why do some nations succeed and others fail in international competition?”*

new perspective on the wealth of nations proved to be groundbreaking; even today Porter's work on clusters is quite popular among policy-makers throughout the world as a framework for developing regional competitiveness, innovation, and growth

(Audretsch, 1998; Breschi & Malerba, 2001; Wever & Stam, 1998; Martin & Sunley, 2003).

“Why do some nations succeed and others fail in international competition?” (Porter, 1990: 1). Although this is a frequently asked question in economics, 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 competitive qualities. Porter argues for the abandonment of the notion of a *competitive nation* and the focus on the economy as a whole. Instead he calls for focus 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. While it is tempting to believe that the process of globalization has diminished the role of nations with respect to a firm's or industries' success, 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 worldwide. The main tenets of his philosophy are captured by the *national diamond*-model, which lays out four attributes for creating an entrepreneurial environment: (1) factor conditions (skilled labor, infrastructure, et cetera); (2) demand conditions (the nature of the home market); (3) related and supporting industries; and (4) firm strategy, structure, and rivalry (internal organization and governance of firms and the nature of domestic competition).

According to Porter, the factors constituting the diamond model are highly interrelated and reinforce each other and are hence mutually dependent. For instance, the presence of demand conditions is not sufficient 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 identifies two more variables that can influence the national system quite dramatically: chance (e.g. wars, external political developments, breakthrough innovations) and government, which is able to influence each of the determinants mentioned above. Education policies can affect factor conditions; regulation policies can affect demand conditions, et cetera.

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 by a number of scholars. Martin & Sunley (2003) take issue with Porter's argument that the linkages should be of main concern in drawing the cluster boundaries and not

geographical boundaries or conventional criteria such as standardized industrial categories.

Holding the strength of the linkages as the main determinant of cluster boundaries, Porter (1998: 202) says “the strength of ‘spillovers’, and their importance to productivity and innovation determine the ultimate boundaries.” Martin & Sunley’s (2003) critique is directed at 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. Martin & Sunley (2003) also criticizes 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). Rocha (2004) criticizes Porter’s lack of recognition for the importance of socio-economic factors in influencing clusters dynamics. By stressing formal economic factors mainly (i.e. competition), Porter understates the importance of socio-economic and territorial factors (Rocha, 2004).

### 2.2.7 *Toward a knowledge-based view of clusters*

The past fifteen years or so might be characterized by an increasing interest in the cluster phenomenon from a knowledge perspective. This literature builds 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 in the socio-economic and territorial factors). Contributions from Amin & Cohendet (2003; 2004), Maskell (2001), Gertler (2003), Gerter & Levitte (2005), Lundvall (1990) and Saxenian (1990) are worthy of special attention.

The first noteworthy stream of research to explicitly emphasize the role of knowledge in regional development is the literature on the learning region or learning economy (e.g. Hassink, 2004; Florida, 1995; Lundvall, 1996; Morgan, 1997). 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 (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<sup>17</sup> as Lundvall prefers, has grown out of a dissatisfaction with conventional economic theory, in the sense that it appears to have lost track of current developments, or as Lundvall (1996) 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).*

A prime indicator of a learning economy is the ability of its participants (whether on individual, firm, regional, or national level) to learn.<sup>18</sup> A learning economy is characterized by constant change and, consequently, a rapid change in required skills and knowledge (Lundvall, 1996; Lundvall, Johnson, Sloth Andersen & Dalum, 2002).

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 said to be of primary influence on the capacity of firms to learn and innovate. The other key elements of this national system include a nation’s research and technology base, ICT infrastructure, trade and innovation policies, 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).

While the literature on learning regions emphasizes the importance of firms to be embedded in so-called national systems of innovation, another stream in the literature focuses on micro processes occurring within industrial districts, cities, and regions (Amin & Cohendet, 2004). This research highlights the role of tacit and explicit knowledge in the emergence and growth of clusters.

