

CAPACITY IN THE GLOBAL KNOWLEDGE ECONOMY: ASSESSMENT AND STEPS TO TAKE

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The Challenge:

Local economic development practitioners must always plan for ways to keep their cities' economies competitive in the future. There is no other way to secure economic growth and sustain or grow jobs in the community. Information and advanced technologies are increasingly important elements of a healthy, globally competitive economy. *"The application of new methods or new technologies to the production or distribution of goods and services"* is called *the knowledge economy* which offers new opportunities, products, and services. The knowledge economy is strongly linked to the creation of higher-skilled higher-paying jobs. These high-wage occupations are not distributed evenly among communities, however. Some communities are poised to help their citizens benefit from the increasing role of technology in the economy, others are ill-prepared to move forward, leaving them vulnerable to economic decline. How do you prepare a community so that it can take advantage of opportunities offered by the knowledge economy?

What is the Tool?

This tool is designed to help communities, particularly those most economically vulnerable, to facilitate development of effective knowledge economy and to create higher-skilled higher-wage jobs. It assists local community leaders and economic development professionals to paint a realistic picture of the current condition of the knowledge economy in their community by computing a Knowledge Economy Index. The tool contains background information and a discussion of key indicators of the community's capacity to compete in the global knowledge economy. The indicators are grouped into five categories or components of knowledge economy: *Knowledge Jobs, Innovation, Digital Economy, Globalization, and Economic Dynamism*. The tool identifies data that describes each of these categories. It also assists community leaders and economic developers in identifying local strengths and weaknesses that lead to

potential strategic actions to improve community's capacity to compete in the global knowledge economy.¹

HOW TO USE THIS TOOL

The Knowledge Economy Index is a “do-it-yourself” manual that makes it possible for communities to conduct an economic analysis and prioritize issues for local action. For example, if the indicators demonstrate ample access to broadband communications but lack of widespread skill or interest in using the Internet by many residents, targeted responses might include technology skills training or initiatives that support community-generated content.

OVERALL KNOWLEDGE ECONOMY INDEX

The Overall Knowledge Economy Index is calculated as a simple un-weighted average of a community's rank in five components of knowledge economy (*Knowledge Jobs, Innovation, Digital Economy, Globalization and Economic Dynamism*) utilizing sixteen individual indicators. The ranks are identified when a community is compared to some standard or the performance of other similar communities or regions; however, if such a comparison is not possible because other cities have not used the index, the city can view its own results from year to year and set a goal for annual improvement in each of the indicators. In this way, the indicators as measured by a single city will point to specific strengths and weaknesses and may suggest specific actions to improve community's competitiveness in the global knowledge economy.

The following sections briefly describe each of the five major components and the indicators within them that can assist a community in describing its local knowledge economy. Other relevant and available indicators may be useful in describing each of the index categories.

It should be remembered that data availability and reliability naturally vary significantly from community to community. The index should be viewed as a guide to community self-discovery, not a prescription. Local modifications will most likely be necessary and more often than not very appropriate for a community's self-analysis.

¹ The methodology used in this tool was originally developed by Robert D. Atkinson, et al. See, Atkinson, Robert D., Court, Randolph H. and Ward, Joseph M. *The 1999 State New Economy Index*, The Progressive Policy Institute, Washington, DC.

1. KNOWLEDGE JOBS

As knowledge and information continue to drive economic growth, providing knowledge jobs is increasingly critical for generating economic growth. The Knowledge Jobs Category is calculated as an average of a community's rank for three indicators: **Information Technology Jobs**, **Workforce Education**, and **Management and Professional Jobs**.

- **Information Technology Jobs**

Description: A thriving knowledge economy is characterized by an ample supply of jobs in information and communication technology related industries.

Information Technology Jobs are represented in the Knowledge Economy Index as *the percentage of the workforce employed* in four information technology related industries: telecommunications, computer systems design and related industries, information services and data processing services and cable networks and program distribution.

- **Workforce Education**

Description: To compete in the knowledge economy, a community must offer an innovative, well-trained workforce. One common measure of the level of training among a modern workforce is a college education.

