
21 The role of civic capital and civic associations in cluster policy

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1 Introduction

A broad range of academic and policy-related research has adopted the cluster concept as a practical tool to inform local economic development policy. The concept has been used to analyse the factors that contribute to the relative success enjoyed by different regions and localities, as well as provide a framework to guide policy makers in the design of local initiatives. Much of this literature suggests that the benefits of clustering are linked to advantages that firms derive from proximity to other firms in related and supporting industries, as well as to the benefits from having privileged access to extraeconomic resources located close to the cluster (Asheim, Cooke and Martin, 2006). These additional resources include a strong local research infrastructure, specialized training institutions, focused support services, such as legal and accounting, access to a sufficient supply of necessary capital and supportive government policies, especially at the regional and local level. Closely related to these extraeconomic resources is the presence of an institutionally 'thick' set of local actors who provide dynamic leadership for the cluster, both in terms of facilitating the kind of inter-firm linkages that accelerate the flow of knowledge among cluster-based firms, as well as promoting the policy interests of the cluster to relevant levels of government. However, the exact nature and role played by local civic associations and civic actors is more often the subject of anecdotal comments than the object of detailed analysis, and the policy implications drawn from these observations are often based on a few highly visible success stories, rather than the comparative analysis of a large number of cases.

This chapter reports on the results of a comprehensive study of industrial clusters across the Canadian economy designed to investigate the range of factors that contributed to the development of those clusters (Wolfe and Gertler, 2004; Wolfe, 2003; Wolfe and Lucas, 2004; Wolfe and Lucas, 2005). The project posed a number of common questions in the investigation of each of the clusters studied: (i) what role do local institutions and associations play in fostering the development of innovative and dynamic cluster: (ii) how dependent are local firms on unique local knowledge assets, and what is the relative importance of local versus non-local knowledge flows between economic actors; and (iii) how did each local industrial concentration evolve over time to reach its present state, and what key events and decisions shaped its path? Drawing upon the results of these case studies, we present an overview of the key role played by civic associations and civic actors in cluster development, and the policy implications that flow from that role.

Many clusters have access to the knowledge assets and research infrastructure necessary for the development of a cluster-based development strategy, but they differ in their capacity to mobilize these assets in the pursuit of such a strategy. According to some commentators, social, or what we prefer to call 'civic', capital is a critical ingredient in the

success of the most dynamic clusters and regional economies. The presence of civic capital grows out of the dense interaction between key local associations and civic actors that sustain cluster dynamics. Recent experience in both the US and Canada indicates that local communities which enjoy this level of interaction can formulate strategies to alter their economic trajectory and improve their chances of economic development. The successful initiation of this kind of process depends upon the ability to collaborate across boundaries – both geographic and social. Even in more established clusters, the mere concentration of a large number of firms is not always sufficient to transform a particular locale into a vibrant and dynamic regional economy. It also requires the presence of an ‘economic community’: strong, responsive relationships between the economy and community that afford both companies and the community a sustained advantage. These relationships are mediated by key people and organizations that bring the economic, social and civic interests in the community together to collaborate (Henton, Melville and Walesh, 1997). The promotion of this degree of civic engagement constitutes both a critical object of, and support for, effective cluster development.

2 Social capital, civic capital and cluster development

Scholarship on regional economic development has long been concerned with the specific factors that contribute to the success of some regions and the failure of others. Among the factors considered are technology, education, institutions and industrial clustering. All of these play a role as determinants of regional success, but none more so than the character of the *relationships* between actors in a region – what is frequently referred to as ‘social capital’. Social capital is defined as the ‘social relations among agents, resting upon social institutions that allow for cooperation and communication’ (Lorenzen, 2005, 3). Social capital refers to various features of the social organization of a region, such as the presence of shared norms and values that facilitate coordination and cooperation among individuals, firms and sectors for their mutual advantage. The close relations among key actors or agents enable knowledge exchange, social learning and more effective collective action, especially at the local or regional level. The existence of social capital depends upon the ability of people to associate with each other and the extent to which their shared norms and values allow them to subordinate their individual interests to the larger interests of the community. The use of the term ‘capital’ indicates that it involves an asset, while the term ‘social’ connotes that the particular asset is attained through involvement with a community. It secures the conditions that enhance the benefits derived from more tangible investments in physical and human capital. Without its supportive functioning, high levels of these more tangible forms of investment may fail to produce the benefits that should potentially flow from them (Putnam et al., 1993, 167–76; Maskell, 2000).

Social capital arises from relationships in which the old dichotomy between cooperation and competition no longer prevails, as the presence of trust and reputation promote information sharing and reciprocity within business networks. According to Jane Fountain, social capital ‘refers to those features of social organization, such as networks, norms and trust that facilitate coordination and cooperation for mutual benefit’ (1998, 87). Effective partnerships, consortia and research or business networks are themselves a form of social capital. Partners involved in these relationships establish a willingness to exchange information on something more stable and enduring than a ‘barter’ basis. As

these relations grow and develop, a larger component of the knowledge shared and transmitted becomes 'tacit', rather than explicit, with a concomitant increase in the level of understanding gained through the exchange. Ultimately, the relationships can be extended to include other partners of the respective firms, further enhancing the extent and the value of the network (Maskell, 2000; Lorenz, 1993).

