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Knowledge Management As an Economic Development Strategy

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KNOWLEDGE MANAGEMENT AS AN ECONOMIC DEVELOPMENT STRATEGY

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CONTENTS

CONTENTS	i
ACKNOWLEDGEMENTS	ii
EXECUTIVE SUMMARY	iii
BACKGROUND	1
TACIT AND FORMAL KNOWLEDGE	2
KNOWLEDGE AND INFORMATION IN ECONOMIC DEVELOPMENT	4
CHANGING FACTORS IN LOCATION DECISIONS	4
<i>The IT infrastructure</i>	4
<i>A skilled workforce</i>	5
<i>Quality of life</i>	6
PRODUCTION AND PLACE	6
CAPTURING LOCAL KNOWLEDGE	7
KNOWLEDGE AND ECONOMIC CLUSTERS	8
WHAT IS KNOWLEDGE MANAGEMENT?	10
KM TOOLS AND TECHNIQUES FOR ECONOMIC DEVELOPMENT ACTIVITIES .	13
USING COMPUTERS AND THE INTERNET	13
<i>External communications and marketing</i>	14
<i>Internal communications and capturing tacit knowledge</i>	15
TECHNIQUES FOR UNCOVERING AND DEVELOPING LOCAL INTELLECTUAL ASSETS	15
<i>Creation of an information product</i>	16
<i>Identifying entrepreneurial opportunities</i>	16
<i>Developing local clusters</i>	17
TECHNIQUES FOR IMPROVED ECONOMIC DEVELOPMENT ACTIVITIES	18
<i>External knowledge sharing</i>	18
<i>Internal knowledge capturing</i>	20
CONCLUSION	21
ENDNOTES	22
BIBLIOGRAPHY	28
ADDITIONAL RESOURCES	34

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EXECUTIVE SUMMARY

The United States is shifting to an information economy. Productive capability is no longer completely dependent on capital and equipment; information and knowledge assets are increasingly important. The result is a new challenge to the practice of local economic development. In this information economy, success comes from harnessing the information and knowledge assets of a community and from helping local businesses succeed in the new environment. Knowledge Management (KM) can provide the tools to help economic development practitioners accomplish that task.

KM is a set of techniques and tools to uncover and utilize information and knowledge assets—especially tacit knowledge. Economic development organizations can use KM tools to enhance external communications of local companies including marketing and to promote internal communications within local businesses and help companies capture tacit knowledge. More importantly, they can use those tools to uncover and develop local intellectual assets, including helping develop information products, and helping identify entrepreneurial and business opportunities. KM tools are also useful in developing local economic clusters. Finally, these tools can be used to enhance external knowledge sharing among the economic development community and to capture and share tacit knowledge within an economic development organization.

BACKGROUND

The United States is becoming, if it is not already, an information economy. Advances in information technology (IT), i.e. computer and telecommunications technology, are helping to revolutionize the U.S. economy. The result of this revolution is far more profound than simply the electronic delivery of goods and services, as important as that may be for both business and government. The shift to an information economy is changing how we work and do business in ways that were inconceivable a few decades ago.

Part of the story is the rise of the IT-creating industries. According to one estimate, the computer and telecommunications industries contributed between 21 and 31 percent of U.S. GDP growth in each of the years 1995 to 1998.¹ High-tech areas such as Silicon Valley have become well-studied examples of technology-driven economic development.

This information revolution goes beyond the creation of computer and telecommunications equipment. The creation of knowledge and information is just as important as the creation of the hardware. In the information age, the output of workers is more likely to be an “intangible”—such as software, ideas, services, music, literature, etc.—rather than a physical good. As economic activity is digitized, advanced economies are becoming “weightless.”²

The information age is also having a profound impact on those industries that utilize technology and information. Both manufacturing and services have been transformed by the IT revolution. The importance of information as an input to the production process—both to better meet customer demand and to continuously improve the product and the process—is one aspect of the impact. The speed with which knowledge is created and exchanged is another. In this digital marketplace, instantaneous information must be processed as quickly as possible. Otherwise advantage can be ceded to competitors.

In the information era, productive capability is no longer completely dependent on capital and equipment. Productive capability is more and more a function of workers’ skills, knowledge and expertise. Peter Drucker has observed:

Increasingly, the human being does not work in mass production, but in what might be called “team production.” And that means that increasingly the producing human being is a knowledge worker. Workers as they did before the Industrial Revolution, own the means of production. The means is between their ears.³

As information and knowledge become more important, organizations are re-structuring themselves to better utilize these assets. Empowerment, flattening and decentralization of the organization, and a focus on innovation and continuous improvement are all hallmarks of the modern enterprise. Networked forms of organization are arising that draw in suppliers and customers, as well as workers, as knowledge sources and information processors. This reorganization of work originated in manufacturing and has spread to virtually all forms of work including services and government activities.

Economic development strategies and practice must adapt to this new economic landscape. Strategies must be developed to provide businesses with the required new information assets. Strategies must also be created to build upon a community's local knowledge assets. Economic development practice must learn to utilize IT and knowledge creation tools. Often referred to as knowledge management (KM), these tools and techniques can help economic development organizations better capture and communicate both internal knowledge hidden within the organization and external information about the community and its knowledge assets.

Tacit and formal knowledge

To understand how knowledge management works and why it is important for economic development, it is important to understand the importance of tacit knowledge. The information age is not built purely on formal brainpower. In this new age, utilization of information and knowledge counts as much as its production. The ability to quickly utilize the knowledge and information of the entire workforce, not only the "information elite," is critical.

Knowledge and information are not the same thing. The standard hierarchy goes from data to information to knowledge to wisdom. According to Davenport, DeLong and Beers:

Knowledge is information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions.⁴

Making decisions and solving problems involves much more than systematic and rational analysis.⁵ It involves "making the gut choice" or "just doing what had to be done." It is a process of assessing a situation and acting. That part of our knowledge base is intuitive and experiential:

The skilled carpenter knows just how a given variety of wood must be handled, or what type of joint will best serve his purpose at a particular edge. To say that he "knows" these things is not to claim that he could put his knowledge into words. . . . The practitioner's knowledge of the medium is tacit. It is essential to the skilled practice: the carpenter uses what he knows with every stroke of his tools.⁶

The ability to develop and then utilize this tacit knowledge is what distinguishes an expert—be it a line worker in a paper mill, a brain surgeon or a computer software developer.

This is not to downplay the importance of formal knowledge. Formal knowledge consists of the codified body of knowledge upon which our scientific and technological process is based. Access to this knowledge rests on the ability to read, write, perform arithmetic operations, and reason mathematically—what is sometimes referred to as literacy and numeracy. Without these basic skills, it is next to impossible to operate successfully in today's economic environment—unlike in the past when brawn was enough in many cases. Indeed, with the proliferation of knowledge and information, reasoning skills become even more important. There is an enormous need to be able to quickly distinguish between what information is relevant and what is irrelevant.

In the end, both tacit and formal knowledge are needed. They interact. Tacit knowledge complements formal knowledge; it allows an individual to take elements of formal knowledge and use that knowledge in a way that is unique for a particular situation. It also allows individuals to go beyond the current limits of formal knowledge. Creativity, intuition and innovation owe much to the ability to tap into the reservoir of tacit knowledge.

Related to tacit knowledge is the concept of social capital.⁷ Social capital is the interaction part of tacit knowledge. It is that web of relationships and connections by which tacit knowledge is shared within a community. It is the social structure that facilitates coordination and communications.

Not everyone agrees on the detailed dimensions and definitions of what constitutes social capital.⁸ The result is a disagreement on the precise role of those elements in economic development. Yet, there is general agreement that organizational and community-based tacit knowledge is an important part of economic activity. Information, social capital and tacit knowledge are also becoming important parts of the economic development process, as we shall see in the next section.

KNOWLEDGE AND INFORMATION IN ECONOMIC DEVELOPMENT

Just as information and knowledge are changing the nature of our economy, they are also changing the practice of local economic development. Companies are changing how they operate and what drives their location decisions. Local economic development strategies must adapt to these changes. In addition, we are gaining a better understanding of how information and knowledge affects both the economy in general and the economic success of specific localities. As a result, there is a rise in new theories of economic development, such as economic clusters, that can be useful in guiding local economic development activities.

Changing factors in location decisions

The shift to a knowledge/information-based economy is changing what business needs as inputs to the production process. No longer are business location decisions based simply on the availability of cheap land, cheap energy, a low-cost labor force, availability of raw materials, or access to transportation. The ability of a locality to supply a company's need for information and knowledge assets has become paramount in economic development. There are at least three elements involved in the process: an up-to-date IT infrastructure, availability of skilled workers, and a good quality of life.