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<sup>17</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>18</sup> As well as *to forget*, which is regarded a pre-requisite for learning new skills in particular (Lundvall, 1996; Johnson, 1992).

Here knowledge is believed to manifest itself in different forms [e.g. Lundvall's (1996) know-who, know-what, know-why, and know-how], each having different characteristics. These characteristics relate to Polanyi's (1967) notion of the tacit dimension of knowledge. Tacit forms of knowledge, like for instance Lundvall's *know-how* and *know-who*, are seen to be conducive to cluster formation (Brown & Duguid, 2000; Gertler 2003).

A good 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 in Silicon Valley established entrepreneurial networks in their home countries and in the process also transformed 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 off which both Silicon Valley and its spin-off regions profit.

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.

### **2.3 | Some critical reflections on managing clusters as knowledge assets**

Having established that over the years there has been a move towards a knowledge-based view of clusters, we now consider the prevalent beliefs among some scholars and the very many policy-makers that the emergence and growth of clusters is responsive to policy interventions.

Michael Porter advocates this position quite fervently, for he sees the 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 recommendation from Porter is that governments should not try creating new clusters (1998b). Instead governments should “reinforce and build on existing and emerging clusters” (Porter, 1998b: 89) for “successful new industries and clusters often grow out of established ones” (*ibid.*).

Scott (1996) holds a similar view 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>19</sup> First, public investment in technology is required to stimulate local productivity and growth. Second, local governments can stimulate local clusters by investing in educational institutions aimed at serving specific local needs. Third, local authorities can stimulate healthy competition, i.e. preventing or halt so-called cutthroat competition.<sup>20</sup> Fourth, recognizing that small specialist producers are an essential part of the cluster, government policies should be targeted at the problems these small producers usually have to cope with (raising capital, gathering information, et cetera). Fifth, local governments should try to create a local agency that is capable of “coordinating local economic development strategies” (*ibid.*: 318).

Thus we see that policy-makers are persuaded to have a “cluster toolkit” at their disposal by which they can influence the emergence and growth of clusters. Correspondingly, regional policy-makers seem to be preoccupied with the creation of competitive regional industries (Saxenian, 1990; Power & Lundmark, 2004; Wolfe & Gertler, 2004). However, Kumar *et al*'s (1998) case study of the Prato region shows that top-down, managerial attempts to create inter-company links turned out to be unsuccessful. Small firms that made up the textile industry in Prato were already densely connected through family and friendship ties. The introduction of new ICT

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<sup>19</sup> Noteworthy: Scott articulates these five policy interventions with the cultural-products industry of Los Angeles in mind.

<sup>20</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).

tools aimed at codifying and circulating knowledge 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 seem logical and straightforward. However, the issue of cluster governance takes quite a different turn when viewed from the knowledge-based perspective, as we will see below. We will draw on a comparison with the knowledge-based view of the firm, a topic far more extensively studied, to generate insights into cluster governance from a knowledge-based perspective.

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

Many facets of the rise of the knowledge-based view of clusters reminds one of the rise of the resource-based view during the 80s and 90s, later repackaged as ‘the knowledge-based view’ of the firm. (e.g. Barney, 1991; Grant, 1996; Spender, 1996; Kogut & Zander, 1992). Central to the rise of the knowledge-based view is the focus

*Many facets of the rise of the knowledge-based view of clusters reminds one of the rise of the resource-based view during the 80s and 90s*

on 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 amongst

others by sociology of organization, industrial organization and management science, differed from the prevailing transaction cost explanations for why organizations exist.<sup>21</sup> The similarities between the knowledge-based view of clusters and knowledge-based view of organization are readily apparent.

While both the knowledge-based transaction cost approaches are not necessarily in conflict with one another, and are sometimes even used in combination (e.g.

<sup>21</sup> The transaction cost 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.