The networks that constitute social capital in this sense comprise a rich and dense social community in which the business relationships of the local economy are embedded. Social capital tends to be accumulated as an unintended consequence of other activities that people are engaged in; its presence or absence is linked to the vitality of civil society in that region. A key element that underpins the social capital of a region is the degree of trust that exists among the various members or groups that comprise it. Because trust and social capital are collective assets built up through patterns of interaction within specific communities, they are rare commodities that can neither be bought, nor traded; they can only be built up painstakingly through a prolonged process of interaction. A growing number of studies identify the existence of trust relations among a network of regional firms as critical for their competitive success, but the factors that contribute to its presence vary considerably across different countries and regions (Morgan, 1997; Cohen and Fields, 1999).

The concepts of social capital and trust explain why certain kinds of economic activity tend to cluster despite the opposing trend towards dispersal brought on by the spread of globalization. Peter Maskell suggests that it may also explain why some regions continue to be 'sticky' in attracting strong concentrations of firms in related activities. The process of globalization transforms what were previously localized inputs into *ubiquities* readily exploited by many firms at a variety of locations around the globe. Firms faced with this shift search for alternative inputs on which to base their competitive advantage. Such inputs must have a high potential value and be difficult to imitate or replicate (Maskell, 1999). Social capital represents one such input. The pattern of its formation varies considerably across regions as a function of the nature of inter-firm relations, the impact of external shocks (in the form of market or technological developments) and the role of key civic actors or agents, as early entrepreneurs who spin off successor firms and train young entrepreneurs, or as visionary leaders who chart a unique course for the local community and economy (Lorenzen, 2007). Trust, as a component of social capital, helps overcome market failures or reduce the level of market costs for firms in densely related networks, by supporting stable and reciprocal exchange relationships among them and increasing the level of civic engagement in the local community.

At the same time, Maskell maintains that an important distinction between community and social capital is necessary. In his discussion of social capital, he distinguishes between the benefits of networks and the benefits of social capital. Networks are made up of individuals within a community, but do not necessarily include *all* of the members of the community. Networks, he argues, exist for the benefit of specific members, but social capital is an asset of the entire community (Maskell, 2000, 117). This suggests that tightly functioning and inward looking networks are not the equivalent of effective communities, well endowed with social capital, and that we must specify more clearly the relative effects of each. The distinction he draws is similar to one made by Lorenzen between the business realm and the civic realm of social relations. Business relations include technological learning within the firm and inter-firm trade and knowledge exchanges. Civic relations

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include those that exist between people in a community who interact with each other through their involvement with schools, various cultural and leisure activities and other civic associations. Lorenzen argues that the civic dimension of social capital is particularly sensitive to geographic distance because many of the activities that enhance the strength of civic relations are based on the specific catchment area of a civic association or membership in a cultural organization. These relations frequently entail face-to-face meetings that are limited by distance as well (Lorenzen, 2007).

This distinction between business and civic relations helps us overcome one of the key limitations of the concept of social capital as a tool for understanding the dynamics of regional governance and innovation: its lack of precision. In some respects, it is too broadly defined and has been subject to too many applications across a wide range of fields. As the use of the concept has been extended, it has come to encompass a wide range of attitudes, values and relationships, making it difficult to identify the key factors at work in influencing cluster performance or regional economic development more specifically. Closely related to this concern is the problem of scale. At what scale of analysis should the concept be applied? Is it equally applicable across a wide range of geographic and political scales? Part of the problem is that social capital can be a characteristic of an individual (their preferences for cooperation or charisma, for example), a specific group (an ethnic group or family unit), a community, a city or a nation – all of which are legitimate. Social capital may exert significantly different effects at each of these spatial scales (Iyer, Kitson and Toh, 2005, 1019). Equally problematic is the tendency to conflate the presence of social capital in the form of high levels of civic participation as both cause and effect. Michael Woolcock has commented on this tendency:

Social capital in the form of trust, it is argued, is created as a by-product of other collective endeavours such as participation in civic associations, but these activities are themselves public goods, and are also identified as social capital, leaving us with the problematic conceptual task of distinguishing between the sources of social capital [and] the benefits derived from them. (Woolcock, 1998, 156)

To address this concern we distinguish between the concept of social capital and that of *civic capital* to deal specifically with the contribution that civic associations and civic actors make to the process of cluster development. This concept builds on the distinctions noted above between networks and community, and between business and civic relations. It also incorporates the insights derived from the work on civic entrepreneurs to produce a more nuanced conception appropriate to analysing the role of civic associations and civic actors (Henton et al., 1997). Civic capital consists of interpersonal networks and solidarity within a community based on a shared identity, expectations or goals and *tied to a specific region or locality*. It comprises formal or informal networks among individual community members, between communities, or between community and the local or regional government. The concept of civic capital recognizes the critical role of local leaders, or civic entrepreneurs, in intensifying and formalizing collaborative networks within and between communities. Drawing on Putnam et al.'s distinction between bonding and bridging capital, civic entrepreneurs help build bridges between different members of a community to coalesce and formalize coalitions based on shared identities and interests. However, their most important role is in *bridging* the gap between communities and between local governments and community actors. Civic entrepreneurs

understand the importance of collaboration; in their bridging role they bring business, the community and government together to set and achieve long-term development goals. They can emerge from any sector of society – business, government, education and community organizations – but all share similar characteristics of visionary leadership, charismatic personalities, interest in building the economic region, and commitment to collaborative solutions. Civic entrepreneurs help to build and intensify civic capital by ‘creating opportunities for people to work together on specific projects to advance their economic community’ (Henton et al., 1997, 31).