The IT infrastructure

The starting point for economic development in the information age is the existence of a suitable IT infrastructure. Many people see the Internet as a consumption tool—as a means of recreation, information gathering and shopping. Economic development practitioners know that the information technology infrastructure is also a production tool. Advanced information technologies can make businesses more productive and efficient as well as expand their markets. To take advantage of those opportunities, companies must have access to high-speed telecommunications connections, known as “broadband.”⁹

Having access to broadband is especially important in attracting technology-creating companies. It is also important for the heavy IT using companies. More and more companies are able either to locate so-called back office operations in distant areas or to outsource those operations entirely to companies located in lower-wage areas. On an individual basis, the location of back office operations in more distant areas leads to a sort of telecommuting.¹⁰

In some areas, especially current commercial and business hubs, broadband has been and is being installed as a matter of course. Other areas, especially rural areas and parts of the inner city, are in danger of being left behind.¹¹ According to a joint study by National Telecommunications and Information Administration (NTIA) and the Agriculture Department's Rural Utility Service (RUS), “rural areas are currently lagging far behind urban areas in broadband availability. Deployment in rural towns (populations of fewer than 2,500) is more likely to occur than in remote areas outside of towns. These latter areas present a special challenge for broadband deployment.”¹²

There is an ongoing debate over what to do to foster the deployment of the broadband infrastructure.¹³ As the NTIA/RUS report states, “in general, it is the last mile, not the backbone, that presents the greatest challenge to bringing broadband to all Americans.”¹⁴ To use the Federal Communications Commission’s metaphor, the problem is not the freeway but the driveway.¹⁵

In addition, the existence of a broadband connection is not enough to ensure an adequate infrastructure. The connection must be affordable and reliable, and the locality must have the technical support services to ensure that the connection is fully utilized. The problem is especially acute in areas that have been by-passed by the existing telecommunications infrastructure, such as Native American tribal lands.¹⁶

It is beyond the scope of this report to discuss specific policies to ensure all areas have access to the advanced telecommunications infrastructure.¹⁷ It is also beyond the scope of this paper to discuss what level or form of access is appropriate for an area’s economic development. Suffice it to say access to the infrastructure is a key element for economic development in the new information economy.

A skilled workforce

The second obvious change in business due to the emergence of the information age is a greater need for a skilled workforce. Access to the physical infrastructure is a necessary, but not sufficient condition for economic development.¹⁸ If worker skills are companies’ greatest assets, then companies will locate where a skilled workforce is available. In addition, new companies will be more likely to be started in such locations. As one economic development specialist was quoted as saying:

Brainpower will be the dominant resource of the 21st century. Cities that do the best job of attracting and educating talented people will flourish. People are the new products.¹⁹

Training and workforce development issues are now at the top of every economic development agenda—national as well as local. The demand for workers with information technology skills remains high. The Information Technology Industries Association estimated in April 2000 that roughly half of the 1.6 million new IT jobs created that year would go unfilled.²⁰ Obviously, those localities that can supply these workers will be the places where existing companies choose to re-locate and where new IT-related businesses start.

Local economic success requires going beyond luring in companies with a technologically skilled workforce. Helping existing companies upgrade the skills of their existing workforce is just as important. States and local governments have long recognized the importance of incumbent worker training. According to the National Governors' Association (NGA), at least forty-seven states have customized training programs to assist firms in upgrading the skills of their workers.²¹

Nor is it just a matter of technical training. The ability to utilize knowledge, both tacit and formal, is increasingly important. Companies are changing their operations to take better advantage of their knowledge and information assets. Those changes—often labeled as a shift to

“high performance work organizations”—place greater emphasis on organizational skills such as decision-making, communications and group processes. Training in these skills is increasingly important.

The shifts in organizational structure are also changing how labor markets operate. The career paths of the past are no longer open to many, closing off old forms of economic advancement. Conversely, new opportunities are arising. New issues are arising, such as the role of contingent (i.e. temporary and part-time) workers. These changes present special challenges to policy makers and economic development practitioners.²² Those localities that successfully meet those challenges will be better positioned to succeed in the information economy.

Quality of life

The third important element in business location decisions is an area’s quality of life. Highway congestion, pollution and/or a lack of housing can diminish an area’s potential attractiveness.²³ Good schools are important not only to educate the next generation of workers, but also to lure their parents into the area. Quality of life has long been recognized as an important factor in marketing a locality. In the new information age, these factors become even more critical. Joel Kotkin argues that information elites can move to where ever they wish:

As information and intelligence have become the prime drivers of the economy, many less-favored places have suffered grievously. An economy largely dictated by the locational preferences of an aristocracy of talent—who can live where they want and dictate of [*sic*] geography of wealth—has meant that less desirable places, and the people left behind in them, often gain little, or actually lose ground, even during periods of sustained economic growth.²⁴

Kotkin may overstate the importance of this mobile information-creating elite. Tacit knowledge and the skills of the entire workforce are now important factors of production—not just the knowledge and skills of the information elites. Still, quality of life is just as important for these less mobile workers as for the mobile elite. In areas of poor quality of life, it is more likely that those who can leave will leave. Those who remain will be less motivated and therefore less productive.

Production and place

Tacit knowledge also plays a more direct role in the location of economic activity. Physical capital—the basis of production in an industrial economy—has become increasingly mobile. This has given rise to the general perception of a footloose nature of production. For example, Lester Thurow states that:

For the first time in human history, anything can be made anywhere and sold everywhere. In capitalistic economics that means making each component and performing each activity at the place on the globe where it can be most cheaply done and selling the resulting products or services wherever prices and profits are highest.²⁵

At the same time, individuals and information appear to be more mobile than ever. People can fly anywhere in the world and communicate instantaneously. IT allows human resources to be

utilized and shared across traditional boundaries of time and space. This has led some to argue that the information (“intangibles”) part of the economy will follow manufacturing toward footloose production.²⁶

However, human and social capital is far less mobile than physical capital. Tacit knowledge and worker skills are generally location specific. While a worker may move and take their skills with them, many skills based on tacit knowledge can not easily be separated from the specific production process and from specific location where that production takes place. Even formal knowledge is in a sense both mobile and immobile at the same time. Codified knowledge is easily shared, especially given advanced IT. But, it does not leave in the sense that it is no longer available at the original location. The shared knowledge remains part of the local economic base.

Nor does IT preclude or substitute for face-to-face interactions, both planned and serendipitous. Face-to-face contacts remain the most information intensive means of communications—an important factor in an information-rich economy. As one commentator put it:

Paradoxically, location matters more than ever in high-tech. To be a player in Silicon Valley, you have to be in peoples’ faces.²⁷

This applies to the information-utilizing industries, as well as the high-tech, knowledge-creating sectors. Tacit knowledge is needed to customize products and adapt to rapidly changing situations that are the hallmark of the information age. In the service industries, the communications revolution is not about moving to other locations in a mimic of footloose industrial production. It is about using information from global sources to meet the needs of local customers. For example, a local insurance agent can tap into the company’s global knowledge base (formal and informal) to design coverage customized to meet the specialized needs of a local client. Tacit localized knowledge is combined with global resources. The result is a production system that is strongly rooted in its local market and local knowledge-based comparative advantage, while drawing upon resources from, and contributing resources to global networks.

Capturing local knowledge

Economic development has always been focused on using local assets. In the past, these have been physical, such as natural resources or a location at a prime transportation intersection. As discussed above, information era assets are different. Tacit knowledge and social capital are increasingly important—those assets which are simultaneously local and globally based. As locally developed information assets become the keys to economic success, all communities have the opportunity to benefit from capturing and using their local knowledge.

One form of local knowledge is often referred to in the international development literature as “indigenous” knowledge (IK). IK is often thought of by many as non-Western knowledge or “traditional” knowledge (i.e. the knowledge of indigenous peoples) as opposed to “the international knowledge system generated by universities, research institutions and private firms.”²⁸ However, the nature of IK is not limited to indigenous peoples, but rather a function of the type of information.

The World Bank describes IK as having the following characteristics:

local, in that it is rooted in a particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities . . .

tacit knowledge and, therefore, not easily codifiable.

transmitted orally, or through imitation and demonstration. Codifying it may lead to the loss of some of its properties.

experiential rather than theoretical knowledge. Experience and trial and error . . .

learned through repetition, which is a defining characteristic of tradition even when new knowledge is added . . .

constantly changing, being produced as well as reproduced, discovered as well as lost; though it is often perceived by external observers as being somewhat static.²⁹

Every region, every neighborhood of every city and in every rural area in the United States has its own reservoir of unique tacit knowledge. That local knowledge can be captured and utilized to drive economic development by using a number of tools and techniques that collectively have come to be known as Knowledge Management.

Knowledge and economic clusters

Capturing tacit knowledge is one important economic development activity. Building social capital and means for sharing that knowledge is another. One economic development strategy that has arisen over the past few years concerns the development of economic clusters.³⁰ Social capital and information sharing play a crucial role in creating successful economic clusters.

Traditional explanations of industrial clusters were based on costs and physical resources. The steel industry clustered in areas where coal and iron ore were plentiful and where they could be brought together at low cost—such as Pittsburgh, Gary and Cleveland where water and rail transportation could easily join the iron ore ranges of the Great Lakes with the Appalachian coal mines.