Williamson, 1996), the knowledge-based view is undeniably rising in popularity. 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 so as 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 early KM initiatives proved to be biased in the belief that knowledge sharing can be engineered, reflected in their focus on codification, technology, and individual or local pockets of knowledge (Huysman & De Wit, 2004). These biases have also been referred to as the management trap, the ICT trap and the local learning trap<sup>22</sup> (Huysman & De Wit, 2004).

### 2.3.2 *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 with interventions. Although most regional interventionists have not yet adopted the specific words 'Knowledge Management,' this might only be a matter of time. So that they do not fall into the same traps as KM managers in organizations, it might be useful to draw lessons from KM management experience in organizations.

The experience with KM in organizations does not provide a very optimistic picture. In fact, more and more, organizations have started to question the effectiveness and efficiency of imposing knowledge management strategies. Even though more than 80 percent of the larger companies have officially introduced KM strategies (KPMG,

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<sup>22</sup> Early KM initiatives were characterized by a number of biased assumptions. The management trap, for instance, refers to managers' bias towards the need to *control* knowledge, and to address attention to KM *only* when managers expect the organization to benefit directly. Likewise, the local learning trap refers to a situation in which managers focus mainly on supporting individual learning and do not recognize the importance of communities and organizations benefiting from KM as a whole. Finally, the ICT trap refers to situations in which KM initiatives are biased towards a stock approach to knowledge as well as a technology driven orientation (Huysman & De Wit, 2004).

2000)<sup>23</sup>, most of these companies are still struggling how to manage knowledge. It still is difficult to identify best practices for KM (Davenport & Prusak, 1998).

In the development of knowledge management, two generations of thought have been identified (Hislop, 2002; Hislop, 2005; Huysman & De Wit, 2002; Scarbrough & Carter, 2000). In the first generation, both in research and practice, knowledge was conceptualized 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 other words, if optimal organizational and technical infrastructures are offered, people will share their knowledge (Alavi & Leidner, 2001; Davenport, De Long & Beers, 1998; Davenport & Prusak, 1998; Egan & Kim, 2000; Ellis & Rumizen, 2002; Gold, Malhotra and Segars, 2001; Hinds & Pfeffer, 2003; Zack, 1999).

The contribution of IT to knowledge management is the subject of much discussion, inducing some writers to critically analyze managerial and IT determinism (Hendriks & Vriens, 1999; Hislop, 2002; Roberts, 2000; Ruggles, 1998; Scarbrough & Swan, 2001; Spiegler, 2003). These writers 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). The fact that, both in practice and in academic research, the engineering approach has yielded disappointing results has prompted the insight that knowledge is not simply an aggregate of information which can be de-coupled from its context. The focus of attention thereafter shifted towards the tacit dimension of knowledge which is socially embedded in the context in which it takes shape and creates meaning. With this realization, a new understanding developed that knowledge sharing cannot be stimulated by imposing structures and tools but by rich social interaction and immersion in practice (Hislop, 2005). Communities (or networks) of practice were considered the most appropriate environments for knowledge creation and sharing (Hislop, 2002; Ruggles, 1998;

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<sup>23</sup> This research was conducted using a sample of 423 organizations located in the United Kingdom, mainland Europe, and the United States of America, with a yearly turnover exceeding US\$347 million (£200 million). The researchers chose these sample criteria for “organizations of this size have the greatest need to implement KM initiatives, have possibly the greatest capability and resources to do so, and potentially can reap the greatest benefits” (KPMG, 2000: 5).

Scarbrough & Swan, 2001). The emphasis now moved away from managerial intervention to social dynamics resulting in knowledge sharing (Hislop, 2005).

This so-called *emergent* approach to knowledge embraces the “epistemology of practice” (Cook & Brown, 1999), when knowledge is seen as socially constructed and embedded in the social context (Blackler, 1995; Brown & Duguid, 1991; 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*<sup>24</sup> as the driving force for knowledge sharing (Adler & Kwon, 2002; McFadyen & Albert, 2004; Nahapiet & Goshal, 1998).