Workforce Education is represented as *the percentage of people over age 25 who have completed a bachelor's degree or higher*.

- **Management and Professional Jobs**

Description: As economic growth continues to shift toward information and service related industries, an important set of knowledge based occupations are managerial, professional and related knowledge occupations.

Management and Professional Jobs are represented as *the percentage of the workforce aged 16 and over employed* in managerial, professional, and related occupation categories.

2. INNOVATION CAPACITY

In a knowledge economy, the ability of communities to transform new ideas into economic opportunities is critical to continued vitality. The Innovation Capacity Category is calculated as a simple average of a community's rank for five indicators: **High Technology Jobs**, **Venture Capital Firms**, **Patents**, **Engineers**, and **Bioscience Jobs**.

- **High Technology Jobs**

Description: The prevalence of jobs in industries that rely on advanced technologies can reflect the degree to which a community is participating in the leading edge of economic activity.

High Technology Jobs are represented as *the percentage of the workforce employed* in one of seven industries representing high technology firms: Computer and Electronic Product Manufacturing; Software Publishers; Cable Networks and Program Distribution; Telecommunications; Information Services and Data Processing Services; Computer Systems Design and Related Services; and Scientific Research and Development. For each community, the combined number of jobs in the high technology industries was divided by the total number of jobs to determine the percentage of the workforce employed in such jobs.

- **Venture Capital**

Description: In an economy that relies on innovation for growth, the fiscal capacity for supporting innovative business enterprises is critical. Geographic proximity to venture capital firms is an indicator of a community's access to the necessary capital for innovation to take place.

Venture Capital is represented by the *number of venture capital firms* in a community.

- **Patents**

Description: In today's economy innovation and intellectual capital are crucial for continuing success. The number of patents generated by research and development activity is an important measure of innovation.

Patents are represented as *the number of patents registered per 100,000 population*.

- **Engineers in the Workforce**

Description: Professional engineers comprise a high-wage, high-skill occupation category, and therefore can serve as an indicator of the level of innovation of a community's workforce and industry base.

Engineers are represented on the basis of *the number of professional engineers per 10,000 workers*.

- **Bioscience Jobs**

Description: Bioscience firms comprise a business sector that relies on scientific innovation. The location of such firms and employment opportunities can indicate the degree of innovation evident in a community's economy.

Bioscience is represented as *the total number of employees in bioscience firms with headquarters in the community*. Bioscience firms are such industries as: Medicals/ Botanicals , Pharmaceuticals , Diagnostic Substances, Biological Products except Diagnostic , Research and Development in the Life Sciences.

3. DIGITAL ECONOMY

New technologies facilitate the increasingly rapid communication of ideas and exchange of information. Economic development relies on effective uses of such technology by citizens, governments, and businesses. The Digital Economy Category is calculated as an average of a community's rank for three indicators: **Internet Use**, **Digital Government**, and **Cable Modem Access**.

- **Internet Use**

Description: In an economy in which the Internet is increasingly used for both social and commercial transactions, the extent to which residents use the Internet is one indicator of a community's integration into the digital economy.

Internet Use is represented as *the percent of residents who use the Internet at least three times per week*.

- **Digital Government**

Description: Residents and businesses increasingly expect local governments to provide information and services online. In a knowledge economy, local governments with an online presence may be at a distinct advantage in attracting and retaining people and firms.

Digital Government is represented as *the percentage of local governments (city, village, township, county) that have a website*.

- **Cable Modem Access**

Description: In a digital age, access to a high speed information and communications infrastructure is essential for advancing the knowledge economy. One measure of a community's telecommunication infrastructure is the extent to which residents and business firms have access to broadband technologies including DSL and cable.

Cable Modem Access is represented as *the geographic extent of cable modem access within each community*.

4. GLOBALIZATION

To be competitive in the new economy, cities and regions must operate in the global economy. The Globalization Category is calculated as an average of a community's rank for two indicators: **Firms with Foreign Parents or Investments** and **Exporting Firms**.

- **Firms with Foreign Parents or Investments**

Description: To succeed in a global market, communities must have a strong global presence. One measure of this globalization is the number of firms with foreign parents or investors.