The concept of information and knowledge as the key factor of production adds an extra dimension to the understanding of the process of economic clusters. What makes a successful cluster is the implicit sharing of knowledge and skills, especially tacit knowledge. As Michael Porter points out, “clusters represent critical masses of skill, information, relationships, and infrastructure in a given field.”³¹ As discussed earlier, there is no substitute for physically being there when it comes to the transfer of tacit knowledge. Clusters are an efficient means of knowledge management. As recent study on innovative regions puts it:

Geographic clustering of people, companies, and institutions is a powerful mechanism for transferring and augmenting personal knowledge quickly. Sharing knowledge, skills, and experience is simply easier when the components of the learning network are in the same place.³²

For example, one key to Silicon Valley’s success was the formal and informal mechanisms for sharing information and ideas. In contrast, Boston’s Route 128 did not have a similar networking

model in place. This, according to AnnaLee Saxenian, was the reason why Silicon Valley was able to successfully adapt to successive technological changes, while Route 128 floundered:

Silicon Valley has a regional network-based industrial system that promotes collective learning and flexible adjustment among specialist producers of a complex of related technologies. The region's dense social network and open labor markets encourages experimentation and entrepreneurship.³³

This social network included both ad-hoc interactions, such as those at the Wagon Wheel bar in Mountain View, and more organized occasions, such as conferences and hobbyist's clubs such as the Homebrew Computer Club. The result was faster innovation:

It provided the advantage of speed, as local firms learned about market changes before others did. And it facilitated the frequent face-to-face communications needed for successful collaboration, while also intensifying competitive rivalries.³⁴

The growth of the Italian ceramic tile industry after World War II provides another good example.³⁵ Centered on the town of Sassuolo in the Emilia-Romagna region of northern Italy, the region benefited from close linkages among companies. These relationships simultaneously promoted cooperation and fierce competition among the manufactures. They also facilitated information and skill sharing between the tile manufacturers and the equipment makers. Such information flows resulted in innovations in products and improvements in process and productivity.

Just as KM techniques are useful in capturing and sharing local tacit knowledge, they are also useful in building the social capital and information sharing mechanisms needed to create successful economic clusters. But before describing how KM can be used in economic development, we must first provide an overview of what KM is.

WHAT IS KNOWLEDGE MANAGEMENT?

In today's information economy, companies have come to realize that their major business assets are, as Rosabeth Kanter describes them:

- concepts (i.e. ideas, designs, etc.);
- competence (i.e. the ability to execute); and,
- connections (i.e. close relationships that allow for the augmentation of resources and the leveraging of one's abilities).³⁶

One major consulting firm defines five different types of assets that companies can use to create value: physical, financial, employee and suppliers, customer, and organizational.³⁷ Only the first two, physical and financial, include traditional assets. The last three are sources of knowledge and information assets.

To succeed in this new environment, companies have sought ways to tap into those knowledge and information assets. The term "Knowledge Management" has emerged to describe these efforts. KM is a set of techniques, tools and activities focused on helping organizations capture and communicate their "resources, tacit and explicit perspectives and capabilities, data, information, knowledge and maybe wisdom."³⁸ In many cases, KM has taken on the aspect of a bundle of software programs and other information technologies. But the definition is much broader. It encompasses any activities that help uncover and utilize information and knowledge assets—especially tacit knowledge.

One of KM's leading practitioners, Karl-Eric Sveiby, describes it as being divided into two tracks:

IT-Track KM = Management of Information. Researchers and practitioners in this field tend to have their education in computer and/or information science. They are involved in construction of information management systems, AI [artificial intelligence], reengineering, group ware etc. To them **Knowledge = Objects** that can be identified and handled in information systems. This track is new and is growing very fast at the moment, assisted by new developments in IT.

People-Track KM = Management of People. Researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or business/management. They are primarily involved in assessing, changing and improving human individual skills and/or behavior. To them **Knowledge = Processes**, a complex set of dynamic skills, know-how etc, that is constantly changing. They are traditionally involved in learning and in managing these competencies individually—like psychologists - or on an organizational level - like philosophers, sociologists or organizational theorists. This track is very old, and is not growing so fast.³⁹

The two tracks differ in their techniques and tools. In the IT track, the emphasis is on using software and the Internet. One goal is to capture information in databases. The other goal is to improve communication internally (to share knowledge within the organization) and externally (to determine customer preferences and to better manage the flow of goods and services to and from suppliers). In the people track, emphasis is on creating an environment that fosters innovation and the highest possible level of skill-utilization—the so-called management of human capital.

In a review of 39 knowledge management projects, Davenport, et al. identified four broad types of objectives.⁴⁰ The first type of objective was the creation of knowledge repositories. These projects generally took the form of database management programs. Three types of databases were identified. The first type focused on external knowledge and utilized tools such as competitive intelligence systems that gathered information from outside sources. The second were mechanisms for better using structured internal knowledge contained in reports and manuals (i.e. document capture) and for the codification of internal tacit knowledge. These structured internal databases often contain information such as customer and product information, description of specific sales presentations and tactics, and other tidbits that would help sales and marketing. The third type were informal means of capturing know-how and lessons learned (i.e. sharing of internal tacit knowledge), usually in the form of discussion group archives using tools like Lotus Notes.

The second objective was to improve knowledge access. These projects focused on the access to and the sharing of knowledge. One way was through the use of databases that are directories of external experts (expert networks). Such directories could also characterize internal expertise, such as one example of a software company whose “expert network” describes over 300 types of knowledge competencies necessary for software development projects. The system is used to match personnel with software development projects. Other techniques involve advanced communications technologies, including desktop videoconferencing and document sharing tools, to facilitate the direct sharing of knowledge and information among co-workers.

The third objective was to enhance the knowledge environment. Projects in this category sought to change norms and values to encourage both the creation and sharing of knowledge. In part, these organizational approaches attempt to shift what is valued in the organization. In one example, a large computer company attempted to promote the re-use of component designs—a form of sharing knowledge—to avoid “reinventing-the-wheel” every time they developed a new product. To do this, they shifted corporate values to emphasize the importance of quick design (“time-to-market”) and downplayed the importance of the originality of the design.

The final objective was the management of knowledge as an asset. These projects involved creating formal audits and metrics of knowledge management at the corporate level. Essentially, they attempt to codify intellectual capital and report them on the company’s balance sheet. Such projects are part of the management and accounting professions’ endeavors to understand and explain intangible assets. One of the most recent activities in this area is the attempt to devise accounting measures that treat skill-development (“training”) as an investment rather than a cost.

These four objectives are similar to Sveiby's two categories. Creation of knowledge repositories and improving knowledge access center around IT tools and processes, while enhancing the knowledge environment and managing knowledge as an asset tend to focus on the organizational and people issues.

The organizational techniques to enhance internal and external communications need not be tied to the use of IT. Davenport, et al. found that the Austin-based semiconductor research consortium Sematech greatly improved the flow of knowledge and information through old fashioned methods:

Sematech has a knowledge transfer organization and several formal roles for that purpose; it also holds many sessions of which the primary objective is knowledge transfer. Many take place in Austin or at sponsoring firms' locations, but, most important, the company uses "assignees" from sponsoring firms in its R&D processes. Any knowledge they gather during their two or so years at Sematech is effectively transferred when they return to their companies. While Sematech also has several technological channels for knowledge transfer in place, managers credit face-to-face transfer as the most effective by far.⁴¹

The categories of IT and organizational change should not be seen as mutually exclusive. Companies set up processes and systems that incorporate multiple techniques that are mutually reinforcing. As Davenport, et al. put it:

For example, a company could profit from creating a repository and improving the knowledge management environment to motivate people to contribute to and access the repository.⁴²

KM is an evolving area. The broad scope of activities that call themselves KM makes a precise definition difficult. Yet, it is the broad nature of KM that makes it such a powerful concept. Angus, Patel and Harty summarized the point succinctly:

Knowledge management is a way of doing business. In reality, it's more a business practice than a product. The products are what facilitate the practice of knowledge management—or at least specific facets of it—with the appropriate use of technology.⁴³

It is beyond the scope of this paper to provide a detailed review of either the IT tools (data capturing tools and techniques, document scanning and retrieval programs, expert systems, data mining tools, and collaborative work software) or the organizational change and development techniques. The Additional Resources section at the end of this paper provides some guidance for further exploration.

KM TOOLS AND TECHNIQUES FOR ECONOMIC DEVELOPMENT ACTIVITIES

The basic concept of the information economy is that information and knowledge are an organization's key assets. Business success stems from harnessing those assets. The same concept can be applied to a locality. Economic success comes from harnessing the information and knowledge assets of a community and from helping local businesses succeed in the information age. KM can provide the tools to accomplish that task.

As discussed earlier, the definition of knowledge management used in this review is very broad. We consider any technique that improves the communication, sharing and/or formal capture of information or knowledge to be a KM tool. The tool can be either IT or organizational. These tools can perform a number of tasks:

- enhance external communications of companies including marketing;
- promote internal communications within local businesses and help companies capture tacit knowledge;
- uncover and develop local intellectual assets, including
 - help develop information products, and
 - help identify entrepreneurial and business opportunities;
- help develop local economic clusters;
- enhance external knowledge sharing among the economic development community;
- capture and share tacit knowledge within an economic development organization.

Using computers and the Internet

Using our broad definition of KM, the simplest tool is the use of IT to improve internal and external communications, including for marketing. Note that in some cases, an even more basic step of improving computer literacy is needed. Assistance with word processing programs, accounting software, inventory management and the myriad of other software applications can be a major step forward for some businesses.