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 KM debate tends to ignore the potential of information technology in supporting pooling of knowledge. However, with the growing potentials of Web 2.0 technology,<sup>25</sup> and in particular ‘social software, we might see a turn in the literature on KM towards a more hybrid perspective in which knowledge sharing emerges with the help of information technology, especially with the development of software that supports bottom up knowledge sharing processes within communities. Web 2.0 technology, for

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<sup>24</sup> 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: 119).

<sup>25</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, Twitter.com), wikis (Wikipedia.org), RSS-feeds, and other forms of social software and applications (such as Flickr.com and YouTube.com).

example, appears to be very popular in connecting professionals within the Amsterdam Interactive Media sector region. In particular, social network services, 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*.

#### **2.4 | 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 area of research, 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 chapter, 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 against 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 areas 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 that IT infrastructure will stimulate the flow of knowledge between the small and medium firms within a cluster. 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 marked the first generation of KM, wherein managers looked at local pockets of knowledge instead of adopting a 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 the firms indeed 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 the development of intellectual capital (Nahapiet & Goshal, 1998).

The literature review not only addressed the rise of the 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 chapter, 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.

## 2.5 | References

- Adler, P.S. & Kwon, S-W. (2002). Social capital: prospects for a new concept. *Academy of Management Review*, 27, 17-40.
- Alavi, M. & Leidner, D.E. (2001). Review: knowledge management and knowledge management systems; conceptual foundations and research issues. *MIS Quarterly*, 25, 107-36.
- Aldrich, H.E. & Ruef, M. (2006). *Organizations evolving*. London: Sage Publications.
- Amin, A. & Cohendet, P. (2004). *Architectures of knowledge. Firms, capabilities, and communities*. New York: Oxford University Press.
- Amin, A. & Cohendet, P. (2003). Geographies of knowledge formation in firms. Paper presented at the Druid summer conference 2003 on creating, sharing, and transferring knowledge. *The role of geography, institutions and organizations*. Copenhagen, June 12-14.
- Amin, A. & Robins, K. (1990). Industrial districts and regional development: limits and possibilities. In *Industrial Districts and Inter-Firm Co-operation in Italy*, In: F. Pyke, G. Becattini and W. Sengenberger (eds.), pp. 185-219. Geneva: ILO Publications.
- Audretsch, D.B. (1998). Agglomeration and the location of innovative activity. *Oxford Review of Economic Policy*, 14(2), 18-29.
- Audretsch, D.B. & Feldman, M.P. (1996). R&D spillovers and the geography of innovation and production. *The American Economic Review*, 86(3), 630-640.
- Aydalot, Ph. & Keeble, D. (1989). High-technology industry and innovative environments in Europe: An overview. In *High Technology Industry and Innovative Environments: The European Experience*, In: Ph. Aydalot and D. Keeble (eds.), 1-21. UK: Routledge.
- Barney, J.B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28(1), 31-56.

