Innovation and Poverty Reduction

by

Sherri Torjman and Eric Leviten-Reid

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The authors gratefully acknowledge the financial contribution of the Social Development Partnerships Program of Human Resources Development Canada in support of this work. The views expressed in this publication do not necessarily reflect those of Human Resources Development Canada.

ISBN 1-55382-068-1

Published by:

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Introduction

In response to a rapidly changing social and economic environment, innovation has emerged as an important focus for public policy. This paper examines the theme of innovation as it relates to the goal of poverty reduction. It explores ways in which the practice of community-based poverty reduction is responding to the challenges posed by an innovation economy.

This is one of a series of papers written in support of the Vibrant Communities initiative. Vibrant Communities is a four-year national effort to explore promising local strategies to reduce poverty. The Tamarack Institute for Community Engagement, the Caledon Institute of Social Policy and the J.W. McConnell Family Foundation are the sponsors of this initiative. Human Resources Development Canada is funding the policy component of the work.

Selected convenors from 14 cities across the country are involved in a Pan-Canadian Learning Community in which they come together on a monthly basis to share ideas, resources and strategies. (An additional community in Newfoundland is being approached to participate in this national learning partnership.) Through the Learning Community, members have an opportunity to reflect on their own approaches to poverty reduction and to consider effective practices being employed by others.

In addition, at least five communities referred to as 'trail builders' will receive substantial funds to undertake multifaceted, multi-year poverty reduction initiatives. These Trail Builder initiatives are integral to the action learning process being employed by Vibrant Communities. They test in local settings ideas of interest to the Learning Community and generate the practical experiences which fuel discussion within the wider network.

Community-based approaches to solving pressing social and economic problems are not new. Voluntary action by citizens and organizations was alive and well long before government programs. What *is* new is the methodology that appears to be emerging at the local level – which is far more strategic than before. Funders, policy-makers and program designers have been exploring a range of approaches to revitalizing distressed neighbourhoods and to tackling other complex problems, such as unemployment and poverty. This new generation of efforts is known in the field as *comprehensive community initiatives*.

These initiatives are described in more detail in a related paper [Torjman and Leviten-Reid 2003]. Among the key features of these initiatives are four themes being explored by Vibrant Communities:

- Comprehensive thinking and action: Devising strategies that respond to the complex web of factors contributing to poverty.
- Multisectoral collaboration: Weaving together the contributions that government, business, nonprofit organizations and low-income residents can make to poverty reduction.

- Community asset-building: Identifying and building on community strengths.
- Community learning and change: Reflecting on experience to identify lessons that can lead to more effective practices.

In various ways, this set of approaches is well tuned to the challenges associated with innovation. It enables communities to devise new social arrangements that make it possible for all residents to share in emerging economic opportunities.

Community-based Poverty Reduction: An Evolving Practice

In recent years, nations in the industrialized world have undergone dramatic changes in commerce and production. The means of production have been fundamentally altered in most industries and sectors of the economy. The basis for economic wealth has evolved from a sole focus upon the industrial manufacture of goods to the creation and application of information within the context of a knowledge-based economy. Technology has created profound shifts in the flow and management of information. Computers and machines have taken over much of the work that used to be done by human heads and hands.

The liberalization of trade also has had a major impact upon the structure of economies. Recent international free trade agreements have modified substantially the way that many industries, both in Canada and abroad, do business. Most local economies throughout the country, and indeed throughout the world, are still adjusting to these structural changes.

While the introduction of new technologies and global economic activities are not new in themselves, what *is* new – and therefore makes the phenomenon seem new – is the speed at which social and economic life is changing.

From an economic, social and environmental perspective, globalization has proven to be a two-edged sword. On the one hand, it has generated new sources of wealth in many countries, which have seen an overall rise in living standards. At the same time, it has created unprecedented disparities. Some observers argue that globalization has encouraged a 'race to the bottom' in which the corporate search for cheaper and leaner modes of production has resulted in the loss throughout the industrialized world of millions of decent jobs [Korten 2001]. It has given rise to social dislocation as a result of widespread unemployment and glaring inequalities of wealth, which in turn have led to concerns about social cohesion and marginalization.

These challenges are being widely felt throughout the developed world – not least of all in the remote and rural regions of Canada, where communities that once depended upon resource extraction are undergoing major transformation [Gurstein 2001: 6]. Communities which tradition-

ally had relied on outside capital to initiate costly resource extraction activities, and for outside professional and managerial skills to organize and maintain these activities, are finding that these skills are no longer available now that their resource base is less competitive in the knowledge economy [Gurstein 2001: 6].

Similar difficulties are being experienced in small cities and in the core neighbourhoods of urban centres that once had thrived on traditional manufacturing jobs. As these industries relocate, close or downsize, their laid-off workers have been thrust into a precarious labour market. In the emerging so-called 'New Economy,' there is a growing gap between good jobs that require high skills and pay good wages and benefits, and bad jobs that require lower skills, involve part-time or irregular hours and offer few if any benefits. Many communities throughout the country are responding to these challenges through a range of community-based initiatives, sometimes referred to as 'community economic development.'

Community economic development is not new. It has a rich heritage that extends to the social reform movements of the early 20th century. Such movements took shape in response to major dislocations associated with the rise of industrial capitalism – economic and social challenges that bear more than a passing resemblance to those we face today. Like community economic development, these movements sought to create societies that are both economically viable and socially just.

One outstanding example is the Antigonish Movement that flourished in Atlantic Canada from the 1920s to the 1940s. Combining the principles and practices of economic cooperation with those of adult education, the Antigonish Movement embodied many of the core ideas that define community economic development today. It advanced a vision of a society committed to the common good, conceived human development in holistic terms, saw economic inclusion as a critical ingredient for a healthy society, embraced collaborative learning as the preeminent tool for countering social problems, and promoted the idea that communities have both the capacity and the right to participate directly in shaping their own affairs.

While these guiding concepts continue to resonate with community economic development today, the context has changed and with it the techniques and strategies for pursuing this work. Indeed, the approach to poverty reduction being advanced through Vibrant Communities can be seen as a variant of community economic development. The approach seeks, in direct ways, to address the distinct challenges associated with the innovation economy.

When contemporary versions of community economic development took shape in the late 1960s and early 1970s, the key organizational structure employed was the community development corporation – a nonprofit, community-based structure able to pursue a multifaceted agenda within the bounds of a single organization. While the community development corporation remains a vital organizational form, the changing context has heightened the importance of issues which are

regional in nature and that require concerted action by a broad range of local stakeholders. Vibrant Communities can be seen as one of a new wave of initiatives through which community development corporations and other local agencies are making greater use of multi-organizational and multisectoral networks to tackle poverty and related problems.