Firms with Foreign Parents or Investments are represented as *the number of firms* registered as having foreign parents or investors (can also be computed as *a share in total number of firms*).

- **Exporting Firms**

Description: One important measure of how fully a region participates in the global economy is the extent to which its firms export goods to foreign markets.

Exporting Firms are represented as *the number of firms* engaged in production for export (can also be computed as *a share in total number of firms*).

5. ECONOMIC DYNAMISM

In an environment marked by rapid changes, adaptation to a new environment is crucial. Such adaptation is often evidenced by "churn" in the workforce, as new jobs replace old jobs in the economy, and new enterprises form and aging enterprises transform themselves. The Economic Dynamism Category is calculated as an average of a community's rank for three indicators:

Manufacturing Employment Change, Service Sector Employment Change and **Sole Proprietorship Employment Change**.

- **Manufacturing Employment Change**

Description: Manufacturing employment has historically provided a significant share of the high wage jobs in older industrial regions. In a knowledge economy, rapid change in the employment mix across sectors is often evident, and economic transformation in a local economy may depend on harnessing the opportunities this rapid change may present.

Manufacturing Employment Change is represented as *the absolute percentage change in jobs* in the manufacturing sector during the recent 5 years.

- **Service Employment Change**

Description: One characteristic of the knowledge economy is a shift from a manufacturing to a service economy. The rate of change in the number of service sector jobs is one factor to consider in seeking understanding the implications of a rapidly changing economic environment.

Service Employment Change is represented as *the absolute percentage change in jobs* in the service sector during the recent 5 years.

- **Sole Proprietorship Employment Change**

Description: In a knowledge economy, innovation and entrepreneurial activity are viewed as increasingly significant. One outcome of the entrepreneurial culture is an emphasis on businesses operated as sole proprietorships.

Sole Proprietorship Employment Change is represented as *the percentage change in the number of jobs* in firms classified as sole proprietorships during the recent 5 years.

What Is Next?

When the overall Knowledge Economy Index is computed, it can be used by a community as a marketing tool in attracting new technology-intensive businesses or as a reference point in strategic planning. For example, if a community shows high numbers in a given category, it should advertise that fact to potential high-technology investors. The index is also useful at the stage of action planning for economic development. When a community knows which component of knowledge economy has the lowest ranking, it targets its development efforts on this component, and can measure its progress in the future. For example, if a community lacks well educated labor force, it can establish a scholarship or student loan program which is conditional on student's return to the community after graduation. Examples of other actions to upgrade the components of knowledge economy are presented later in this tool.

Results and Potential Must be Evaluated Against the City's Characteristics

Technology-led economic development offers enormous potential for those individuals and communities who are creative, talented, have a modern IT infrastructure, and have the foresight to plan for the new economy. Previous research has revealed that planning for the information and communications technology infrastructure, workforce development, and other components of knowledge economy, was often not incorporated into the traditional economic

development planning at the local and regional levels. The Knowledge Economy Index presented here can assist local, regional and national leaders and economic development practitioners to be better prepared to compete in the global knowledge economy and to plan their economic development actions strategically.

For publicly funded technology-led economic development to have a broad economic impact beyond just creating a few highly-skilled, highly-paid jobs for professionals in gifted communities, economic development practitioners and public policy officials must have a basic grasp of the creative process that supports innovation and commercialization. This creative and commercialization process can be described as the innovation-commercialization continuum (Figure 1). Current practice suggests that in the early phases of conceptualizing and prototyping an innovation, it is often critical for the “inventor” to be near a university/research institute where the necessary intellectual mass (human capital), technological infrastructure, financial capital, and creative environment are in place to support the incubation of a new idea/method.

Figure 1. The Innovation-Commercialization Continuum



While regions may have a number of public and private higher education/research institutions, many communities do not have this historic intellectual infrastructure. As a result, for many communities the strongest economic development opportunities in technology-led development will most likely be in the later phases of the innovation-commercialization continuum. Once the innovation has been prototyped and is ready for commercialization, the routine production of the new “product” can conceivably occur anywhere that a labor force, transportation/information system, business environment, and community amenities are conducive to the production. At this point in the continuum, incubated inventions can actually shop globally for a production home.