The advantage of this definition of civic capital is that it allows for individual agency through the engagement of key actors, as well as accounting for a societal dimension. It is uniquely tied to place, but allows for a nuanced approach to community and networks. Finally, defining civic capital as a sense of solidarity or interpersonal ties enables civic capital to exist prior to agency, but also accounts for the way it can be harnessed and intensified to promote effective regional governance by civic entrepreneurs. The term ‘governance’ implies a more flexible, multilateral process of negotiated economic development whereby political authorities at the regional and local level partner with a range of civic associations to formulate cluster-based innovation strategies. This approach recognizes that civic capital can be created as an outcome of concerted community-based actions. The basis for doing so is the establishment of collaborative networks between various elements of the business and civic communities,

The presence of collaborative institutions and organizations, such as cluster organizations, professional networks, research–industry consortia and entrepreneurial support networks, greatly facilitates this environment. These alliances, networks and other relationship-building mechanisms create connections and linkages vital to economic development in a technology-driven world. . . . many regions fortunate enough to have university research assets underuse these knowledge economy resources, precisely because relationships have not been established to connect the university and local industry. . . . Relationships matter. (Montana, Reamer, Henton et al., 2001, 10)

The presence of these networks of collaborative institutions and civic associations engaged in promoting the development of local clusters also contributes to the degree of ‘institutional thickness’ in the local and regional economy. Amin and Thrift (1994) view economic success as a function of the presence of these associations and the degree of interaction between them. The presence of a large variety of local organizations (including firms, local chambers of commerce, trade associations, cluster organizations, regional development agencies and so on) is the first of four dimensions of institutional thickness. The second is high levels of interaction between these organizations and associations. The contacts and exchanges often result in the development of shared rules, conventions and knowledge that constitute the ‘social atmosphere’ or, in our terms, the civic capital of a region. The third facet is the establishment, as a result of interaction, of formal and informal coalitions and networks. Finally, institutional thickness implies the development of shared goals and visions regarding regional governance: the development of a shared identity based on ties to the region. Thickness can thus be interpreted as the institutionalization of civic capital.

Successful regional economies and effective clusters benefit from these dense networks of local organizations and civic associations to facilitate coordination. They also benefit

from the presence of collaborative institutions, which help communicate the respective needs of different community actors to each other, establish local and regional priorities for economic development, mobilize and commit the resources required to achieve these priorities. Above all, they contribute to the articulation of a shared vision for the economic community and the local economy and build a consensus among key civic actors and associations around that vision (Porter, Monitor Group, ontheFRONTIER et al., 2001, 75). In doing so, they build civic capital and improve competitiveness within clusters by creating relationships and establishing trust, facilitating the organization of collective action, developing collective institutions that benefit the members of the cluster, identifying common strengths or mutual needs and contributing to the development of a common economic agenda.

The presence of collaborative institutions plays a central role in the formation and development of clusters. The emergence of these collaborative institutions marks a critical stage in cluster formation according to the descriptive model elaborated by Feldman et al. (2005). The first stage of the model constitutes the latency phase in which a strong base of labour skills or human capital, or a significant research infrastructure, is created in a region. The presence of these underlying assets provides the basis for the emergence of a cluster, sometimes in response to an external shock to the regional economy or the emergence of new technological opportunities that alter the opportunity cost for entrepreneurship and new firm formation. In the second phase, the cluster evolves as local entrepreneurs and newly formed firms establish their own networks and build the deep institutional structures that constitute the industrial system of a region. Once a critical mass of new start-up firms has emerged, the entrepreneurial founders of the firms begin to form local civic associations needed to support their own activities and encourage new entrepreneurs to launch their own firms. These organizations engage in a range of activities that help diffuse the knowledge and skills needed to grow and expand the cluster. The final stage occurs when there is a fully functioning entrepreneurial environment where the success of the initial start-ups creates additional possibilities for new ones, as well as spin-offs.

The emergence of key local actors and dense networks of civic associations marks a critical stage in the development and growth of clusters. The presence of both cluster-specific organizations and more regionally based ones constitute an important resource for the design of cluster development strategies. Effective cluster development strategies build upon the resources afforded by these associations to provide support for the firms in the cluster. In the following sections, we examine the extent and nature of the contribution made by local civic associations and the presence of civic capital to the development of industrial clusters in Canada and the implications for the design of cluster policies.

3 Key findings from the ISRN cluster research

Our analysis of the role that civic associations and civic actors play in cluster development draws upon the detailed case studies undertaken by the Innovation Systems Research Network in its examination of 26 regional and local clusters in Canada.¹ The study investigated the same type of clusters in two or more regions across the country, using a common research methodology based on in-depth interviews with key cluster participants. The selection of case studies deliberately ranged from highly knowledge-intensive

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activities, such as biotechnology, photonics/wireless equipment, telecom equipment and aerospace, to more traditional sectors, such as steel, automotive parts, specialty food and beverages, and wood products. Finally, the cases were distributed across both metropolitan and non-metropolitan regions, reflecting the unique geography of Canada's national economy.