In order to better understand the links between community-based poverty reduction and innovation, it is necessary to review the concept of innovation and key components of the innovation process.

Innovation

Several observations are critical for understanding innovation and its implications for community-based poverty reduction.

First, the concept of innovation often is defined as the creation or generation of new ideas. But this conceptualization is too narrow; innovation also involves the application of existing ideas in new ways or to new fields.

Second, the concept of innovation used to be understood largely as a specific event, created by factors internal to a firm or organization. It is now conceptualized as a process of solving problems and typically is the product of an interaction between a firm and an array of other actors. It is enhanced through social exchange [Landry, Amara and Lamari 2001: 3] and ongoing learning, searching and exploring [Lundvall 1992: 8].

Third, much of the early literature on innovation tended to focus upon national systems. Attention has shifted, however, to "regional innovation systems" [Wolfe 2002: 6] in light of the fact that innovative capabilities tend to be sustained through regional networks of firms and support structures that share a common knowledge base, skilled workers and other specialized resources. Regional innovation systems typically are defined as a set of economic, political and institutional relationships that generate a collective learning process leading to rapid diffusion of knowledge and practice. The regional level is critical because the factors of space and proximity allow for the face-to-face interaction that facilitates learning and the growth of specialized knowledge [Wolfe 2002: 5].

While globalization poses challenges, it also creates opportunities related to the unique capacity of local communities to act as centres of learning and innovation. Core factors include access to a pool of labour, support services for local industry, trust relations among networks of suppliers and buyers, and the interactive learning effects that emerge in a regional or local setting [Wolfe 2002: 4]. The process of creating skills and influencing the rate of improvement and innovation are intensely local [Porter 1998].

Successful regions have the capacity to adjust continually to changing circumstances. These regions identify and cultivate their assets, engage in collaborative processes and encourage a regional mindset that fosters such growth [EDA 2001: 1].

In short, knowledge and learning within the context of clustering are the basic building blocks of innovation. *Knowledge* is crucial to the development of organizational competencies and *learning* is the process through which organizations harness and apply knowledge. Learning is facilitated and enhanced by close proximity, through *clustering* in both a geographic and functional sense. Learning and clustering, in turn, are fostered through *managing the process of innovation*. Each of these components is discussed below.

Components of Innovation

a. Learning

The wealth of nations used to be tied principally to the harvesting of natural resources. Today, another factor has become important: The wealth of nations is linked largely to their capacity to harness the wealth embodied in their human resources. The so-called 'knowledge economy' is built on knowledge, creative capabilities and connections.

Success comes from harnessing the information and knowledge assets of a community [Jarboe and Alliance 2001: 1]. It derives from nations' ability to create and apply new knowledge. Knowledge economies require extensive investment in human capital – i.e., the "knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" [OECD 2001: 18]. The most important asset in a technology-driven economy is people [EDA 2001: 13].

The knowledge economy has been bolstered by the rise of information and communications technologies, which both drive economic development and facilitate the exchange of information. In theory, all individuals and communities have the capacity to be active players in the knowledge economy [Goslee 1998]. In practice, sophisticated technologies have created a 'digital divide' in which some individuals and communities have access to various technologies and skills required to use them and others do not. The digital divide reflects the gap between the information rich and information poor.

The concept of knowledge typically is used as though it refers to a single entity – i.e., a piece of factual information. In practice, the concept of knowledge breaks down into several major categories. Recent OECD research on human capital identifies four major types of knowledge: know-

what, know-why, know-how and know-who [OECD 2001: 11]. Each type of knowledge is relevant for different purposes and may require a distinct methodology for its application.

'Know-what' refers to basic factual information, which can be disaggregated into its constituent parts and communicated as data. 'Know-why' implies knowledge about principles and laws of motion or change in nature, the human mind and society. Know-why effectively provides the explanations that lie beneath the factual data and seeks to elucidate why certain patterns of behaviour occur.

'Know-how' represents yet another category of information. It refers to the skills required to carry out certain actions or the ability to do something. Know-how is linked closely to the final category: 'know-who.' The latter involves information about who knows what to do and how to do it. It also entails the social ability to cooperate and communicate with different kinds of people and experts [OECD 2000: 15]. Know-how often is transmitted through apprenticeships, mentoring and community networks. Both know-how and know-who involve a social component.

Other explorations of the concept of knowledge differentiate between its 'static' and 'applied' components. The literature distinguishes, for example, between codified knowledge and tacit knowledge [Jarboe and Alliance 2001; Landry, Amara and Lamari 2001: 13].

Codified knowledge refers to formal knowledge, such as the material taught in formal educational institutions and the information that comprises the compulsory expertise and skill base of any given field. Codified knowledge generally is well documented and can be easily communicated, though not necessarily readily understood, given the specialized nature of the knowledge involved.

Tacit knowledge, by contrast, is the understanding derived from experience and mutual learning, whether through a mentoring relationship or participation in a relevant network. Tacit knowledge is required to help customize products and services, and adapt to rapidly changing situations that are the hallmark of the information age [Jarboe and Alliance 2001: 7]. Tacit knowledge involves an intuitive and experiential form of expertise critical for making decisions and solving problems [Goslee 1998: 3]. Because tacit knowledge is embedded within a human and social context, it is often more difficult to transfer than codified knowledge.

While distinct, codified and tacit knowledge are highly complementary. Tacit knowledge complements formal knowledge by enabling its application to particular challenges or circumstances.

Most of the important knowledge transmitted between parties in the innovation process is tacit rather than codified and thereby confers an advantage on firms which participate in networks of exchange. The creation of new knowledge basically takes place through the constant interaction between tacit and codified forms of knowledge, creating a dynamic spiral of knowledge conversion that leads to innovation [Jarboe and Alliance 2001: 7].

In the era of the global economy, regional and local economies have become increasingly important because of their role in fostering innovation. Codified knowledge is widely available. Tacit knowledge, by contrast, is embedded in communities and is a crucial local resource. Local areas are at an advantage because they enable the transmission of tacit knowledge, essential for innovation.

While the phrase 'knowledge economy' is commonly used to characterize nations' primary source of wealth, the term implies that knowledge acquisition is a primary goal. Yet the acquisition and application of knowledge must be understood as continual processes. It is the capacity to learn continuously and adapt to rapidly changing conditions that determines the innovative performance of firms, regions and countries. In fact, the term 'learning economy' may be a more appropriate representation [Wolfe 2002].

Just as knowledge acquisition can be viewed incorrectly as a singular act, learning used to be understood as a linear, unidirectional process – a one-way transfer from 'teacher' to 'learner' [Torjman et al. 2001]. The focus was upon the production and distribution of information. It was assumed that the recipient of information had learned the material simply by virtue of having received it.