Another approach is to use the Internet itself to help companies get basic business information. For example, the West Virginia High Technology Consortium Foundation has created an online database that links small businesses to a myriad of sites. These sites include information and assistance on finance, accounting, general business, economics, marketing, management and legal issues.⁴⁴

Helping local businesses use the Internet obviously requires access to the advanced telecommunications infrastructure, as discussed earlier. Beyond question of access to the infrastructure is the capability of the locality to utilize that infrastructure. The Computer Systems Policy Project (CSPP) has created a guide to help communities assess their readiness for electronic commerce.⁴⁵ The guide walks a community through a number of self-assessment questions. These include key areas such as infrastructure capabilities, access to critical services,

community usage by citizens, business and government, and planning issues. More importantly, the guide gives concrete descriptions of what it takes to reach each level of readiness. In this way, the assessment not only tells a community where it stands, it helps show the way to future improvement.⁴⁶

External communications and marketing

The most basic use of KM in economic development is to help local businesses use advanced information technologies, i.e. the Internet, to expand their markets. Some might argue with the description of sales and marketing via the Internet as a KM tool. It is included in this review because it is a good example of a simple but powerful application of the principles of KM: that information, including information about your product, is your key asset.

International development agencies are already using advanced information technologies to connect local artisans and shopkeepers to global markets.⁴⁷ Frank Odasz describes the opportunities when he says, “the key point is that a basket-maker in a rural community would not be likely to earn a living selling baskets solely to a local market, whereas with an unlimited ‘global niche market’ available through Internet marketing, a basket-maker might do very, very well!”⁴⁸

Many areas in the U.S. utilize their local economic development or Chamber of Commerce Web site as a tool to promote their locality and link to local businesses. Other areas give more direct help to companies in the form of Internet marketing assistance. For example, the Pueblo-Durango Internet Partnership has used a WebFair approach to help local small businesses become Internet ready. The WebFair consisted of a series of classes on all aspects of marketing via the Internet. In conjunction with the WebFair, mini-grants of \$500 to \$1000 were available to help companies move beyond a basic Web site, including advanced marketing activities and better integration of the Internet activities with other business operations.⁴⁹

The Home Grown Jobs Initiative in Ely, Nevada has created a joint Web site to help local small business, especially very small, one-person businesses, develop a marketing and sales presence on the Internet. WhitePineCountryStore.Com is a Web portal to the businesses located in White Pine County. The Initiative, a winner of a 2000 AOL Rural Telecommunications Leadership Award, also features on-going support and training.⁵⁰

Interestingly, the ultimate Internet marketing tool for some small-business, particularly home-based businesses, may already be available. As Frank Odasz observes:

Just a few years ago, small businesses struggled with the problem of how people would find their Web pages. Today, <http://ebay.com> demonstrates one way of resolving this issue for many home-based businesses. Ebay has become a ‘portal’ for those seeking unusual gifts. Many home-crafts persons, antique dealers, bed and breakfast establishments, and similar businesses are enjoying a robust business from very rural locations due to the broad exposure portals like Ebay provides for their products.⁵¹

Internal communications and capturing tacit knowledge

Use of the Internet for sales and marketing is the simplest form of KM. The next step is to use IT to enhance organizational communications, especially to share local knowledge. One example is the Great Harvest Bread Company, a network of 137 bakeries in 40 states. Great Harvest runs a Web site called Breadboard to capture and share information and knowledge. This tool is combined with the organizational KM techniques of face-to-face and telephone conversations. For example, one shop instituted a “Baker for the Day” program to help a local charity raise money, and incidentally, to promote the local bakery. This marketing and public service innovation spread rapidly throughout the network. In addition to the traditional means of organizational communications, Great Harvest has a knowledge capture system called Case Studies to formally document those shared tips, stories and anecdotes that led to better products or processes.⁵²

Great Harvest’s headquarters is located in rural Dillon, Montana. The term headquarters is somewhat of a misnomer. The organization is a network of franchises operating as a learning organization. This combination of new forms of organization and advanced information technology illustrates the types of enterprises that will be increasingly important to local economic development in the future. Using the networked model of organization, local knowledge from many locations can be captured and shared within the network. Economic development becomes a process help local entities tie into the appropriate networks—locally, nationally and globally.

Techniques for uncovering and developing local intellectual assets

The potential for information-based and knowledge-based economic development is much greater than simply the utilization of IT to enhance existing local businesses. Every community has or can develop some knowledge and skills that are useful in the information age. Capturing and utilizing that local knowledge is the next use of KM tools in economic development.

One example is the World Bank’s Indigenous Knowledge Program.⁵³ This KM activity is focused on the capturing this indigenous knowledge so that the information can be used to improve development programs. Knowledge of the local situation is critical to the success of a project. For example, knowledge of traditional societies’ forms of apprenticeships and rites-of-passage has been used to develop successful apprenticeship programs for at-risk youth in Africa and the Caribbean.⁵⁴

These KM tools include both techniques for capturing indigenous knowledge and tools, such as an Internet-based database and other information dissemination techniques, to share this information. Knowledge of the local situation is just as critical to the success of an economic development project in the United States as it is in developing nations. Such explication and sharing of local knowledge and information is a key part of economic development in the US.

Local knowledge is not just useful for successful design and implementation of a program. Local knowledge can be the driver of that economic development activity by:

- capturing and using that knowledge as an information product, in and of itself; and,
- using local knowledge to identify new entrepreneurial opportunities.

Creation of an information product

The capture part of KM tools can be used for identification, development and utilization of local knowledge/information as marketable content. Use of traditional medicines by the pharmaceuticals industry is perhaps the most well known example of using local information content to create a marketable product. Another example is the creation of a local cultural Web site. In such cases, often the information content is often embedded in another product—such as an art or craft object.

The activities of the pharmaceuticals companies have raised awareness of the difficulty of assessing ownership and usage rights to such intellectual content.⁵⁵ The same concerns apply to the possible appropriation of cultural and native knowledge resources by outsiders.⁵⁶ This is especially true when digital technologies allow for easy duplication, manipulation and communication of the recorded information. Other issues arise when the knowledge is generally known within a community and must be modified or augmented to create a commercial product. These concerns are of high importance and sensitivity to indigenous peoples around the world.⁵⁷

The sale of pure information content often occurs on an individual level, as opposed to a community level. In other words, entrepreneurs can use advanced IT to better leverage their own personal knowledge gained from their own experiences based in a certain location. For example, AgriImaGIS is an agricultural imaging business run by a former farmer. His knowledge of how to translate the information from satellite images into information for farmers on vegetation density, crop quality and the specific needs for fertilizer and pesticides was gained through 20 years of farming.⁵⁸

These types of opportunities for those with a specific set of information skills are becoming common. As the information revolution continues, there will be a greater and greater need for those with the skills and understanding of a situation to play the role of information broker. Some older form of market brokers—“the middle man”—will disappear in the process economists call dis-intermediation. But new opportunities will be created as forms of information filtering and brokering arise to meet the changing market needs.

Identifying entrepreneurial opportunities

The identification of marketable content is not the only form of local information assets. Just as important is the utilization of local knowledge/information to identify non-information market opportunities and skills. Knowledge management tools can be used to identify local skills and capacities that can generate market opportunities. For example:

A neighborhood organization interviewed over 100 local residents and found many women who had worked in hospitals, hotels or cared for sick and elderly people. Many of these women had families and were unemployed. They wanted to work part-time. The association brought them together and they formed a “company” to sell their services as home health care providers. There was great demand for their services and over 80 women were connected to neighbors needing community care. This connection met a community need and increased the income of the women.⁵⁹

In some cases, traditional local products can be identified and marketed for export. An example is the sugar cane wine industry in the Congo area of Africa. In these cases, it is important to utilize, build upon and compliment the local technical production knowledge.⁶⁰

Among the leaders in the community asset based approach to economic development are John L. McKnight and John P. Kretzmann at the Asset-Based Community Development Institute of Northwestern University's Institute for Policy Research.⁶¹ Kretzmann and McKnight take the approach that that, “community assets are key building blocks in sustainable urban and rural community revitalization efforts. These community assets include:

- the skills of local residents
- the power of local associations
- the resources of public, private and non-profit institutions
- the physical and economic resources of local places.”⁶²

They have developed series of capacity inventory tools to help identify local assets.⁶³ These assets range from the individual skills and enterprising interests and experiences of the local residents to the capabilities of local businesses. They also include the role of other local organizations and institutions and the local consumer expenditure capacity. One interesting knowledge management technique is the use of the “Learning Exchange” model to catalog community skills.⁶⁴

These new entrepreneurial opportunities need not be confined to the local economy. A powerful strategy is to create new opportunities to develop local skills and market the results globally using advanced information technologies. One organization that takes this combined approach is the Appalachian Center for Economic Networks (ACEnet). June Holley explained:

Because there's been so little business development in our community, and we still have double digit unemployment in a lot of the area, we've helped about 100 specialty food businesses get started and have also started a high school computer entrepreneurship program because we needed consultants and trainers for those businesses. We integrate technology in every aspect of what we do.⁶⁵

Inspired by European experiences with the flexible manufacturing networks approach, ACEnet has successfully used this model in the U.S. to create a local economic cluster centered on the specialty food products industry.⁶⁶ ACEnet operates as a combination food business incubator, e-commerce and technology training program, venture capital fund and local economic development think-tank. The think-tank part of the operation, the ACEnet Institute, publishes a number of reports of their experiences—including a “Replication Manual.”⁶⁷

Developing local clusters

As the ACEnet example illustrates, KM tools can be used to identify local assets upon which to build an economic cluster. Organizational KM tools can also go one step further to help create the cluster itself. To create a successful cluster, an area needs, implicitly if not explicitly, such information sharing mechanisms.