The analysis of the case studies reveals the presence of a large number of civic associations and civic actors that play important roles in the formation and development of clusters. For the purposes of this analysis we defined civic actors as those based primarily in the region of the cluster with at least one programme or policy goal focused on the concerns of the industrial cluster. In this respect, a national association was considered to be a local actor with reference to a specific cluster if it tailored the delivery of its services or policy advocacy efforts to reflect the local or regional variations in the conditions affecting that cluster. There is a broad set of institutions and actors that qualify under this definition. Crucial among them are local trade or industry associations and community-based advocacy groups. Many of the most successful clusters among the case studies have developed highly effective civic associations that promote interaction and networking among the various members of the cluster, as well as advocating local, regional and even national, policy innovations that work to the benefit of cluster members. In our analysis of the case studies, we distinguished between the range of associations that emerged as the clusters grew and developed and the patterns of local and regional governance that prevail among the more fully developed clusters. The following discussion examines each of these issues in turn.

Perhaps the most obvious conclusion that emerges from the case studies is the diversity in the range of local actors and institutions found in different regions of the country and different sectors of the economy. The variety of local actors involved in the individual clusters is strongly influenced by the particular trajectory of development (or path dependence) of the individual case study.² Many of the current clusters have either emerged in the past two to three decades, particularly those in the biotech, information technology, new media, and even the wine clusters, or have experienced significant growth and transformation in the same period, such as those in more established industrial sectors, like auto parts and tool, die and mould makers. In almost all of the cases examined, the key civic associations and actors were formed during the second stage of the cluster's development. In some instances, the emergence of the key local actors was a contributing factor in the development of the cluster, while in others the emergence of both cluster-specific and more general civic associations reflected the growing significance of the cluster within the local economy. The wide variation observed in the number and type of local actors makes the task of drawing general conclusions about their role more complex. However, it also serves as a reminder that there is no single template for effective models of cluster development and that those clusters which flourish often do so by building on the strengths of the local economic base, as well as drawing upon the talents and resources of key local actors to promote the growth of the cluster.

The associations active in the various clusters in the national study were quite varied in their origins. In the instance of the successful high-technology cluster association in the Ottawa region, OCRI (Ottawa Centre for Research and Innovation), several local educational institutions came together in the early 1980s to create a network to link post-secondary research institutions with some of the prominent federal government

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laboratories in the national capital region. This important regional network emerged thanks to the efforts of several key civic entrepreneurs, among them OCRI's founding president. Along with partners from the private sector, he was instrumental in founding and leading several related groups (the Ottawa Community Network, OCRI-net and the Optical Processing and Computing Consortium of Canada). Over the next two decades, OCRI evolved into a highly effective networking association that hosts more than 700 events a year and is widely hailed as one of the most effective of its kind in the country. It plays an active role in providing a wide range of services for firms in the ICT cluster and has even taken over key marketing and investment attraction functions previously performed by the municipal government in Ottawa (Chamberlin and de la Mothe, 2003; Wolfe, 2002).

In the case of the somewhat smaller, but quite dynamic, software and information technology cluster in Waterloo, Ontario, the community-based high-technology association was initiated by the founders of some of the leading companies in the region. After meeting on a relatively informal basis for a number of years, they created a more formal organization, Communitech, in the early 1990s and recruited many of the other emerging high-technology companies in the region to join (Nelles, Bramwell and Wolfe, 2005). In addition to Communitech, which defines its mandate as representing the high-technology firms in the region, Waterloo is particularly thick with economic development associations. The regional marketing association, Canada's Technology Triangle Inc (CTT Inc.), focuses on attracting and supporting a more diverse set of industries. CTT Inc. was founded as an informal collaboration between the municipalities in the area but has since evolved into a public-private partnership that engages key actors in the private and academic sectors. It was originally conceived as a marketing association but has expanded its mandate through its membership and leadership in other collaborative associations in the region and throughout Southern Ontario. CTT Inc. played a key role, along with the Kitchener-Waterloo Chamber of Commerce, in founding the Prosperity Forum, a group made up of private sector leaders and educational representatives, whose aim is to address the wide variety of issues related to regional prosperity. To date the group has developed policy groups and recommendations on growth management, regional vision, the arts, branding, post-secondary education and health issues. There is considerable interaction and collaboration (as well as some degree of competition) between these local actors, all of which has contributed to the strength of local governance in the region (Nelles, 2005).

The high-technology association in another leading technology-based cluster in Calgary, Alberta was founded as a joint partnership between the City of Calgary, the local Chamber of Commerce and the University of Calgary to promote high-technology entrepreneurship and help local companies grow and develop. Calgary Technologies Inc. is a not-for-profit agency that provides a wide array of services for technology incubation and commercialization. Its mission is to diversify Calgary's economy by attracting, growing and developing research and knowledge-oriented organizations and firms in the fields of science and technology (Langford, Wood and Ross, 2003). Like Communitech in Waterloo and OCRI in Ottawa, one of its key functions is to provide a central node for networking activities between firms, research institutions and finance.

Vancouver, British Columbia, the third-largest urban area in Canada, is home to both a series of cluster-specific organizations and a general high-tech association, Leading Edge BC, that provides services to its members, creating a forum to facilitate networking

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among members of the cluster and advocating on behalf of the interests of their members. Both the biotechnology cluster and the new media cluster are well served by strong and inclusive local cluster associations (Holbrook, Salazar, Reibling et al., 2004; Smith, McCarthy and Petrusevich, 2004). BC Biotech serves the information, policy advocacy and networking needs of its membership. New Media BC plays a similar role in the new media cluster. It works to build the new media community locally and nationally, promotes the region internationally and facilitates partnerships with local and national associations, industry studies and lobbying activities. WINBC (the Wireless Innovation Network of British Columbia) emerged from a joint cluster initiative that was sponsored by the National Research Council's Industrial Research Assistance Program with the Canadian Institute for Market Intelligence in the province. It aims to promote collaboration within the industry and support to early-stage firms in the region's growing wireless technology cluster. The individual clusters in Vancouver are thus embedded in a thick, and often complementary, associational milieu.