Learning now is understood as a far more complex phenomenon. The translation of information into knowledge is a dynamic – and interactive – process that involves explicit engagement with the material [NCDDR 1996: 9]. Learners must engage with the information in some meaningful way, preferably through a mediating process that ideally involves interpersonal interaction.

This process of engagement points to the important role of people as creators and carriers of knowledge. The transmission of knowledge "lies less in its databases than in its people" [Brown and Duguid 2000: 121]. Because of the human exchange dimension of learning, the concept of social capital is particularly relevant to the learning economy. The literature on human capital clearly recognizes that social capital provides the basis for learning within families, organizations and regions [OECD 2001].

Social capital refers to the features of social organization, such as networks, norms and trust, which facilitate coordination and cooperation for mutual benefit [Putnam 2000]. While human capital is embodied in the knowledge and skills of individuals, social capital arises from the relationships among individuals [Coleman 1998: 100]. It is these relationships and networks that enable the transmission of tacit knowledge.

b. Clustering

Clusters can be understood as geographic concentrations of related organizations in a given field. They include groupings of interconnected companies, service providers, suppliers of inputs, customers and manufacturers of related products. Clusters also can involve governments and other organizations such as laboratories, training institutes, universities and trade associations that provide specialized training, education, information, research and technical support [Porter 1998].

Because clusters involve the exchange of knowledge and skills, they are an efficient means of knowledge management [Jarboe and Alliance 2001: 8]. Geographic clustering of people, companies and institutions is a powerful mechanism for transferring and building knowledge. The sharing of knowledge, skills and experience is easier when the components of the learning network are in the same place [Jarboe and Alliance 2001: 8].

The concept of clusters is rooted in the research and practice on sector strategies, which actually can be traced to the 1960s. But in the 1990s, Harvard business professor Michael Porter introduced a modified form of sector-based strategy that stressed the importance of geography, informal relationships and supporting institutions. The focus of economic development efforts subsequently shifted to the concept of clusters of industries that could gain advantage through co-location.

Successful clusters typically have long historical roots and the emergence of new clusters takes time. Usually industry-driven, cluster strategies leverage the relationships between firms and related institutions in a given area to stimulate innovation and efficiency. Clusters also may be based on factors such as natural resources or geographical advantages.

The concept of clusters implies more than a passive grouping of common actions. Rather, it acknowledges that there are interactions and links within and among various streams of activity which comprise a cluster. Synergies arise from the exchange of knowledge, skills, human resources, ideas and financing.

The existence of clusters suggests that the major factors which determine competitive advantage lie outside the boundaries of individual firms [Wolfe 2002: 15]. The cluster approach reflects the systemic character of modern innovation, which depends increasingly on interactions among interdependent actors. In many regions, it is not individual firms but rather clusters of innovative firms that are driving growth and employment. Many employment-related and training programs now recognize this reality; they identify key clusters and work with business to design customized training that responds to local workforce requirements [Torjman 2002].

Economic clusters emerge most often when there is a critical mass of firms allowing economies of scale and scope, a strong science and technology base, and a culture conducive to innovation

and entrepreneurship. Regional clustering is considered a prerequisite to the emergence of regional innovation systems.

Fully formed regional innovation systems also involve cooperation in innovation activity between firms and knowledge organizations such as universities, colleges, training organizations, research and development (R&D) institutes, technology transfer agencies, business associations and finance institutions. These organizations house important know-how, train workers and provide finance – all of which support regional innovation.

Clusters, then, are more than simply a network of specialized businesses that rely on each other. Equally valuable is the supporting infrastructure of related institutions upon which these firms draw. The members of a given cluster form, in effect, an ecosystem [Wolfe 2002: 17]. Not surprisingly, this complex interaction of organizations that depend upon each other in diverse ways presents clear management challenges.

c. Managing the Innovation Process

Interactive learning and clustering must be harnessed in a purposeful way. "An innovative economy demands a systematic approach to innovation – a strategy that mobilizes new combinations of people, resources and ideas" [National Research Council website].

While there is no single innovation process that applies across the board [den Hertog, Bergman and Charles 2001: 406], there are several generic factors that comprise the innovation process. These include creating a vision, identifying assets, framing opportunities and challenges, developing an action plan, mobilizing for implementation, and monitoring and assessing performance [EDA 2001].

Creating a vision

An organization or region that fosters innovative approaches to economic development must articulate a vision which sets out the objective it seeks to achieve. The creation of a vision typically is the result of a developmental process that reflects consensus among participants in the strategic planning process. The vision must be translated into action in the form of a strategic plan [EDA 2001: 39].

Identifying assets

The next important step in managing the innovation process involves identifying the assets of the organization or region in which the organization operates. While firms and regions have varying types and quantities of assets, they all have basic knowledge assets and the ability to identify and cultivate them. These assets include workforce skills, knowledge and research development, creativity, advanced telecommunications infrastructure, quality of place and financial capital [EDA 2001: 9].

The notion of identifying and building upon local assets is now widely familiar in the community development field. Extensive work is under way to promote the regeneration of neighbourhoods through a process known as 'asset-based community development' [Kretzmann and McKnight 1993]. In this formulation, local assets include the skills of residents; the power of local associations; the resources of public, private and nonprofit institutions; and the physical and economic resources of local regions.

Framing opportunities and challenges

The next step in managing the innovation process involves a so-called 'framing exercise' – i.e., the development of a strategic plan of opportunities and challenges, based on a solid understanding of the local economy. It is at this stage that tacit knowledge becomes important – the real information as to what is possible to achieve.

The strategic planning process typically is opportunity driven. It targets and seeks to harness the assets of the region in order to build competitive positions in national and international marketplaces. It promotes innovative, often technology-related ideas in all realms of regional economic activity and not just in the high-technology sectors. It facilitates relationship-building across the region, because collaboration is essential to innovation. The process is ongoing and iterative, continually changing to mirror shifts in the economy [EDA 2001: 6].

Innovation-led development implies that the way in which a region harnesses its assets is more important, in many ways, than the initial ingredients with which it starts [EDA 2001: 9]. One way to proceed in the search for 'innovation niches' is to determine the requirements – the goods, services and/or skills – of the major clusters in the local economy and to become a supplier to these clusters.

Other opportunities for innovation can be found by determining the precise areas of science and technology that would meet most effectively the needs of the given region or community. Another possibility is to identify ways to incorporate advanced technologies into existing products and processes [EDA 1999: 29]. Technology-based incubators, manufacturing extension services,

investment in technology infrastructure and skills training all can play a role in revitalizing distressed areas [EDA 1999: v].

It should be noted that the 'sophisticated technology' route is not the only answer for all circumstances and for all groups and communities. Neither is it always the most desirable solution. There may be other goods and services in high demand, including the delivery of human services.