One such mechanism is the creation of locally based consortia of businesses and other organizations.⁶⁸ As with ACEnet, these consortia are often explicit attempts to create a local flexible-manufacturing network. For example, the Berkshire Plastics Network is helping to make western Massachusetts a center of the plastics industry. The Network provides modernization and technical support services, as well as training and marketing assistance to over 40 companies involved in the design and production of molds, components and plastic products.⁶⁹ Creation of such local consortia is an example of a successful “knowledge management” economic development strategy.⁷⁰

It should be noted that formal consortia are only one mechanism of fostering communications and the sharing of knowledge. Any activity that builds social capital is an important economic development activity. Silicon Valley’s The Homebrew Computer Club mentioned earlier is a case in point. Activities that encourage social interaction among people in the same local industry (i.e. building social capital) are, in effect, organizational KM techniques.

By creating social capital, these organizational activities also help anchor businesses in a specific locality. If the key to a company’s success is the dense network of local contacts, local skills and tacit knowledge and local information gathering institutions, then that company is less likely to move. The formal and informal consortia also help promote the creation of locally based knowledge in the form of specialized skill development. Such community workforce development activities deepen and enrich the local knowledge and information base.

Techniques for improved economic development activities

As discussed earlier, local economic development organizations can use KM tools and advanced IT to help local business. Economic development organizations can also benefit from the application of those technologies to their own operations. Use of KM tools can help these organizations better capture, organize and communicate information and knowledge both within and outside of the organization.

External knowledge sharing

One the easiest starting points is to use KM tools and techniques, especially the Internet, for communications among the larger economic development community—beyond the organization’s boundaries. That larger community is both locally-based and national/international in scope. On the local level, it incorporates the other interested parties—the businesses, utility companies, local governments, chambers of commerce, community organizations—with an interest and a stake in the local economic development process. On the broader level, it encompasses the regional, national and international body of economic development practitioners and researchers—the “community of practice.”

Grant County (WI) was one of the leaders in using the Internet for disseminating economic development information. The Grant County Economic Development Corporation (GCEDC) used its Web site as a means of linking and integrating economic development information on all localities within the county—in essence becoming the one-stop site for information. They also use their Web presence to promote and market both the area as a business location and the products of current local businesses.⁷¹

The Commerce Department's Economic Development Administration (EDA) also uses its Web site to provide economic development information. Part of the EDA Web site is Economic Development Information Clearinghouse (EDIC). EDIC is a source of general information on economic development and the development process. It also provides numerous links to papers on economic development and to development organizations.⁷²

Another example comes from international development activities. As mentioned earlier, the World Bank's Indigenous Knowledge Program is itself a KM tool. That effort is allied with a broad program that the World Bank is helping to launch, known as the Global Development Gateway. The Gateway is:

a portal website [*sic*] on development issues, from which users can access information, resources, and tools, and into which they can contribute their own knowledge and experience, the Gateway creates a common platform for shared material, dialogue, and problem-solving that is easy to access and navigate through. This will enable those in the development field to share information, easily communicate, and build communities of practice around significant challenges from the grassroots up.⁷³

The purpose is to provide:

online training modules, research findings, best practices and ideas, case studies, procurement services, information on development projects, funding, commercial opportunities, product reviews, news, jobs, and directories -- all tailored to the needs of specific audiences such as community leaders, policymakers, local government officials, private investors, and academics.⁷⁴

The Gateway is both an ambitious and somewhat controversial project. It remains to be seen whether it lives up to its potential. It is, in any event, an exciting attempt to utilize advanced IT in the economic development process.

These examples show that the Internet can be used as a knowledge management tool to share information. It is beyond the scope of this report to list or even describe the many efforts by economic development agencies and organization to use the Internet as a means of communicating and sharing information. Just as there are numerous programs to help companies establish an on-line presence, help exists for non-profit and community organizations to better utilize advanced information technologies in their everyday operations. More information can be found in the Additional Resources section below.

Successful KM goes well beyond establishing a successful Web presence. The goal of knowledge management is to use these tools to capture and share information and knowledge. KM must also incorporate ways of capturing new ideas and tacit knowledge. The Global Development Gateway itself was in many ways, the latest outcome of broader KM activities.

Part of that activity is centered on the Global Knowledge Partnership, which is coordinated by a small secretariat, currently located at the World Bank Institute.⁷⁵ The Partnership helps its

members communicate and share information. One key KM tool is the GK-AIMS database, which includes entries on organizations, programs, information resources and events.⁷⁶

The above discussion of IT-based KM tools should not be taken as a preference for these mechanisms over organizational activities. The traditional conferences, workshops, meetings, reports and papers remain powerful tools of knowledge capture and sharing. As was the case with business use of the tools, it is often the combination of IT tools and organizational techniques that is the most successful.

However, one note of caution about these activities is in order. It is important that the process be one of sharing knowledge—not an attempt to impose a standard best practice from one location on another. If knowledge is localized and tacit, then knowledge and information taken from one locality and one particular context needs to be translated and adapted before it can be adopted.⁷⁷ That will require understanding why it worked in one location and what lessons can be learned that are applicable to other situations.

Internal knowledge capturing

Efforts to utilize KM tools within public sector organizations are relatively new, but growing. These efforts seem to focus mainly on the IT track of KM—as part of the broader e-government movement. For example, the first annual E-Gov.Com conference on knowledge management was not held until April 2000.⁷⁸ These activities go beyond IT application such as document management and government procurement processing to include organizational issues and ways of capturing and sharing best practices and tacit expert knowledge.⁷⁹

It is not possible to describe how each economic development entity might best use KM tools; each organization has its own needs. One organization's need might be better communications with a far-flung field staff.⁸⁰ Another organization might use a Geographic Information System (GIS) to integrate data from various sources into a comprehensive database on local development opportunities.⁸¹ It is very easy to envision a system evolving into a broader database capturing insights and information about a location from local real estate professionals, residents and businesses.

Likewise, organizational changes—as contrasted with IT approaches—may also be needed. Just as the rise of the information age is changing economic development strategies, it is also changing the relationships among economic development practitioners. Economic development entities—governmental and non-government organizations—will be forced to re-evaluate and re-structure their relationships both with one another and with groups not traditionally associated with economic development. Networked forms of organizational structures, collaborative activities, and empowered individuals are all forms of KM in action. Business organizations are taking advantage of these tools; economic development entities should do likewise.

Creative use and combinations of these and other KM tools can help an economic development organization better market and utilize its major asset: information and expertise. After all, economic development entities are pure examples of knowledge-based organizations. And who better could benefit from knowledge management?

CONCLUSION

The shift to an information economy is creating new challenges for economic development. As knowledge and information play an increasingly important role in economic activity, the needs of businesses have changed. More importantly, the nature of the business opportunities has shifted. These opportunities are twofold:

- to create new information and knowledge-based enterprises, and
- to utilize information and knowledge better in existing companies.

The tools and techniques of Knowledge Management can help economic development practitioners face this new environment. Economic development organizations can use KM tools to enhance the external communications of local companies, including for e-commerce and marketing. They can also promote the use of KM tools and techniques to help local businesses capture and utilize their knowledge and information assets.

More importantly, KM tools and techniques can be used by economic development practitioners to uncover local information assets and entrepreneurial activities that can serve as the bases for future economic development. Finally, economic development practitioners can use these tools to enhance knowledge sharing among key members of the community and to capture and share tacit knowledge within their own organizations.

Knowledge management can be a powerful tool in economic development—but only if we can harness its power to the unique needs of economic development activities. As this review has shown, the use of KM tools in economic development is just emerging. Just as companies are learning a new way of operating, economic development organizations need to learn and experiment with these tools and techniques. Economic development practitioners should be encouraged and supported in their efforts to use and tailor these tools to meet their own needs—and be encouraged to share their successes and failures. In essence, we need to set up a KM process for understanding and sharing best KM practices.

Economic development in the information age requires better use of information and knowledge. It requires unlocking the information and knowledge assets of a community as the driver of local economic development. It also requires unlocking the hidden information and knowledge about a community and about the process of economic development.

The information economy is not about the information technology industries. It is about the use of information and knowledge—formal and tacit—in economic activities. Building a strong local economy means developing and cultivating the local knowledge and information base. KM tools and techniques can provide the foundation upon which to build successful local information-age economy.

ENDNOTES

¹ *Economic Report of the President*, 104.

² For a general description, see Quah, “A weightless economy.”

³ Quoted in Panchak, “The Future of Manufacturing.”

⁴ Davenport, et al., “Successful knowledge management projects.”

⁵ See Klein, *Sources of Power: How People Make Decisions*.

⁶ Neisser as quoted in Zuboff, *In the Age of the Smart Machine: the Future of Work and Power*, 187.

⁷ For an overview description of social capital, see Adler and Kwon, “Social Capital: The Good, the Bad, and the Ugly.”