Dynamic local actors are not limited to industry or community-based associations. In many of the clusters studied, specialized educational institutes, research programmes or even individual academic departments play a central role in providing support for the cluster, as well as constituting a means of facilitating interaction among its members. In the majority of our cases, universities and public research institutes were not directly responsible for seeding the growth of the clusters, but were highly responsive to market signals from the local economy, expanding teaching and training programmes in skills areas that are critical for the continuing expansion of their local clusters (Doutriaux, 2003).

They have also been highly effective at allocating new resources provided by senior levels of government, such as increased research funding or newly designated research chairs, to areas that will be most beneficial to the sectors strongly represented in their local clusters. Thus, while post-secondary educational institutions and public research institutes play a key role in supporting innovation within clusters and supplying the need for highly skilled talent in the local labour, they are less directly engaged as leaders in regional governance. This highlights the distinction between cluster drivers (that is, sources of innovation and knowledge) and leaders (governance leaders, network facilitators and policy advocates). The civic entrepreneurs who found and manage local civic associations may emerge from public research institutions; however, the institutions themselves are generally partners, rather than leaders on regional governance issues. This pattern is gradually beginning to change as a growing recognition of the importance of the local research base for cluster growth increases. The Greater Toronto area has recently witnessed the formation of the Toronto Region Research Alliance, (TRRA), an association linking the leading research universities in the city itself with others in the neighbouring region. The organization defines itself as a non-profit organization dedicated to making the Toronto region a world-leading centre for research and research-intensive industry by building public and private research capacity, enhancing the commercialization of research, and attracting new research-intensive companies to the region and working to expand those already present. The formation of the TRRA grew out of the efforts of key civic entrepreneurs who launched a series of initiatives to enhance the vitality of the regional economy and address a number of pressing social issues in the region (Toronto City Summit Alliance, 2003).

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In some of the clusters, leading government agencies from both the federal and provincial level provide an important source of support to the cluster. In at least one prominent case, the multimedia cluster in Montreal, the key local actor is a government-initiated and supported association that was founded as part business incubator and part implementer of provincial government policy to promote the growth of the cluster. In this case, there are also several strong, community-based associations that play an active role in the cluster, as well as a number of local advocacy groups and several post-secondary research institutes that provide both research and the training of highly qualified personnel for the members of the cluster (Tremblay, Klein and Bordeleau, 2001; Tremblay, Chevrier and Rousseau, 2004). The experience of the Toronto multimedia cluster provides an interesting contrast to that of Montreal. The Toronto new media cluster has never formed a single umbrella organization. The firms in the cluster have experimented with a number of more specialized local industry associations whose size and vitality has waxed and waned with the relative strength of the cluster itself. Over the past decade one of these associations was absorbed by a national-level organization and lost its local focus, while others have faded away. The lack of associational coherence for the cluster may have contributed to the disjointed nature of the policy measures adopted by higher levels of government, because of their inability to understand the needs of the predominantly small firms in the cluster (Britton and Legare, 2005).

The largest number of clusters among the case studies was found in the health, marine and agricultural biotechnology sectors. Given the close links between the commercialization and application of research results and the emergence of these clusters, it is not surprising that government research institutes, research-intensive post-secondary institutions and affiliated teaching and research hospitals are among the most important set of local institutions for the development of these clusters. In the case of the Montreal biotechnology cluster, the location of the National Research Council's Biotechnology Research Institute has been critical for the development of the cluster (Niosi and Bas, 2000; 2003). The Saskatoon biotechnology cluster, Canada's highest profile ag-biotech cluster is well served by a wide range of civic actors and associations that include a National Research Council Institute, local post-secondary research institutes, a highly successful university-related Science Park, as well as a dynamic local industry association that works to expedite the commercialization of research results for the market by offering a wide range of services to its local members (Phillips et al., 2005).

In the case of Toronto, Canada's largest urban agglomeration, the presence of a leading research-intensive university and its nine fully affiliated, plus 11 partially affiliated, teaching hospitals, constitute the dense research infrastructure from which a dynamic life sciences cluster is emerging and developing. However, the Toronto region is also home to a dense network of national and regionally specific associations representing multinational pharmaceutical firms and national generic manufacturers, as well as larger multinationals and domestic firms in medical and assisted technologies (MAT). The research found that, while relations between the national associations representing multinational and domestic firms are often viewed as adversarial, some interviewees in the MAT sector saw them as playing complementary roles. The Health Technologies Exchange is a regional association formed in 2001 that provides information about local consultants and suppliers, marketing, sources of finance and government procurement policies to member firms. Most of the 60 dedicated biotechnology firms (DBFs) in the

region are members of the Toronto Biotechnology Initiative that facilitates inter-firm and interorganizational networking. At the same time, the growth of the cluster has been accelerated by the presence and activities of several local 'civic entrepreneurs' who almost classically fit the mould described by Henton et al. These 'network promoters' who include the founder of HTX, as well as several newly formed biotechnology cluster organizations, 'use their first hand knowledge of existing institutional structures to design and promote bridging structures that appeal to a wide range of life sciences firms. At the same time, they leverage their credibility within the large firms and financial communities to advocate for more inclusive forms of institutional support' (Lowe and Gertler, 2005).