Developing an action plan

The preliminary scoping of assets, opportunities and challenges helps set the stage for developing an action plan. A good plan builds on existing strengths and encourages investment in new areas. It identifies both the short- and long-term actions for implementing strategies in the following areas: the key clusters on which the region will rely in the coming years; how competitive advantage will be developed and maintained for these clusters; entrepreneurship and human capital development; knowledge development; physical infrastructure investments; local financial capital; and the widening of economic advantage to disadvantaged groups and the qualities of the region [EDA 2001: 47].

Specific tools that build the assets of the community include revolving loan funds, small business incubators, workforce training programs, strategic infrastructure investments and business attraction programs. Collaborative tools include industry trade associations, entrepreneurship networks, and research and development organizations.

Mobilizing for implementation

The process of innovation requires collaboration across boundaries, both geographic and functional. Leaders from business, universities and governments may need to find ways to collaborate across functional and sector boundaries [EDA 2001: 10]. Successful implementation involves widespread participation in the process of designing new strategic initiatives. Economic development is virtually unsustainable in the absence of collaborative institutions and organizations that provide a forum and structure for ongoing discussion, mobilization and action [EDA 2001: 24]. Developing a shared mindset among participants is crucial for success [EDA 2001: 26].

While diverse participants should be engaged in the implementation of innovation, a successful process typically needs a champion to spearhead the initiative and shepherd it through its various stages. The champion is crucial and assumes more than the role of a process manager; a true champion believes strongly in the value of the work and takes an active personal interest in its successful achievement.

Effective leaders usually have an entrepreneurial personality and are 'boundary crossers.' They see infinite opportunity in the knowledge economy. They continually seek change and exploit it as an opportunity. They are basically entrepreneurs who have a mindset that sees the possibilities rather than the problems created by change [Dees 1998: 2]. Effective leaders engage in a process of continuous innovation, adaptation and learning [Dees 1998: 6]. In fact, the most notable trait of great leaders is their quest for learning [Kotter 1998], which is facilitated within organizations by management styles that enable the flow of information.

There are many benefits of bringing together a range of actors in collaborative arrangements. The collaborative process often leads to synergies, which help generate new ideas. Goods and services tend to be developed with a more accurate understanding of practical needs. Collaborative arrangements help break down bureaucratic barriers and respond quickly to problems and opportunities. Successful collaborations can generate increased trust that can affect economic activity beyond the specific innovation initiative [Kwass and Siegel 1995].

But collaborative efforts do not just happen on their own. They require some form of coordinating or governance mechanism to hold together all the diverse players. Some community-based or regional efforts, for example, are governed by a coordinating mechanism in the form of a leadership roundtable or steering committee, which is generally multisectoral in composition. It acts as champion of the issue, convenes key players, helps set out a clear vision for the effort and associated strategic plan, and acts as the liaison between the broader community and the designated initiative.

As in the process of learning, social capital is the key ingredient to the success of most dynamic clusters [Wolfe 2002: 27]. It is an essential part of the 'glue' that binds these clusters. The competitive advantages that flow from clusters are linked closely to the value of information and knowledge they are willing to share. The networks, relationships and associated degree of trust effectively comprise the social underpinnings of the cluster.

Taking action

Cluster-based strategies usually start by analyzing a local economy, identifying key clusters and employing one or more of the following strategies: creating new relationships within or between related industries, developing specialized industrial parks, modernizing production technology, assisting new product development, targeting labour shortages through training, investing in research and development, financing investment in production technologies and addressing competitiveness issues. Training and technical assistance are commonly employed tools.

Monitoring and assessing performance

Managing innovation involves monitoring performance – whether of an individual firm or entire region – and determining progress relative to identified targets. Innovative regions seek continual improvement. "To be fully effective, the assessment process should aim to develop local capacity for continuous self-assessment and to create a tool for engaging a diverse group of participants in the broader planning and implementation process" [EDA 2001: 42].

There is also growing recognition that tracking performance is important not so much for evaluation but for learning purposes. No learning can take place without continual assessment. The primary purpose of assessment is to learn – i.e., enhance capacity to produce intended outcomes. So the final step in managing innovation entails learning – also its primary point of departure. The innovation process is a system that both begins and ends, if it does indeed end, with learning at its core.

Links to Community-based Poverty Reduction

Community-based poverty reduction and cluster-based innovation strategies share many of the same basic insights and practices. Both recognize learning as the crucial underlying capacity for coping with the challenges of the emerging economy. Each sees the local community as the key site where the elements that support innovation converge. Both seek to bring a wide array of stakeholders together to find new ways of working for the common good. And both acknowledge the role that social capital plays in enabling collaborative action.

Despite these common factors, community-based poverty reduction and cluster-based innovation also differ in significant ways. Most importantly, they emphasize different goals. Typically, cluster development strategies are driven by objectives such as enhanced competitiveness or regional economic growth [Rosenfeld 2001: 22]. On the other hand, the primary concern for community-based poverty reduction tends to be the equitable distribution of economic opportunity.

Indeed, the overarching challenge facing community-based poverty reduction is to strengthen the focus on equitable development and find effective ways for ensuring that all citizens are able to share in the benefits of the 'new economy.'

The Problem

Unfortunately, cluster development strategies often exacerbate rather than alleviate disparities in economic opportunity. The Ford Foundation recently convened a conference involving European and American experts to examine the implications of cluster development for disadvantaged communities. The conference, referred to here as the 'Just Clusters' forum after the report summarizing its findings, identified a number of ways that such communities and their members tend to be bypassed by the benefits associated with these initiatives.

First, cluster development strategies typically focus on high-tech, high-growth sectors. Such sectors generally are concentrated in large urban centres or near research universities with plentiful amenities and a population of highly educated and talented people. Distressed communities often lack such assets [Rosenfeld 2002b: 20].

Furthermore, the jobs created by such high-tech, high-growth sectors typically require high levels of training and education that many people living on low incomes do not have. High-tech clusters do create lower-skill jobs especially in activities that support the cluster, but these jobs generally pay low wages. Moreover, it is difficult to establish job ladders that allow workers to move from the support sector to the better-paying positions in the core of the cluster [Rosenfeld 2002b: 20].

To make matters worse, the development of high-tech clusters can even lead to net losses in economic well-being for low-income members of the community. Rising housing and living costs spurred by cluster development make it difficult for low-income residents to live in the vicinity of the cluster [Rosenfeld 2002b: 20]. In some cases, this problem has led to organized resistance on the part of communities seeking to prevent the displacement of residents by emerging clusters. In San Francisco, for instance, some 30,000 residents from across the city signed a petition seeking to ban high-tech development and other changes that drive up the cost of living and force low- and moderate-income residents to leave their neighbourhoods [Florida 2002: 290].