Communities without a university or technology center can compete for the jobs related to technology in later phases of the product life-cycle. These communities must pursue strategies designed to enhance their competitive advantage in a technology driven economy and improve their features that would attract and develop industries in the knowledge economy. Communities with the desired

infrastructure, labor pool, amenities, quality of life and other factors can and do compete for the high-skilled high-wage jobs in the global knowledge economy.

This emphasis on the knowledge economy complements existing economic development efforts such as small business development and retention, manufacturing retention and expansion, and capital asset development that are ongoing in many communities throughout the world.

Steps that Can be Taken to Improve the Results on the Index

Following is a checklist of activities that a community might undertake to improve its status in the knowledge economy. If the index shows weaknesses, a community can target its actions to improve in certain categories of the knowledge economy. It should plan these as parts of long-term strategic objectives.

Planning for Knowledge Jobs

- Emphasize education! In the knowledge economy, an educated citizenry is critical to success. If a community does not get smarter it **will** get poorer.
- A community should provide educational opportunities across the life-span of the workforce.
- Begin with early childhood development with a seamless transition to school, higher education, career development and retraining programs.
- Establish a business/education roundtable as a regular forum for businesses to discuss education and training needs and for education to discuss program challenges, curriculum options and resources.
- Develop “technology education centers” designed to train participants on relevant technologies of interest to the local community (see in this volume).
- Recapture high school graduates that leave the area for higher education through strategies such as forgiving student loans, promote local alumni networks, and welcome home events.

Planning for Innovation

- Establish a technology business incubator.

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- Create flexible investment funds to make capital available to emerging enterprises/ technologies/entrepreneurs.
- Support an entrepreneurial environment that values risk takers and innovators.
- Provide broadband access.
- Host business/community “innovation fairs”.
- Provide patent assistance.
- Establish links to higher education technology centers in your region to facilitate the location/expansion of innovative enterprises to your community (see in this volume).
- Establish a “speaker’s bureau” of informed community leaders who can help spread the word on the global knowledge economy and its potential challenges and opportunities for your community.
- Create a “technical assistance network” that can provide low or no cost preliminary consultation to local businesses on incorporating technology within their enterprise.

Planning for a Digital Economy

- Link homes, schools, businesses and government to the global Internet and to each other.
- Create a community/business/government web presence.
- Provide broadband access where currently not available.
- Provide wireless access where appropriate.
- Provide non-formal adult education programs for residents on the global communications network.
- Map your community’s global communications network.
- Use digital communications to support democratic governance in you community.
- Provide technical and financial assistance for residents and businesses to improve and expand their access to the digital economy.
- Require “open capacity” on any fiber optic infrastructure that is constructed, which may be used in the future to expand your e-commerce capacity.

Planning for Globalization

- Facilitate export trade and global markets for existing products and services in your community.
- Identify existing exporting firms and identify related local industries that may also export to similar markets.
- Consider attracting foreign based firms to your community in strategic and complementary industries.
- Link to foreign trade zones in your region.
- Identify and describe your community's global transportation capacity and share that with your local businesses.
- Identify and celebrate local ethnic/cultural heritages (see in this volume) and explore possible international social capital opportunities.
- Conduct an "Industry Cluster Analysis" to assess possible global linkages and opportunities.
- Organize and conduct training for key industry personnel and entrepreneurs on international trade and working in a culturally diverse economy.

Planning for Dynamism

- Establish effective communications amongst firms to **anticipate** change and develop responses (see in this volume).
- Support transition strategies for your community's workforce.
- Identify "new enterprises" in your community to assess potential emerging trends in your local economy.
- Implement "safety net" strategies for displaced workers and families to reduce personal stress and improve retention of skilled workers.
- Run business "birth announcements" in the local newspaper.
- Support strong entrepreneurial development programs to help new businesses form and expand locally.
- Provide access to a variety of types of capital for businesses.

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- Build or rebuild “flexible space” environments that can be reused for a variety of production and services.
- Support local business incubator programs (see in this volume).
- Identify leakages in the local economy that may provide opportunities for business development.
- Examine alternative forms of business ownership in potential business closures.