⁸ For more on social capital and economic development, see Putnam, *Bowling Alone*, and “The Prosperous Community: Social Capital and Public Life.” Also see, Cohen and Fields “Social Capital and Capital Gains or Virtual Bowling In Silicon Valley.

⁹ The broadband is commonly defined as made up of backbone of fiber optic cable with a user access point that can be telephone Digital Subscriber Lines (DSL), an Integrated Services Digital Network (ISDN), a cable modems or a wireless connection. The FCC defines broadband as an connection over 200 kilobits per second. As a point of reference, the connection speed of a standard “dial-up” computer modem using a normal telephone line is 56 kilobits per second.

¹⁰ See OTA, *Technological Reshaping of Metropolitan America*.

¹¹ For a detailed discussion, see FCC, *Deployment of Advanced Telecommunications Capability: Second Report*.

¹² NTIA and RUS, *Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans*, ii.

¹³ Note: Not everyone agrees with this conclusion. One advocacy group, iAdvance, has taken the position that much more needs to be done to provide incentives for building out the backbone mainly by allowing the RBOC to enter. See Olbeter Robison, *Breaking the Backbone: The Impact of Regulation on Internet Infrastructure Deployment*, and Matt Robison, *A 21st Century Internet for All Americans*. On the other side is the Competitive Broadband Coalition, *Setting the Record Straight: The Fallacies and Realities of the Broadband Debate*.

- ¹⁴ *Advanced Telecommunications in Rural America*, 9.
- ¹⁵ FCC, *Deployment of Advanced Telecommunications Capability*, 10-11.
- ¹⁶ New Mexico State University, *Assessment of Technology Infrastructure in Native Communities*.
- ¹⁷ For a discussion of those policies, see Leatherman, *Internet-Based Commerce: Implications for Rural Communities*.
- ¹⁸ For an example of the problem, see Rhoads, “German Town Finds the Digital Divide More Difficult to Bridge Than It Thought.”
- ¹⁹ James Crupi, quoted in Peirce, *Citistates*, 12.
- ²⁰ ITAA, *Bridging the Gap: IT Skills for a New Millennium*.
- ²¹ NGA, *Investing Public Resources to Support Incumbent Worker Training*.
- ²² For a discussion of the economic development challenges and the general challenges to policy makers, respectively, see Theodore and Weber, *Changing Work Organization in Small Manufacturers*, and Jarboe and Yudken, *Smart Workers, Smart Machines*.
- ²³ For example, Houston is worried about pollution driving businesses away. See Yardley, “Houston, Smarting Economically From Smog, Searches for Remedies.”
- ²⁴ Kotkin, *New Geography*, 22.
- ²⁵ Thurow, *The Future of Capitalism*, 115.
- ²⁶ See Frances Cairncross, *The Death of Distance*, and William Knoke, *Bold New World*.
- ²⁷ Paul Saffo of the Institute of the Future in Menlo Park, CA as quoted in Zachary, “Megacommuters Begin to Thrive As They Head to Silicon Valley.”
- ²⁸ Taken from “Reactions: Three definitions of indigenous knowledge.”
- ²⁹ *Indigenous Knowledge For Development: A Framework For Action*, 2.
- ³⁰ EDA, *Cluster-Based Economic Development*.
- ³¹ Porter, “The Competitive Advantage of the Inner City.”

³² Collaborative Economics, *Innovative Regions: The Importance of Place and Networks in the Innovative Economy*.

³³ Saxenian, *Regional Advantage*, 2.

³⁴ *Ibid.*, 156.

³⁵ Porter, *The Competitive Advantage of Nations*, 210-225.

³⁶ For a more detailed discussion, see Kanter, *World Class*.

³⁷ Boulton, et al., *Cracking the Value Code*.

³⁸ Stewart, *Intellectual Capital*, 75.

³⁹ Sveiby, *What is Knowledge Management?*

⁴⁰ Davenport, et. al “Successful knowledge management projects.”

⁴¹ *Ibid.*

⁴² *Ibid.*

⁴³ Angus, et al., “Knowledge Management: Great Concept... But What Is It.”

⁴⁴ NTIA, *Community Connections: Preserving Local Values in the Information Age*, 58.

⁴⁵ CSPP, *Ready?Set?Go!: The CSPP Guide to Global Commerce Readiness*

⁴⁶ In a similar fashion, the World Bank and the Organization for Economic Cooperation and Development (OECD), among others, are attempting to create a system to review a country’s situation with respect to IT and the information economy. One of these first “Knowledge Assessments” was done as part of the World Banks’ review of Korea. This review covers areas such as performance indicators, indicators about the institutional regime, measures of human resources, indicators of the nation’s innovation system and information infrastructure indicators. See World Bank, “Annex 1 - Preliminary Assessment of the Knowledge Economy in Korea.”

⁴⁷ Hazan, *The Virtual Souk, E-Commerce for unprivileged Artisans*.

⁴⁸ Odasz, “Rural Community E-Business Strategies, and Training Resources.”

⁴⁹ Kingsley, “Case Study: The Pueblo-Durango Internet Partnership.”

⁵⁰ Information from the Ely, Nevada Home Grown Jobs Web Site application, reference Number: 502, AOL Rural Telecommunications Leadership Awards, <http://ruraltelecon.org/aolawards/aolcommon/aolawardviewpub.asp?awardid=2839>

⁵¹ Odasz, “Rural Community E-Business Strategies, and Training Resources.”

⁵² See Hopkins, “Zen and the Art of the Self-Managing Company.” See also the Great Harvest Franchising, Inc. Web site <http://www.greatharvest.com/>

⁵³ See World Bank, Indigenous Knowledge Programs <http://www.worldbank.org/afr/ik/>

⁵⁴ World Bank, “Reinventing Apprenticeship and Rites of Passage: An Entry into the Urban Economy in Sub-Saharan Africa.”

⁵⁵ World Bank, “Indigenous Knowledge and Intellectual Property Rights.”

⁵⁶ For example, see Stiffler, “Tulalips hope to join the computer age while protecting their heritage.”

⁵⁷ For example, the Union of British Columbia Indian Chiefs hosted a conference in February 2000 on “Protecting Knowledge: Traditional Resource Rights in the New Millennium.” The Spirit of the Conference Statement clearly states:

We condemn all trade in unlawfully-obtained resources or knowledge, and we will act jointly at the local, regional, national, and international levels to deprive corporations and governments of any profit from such trade through effective international legal, political and economic actions

Spirit of the Conference Statement <http://www.ubcic.bc.ca/spirit.htm>

⁵⁸ Plotnikoff, “Maddock, N.D., stays alive by going against the grain.”

⁵⁹ Asset-Based Community Development Institute, “The Capacity Inventory: How to Use this Document” <http://www.northwestern.edu/IPR/abcd/abcdcihowto.html>

⁶⁰ World Bank, “Strengthening Traditional Technical Knowledge: the Sugar Cane Wine Example.”

⁶¹ Kretzmann and McKnight, *Building Communities from the Inside Out: A Path Toward Finding and Mobilizing a Community's Assets*, and *Mapping Community Capacities*.

⁶² "Background Information on ABCD Institute Project" <http://www.northwestern.edu/IPR/abcd/abcdbackground.html>

⁶³ These guidebooks include, among other publications and guides:
A Guide to Mapping and Mobilizing the Economic Capacities of Local Residents (1996),
A Guide to Mapping Local Business Assets and Mobilizing Local Business Capacities (1996),
A Guide to Mapping Consumer Expenditures and Mobilizing Consumer Expenditure Capacities
(1996),
A Guide to Capacity Inventories: Mobilizing the Community Skills of Local Residents (1997),
See <http://www.northwestern.edu/IPR/abcd.html>

⁶⁴ *A Guide to Creating a Neighborhood Information Exchange: Building Communities by Connecting Local Skills and Knowledge.*
See <http://www.northwestern.edu/IPR/abcd.html>

⁶⁵ Opening Panel, *New IT—New Equity—New Economy* conference, Athena Alliance, Washington, DC, 1 February 2000, video available at
<http://www.athenaalliance.org/convideo.html>

⁶⁶ Kingsley, “Case Study: Appalachian Center for Economic Networks (ACEnet),” 156-163.

⁶⁷ ACEnet, *Cooperative Economic Development Strategies Replication Manual.*

⁶⁸ Jarboe, *Community Workforce Partnerships.*

⁶⁹ See <http://www.berkshireplastics.org>

⁷⁰ Regional Technology Strategies publishes a multi-volume *Networking Toolkit* available from <http://www.rtsinc.org/publications.html>

⁷¹ Meek, “Case Study: Grant County Economic Development through the Internet,” 129-133.
Also see <http://www.grantcounty.org/>

⁷² See <http://www.doc.gov/eda/>

⁷³ “Overview,” *About the Development Gateway*, World Bank
<http://www.worldbank.org/gateway/overview.htm>

⁷⁴ Ibid.

⁷⁵ See <http://www.globalknowledge.org/>

⁷⁶ See <http://gkaims.globalknowledge.org/>

⁷⁷ For a discussion of these points in the context of international development, see

Stiglitz, *Scan Globally, Reinvent Locally: Knowledge Infrastructure and the Localization of Knowledge*.

⁷⁸ See <http://www.e-gov.com>

⁷⁹ For descriptions of KM activities at the Navy Acquisition Reform Office and the Federal Highway Administration, see Weidner, “Navy ARO-All the Right Stuff,” and Burk, “KM At FHWA: The Benefits of Sharing Information.”