A recent study of Ottawa's high-tech cluster expressed similar concerns about the limited benefits that flow from clusters to low-income residents. "For the most part," observed the authors, "the experience of the 1990s in technology cluster growth in the National Capital Region was that it was largely irrelevant to the interests of poor and disadvantaged citizens" [Jackson and Khan 2003: 7].

The study goes on to describe how both the process and outcomes of the cluster tended to serve a limited segment of the community. "While much social capital was built," the study notes, "little social inclusion was achieved." Rather, what was achieved "was a technology sector that created social networks, trust and learning for itself" [Jackson and Khan 2003: 7].

"Almost by definition," the authors conclude, "there is no natural place in a cluster for undereducated workers who often also happen to be poor. In labour market terms, clusters are 'gated communities' that keep in the 'haves' (in terms of education) and keep out the 'have-nots.' Left totally to market forces, there are few opportunities for low-education, low-income households to enter and benefit from clusters" [Jackson and Khan 2003: 7].

New Directions

Participants in the Just Clusters forum found that the growing importance of cluster-based innovation means that proponents of poverty reduction now must adjust their strategies to address the challenges associated with this new model of economic development. "Just as organizations concerned with distributional effects of economic development shaped their past efforts to fit into industrial recruitment, entrepreneurship, technology transfer, networks – and any and all of the various tools that governments have used to generate jobs – they now must think about how to take advantage of cluster-based approaches" [Rosenfeld 2002b: 50].

While there are a variety of adjustments required to address the demands of cluster-based innovation, the Just Clusters initiative found that the most general problem is exclusion and the most basic solution is 'connections.'

> The single most important theme that cut through all of the discussions and nearly all of the recommendations is connections, or what is termed social capital. Implicit in all of the discussions is the social capital that undergirds the systemic relationships within the clusters, the social infrastructure that moves information and affects employment and economic opportunities and innovation. People, those places and firms that are unable to benefit from – or worse, are cut off from – the social capital of clusters are severely handicapped in any economy, but more so in a knowledge-based economy that depends on "know who" to build "know how" [Rosenfeld 2002b: 50].

In a variety of ways, community-based poverty reduction initiatives are seeking to open clusters to those who are excluded, link low-income individuals and communities to opportunities in these clusters and adapt the principles of cluster-based innovation to better serve the needs of those left out.

Promoting a triple bottom line

The first challenge for proponents of community-based poverty reduction is to introduce a focus on equity into cluster development initiatives. Left to their own devices, clusters do not tend to consider issues of equity or the distributional aspects of their operation. To do this, proponents must secure a seat at the table within existing cluster development initiatives.

While cluster-development initiatives tend to involve a variety of stakeholders, groups that bring a special focus on equitable development are often excluded. The Ottawa technology cluster is a case in point: "The list of organizations not on the radar screen of innovations systems policy and strategy is a very long one, indeed, and includes social service agencies, community development corporations, nonprofit housing programs, microcredit funds and many others" [Jackson and Khan 2003: 3].

A simple and practical step that organizations concerned with poverty reduction are taking is to build relationships with cluster associations or councils. Some researchers have suggested that such cluster associations tend to be more responsive to community concerns than are individual businesses. The social capital created by clusters fosters a collective conscience. In addition, the desire for approval by peers, associates and community leaders encourages a willingness to balance the concern for the bottom line with a concern for community well-being [Rosenfeld 2002b: 46-47].

One way to strengthen the orientation of the cluster to issues of equity is to formalize the role for nonprofit organizations, perhaps as associate members of the cluster or as participants in special working groups that address social issues related to the cluster's operation [Rosenfeld 2002b: 46-47]. Through a combination of relationship-building, education and advocacy, community groups have influenced selected cluster development initiatives to embrace a 'triple bottom line' for thinking about their work. The triple bottom line seeks to balance economic, social and environmental concerns in order to achieve an overall quality of life in communities.

A good example is Silicon Valley's Joint Venture. In this region, known worldwide for its highly successful high-technology cluster, Joint Venture helped foster a broader vision of community development. Joint Venture is a "non-partisan civic catalyst that provides a neutral forum in which community members can create solutions to the challenges facing our region" [Joint Venture website]. Beginning in 1992, it engaged representatives from business, government, education and all sectors of the community to identify and act on a vision of the community that balanced economic vitality with quality of life. Since 1998, its publication *Silicon Valley 2010: A Regional Framework for Growing Together* has provided a blueprint for the region's future that incorporates a triple bottom line. The framework addresses four key areas: Innovative Economy, Livable Environment, Inclusive Society and Regional Stewardship [Joint Venture 1998: 7].

Community-based regionalism

As with Joint Venture, groups interested in promoting equitable development increasingly are organizing their efforts on a regional basis. One proponent of this strategy describes the rationale behind the new regional focus as follows:

> As jobs, resources and people spread further away from inner cities, low-income neighborhoods and residents are left with limited access to mainstream opportunities and with fewer resources to address community concerns. In response to the changing context for promoting equity, more practitioners have begun to think and act regionally – a practice that some observers call community-based regionalism (CBR). These efforts emerge from a common understanding that the future of low-income communities is tied to broader regional social, political and economic factors; and that improving the well-being of low-income neighborhoods requires understanding the regional context and taking action beyond a neighborhood or community level [PolicyLink 2000: 4].

While local innovation systems tend to be organized on a regional basis, organizations concerned with the needs of low-income communities often operate at a more local level [Rosenfeld 2002b: 32-33]. A shift in attention and resources is required as organizations seek to understand the regional dynamics affecting their communities, identify strategies for countering them and build the networks needed to be effective in the forums where regional decision-making occurs [PolicyLink 2002: 6-7].

Gaining a seat at the table where regional decision-making takes place is a critical starting point. In addition to targeting associations that support regional clusters, organizations concerned with equitable development are making links to local 'smart growth' initiatives. Smart growth principles have long recognized the connections among a healthy environment, a prosperous economy and social equity. However, early efforts at implementation have not always been strong in addressing equity issues. In response, those concerned with equity "are increasingly building broad-based, equity-focused alliances pushing for regional agendas to explicitly address the lack of affordable housing, poor school quality, poor transportation, and other dimensions of inequity, in addition to preserving open space and reducing traffic congestion" [PolicyLink 2002: 8].