- Becattini, G. (1990). The Marshallian industrial district as a socio-economic notion. In *Industrial Districts and Inter-firm Co-operation in Italy*, eds. F. Pyke, G. Becattini, and W. Sengenberger, pp. 37-51. Geneva: ILO Publications.
- Beerepoot, N. (2005). *Collective learning in small enterprise clusters. Skilled workers, labour market dynamics and knowledge accumulation in the Philippine furniture industry*. Ph.D. Dissertation. Amsterdam: AMIDSt.
- Blackler, F. (1995). Knowledge, knowledge work and organization: an overview and interpretation. *Organization Studies*, 6, 1021-46.
- Borgatti, S.P. & Foster, P.C. (2003). The network paradigm in organizational research: a review and typology. *Journal of Management*, 29(6), 991-1013.
- Bourdieu, P. & Wacquant, L. (1992). *An invitation to reflexive sociology*. Chicago, Il.: University of Chicago Press.
- Bramanti, A. & Ratti, R. (1997). The multi-faced dimensions of local development. In *The Dynamics of Innovative Regions. The Gremi Approach*, In: R. Ratti, A. Bramanti (eds.), and R. Gordon, 3-44. Aldershot: Ashgate.
- Breschi, S. & Lissoni, F. (2001a). Localised knowledge spillovers vs. innovative milieux: knowledge "tacitness" reconsidered. *Papers in Regional Science*, 80, 255-273.
- Breschi, S. & Lissoni F. (2001b). Knowledge spillovers and local innovation systems: a critical survey. *Industrial and Corporate Change*, 10(4), 975-1005.
- Breschi, S. & Malerba, F. (2001). The geography of innovation and economic clustering: some introductory notes. *Industrial and Corporate Change*, 10(4), 817-833.
- Brown, J.S. & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organization Science*, 12, 198-213.
- Brown, J.S. & Duguid, P. (2000). Mysteries of the region: knowledge dynamics in Silicon Valley. In *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*, eds. W.F. Millar, Ch.-M. Lee, M.G. Hancock, and H.S. Rowen, 16-38. US: Stanford University Press.
- Brown, J.S. & Duguid, P. (1991). Organizational learning and communities-of-practice: Toward a unified view of working, learning and innovation. *Organization Science* 2, 40-57.

- Brusco, S. (1990). The idea of the industrial district: Its genesis. In *Industrial Districts and Inter-firm Co-operation in Italy*, eds. F. Pyke, G. Becattini, and W. Sengenberger, 10-19. Geneva: ILO Publications.
- Caniëls, M.C.J. & Romijn, H.A. (2003). Firm-level knowledge accumulation and regional dynamics. *Industrial and Corporate Change*, 12(6), 1253-1278.
- Castells, M. (1996). *The information age: economy, society and culture. Volume 1: The rise of the network society*. Oxford: Blackwell Publishers.
- Ciborra, C.U. (1996). *Groupware and teamwork*. Chistester: John Wiley and Sons.
- Cook, S. & Brown, J.S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization Science*, 10, 381-400.
- Davenport, T.H., De Long, D.W. & Beers, M.C. (1998). Successful knowledge management projects. *Sloan Management Review*, 39(2), 43-56.
- Davenport, T.H. & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston: Harvard Business School Press.
- Egan, M. & Kim, J. (2000). Knowledge-sharing at the World Bank. *Knowledge management review*, 3(3), 24-27.
- Ellis, M.S. & Rumizen, M. (2002). The evolution of KM at Buckman laboratories: How its KM program has developed with the new leadership. *Knowledge Management Review*, 5(1), 12-15.
- Feldman, M.P. (2001). The entrepreneurial event revisited: firm formation in a regional context. *Industrial and Corporate Change*, 10(4), 861-891.
- Feldman, M.P. & Francis, J.L. (2004). Homegrown solutions: Fostering cluster formation. *Economic Development Quarterly*, 18(2), 127-137.
- Florida, R. (1995). Toward the learning region. *Futures*, 27(5), 527-536.
- Gertler, M.S. (2003). Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there). *Journal of Economic Geography*, 3, 75-99.
- Gertler, M.S. & Levitte, Y.M. (2005). Local nodes in global networks: The geography of knowledge flows in biotechnology innovation. *Industry and Innovation*, 12(4), 487-507.
- Giuliani, E. (2005). Cluster absorptive capacity: Why do some clusters forge ahead and others lag behind? *European Urban and Regional Studies*, 12(3), 269-288.