⁸⁰ For example, the Pacific Business Center at the University of Hawaii runs a technical assistance “circuit rider” program for Pacific Island nations and territories. Long distance communications links are an essential part of the process. See EDA, “Circuit Riders in Hawaii,” 43.

⁸¹ See Tate, “Case Study: City of Vallejo Economic Development Information System (VEDIS),” 124-128.

BIBLIOGRAPHY

Adler, Paul S. and Seok-Woo Kwon. "Social Capital: The Good, the Bad, and the Ugly." in Eric. L. Lesser, ed. *Knowledge and Social Capital: Foundations and Applications*. Boston: Butterworth-Heinemann, 2000.

Angus, Jeff. "For Some, a Solid Knowledge-Management Foundation." *InformationWeek Online*, 13 March 2000, <http://www.informationweek.com/777/knowledge.htm> (26 March 2001).

Angus, Jeff, Jeetu Patel and Jennifer Harty. "Knowledge Management: Great Concept... But What Is It." *InformationWeek*, 16 March 1998, <http://www.techweb.com/se/directlink.cgi?IWK19980316S0045> (26 March 2001).

Appalachian Center for Economic Networks. *Cooperative Economic Development Strategies Replication Manual*. Athens, OH: Appalachian Center for Economic Networks, 1998.

Asset-Based Community Development Institute, Institute for Policy Research, Northwestern University. *A Guide to Mapping and Mobilizing the Economic Capacities of Local Residents*. Evanston, IL: Institute for Policy Research, 1996.

—*A Guide to Mapping Local Business Assets and Mobilizing Local Business Capacities*. Evanston, IL: Institute for Policy Research, 1996.

—*A Guide to Mapping Consumer Expenditures and Mobilizing Consumer Expenditure Capacities*. Evanston, IL: Institute for Policy Research, 1996.

—*A Guide to Capacity Inventories: Mobilizing the Community Skills of Local Residents*. Evanston, IL: Institute for Policy Research, 1997.

—*A Guide to Creating a Neighborhood Information Exchange: Building Communities by Connecting Local Skills and Knowledge*. Evanston, IL: Institute for Policy Research, 1998.

Boisot, Max. *Knowledge Assets*. New York: Oxford University Press, 1998.

Boulton, Richard E.S., Barry D. Libert, and Steve M. Samek (Arthur Anderson). *Cracking the Value Code*. New York: HarperCollins, 2000.

Burk, Mike. "KM At FHWA: The Benefits of Sharing Information." *E-Gov Journal*, 1 March 2000, http://www.e-gov.com/egovjournal/news/index.pl?article=27&dept=services_solutions (26 March 2001).

Cairncross, Frances. *The Death of Distance: How the Communications Revolution Will Change Our Lives*. Boston: Harvard Business School Press, 1997.

Campbell, Christopher J. *Community Technology Centers: Exploring a Tool for Rural Community Development*. The Center for Rural Massachusetts, University of Massachusetts, Amherst, http://www-unix.oit.umass.edu/~ruralma/CTC_ToC.html (19 January 2001).

Cohen, Stephen and Gary Fields “Social Capital and Capital Gains or Virtual Bowling In Silicon Valley.” *California Management Review* 41, No. 2. (Winter 1999)
available as Berkeley Roundtable on the International Economy (BRIE) Working Paper #132 (September 1998), <http://socrates.berkeley.edu/~briewww/pubs/wp/wp132.htm> (1 March 2001).

Collaborative Economics. *Innovative Regions: The Importance of Place and Networks in the Innovative Economy*. (prepared for The Heinz Endowments) Pittsburgh PA, October 1999, 5
<http://www.coecon.com/HeinzRpt1099.pdf> (26 March 2001).

Competitive Broadband Coalition. See *Setting the Record Straight: The Fallacies and Realities of the Broadband Debate*. Washington, DC: Competitive Broadband Coalition, 25 October 1999, <http://www.competitivebroadband.org/> (1 March 2001).

Computer Systems Policy Project. *Ready?Set?Go!: The CSPP Guide to Global Commerce Readiness*. Washington, DC: Computer Systems Policy Project, July 1998, <http://www.cspp.org/projects/readiness/> (26 March 2001).

Davenport, Thomas H., David W. De Long and Michael C. Beers. “Successful knowledge management projects.” *Sloan Management Review* 39, no. 2 (Winter 1998): 43 (as downloaded from InfoTrac Web).

Economic Development Administration. *Cluster-Based Economic Development: A Key to Regional Competitiveness*. Washington, DC: Economic Development Administration, October 1997.

Economic Development Administration, National Forum on Economic Development, U.S. Department of Commerce. “Circuit Riders in Hawaii.” *State of the Art Practices in Economic Development for the 21st Century*. Washington, DC: Economic Development Administration, January 1999.

Economic Report of the President. H. Doc. 106-161. Washington, DC: Government Printing Office, February 2000.

Edvinsson, Leif, and Michael S. Malone. *Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower*. New York: Harper Business, 1997.

Federal Communications Commission. *Deployment of Advanced Telecommunications Capability: Second Report*. Washington, DC: FCC, August 2000.

Hazan, Maurice. *The Virtual Souk, E-Commerce for unprivileged Artisans*.

1999 Winning ICT Stories, International Institute for Communication and Development (IICD) and the Information for Development (infoDev) program of the World Bank, <http://www.iicd.org/stories/> (27 March 2001).

Hopkins, Michael S. "Zen and the Art of the Self-Managing Company." *Inc.*, 01 November 2000, http://www.inc.com/incmagazine/article/1,3654,ART20904_CNT53,00.html (26 March 2001).

Information Technology Association of America. *Bridging the Gap: IT Skills for a New Millennium*. Arlington VA: Information Technology Association of America, April 2000), <http://www.ita.org/workforce/studies/hw00execsumm.htm> (27 March 2001).

Jarboe, Kenan Patrick. *Community Workforce Partnerships*. Policy Report. Washington, DC: Progressive Policy Institute, August 2000.

Jarboe, Kenan Patrick, and Joel Yudken. *Smart Workers, Smart Machines: A Technology Policy for the 21st Century*. Washington DC: Work and Technology Institute, 1996.

Kanter, Rosabeth Moss. *World Class*. New York: Simon & Schuster, 1995.

Kingsley, Gordon. "Case Study: The Pueblo-Durango Internet Partnership." *Innovative Local Economic Development Programs*. Washington, DC: Economic Development Administration, November 1999.

—"Case Study: Appalachian Center for Economic Networks (ACEnet)." *Innovative Local Economic Development Programs*. Washington, DC: Economic Development Administration, November 1999.

Klein, Gary. *Sources of Power: How People Make Decisions*. Cambridge: MIT Press, 1998.

Knoke, William. *Bold New World*. New York: Kodansha International, 1996.

Kotkin, Joel. *New Geography: How the Digital Revolution is Reshaping the American Landscape*. New York: Random House, 2000.

Kretzmann, John P., and John L. McKnight. *Building Communities from the Inside Out: A Path Toward Finding and Mobilizing a Community's Assets*. Evanston, IL: Institute for Policy Research, 1993.

—*Mapping Community Capacities*. Evanston, IL: Institute for Policy Research, 1990, revised 1996.

Leatherman, John C. *Internet-Based Commerce: Implications for Rural Communities*. Reviews of Economic Development Literature and Practice: No. 5,. Washington, DC: Economic Development Administration, September 2000.

Liebowitz, Jay, ed. *Knowledge Management Handbook*. Boca Raton, Fla.: CRC Press, 1999.

Meek, Alfie. "Case Study: Grant County Economic Development through the Internet." *Innovative Local Economic Development Programs*. Washington, DC: Economic Development Administration, November 1999.

National Governors Association, Employment and Social Services Policy Studies Division, Center for Best Practices. *Investing Public Resources to Support Incumbent Worker Training*. NGA Issue Brief. Washington, DC: National Governors Association, 8 December 1997.

National Telecommunications and Information Administration, Technology Opportunities Program, U. S. Department of Commerce. *Community Connections: Preserving Local Values in the Information Age*. Washington DC: National Telecommunications and Information Administration, September 2000.

Neisser, Ulric. "Toward a Skillful Psychology." in D. Rogers and J.A. Sloboda, eds. *The Acquisition of Symbolic Skills*. New York: Plenum Publishing Corp., 1983, 3—as quoted in Shoshana Zuboff. *In the Age of the Smart Machine: the Future of Work and Power*. New York: Basic Books, 1988.

New Mexico State University, College of Engineering. *Assessment of Technology Infrastructure in Native Communities*. Washington, DC: Economic Development Administration, June 1999.

Odasz, Frank. "Rural Community E-Business Strategies, and Training Resources." *The Good Neighbor's Guide to Community Networking*. Lone Eagles Consulting, <http://lone-eagles.com/cnguide.htm> (26 March 2001).

Olbeter, Eric R. and Matt Robison. *Breaking the Backbone: The Impact of Regulation on Internet Infrastructure Deployment*. Washington, DC: iAdvance, 27 July 1999, and Matt Robison. *A 21st Century Internet for All Americans*. Washington, DC: iAdvance, 2 December 1999, <http://www.iadvance.org> (1 March 2001).