Even some of our more traditional-looking case studies, such as those of the two Canadian wine clusters in the Niagara Peninsula in southern Ontario and the Okanogan Valley in British Columbia, are particularly rich in a wide range of local associations to serve the needs of various members of the cluster. In this instance, however, the respective clusters may suffer from a surfeit of local actors as there are several associations representing the interests of the local grape growers, ensuring that local wines meet the quality standards that have been set, industry-funded service organizations and associations of the local vintners, as well as a growing number of research centres and institutes in both post-secondary institutions and local branches of federal and provincial research organizations designed to meet the needs of the local wine clusters (Hickton and Padmore, 2005; Mytelka and Goertzen, 2004).

Not all of our case studies provide unambiguous evidence of the supportive role played by local civic associations. The case of the Tool, Die and Mould cluster in Windsor, Ontario provides an instructive counterexample. Despite the strong element of informal networking among the many small firms that comprise the cluster, membership in the formal association representing the mould makers is quite uneven. The strong, competitive personalities of some of the leading entrepreneurs, as well as grudges that some of them have held since they worked together at the anchor firm which spun out many of their firms, makes cooperation difficult. Despite this impediment to formal associational activities, members of the cluster feel that their common ethnic background, educational experience and subsequent work experiences provide the basis for the informal networks that are an important element in intra-cluster dynamics. In this instance, the strength of the informal networks in the local cluster contributed to the formation of local social capital, in contrast to the more formally organized civic capital that was observed in many of the other case studies (Holmes, Rutherford and Fitzgibbon, 2005).

While institutional thickness and the presence of a broad array of civic associations are often touted as universally positive factors for cluster development, the presence of more civic associations does not automatically guarantee effective governance. In some case studies (for example, in the case of Quebec photonics, or Toronto New Media) local actors complained that the proliferation of too many industry and cluster associations led to competition and fragmented governance, rather than collaboration. In these cases the presence of so many associations claiming to speak for the industry meant that no one was heard clearly. However, it is also worth noting that the opposite can also be true – one overarching association may be a more visible and effective policy advocate, but in industries characterized by a variety of specializations the interests of specific groups of firms can be overlooked. The evidence from these cases suggests that there is rarely an 'optimal'

level of institutional thickness for specific clusters and that the degree of organizational strength and coherence needs to be evaluated on a case-by-case basis.

Both the variety of civic actors and associations in the case studies, and the potential problem of associational overlap and competition, highlight the need to develop a typology of different patterns of cluster governance. Our typology builds upon a previous one developed in the ISRN research project that organizes clusters along two key dimensions, knowledge dynamics along the vertical axis and industrial structure and cluster linkages along the horizontal axis. Following on work by Asheim and Gertler (2005), the typology distinguishes between the nature of the innovation process within industries, depending on the type of their specific knowledge base. To the two original knowledge bases, analytical and synthetic, we have added a third, hybrid, reflecting the specific nature of key parts of the Canadian economy. These distinctions refer to knowledge bases that draw upon different combinations of codified and tacit knowledge, different mechanisms for sharing or transferring knowledge among key actors in the cluster, different requirements for skills and qualifications, and finally different research and institutional structures required to support the knowledge base in the cluster (Wolfe, Davis and Lucas, 2005, 8–12).

An analytical knowledge base refers to industrial settings which rely upon scientific knowledge and where the production process draws upon sources of knowledge that make extensive use of cognitive and rational models. Prime examples of industrial clusters that rely upon this type of knowledge base are found in information technology and biotechnology. Both basic and applied research, as well as more formal development of products and processes, constitute the central activities of this type of knowledge production. The consequential patterns of interaction between firms in the local cluster, and the underlying research and educational infrastructure of the local economy, affect the shape of governance relations. Indeed, in these cases either the public sector is a key leader in terms of governance, or it plays on equal footing with private actors and associations.

The synthetic knowledge base applies to industrial contexts where the innovation process involves the application of existing sources of knowledge or new combinations of knowledge. This often occurs in response to the necessity of finding technical solutions to specific problems that emerge out of the interaction between clients and suppliers. Greater reliance is placed on applied product development than on pure research. Tacit knowledge sharing among firms along the supply chain or between engineers in different firms within the cluster can constitute an important source of innovation. University–industry linkages play an important role in these clusters, but their contribution more frequently takes the form of applied problem solving, through interpersonal linkages between key members of the research institutions and firm staff, than through the licensing or patenting of basic research. Both the university and college or technical education system are viewed as important sources of talent and recruitment.

The third category, resource-based knowledge, represents a hybrid category, reflecting the importance of resource industries within the Canadian context and the combination of both analytic and synthetic knowledge bases in generating new products and processes in these industries. The knowledge setting of this category applies to clusters where the primary source of input is a raw material or agricultural product. Increasingly, most forms of cultivation, as well as resource extraction, draw upon scientific and analytic knowledge bases, but, at the same time, they tend to involve a higher degree of skill or craft in the production process. In these cases scientific research can help improve knowledge about

Table 21.1 *Governance structure and local clusters*

Governance structure	Government-led/ supported	Industry-led	Diffused
Analytic knowledge base	Halifax Biotech Quebec Optics Saskatoon Biotech		BC Biotech Toronto Life Sciences
Synthetic knowledge base	Cape Breton ICT Montreal Multimedia	Toronto Multimedia New Brunswick ICT Ottawa ICT	Calgary Wireless Vancouver Wireless Waterloo ICT
Hybrid knowledge base	Ontario Wine	Ontario Steel Ontario Auto Parts Windsor Machine, Tool, Die and Mould	BC Wine

processes as well as materials. However, development of new techniques, production processes and tacit knowledge are also critical to competitiveness.