Some cities in Canada are actively addressing the issue of poverty within the context of their smart growth initiatives. The City of Ottawa, for instance, recently convened a Smart Growth Summit as part of its Ottawa 20/20 planning initiative. The Summit considered a wide range of emerging challenges – "everything from transportation and economic growth to affordable housing, arts and culture, and our evolving social needs" [City of Ottawa 2003]. It explicitly identified poverty as one of the issues to address in order to achieve economic, social and environmental well-being for all residents of Ottawa. Although it remains to be seen if the ideas expressed in the City's plan will be put into practice, the official recognition of such concerns is an important step in efforts to promote equitable development.

PolicyLink, a national nonprofit organization in the US, has made community-based regionalism the focus of its expertise. It identifies three broad strategies for advancing equitable development:

- *Neighborhood Investment/Linkage Strategy*: Connecting low-income communities directly to regional economic opportunities and to the financial and technical resources required for economic development.

- *Regional Organizing/Advocacy*: Organizing constituents with common interests across the various political boundaries of a region for explicit policy goals related to equitable development.

- *Regional Economic Reform*: Using workforce and economic development interventions to create a 'high road' economy in low-income neighborhoods – i.e., an economy associated with higher productivity, higher paying jobs and better labour relations, reduced environmental damage and greater commitment to the health and stability of communities [PolicyLink 2000: 5-6].

Working with community-building organizations throughout the US, PolicyLink has assembled an "Equitable Development Toolkit." The Toolkit describes a wide range of specific interventions and strategies for promoting regional equity. The strategies are organized under four main headings: Affordable Housing (e.g., limited equity housing co-operatives, employer-assisted housing and retention of subsidized housing); Controlling Development (e.g., inclusionary zoning, commercial linkage strategies and in-fill incentives); Financing Strategies (e.g., developer impact fees and housing trust funds); and Income and Asset Creation (e.g., co-operative ownership models, community financial institutions, local hiring strategies and living wage provisions) [PolicyLink 2003].

Still other interventions in areas such as transportation and education help ensure a more equitable distribution of social and economic opportunities among residents of a region. For instance, improved regional public transit can promote access to jobs. Distributing affordable housing more equitably across regions can lead to better educational opportunities for low-income residents [PolicyLink 2002: 9]. In combination, this array of strategies represents a powerful approach to countering regional dynamics that lead to isolated and impoverished communities.

Workforce intermediaries

As noted, the limits or constraints to active participation in a successful cluster are largely a function of lack of connections or access to social capital. Particularly when it comes to seeking jobs, there is 'strength in weak ties' – i.e., connection to a wide but loose network of contacts through which the job seeker is able to learn about specific job openings. Conversely, a lack of connections to economic opportunities tends to be negatively reinforcing: "When most of one's neighbors have either no jobs or bad jobs, then the social networks in that community will not be helpful in connecting to available employment" [PolicyLink 2002: 5].

Most networks and informal grapevines do not work well for people, places and firms that are isolated by social, cultural or geographic barriers. Those on the 'outside' typically need help to access and navigate through the array of information and services [Rosenfeld 2002b: 41].

Intermediaries are vitally important in this regard. Without incentives or guides, companies tend to overlook communities and neighbourhoods in which average skill levels are low and where educational programs are inadequately matched to the needs of employers [Rosenfeld 2002b: 30]. Intermediaries serve as 'linking agents' that effectively address both the needs of job seekers and employers.

While many community-based organizations are well positioned to play this role, they often lack the sectoral expertise to be fully effective. As noted by the Just Clusters forum: "Organizations developed over the past three to four decades to implement poverty programs or address social issues are generally staffed by people with social service and community organizing, not industry, experience. They are unaccustomed to working with employers or clusters" [Rosenfeld 2002b: 32]. Consequently, employers and nonprofits working with low-income populations and communities often do not speak the same language.

A spate of new initiatives is addressing this challenge. Sometimes known as sectoral employment strategies, they feature nonprofit organizations that serve as workforce intermediaries targeting specific industry sectors. Sectoral employment strategies tend to:

- Target a particular occupation or set of occupations within an industry.
- Intervene by becoming a valued actor within the industry which employs that occupation.
- Exist for the primary purpose of assisting low-income people obtain decent employment.
- Eventually create systemic change within that occupation's labour market [Glasmeier, Nelson and Thompson 2002: 3].

In some cases, such as Toronto's Learning Enrichment Foundation (LEF), close working relationships are built with employers in a number of sectors. Based on its intimate understanding of the skills sought by local businesses, LEF is able to offer training programs customized to the needs of employers [Torjman 1999]. Equally close relations established with job seekers have allowed LEF gradually to develop an integrated set of services – from employment counselling and Second Language training to follow-up support and child care – which meet the various needs of those entering or re-entering the workforce.

The Jane Addams Resource Corporation (JARC) in Chicago represents another version of the sector-focused workforce intermediary. While this nonprofit organization has a broad community development mandate, it has forged a special relationship with one segment of the local economy – the small metalworking firms found in and around the city. Although motivated originally by the desire to assist low-income residents secure decent employment, support for the metalworking sector itself has become a crucial means to that end. Working in collaboration with companies, JARC now offers a range of training from pre-employment to advanced technology skills to prospective and incumbent workers. It also facilitates collaboration among metalworking firms through regular meetings to discuss challenges facing the sector and through applied research initiatives undertaken jointly with business partners [Rosenfeld 2002b: 42].

In addition, JARC has successfully advocated for public policies that support the metalworking sector, securing financial assistance for workforce development and business retention programs. This close involvement with the sector has resulted in both a depth of knowledge and a level of trust that enhances JARC's core goal of meeting the employment needs of low-income residents. Business support for workforce development initiatives has grown and JARC has been able to design and deliver training programs that enable low-income residents to secure entry-level positions and move gradually up well-defined job ladders [Glasmeier, Nelson and Thompson 2002: 3].

Both the Jane Addams Resource Corporation and the Learning Enrichment Foundation embody approaches that increasingly have been recognized as effective practices in the field of workforce development. The Jobs Initiative, a multi-site sectoral employment project undertaken by the Annie E. Casey Foundation, has documented many of these key practices. Lessons from these initiatives include:

- Employers must be engaged in workforce development at the beginning of the process and viewed as collaborators in that process.

- Efforts to increase worker retention in the labour market are as important as job placement and must be targeted toward employers and employees alike.

- Linking low-income residents with family-supporting jobs that offer career advancement ultimately requires broad systemic change and buy-in among all affected stakeholders – low-income workers, employers, elected officials, community-based organizations, government agencies and others.

- Community-based organizations must be provided with adequate financial support, technical assistance, networking opportunities and other resources that enable them to design more effective, accountable and outcomes-oriented programs [Gibson 2000: 5].