- Glaeser, E.L., Kallal, H.D., Scheinkman, J.A., & Shleifer, A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126-1152.
- Gold, A.H., Malhotra, A., & Segars, A.H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18, 185-214.
- Granovetter, M.S. (1985). Economic action and social structure: The problem of embeddedness. *The American Journal of Sociology*, 91(3), 481-510.
- Granovetter, M.S. (1973). The strength of weak ties. *The American Journal of Sociology*, 78(6), 1360-80.
- Grant, R.M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17 (Special Issue: Knowledge and the Firm), 109-122.
- Hansen, M.T., Mors, M.L. & Løvås, B. (2005). Knowledge sharing in organizations: multiple networks, multiple phases. *Academy of Management Journal*, 48, 776-793.
- Hassink, R. (2004). The learning region: A policy concept to unlock regional economies from path dependency? Paper prepared for the conference: *Regionalization of Innovation Policy - Options and Experiences*. June 4<sup>th</sup> -5<sup>th</sup>, Berlin.
- Hauschild, S., Licht, T., & Stein, W. (2001). Creating a knowledge management culture. *McKinsey Quarterly*, 1, 74-81.
- Hayek F.A. (1937). Economics and knowledge. *Economica*, 4(13), 33-54.
- Hendriks, P. & Vriens, D.J. (1999). Knowledge-based systems and knowledge management: Friends or foes? *Information & Management*, 35, 113-125.
- Hinds, P. & Pfeffer, J. (2003). Why organizations don't "know what they know": Cognitive and motivational factors affecting the transfer of expertise. In *Beyond Knowledge Management: Sharing Expertise*, eds. M. Ackerman, V. Pipek and V. Wulf, 3-26, Cambridge, MA: MIT Press.
- Hislop, D. (2005). *Knowledge management in organizations: A critical introduction*. Oxford: Oxford University press.
- Hislop, D. (2002). Mission impossible? Communicating and sharing knowledge via information technology. *Journal of Information Technology*, 17, 165-177.
- Huysman, M. & Wulf, V. (2006). IT to support knowledge sharing in communities: Towards a social capital analysis. *Journal of Information Technology*, 21, 40-51.

- Huysman, M. & Wulf, V. (2005). The role of information technology in building and sustaining the relational base of communities. *The Information Society*, 21, 81-89.
- Huysman, M. & Wulf, V. (2004). *Social capital and information technology*. Cambridge MA: MIT Press.
- Huysman, M. & Wit, D. de. (2004). Practices of managing knowledge sharing: Towards a second wave of knowledge management. *Knowledge and Process Management*, 11(2), 81-92.
- Huysman, M. & Wit, D. de. (2002). *Knowledge sharing in practice*. Dordrecht: Kluwer Academic.
- Jacobs, J. (1969). *The economy of cities*. New York: Vintage Books.
- Jaffe, A.B. (1986). Technological opportunity and spillovers of R&D: Evidence from firms' patents, profits, and market value. *The American Economic Review*, 76(5), 984-1001.
- Jaffe, A.B., Trajtenberg, M., & Henderson, R. (1993). Geographic location of knowledge spillovers as evidenced by patent citations. *The Quarterly Journal of Economics*, 108(3), 577-598.
- Johnson, B. (1992). Institutional learning. In *National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning*, ed. B.-Å. Lundvall, 23-44. London: Pinter, London.
- Kogut, B. & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383-397.
- KPMG (2000). *Knowledge management research report 2000*. UK: KPMG Consulting Reports.
- Krugman, P. (1991). *Geography and trade*. Cambridge, MA: MIT Press.
- Kumar, K., Dissel, H.G. van, & Bielli, P. (1998). The merchant of prato – revisited: toward a third rationality of information systems. *MIS Quarterly*, 22(2), 199-226.
- Landes, D.S. (2005) [1998]. *The wealth and poverty of nations*. London: Abacus.
- Lazerson, M. (1993). Factory or putting-out? Knitting networks in modena. In *The Embedded Firm. On the Socio-Economics of Industrial Networks*, ed. Grabher, G., 203-226. London: Routledge.