Panchak, Patricia. "The Future of Manufacturing: An exclusive interview with Peter Drucker." *Industry Week*, September 21, 1998:102-104, <http://www.industryweek.com/CurrentArticles/asp/articles.asp?ArticleID=277> (20 February 2001).

Peirce, Neal R. *Citistates*. Washington, DC: Seven Locks Press, 1993.

Plotnikoff, David. "Maddock, N.D., stays alive by going against the grain," *San Jose Mercury News*, 31 October 2000.

Polanyi, Michael. *The Tacit Dimension*. London: Routledge & K. Paul, 1967.

Porter, Michael. *The Competitive Advantage of Nations*. New York: The Free Press, 1990.

— “The Competitive Advantage of the Inner City.” *Harvard Business Review*, (May-June, 1995).

Putnam, Robert D. *Bowling Alone: The Collapse and Revival of American Community*. New York : Simon & Schuster, 2000.

—“The Prosperous Community: Social Capital and Public Life.” *The American Prospect*. (Spring 1993): 35-42.

Quah, Danny T. “A weightless economy.” *The UNESCO Courier*, December 1998, http://www.unesco.org/courier/1998_12/uk/dossier/intro11.htm (20 February 2001).

Rhoads, Christopher. “German Town Finds the Digital Divide More Difficult to Bridge Than It Thought.” *Wall Street Journal*, 25 January 2001, <http://interactive.wsj.com/archive/retrieve.cgi?id=SB980363685143368137.djm> (1 March 2001).

Roos, Johan, Göran Roos, Leif Edvinsson and Nicola Carlo Dragonetti. *Intellectual Capital: Navigating in the New Business Landscape*. New York: New York University Press, 1998.

Saxenian, AnnaLee. *Regional Advantage*. Cambridge: Harvard University Press, 1994.

Stewart, Thomas A. *Intellectual Capital: the New Wealth of Organizations*. New York: Doubleday, 1997.

Stiffler, Lisa. “Tulalips hope to join the computer age while protecting their heritage.” *Seattle Post-Intelligencer*, 18 August 2000, <http://seattlep-i.nwsourc.com/local/tula18.shtml> (26 March 2001).

Stiglitz, Joseph. *Scan Globally, Reinvent Locally: Knowledge Infrastructure and the Localization of Knowledge*. Keynote Address, World Bank, First Global Development Network Conference, Bonn, Germany, December 1999.

Sveiby, Karl-Erik. *The New Organizational Wealth: Managing and Measuring Knowledge-based Assets*. San Francisco: Berrett Koehler, 1997.

—*What is Knowledge Management?* March 1996. Updated 1 March 1998, 3 June 1998, 20 March 1999, and April 2000, <http://www.sveiby.com.au/KnowledgeManagement.html> (26 March 2001).

Tate, Richard. “Case Study: City of Vallejo Economic Development Information System (VEDIS).” *Innovative Local Economic Development Programs*. Washington, DC: Economic Development Administration, November 1999.

Theodore, Nikolas, and Rachel Weber. *Changing Work Organization in Small Manufacturers: Challenges for Economic Development*. Reviews of Economic Development Literature and Practice: No. 3,. Washington, DC: Economic Development Administration, September 2000.

Thurow, Lester C. *The Future of Capitalism*. New York: William Morrow and Company, New York, 1996.

Tiwana, Amrit. *Knowledge Management Toolkit: Practical Techniques for Building a Knowledge Management System*. Upper Saddle River, NJ: Prentice Hall PTR, 2000.

U.S. Congress, Office of Technology Assessment. *Technological Reshaping of Metropolitan America*. OTA-ETI-643. Washington, DC: Government Printing Office, September 1995.

U.S. National Telecommunications and Information Administration and U.S. Rural Utilities Service. *Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans*. Washington, DC, September 2000, ii, <http://www.ntia.doc.gov/reports/ruralbb42600.pdf> (26 February 2001).

Weidner, Douglas. "Navy ARO-All the Right Stuff," *E-Gov Journal*, 6 July 2000, <http://www.e-gov.com/egovjournal/news/index.pl?article=68&dept=oped> (26 March 2001).

World Bank. "Reactions: Three definitions of indigenous knowledge." *Indigenous Knowledge and Development Monitor* 6, no. 3, (December 1998), <http://www.nuffic.nl/ciran/ikdm/index.html> (26 March 2001).

World Bank, Knowledge and Learning Center, Africa Region. "Indigenous Knowledge and Intellectual Property Rights." *IK Notes*, 19 (April 2000), <http://www.worldbank.org/afr/ik/iknt19.pdf> (26 March 2001).

World Bank, Knowledge and Learning Center, Africa Region. "Reinventing Apprenticeship and Rites of Passage: An Entry into the Urban Economy in Sub-Saharan Africa." *IK Notes*, 20 (May 2000), <http://www.worldbank.org/afr/ik/iknt20.pdf> (26 March 2001).

World Bank. "Annex 1 - Preliminary Assessment of the Knowledge Economy in Korea." *Republic of Korea: Transition to the Knowledge Based Economy*. Report Number 20346-KO. Washington, DC: World Bank, 29 June 2000, http://www-wds.worldbank.org/pdf_content/0000949460007210532051/multi_page.pdf (26 March 2001).

World Bank, Knowledge and Learning Center, Africa Region. "Strengthening Traditional Technical Knowledge: the Sugar Cane Wine Example," *IK Notes*, 24 (September 2000), <http://www.worldbank.org/afr/ik/iknt24.pdf> (26 March 2001).

Yardley, Jim. "Houston, Smarting Economically From Smog, Searches for Remedies." *New York Times*, 24 September 2000.

Zachary, G. Pascal. "Megacommuters Begin to Thrive As They Head to Silicon Valley." *Wall Street Journal*, 9 September 1998, online edition.

ADDITIONAL RESOURCES

KM portals, Web sites and bibliographies

John Hokkanen and Tricia Bond, *Knowledge Management: A Bibliographic Resource*
http://www.llrx.com/features/km_bib.htm

Karl-Erik Sveiby's Knowledge Management library
<http://www.sveiby.com.au>

Burton-Jones & Associates' reading list and links
<http://www.burton-jones.com/reading.asp>
<http://www.burton-jones.com/links.asp>

Knowledge Management Portal: The WWW Virtual Library on Knowledge Management
<http://www.brint.com/km/>

Knowledge Management News
<http://www.kmnews.com/>

UT Austin's Knowledge Management Server
<http://www.bus.utexas.edu/kman/>

Knowledge Management Magazine
http://www.destinationcrm.com/km/dcrm_km_index.asp

eKnowledgeCenter
<http://www.eknowledgecenter.com/>

E-Gov Journal's Information Online list on electronic government, including knowledge management
http://www.e-gov.com/egovjournal/news/index.pl?article=19&dept=policy_process

Knowledge Management Consortium International
<http://www.kmci.org/>

Steve Denning, "New Knowledge Management Tools"
http://www.stevedenning.com/new_knowledge_management_tool.html
and *Understanding Knowledge Management*,
http://www.stevedenning.com/knowledge_management.htm

Technology and Internet assistance for organizations and communities

Techsoup.org runs a free Web site “portal” for non-profits to learn about technology at <http://www.techsoup.org>

Frank Odasz at Lone Eagles Consulting offers a guides and assistance in community networking at <http://www.lone-eagles.com>

KnowNet Weaver: an on-line tool kit for creating and maintaining Web sites
<http://www.knownetweaver.org/>

Community Technology Center’s Network (CTCNet)
<http://www.ctcnet.org/>

Other sites for information or assistance

Economic Development Administration (and EDIC)
<http://www.doc.gov/eda/>

Appalachian Center for Economic Networks
<http://www.acenetworks.org/>

Asset-Based Community Development Institute (ABCD), Community Development Program at Northwestern University's Institute for Policy Research
<http://www.northwestern.edu/IPR/abcd.html>
<http://www.northwestern.edu/IPR/abcd/abcdtools.html>

The Planning Commissioners Journal has prepared resource a guide entitled, “Shaping Our Communities: The Impacts of Information-Technology”
<http://www.internetcenter.state.mn.us/Itn-open.htm>

Regional Technology Strategies multi-volume *Networking Toolkit*
<http://www.rtsinc.org/publications.html>

21st Century Workforce Commission
eHandbook of Best Practices
http://www.workforce21.org/bestpractices_key.htm

World Bank's Global Development Gateway
<http://www.worldbank.org/gateway/>

World Bank's Indigenous Knowledge Initiative
<http://www.worldbank.org/afr/ik/>

Indigenous Knowledge Monitor
<http://www.nuffic.nl/ciran/ikdm/index.html>

KnowNet Initiative on IT in developing countries
<http://www.cddc.vt.edu/knownet/index.html>

For computer-based access to the CSPP guide, see
<http://www.cspp.org/projects/readiness/>
also available through Connected Communities
<http://www.connectedcommunities.net/>

For a similar 14-point checklist, see the Economic TeleDevelopment Forum
<http://www.geocities.com/dhdeans/>

E-commerce help
<http://www.sba.gov/classroom>

E-gov.com annual conference on knowledge management in government
<http://www.e-gov.com/>