Developing clusters outside of the high-tech sector

Conventional thinking on innovation tends to focus narrowly on growth sectors of the 'new economy' including, for example, high tech, photonics and biotechnology. However, not all communities are well positioned to become centres for development in these sectors. Moreover, many Canadians are employed in more traditional areas such as agriculture, resource extraction, government and community services, and commercial services, like retail and hospitality. More effort is required to apply strategies associated with innovation to sectors of the 'old economy' in which there may be more employment opportunities for individuals who lack the advanced education and skills typical of jobs in the new economy.

A starting point is to broaden the notion of clusters both geographically and conceptually. Inner-city neighbourhoods and small rural communities may appear to lack the critical mass of interrelated firms required of 'clusters' if boundaries are defined too narrowly. To recognize the potential links to cluster development, it may be necessary to expand the catchment area seen as 'home' for the cluster, look for connections ("umbilical cords") to clusters in adjacent areas, consider less obvious commonalities and more generic needs as the bonds defining a cluster, or consider microclusters that lack scale but represent unique local competencies [Rosenfeld 2002b: 17].

One strategy for loosening the geographic dimensions typical of clusters is being pursued by the University College of Cape Breton. In an effort to reach a critical mass of businesses and supporting institutions, its Department of Economic and Technological Innovation is experimenting with virtual clustering. It is using information and communications technology to create the close working relationships and intensive interaction of a cluster among members dispersed throughout Atlantic Canada [Smith and Brown 2002].

In both the UK and the US, the Initiative for a Competitive Inner City is helping entrepreneurs in low-income communities take advantage of their proximity to the high-tech clusters found in major urban centres. Development strategies for inner-city neighbourhoods often focus intensively within the neighbourhood itself. While important in certain respects, this tendency can result in overlooked opportunities to connect with the wider economy elsewhere in the city or region [Rosenfeld 2002b: 47]. Companies based in the inner city are well positioned to offer supplies, components and support services to nearby clusters. Especially in an era of just-in-time delivery, 'new economy' clusters can generate 'old economy' jobs for inner-city residents.

In principle, the ideas behind cluster-based development can be applied to the old economy as much as the new. The first step is simply "to find a niche in which some special expertise or local resource can provide a competitive edge, some area in which a region or community can distinguish itself and build a reputation for excellence, a mark that attracts customers" [Rosenfeld 2002b: 49]. A remarkable example is the once dying town of Hay-in-the-Wye in Wales which found its niche in used books. It now is home to 35 bookstores that draw buyers from all over the United Kingdom and Europe. Moreover, the 'used book hub' strategy has proven to be a replicable model. *Redu* in Belgium and *Joie de Livres* in France have followed similar paths. *Joie de Livres* has proven to be particularly dynamic in its development, adding a calligrapher, bookbinder, printer and papermaking to its book-based cluster.

The thinking behind cluster-based development is also being applied to the human services and environmental sectors. In the UK, for instance, Social Enterprise London (SEL) effectively has taken on the role of a cluster development association for social enterprises in the fields of child care, health and social services, housing and the environment. Social enterprises are "financially viable and sustainable businesses that trade in the market to fulfill social aims, such as employment creation or the provision of quality local services" [Social Enterprise London nd]. SEL works in

collaboration with a wide range of partners – banks, universities, government agencies and national trade associations – building on each other's expertise to support the development of social enterprise in London. Its cluster development program assists social enterprises to share ideas, form strategic alliances and collaborate to shape the direction of their respective sectors.

In Canada, the Community Economic Development Technical Assistance Program (CEDTAP) has taken the first steps in a similar direction. CEDTAP is a national nonprofit organization that provides technical assistance to community economic development organizations in Canada. It recently has grouped the initiatives it has assisted over the past five years into 20 knowledge categories such as Environmental Management, Community Tourism, Agriculture and Fishing, and Sustainable Housing. In order to foster greater innovation in the field of community economic development, it hopes to develop the expertise of each knowledge grouping and facilitate collaborative learning among their respective members [CEDTAP 2003].

In communities where mature industries are in decline, the lure of the new economy can result in the abandonment of existing assets and the opportunities they represent. Alternatively, some regions are making explicit efforts to renew and revive their traditional industries by applying the same practices associated with clusters in emerging sectors.

The work of the Jane Addams Resource Corporation with metalworking firms is one example, but there are many others. The Garment Industry Development Corporation in New York, the Hosiery Technology Center in North Carolina, Granados del Valle of New Mexico, Alaska Village Initiatives and the Appalachian Centre for Economic Networks (ACENet) all serve as intermediaries supporting modernization and renewal of traditional industries [Ogkagaki, Palmer and Mayer 1998]. The Just Clusters forum found that the key to the success of these initiatives is their "ability to broker collaborative activity, provide useful technical assistance and generate additional external funding for specific projects" [Rosenfeld 2002b: 44].

- Like JARC, several of these initiatives operate from an explicit anti-poverty community development perspective. Common assumptions underlying their work include:

- The market has the capacity to generate jobs and create opportunities on a large scale.

- Mechanisms are required to ensure that low-income and low-skill workers can benefit from the employment opportunities the market produces.

- Efforts to create jobs and opportunities for low-income people should focus not only on the neighbourhoods in which they live, but on a broader geographic area.

- The initiatives need to be large enough to have a measurable impact upon the communities [Ogkagaki, Palmer and Mayer 1998: iii].

Accessing capital

Efforts at business development in low-income communities are hampered by limited access to capital. In general, "capital markets prefer New Economy companies to mature and low technology companies and innovation centres over more remote places that are difficult to monitor and assist" [Rosenfeld 2002a: 10]. The Just Clusters forum identified a number of reasons for the difficulties in accessing capital.

One factor is location. The consolidation of the banking industry in many countries has distanced sources of capital from local communities. While bank branches are present in most communities, the decisions over business investment are usually made in regional or national centres. Often those making decisions have limited direct knowledge of local business proponents and the environment in which they are operating. On the whole, this lack of familiarity tends to weaken the prospects that risks will be calculated in favour of investment.

A similar situation tends to exist with private venture capitalists. Many venture capitalists prefer to invest in companies near enough to monitor and to assist. However, venture capital companies generally are concentrated in a small number of large metropolitan centres. Furthermore, venture capital usually is directed at companies or industries at their start-up as opposed to mature stage. In combination, these factors tend to undermine venture capitalist support for more isolated regions and older industry clusters [Rosenfeld 2002b: 35].

In Canada, a number of strategies have emerged in an effort to address this shortage of capital. For instance, the Canadian Community Reinvestment Coalition (CCRC) has lobbied the federal government to enact legislation modelled after the American Community Reinvestment Act. The Community Reinvestment Act encourages financial institutions to support the credit needs of the low-income communities in which they operate. Financial institutions are assessed periodically on their performance in this regard. The results are taken into consideration in evaluating applications for charters or for approval of bank mergers, acquisitions and branch openings [US Department of Treasury 2003]. The Act is widely credited with generating large sums of capital for both housing and business development in low-income communities. Moreover, its success often is attributed less to the penalties that can be imposed on institutions that do not comply with the Act than on the value of such investments for the institutions which do. Although a Canadian version of this legislation has not yet been developed, the efforts of the Coalition have heightened attention to this issue and encouraged the chartered banks to improve services to local communities [CCRC website].