- Lazerson, M. (1990). Subcontracting in the Modena knitwear industry. In *Industrial Districts and Inter-firm Cooperation in Italy*, eds. F. Pyke, G. Becattini, and W. Sengenberger, 108-133. Geneva: ILO Publications.
- Lundvall, B.-Å. (1996). The social dimension of the learning economy. *Druid working paper*, 96(1), 1-20.
- Lundvall, B.-Å., Johnson, B., Sloth Andersen, E. & B. Dalum (2002). National systems of production, innovation and competence building. *Research Policy*, 31(2), 213-231.
- Maillat, D., Lécho, G., Lecoq, B. & Pfister, M. (1997). Comparative analysis of the structural development of milieux: The watch industry in the Swiss and French Jura Arc. In *The Dynamics of Innovative Regions. The Gremi Approach*, eds. R. Ratti, A. Bramanti, & Gordon, R., 109-137. Aldershot: Ashgate.
- Manuel, D. (2000). De regio als incubator: Een analysemodel voor ICT-regio's. In *Silicon Valley in de Polder: ICT-Clusters in de Lage Landen*, eds. H. Bouwman & W. Hulsink, 79-99. Utrecht: Lemma.
- Marshall, A. (1920). *Principles of economics*. London: MacMillan.
- Martin, R. and P. Sunley, P. 2003. Deconstructing clusters: chaotic concept or policy panacea? *Journal of Economic Geography*, 3, 5-35.
- Maskell, P. (2001). Towards a knowledge-based theory of the geographical cluster. *Industrial and Corporate Change*, 10(4), 921-943.
- McFadyen, M.A. & Albert, C.J. (2004). Social capital and knowledge creation: Diminishing returns of the number and strength of exchange relationships. *Academy of Management Journal*, 47, 735-746.
- Morgan, K. (1997). The learning region: Institutions, innovation and regional renewal. *Regional Studies*, 31(5), 491-503.
- Nahapiet, J. & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 22, 242-266.
- Orlikowski, W.J. (2002). Knowing in practice: enacting a collective capability in distributed organizing. *Organization Science*, 13, 249-273.
- Piore, M.J. (1990). Work labour and action: Work experience in a system of flexible production. In *Industrial Districts and Inter-firm Co-operation in Italy*, eds. F. Pyke, G. Becattini, & W. Sengenberger, 52-74. Geneva: ILO Publications.

- Piore, M.J. & Sabel, Ch.F. (1984). *The second industrial divide. Possibilities for prosperity*. USA: Basic Books.
- Polanyi, M. (1967). *The tacit dimension*. London: Routledge & Kegan Paul Ltd.
- Porter, M.E. (1998a). *On competition*. Boston: Harvard Business Review Press.
- Porter, M.E. (1998b). Clusters and the new economics of competition. *Harvard Business Review*, 6 (November-December), 77-90.
- Porter, M.E. (1990). *The competitive advantage of nations*. New York: The Free Press.
- Powell, W.W., Koput, K.W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, 41(1), 116-145.
- Power, D. & Lundmark, M. (2004). Working through knowledge pools: Labour market dynamics, the transference of knowledge and ideas, and industrial clusters. *Urban Studies*, 41(5/6), 1025-1044.
- Pyke, F. & Sengenberger, W. (1990). Introduction. In *Industrial Districts and Inter-firm Co-operation in Italy*, eds. F. Pyke, G. Becattini, & W. Sengenberger, 1-9. Geneva: ILO Publications.
- Quévit, M. & Doren, P. van (1997). The problem of innovative milieux and territorial structural adjustment policies. In *The Dynamics of Innovative Regions. The Gremi Approach*, eds. R. Ratti, A. Bramanti, & R. Gordon, 343-365. Aldershot: Ashgate.
- Roberts, J. (2000). From know-how to show-how? Questioning the role of information and communication technologies in knowledge transfer. *Technology Analysis Strategic Management*, 12, 429-442.
- Robertson, M. & O'Malley Hammersly, G. (2000). Knowledge management practices within a knowledge-intensive firm: The significance of the people management dimension. *Journal of European Industrial Training*, 24(2), 241-253.
- Rocha, H.O. (2004). Entrepreneurship and development : The role of clusters. *Small Business Economics*, 23, 363-400.
- Rosenfeld, S.A. (1997). Bringing business clusters into the mainstream of economic development. *European Planning Studies*, 5(3), 3-23.
- Ruggles, R. (1998). The state of the notion: Knowledge management in practice. *California Management Review*, 40(3), 80-89.