For the purpose of analysing the differences in the patterns of roles played by local actors and institutions in cluster development, we have identified three different types of governance structures across the horizontal axis (Table 21.1). This typology tries to categorize the different roles played by civic actors according to both the sector of society from which they are drawn – governmental or supported institutions, private sector firm-based organizations and a diffused pattern of governance – as well as by the type of knowledge upon which the cluster is based. Arranging the case studies according to their governance structure across the horizontal axis gives us three categories. Government-led or supported cases represent those in which government actors (be they local, provincial or federal) have taken the lead in organizing, connecting and encouraging coordination between the key actors in the local cluster (education/research, government/development and firms/associations). Those clusters which draw upon analytic, as opposed to synthetic or hybrid, types of knowledge tend also to depend upon more pronounced roles for research institutions than those in the analytic and hybrid knowledge categories. However, even this distinction is beginning to lose some of its validity as the shift to a more knowledge-based economy in general increases the reliance placed by some of the traditional manufacturing sectors of the economy, such as steel or auto parts, on sophisticated knowledge-based inputs. In the analytic industries, much of this coordination has been achieved through public investment in education and the encouragement of strategic interaction between government-funded laboratories and post-secondary research institutions and industry.

For the synthetic-based and hybrid clusters, government has played a key role in bringing public and private actors together to support the sector. In most of these cases, government investments and leadership have facilitated a higher degree of local associativeness, though in many instances government actors still lead governance efforts. The case studies include one that started out with more of a community-led focus: Montreal multimedia

prior to 1997. Many of the firms in this cluster were located in a particular part of Montreal as a result of the way in which the community strove to diversify and modernize the location. Once the multimedia firms moved in, however, the community was largely pushed out of the loop by the introduction of a series of policy measures designed to stimulate the further growth of the cluster, and the case became government-led.

Industry-led cases are those in which most of the impetus for organization and coordination between actors has come from the private sector. Toronto Multimedia and, later, Ottawa ICT are both examples of cases where local private actors organized and played the most pivotal role in terms of industrial governance. These actors have, in some cases, solicited the involvement of public actors in the governance of the sector, but, for the most part, the industry is self-governing, in the sense that it has prospered, and will, likely, continue to prosper, without the ongoing involvement of government actors. This may seem incongruous, given that many of the industries listed in this category are highly regulated and politically supported. However, they tend to be those industries in which coordination has been managed privately.

Finally, we have included a category of diffuse leadership which applies to those cases where there are either so many strong actors from both the private and public sectors without a clear head or leading group, or there is very little coordination at all. Those cases that fit in the former category include Waterloo ICT, discussed above, and Toronto Life Sciences, where the relatively large size of the regional economy has given rise to a growing number of subregional organizations whose efforts are only loosely coordinated. The cases that count as part of the latter group are BC Wine, Calgary Wireless and BC Biotech. A number of the case studies provided very clear instances of the dynamic role played by local civic entrepreneurs in the development of the cluster. However, given that civic entrepreneurs can emerge from any part of the local economy and society – both public and private – their presence tends to cut across all of the four governance structures outlined above.

4 Building civic capital at the community level

It is apparent from both the relevant literature and the evidence compiled from the case studies that there is a wide range of civic actors who contribute to the development of local clusters and an equally wide variety of paths taken by individual clusters in their formation and development (Wolfe and Gertler, 2006). Public policies play a critical role at several different stages of this process. They can improve the antecedent conditions in the local economy that sow the seeds for the emergence of strong entrepreneurial clusters in the local economy. In many of the cases discussed above, the presence of a robust public research infrastructure and the quality of local training and educational institutions are the two most significant antecedent conditions which contributed to the emergence of the clusters. While these factors create the conditions conducive to the emergence of clusters, they are rarely sufficient. Clearly, entrepreneurs play a crucial role in the formation and development of individual clusters. As Feldman and Francis argue, the emergence of clusters is the product of the collective decisions of many individuals who decide to create their own companies or relocate their companies from another region (Feldman and Francis, 2004, 128).

Once the clusters take root, other supports for entrepreneurial activity are essential for sustaining their further development. Frequently, these supports are provided by entrepreneurs banding together to form local civic associations that represent the collective

interests of the cluster and facilitate the sharing of knowledge and learning among the emerging companies in the cluster. The creation of local civic associations such as those discussed above, marks a critical stage in the development of their respective clusters. Although the nature and density of these civic associations varies across the clusters, the presence of networking organizations that link individual entrepreneurs, more established companies, public research institutions, financial intermediaries and economic development organizations are a fairly consistent hallmark of established and well functioning clusters. The extent to which these networks emerge within the cluster and the density of the networks among key actors at the local level are critical factors that affect the pattern of growth within the cluster and its ability to adopt to the technological and market disturbance that invariably have an impact on its member firms.