Communities also have taken more direct action. Over the past decade, more than 20 Canadian communities have created community loan funds, loan guarantee programs and other vehicles to support local entrepreneurship and economic activity [Levine, Torjman and Born 2003]. While

many loan funds are modest in scale, they represent an important form of economic infrastructure that could be used to expand business development activities in low-income communities. Some dynamic credit unions, such as VanCity and Coast Capital Savings in British Columbia, already are engaged in this type of local investment activity with larger sums of capital at their disposal. The Canadian Co-operative Association also is supporting efforts to expand the investment activities of credit unions through its 'Community Involvement' initiative [Canadian Co-operative Association website].

Private and community foundations gradually are becoming important funding sources for community economic development as are social investors and corporate philanthropies. Changes in Canada Customs and Revenue (formerly Revenue Canada) guidelines regarding the charitable status of community economic development have facilitated this shift. However, the resources of charitable organizations are limited. In addition, these organizations generally prefer to invest in the start-up phase of promising ventures. Additional funding is required to sustain such initiatives as they pursue long-term goals, particularly in the case of community economic activities that integrate social and economic objectives. Social service components of these ventures warrant, and usually require, sustained public investment.

Venture philanthropy, as exemplified by the recently established Social Capital Partners, also offers a promising new direction for financing business activity in low-income communities. Like other entrepreneurs who have experienced financial success in high-tech ventures, the founder of Social Capital Partners wanted to put both his capital and his personal know-how to work expanding economic opportunities for others. Social Capital Partners seeks to combine the business acumen of venture capitalism with the social objectives of traditional philanthropy. The result is a growing body of resources committed to grappling with the distinctive challenges of social purpose enterprises – ventures that operate in the market but serve social goals [Jackson and Khan 2003: 15].

Community-based intermediaries can play a vital role in bridging the capital gap. For instance, Community Ownership Solutions has helped develop Inner City Renovations Inc., a construction company providing employment opportunities for members of Winnipeg's Aboriginal community. It has made available technical assistance in developing the business and mobilized the capital needed to finance it. Using funds from its own investment pool, it established Inner City Renovations as a joint venture with Social Capital Partners. The long-term goal of both investors is gradually to transfer ownership of the company to its workers [Cash 2002].

Intermediaries helping to create inter-firm networks or clusters can help the sector build its case for financial support, educate the financial community about the sector and foster closer working relationships between the network and investors. As a participant in meetings of the Carolina Hosiery Association, an executive with a local bank came to know and trust business members of the association and was therefore more likely to support their loan applications [Rosenfeld 2002b: 35].

Science and technology to support distressed communities

In addition to capital, the ability to access science and technology is critical for success in the innovation economy. Technology infrastructure can be seen as the "mortar for building cluster-based economies" [Rosenfeld 2002a: 10]. Unfortunately, many distressed communities, especially rural areas, lack the resources needed to support technology-based business [EDA 1997: 26].

In Canada, some significant efforts are under way to enable economically distressed communities realize the benefits of science and technology. The Community Access Program has enabled many rural and urban communities to achieve a basic level of Internet access. In rural communities especially, upgrading to broadband technology is a vital step. In the meantime, attention has begun to turn from hardware and wiring to ways in which this technology can be used.

A study of the link between community economic development and Internet-based Community Learning Networks (CLNs) found significant potential for using these networks as tools to generate opportunities in the new economy. However, the study also noted that "many of the CLNs reviewed did not indicate effective or organic links with local CED activities" [Gurstein 2001: 12]. One conclusion of the research was that "simply training or sensitizing to technology is probably insufficient to facilitate 'new economy' economic activity – it is a necessary but not a sufficient condition, and for the CLN to be truly linked into New Economy activity there is the need for a direct linkage, for example, through specific training for particular types of employment or skills, or providing support for particular types of economic development activity" [Gurstein 2001: 12].

With respect to science and technology, the challenge facing low-income communities may be described as an organizational divide as much as a technological one. A recent study in the US found that many community-based organizations tend to see technology as a "necessary evil" rather than a strategic tool [Shorters 1999]. Enabling organizations that serve low-income communities to identify how they can use technology to advance their community development efforts may be an important step in supporting local residents to benefit from science and technology. Among the measures which could foster such a culture are the enabling of stronger linkages between 'technologists' and community builders so that awareness of technology's impact is better understood by community organizations. Another measure involves creating an inventory of community-based applications that illustrate how information technology can be used as a tool for social change. A culture of use also can be encouraged by creating online and offline opportunities for community-based organizations to share knowledge and experience [Kirschenbaum and Kunamneni 2001: 28].

Closer working relations between community-based organizations and government or university-based science and technology centres are also needed. A good example is the role that the National Research Council plays in supporting the development of technology clusters in selected communities across the country. In conjunction with local agencies, the National Research Council

facilitates the cluster development process and adds its extensive knowledge and expertise to local science and technology resources [National Research Council website].

Notwithstanding such programs, it appears that a more comprehensive initiative for promoting community-based science and technology is required. One study examining ways to extend the benefits of science and technology to low-income communities suggested three broad strategies:

1. Learning: Fund pilot programs and demonstrations to identify the science and technology programs most likely to have a positive impact upon distressed areas. These may include technology incubators, product development laboratories and testbeds, service centres and innovation centres.

2. Linking: Encourage strategic alliances or coalitions of higher education, government and industry with science and technology expertise to consider the needs of distressed areas.

3. Leveraging: Use federal dollars to encourage science and technology investments in distressed regions and to benefit marginalized people who otherwise might not receive attention and priority [EDA 1997: 36].

Entrepreneurial social infrastructure

Underlying all of the efforts of low-income communities to respond effectively to the challenges of an innovation economy is the need to develop and maintain a dynamic social environment. Some communities become isolated and insular, closed off to new practices evident beyond their borders and slow to embrace newcomers with diverse perspectives and ideas. In such situations, local intermediaries can help build the kind of 'entrepreneurial social infrastructure' that supports learning and innovation. They can build relations among individuals, organizations and sectors that tend not to interact with one another and they can heighten awareness within the community of practices and strategies being used elsewhere to address the challenges of poverty [Rosenfeld 2002b: 49]. While not a solution in itself, this type of open and dynamic community environment is widely seen as a prerequisite to social and economic well-being in an era of innovation.

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