- Sabel, Ch.F. (1994). Flexible Specialization and the re-emergence of regional economies. In *Post-Fordism*, ed. A. Amin, pp. 101-156. Oxford: Blackwell, Published before in *Reversing Industrial Decline? Industrial Structure and Policy in Britain and Her Competitors*, eds. P. Hirst & J. Zeitling (1989). Lemington Spa: Berg Publishers.
- Saxenian, A. (2006). *The new argonauts. Regional advantage in a global economy*. Cambridge: Harvard University Press.
- Saxenian, A. (1990). Regional networks and the resurgence of Silicon Valley. *California Management Review*, 33(1), 89-112.
- Scarbrough, H. & Swan, J. (2001). Explaining the diffusion of knowledge management: The role of fashion. *British Journal of Management*, 12(1), 3-12.
- Scarbrough, H. & Carter, C. (2000). *Investigating knowledge management*. London: CIPD.
- Scott, A.J. (1996). The craft, fashion, and cultural-products industries of Los Angeles: Competitive dynamics and policy dilemmas in a multisectoral image-producing complex. *Annals of the Association of American Geographers*, 86(2), 306-323.
- Sforzi, F. (1990). The quantitative importance of Marshallian industrial districts in the Italian economy. In *Industrial Districts and Inter-firm Co-operation in Italy*, eds. F. Pyke, G. Becattini, & W. Sengenberger, 75-107. Geneva: ILO Publications.
- Smith, K.G., Collins, C.J. & Clark, K.D. (2005). Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms. *Academy of Management Journal*, 48, 346-357.
- Spender, J.-C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*, 17(Special Issue: Knowledge and the Firm), 45-62.
- Spiegler, I. (2003). Technology and knowledge: Bridging a “generating” gap. *Information & Management*, 40, 533-539.
- Steinfeld, C. & Scupola-Hugger, A. (2006). Explaining ICT infrastructure and e-commerce uses and benefits in industrial clusters: Evidence from a biotech cluster. *Proceedings of the 39th Hawaii International Conference on Systems Sciences* (CD-ROM), January 3-6, Computer Society Press.
- Stewart, F. & Ghani, E. (1991). How significant are externalities for development? *World Development*, 19(6), 569-594.

- Swann, P. & Prevezer, M. (1996). A comparison of the dynamics of industrial clustering in computing and biotechnology. *Research Policy*, 25, 1139-1157.
- Tomaney, J. (1994). A new paradigm of work organization and technology? In *Post-Fordism*, ed. A. Amin, 156-194. Oxford: Blackwell.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42(1), 35-67.
- Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review*, 61(4), 674-698.
- Vera, D. & Crossan, M. (2003). Organizational learning and knowledge management: Toward an integrative framework. In *The Blackwell Handbook of Organizational Learning and Knowledge Management*, eds. M. Easterby-Smith & M.A. Lyles, 104-121. Malden MA: Blackwell Publishing.
- Wenger, E. (2000). Communities of practice and social learning systems, *Organization*, 7(2), 225-246.
- Wever, E. & Stam, E. (1998). Clusters of high technology SMEs: The Dutch case. *Regional Studies*, 33(4), 391-400.
- Williams, K., Cutler, T., Williams, J. & Haslam, C. (1987). The end of mass production? *Economy and Society*, 16(3), 405-439.
- Williamson, O.E. (1996). *The mechanisms of governance*. New York: Oxford University Press.
- Wolfe, D.A. & Gertler, M.S. (2004). Clusters from the inside and out: Local dynamics and global linkages. *Urban Studies*, 41(5/6), 1071-1093.
- Zack, M. (1999). Managing codified knowledge. *Sloan Management Review*, 40(4), 45-58.