An additional challenge for the effective mobilization of public policies to promote cluster development is ensuring better integration and coordination of available programmes and policy instruments. This is best accomplished at the local or regional level from the perspective of strategic clusters. It frequently requires a greater degree of coordination across all three levels of government and their economic development agencies. No one level of government has a monopoly on the policy instruments and approaches necessary for effective cluster development strategies. Many existing policies and programmes are implemented in a traditional, top-down, bureaucratic fashion, administered by individual departments or agencies with little cross-jurisdictional coordination and often little attention to their broader implications for cluster development in the local or regional economy. The coordinated approach to economic development policy requires a more integrated approach to policy planning at the governance level, rather than a new round of institutional renovation at the national, regional or local level.

One technique that has been developed and applied in both Europe and North America (and adopted in a growing number of Canadian cases) to promote a greater degree of coordination across relevant organizations at the local or regional level and coordinate policies to support cluster development involves a strategic planning process to facilitate cooperation and coordination among cluster members and across government agencies (Montana et al., 2001; Andersson et al., 2004; Wolfe, 2006). The strategic planning process stresses participative community-based methods and strategic futures techniques. It is designed to enhance communication between civic actors and associations within the regional economy, providing a means of coordination and generating commitment to action, thus serving as an important mechanism for building civic capital within the cluster. Critical to the success of regional planning processes is the ability to involve key agents of change and sources of knowledge to formulate a strategic vision for the region and generate the intelligence needed to chart a new direction to the future. Successful strategic planning exercises build on the presence of an 'economic community': places with strong, responsive relationships mediated by key people and organizations that bring together the respective economic, social and civic interests in the community to collaborate on strategies for the community. According to Henton et al., 'the distinguishing feature of economic communities is not just that they have clusters but that they have mechanisms to engage their clusters and understand what they need from the community' (1997, 7).

Key contributors to the success of regional foresight or strategic planning exercises are the role of knowledge flows and system-wide learning. Knowledge of other actors' strategies and positioning vis-à-vis a given issue (for example through strategic planning) can

reduce uncertainties, thereby enhancing a system's innovative capacity. The degree of mutual understanding and trust is facilitated by the processes that strengthen interactions between civic actors so that they become more permanent, such as technology foresight. Successful strategic planning exercises are valuable for helping regions develop a shared understanding of their local assets and identifying the area's unique local characteristics that support the development of regional industry clusters. These include knowledge economy assets (such as workforce skills, knowledge and research development, creativity, advanced telecommunications infrastructure, quality of place and financial capital), collaborative institutions and organizations (such as regional development organizations, professional networks, research consortia and entrepreneurial support networks), and the regional mindset (values and attitudes that encourage innovation, entrepreneurship and collaboration). The common framework for understanding the region's potential and the shared vision generated through such a planning exercise can also help align the interests and priorities of diverse stakeholders and mobilize support at the local level for key activities needed to boost the cluster (Gertler and Wolfe, 2004; Koschatzky, 2005).

Strategic planning exercises and cluster development initiatives can also help clusters as they move through the inevitable stages of the cluster life cycle (Andersson et al., 2004, 29). A valuable ingredient of effective policies to support cluster development as they move from the formative stage towards the mature stage is to assist the formation of second and third-generation start-up firms, both those spun out of already established firms and those formed through spin-offs from local research institutions. At this stage, government initiatives to sustain the cluster can include a broad range of policies to support upgrading of the innovative capacities of firms and promote the rapid diffusion of technologies, networks to foster greater interaction among the growing small and medium-sized enterprises, as well as providing much-needed mentoring programmes for newly minted entrepreneurs. Often the local civic associations found in our individual case studies are among the most effective organizations for delivering these policies or supports to the member firms in the cluster. They provide an informal forum where more established entrepreneurs can help mentor the emerging ones or where firms can form strategic relationships within the local economy that will help them grow. One of the most valuable pieces of knowledge transmitted through these mentoring or peer-to-peer networking programmes is the essential management skills required to help the cluster firms grow to the next stage in their development. The formation of angel networks and the attraction of venture capital into the locality can also be supported by appropriate government policies and facilitated by the participation of local civic associations (Feldman et al., 2005; Porter et al., 2001). Another critical challenge that clusters face is at the transformative stage, when local firms are faced with a combination of market saturation for their existing products or the emergence of new competitors in other parts of the globe and/or disruptive new technologies that threaten to displace their existing products. The presence of a strong network of local civic associations and the ability to formulate effective local strategies can assist surviving firms in altering their competitive strategies or support the formation of new firms able to capitalize on emerging technological opportunities.

Local civic actors and associations represent an essential component of dynamic clusters. They are rarely created by policy fiat, but emerge as part of the organic process that leads to cluster success. There is a wide variety in the range of civic actors and

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associations that play a role in individual clusters and the sectors from which they arise. There is an equally wide variety in the types of governance structures observed among civic actors and associations. While clusters can occasionally suffer from a surfeit of such actors, leading to an excessively diffused model of cluster governance, more often, the presence of a dense network of local actors and associations constitutes a critical resource that builds trust and cooperation within the local economy and facilitates the process of collective learning and knowledge transfer that grounds the members of the cluster in a particular locale. In this respect, the presence of local civic entrepreneurs and the building of civic capital are key ingredients that contribute to the overall success of the cluster.

Notes

1. For more information on the Innovation Systems Research Network and the origins of its current cluster initiative, cf. Holbrook and Wolfe (2005).
2. For a fuller treatment of the nature of path dependence in cluster emergence, cf. Wolfe and Gertler (2006).

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