The Catalysts for Intellectual Capital 2020

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Regional Development Via Innovative Networks

Leading from the Confluence

The Catalysts for Intellectual Capital 2020 (CIC2020)

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Mihir Desu

Mathematical Sciences

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Introduction:

For a large portion of the 20th century, the U.S. economy was industrially based. Communities were formed around industrial centers and universities "played a secondary role…, providing trained personnel and basic research (Etzkowitz et al., 2008)." Now in the knowledge-based economy, regional economic development objectives, such as increased productivity through innovation and quality of life, can only be achieved through the assessment of available resources, technology and core competencies. "The university plays an increasing prominent role [in this by] contributing the basis on which new industries and firms are built (Etzkowitz et al., 2008)."

At present, there is a new global challenge facing America's communities. The onslaught of new technologies combined with the new wave of globalization has given birth to the "global innovation economy." The only communities showing sustained growth in this economy are those that are strong innovators.

"History should be our guide. The United States led the world's economies in the 20th century because we led the world in innovation. Today, the competition is keener; the challenge is tougher; and that is why innovation is more important than ever. It is the key to good, new jobs for the 21st century. That's how we will ensure a high quality of life for this generation and future generations. With these investments, we're planting the seeds of progress for our country, and good-paying, private-sector jobs for the American people."
-President Barack Obama, August 5, 2009

While natural resources and capital were important for yesterday's industrial economy the driving force of today's global economy are innovative ideas (Table 1). Due to the rapid pace of the global economy, many communities are uncertain how to respond. They have experienced the loss of large employers (e.g. IBM from Binghamton), who moved most of their operations overseas. As such these communities are forced to reinvent their economic development models.

Table 1. Comparison of Industrial and Knowledge based economies

	Industrial Economy	Knowledge Economy
Raw Materials	Natural resources, Labor, Capital	Ideas
Customer Focus	Mass production	Mass customization based on information technology and product design
Organization	Large Corporations, Economies of scale	Entrepreneurs, Networks; University-Industry-Government relationships
Success Factor	Labor, Quality, Low cost, Stability, Control	Talent speed, Innovation, Flexibility, Customization

This transition to the innovation-driven economy emphasizes the importance of building intellectual capital and the commercialization of this capital into new products and services. These products and services can then capture a premium in the world markets, enabling regions to create value and meaningful jobs. This success depends on maintaining a technological lead, a deep vein of creativity and a myriad of networked people who are great inventors, innovators and entrepreneurs.

"The first 100 years of our country's history were about who could build the biggest, most efficient farm. The second 100 years were about the race to build efficient factories. The third 100 years are about ideas." ***Seth Goldin in Fast Company***

It should be pointed out that the world's competitors and collaborators are not cities, states and countries per se, but regions. The nature of industry, labor markets, institutions of knowledge generation and infrastructure define the economy of a region. For example, the key competitors in India and China, respectively, are state of Bangalore and metropolitan areas Shanghai and Guangzhou.

Although the impact of globalization on differs amongst regions in America, each is facing the same challenge. The challenge is to devise the best strategy in response to the rapid and profound changes of the innovation-driven economy. All regions have goals to increase the quality of life and standard of living. As such regions are being thrust into the competition for talent, capital and technology. Success in midst of this competition requires comprehensive economic planning. This planning entails determining the region's core competencies, resources, long-term comparative advantage and formulating priorities and strategies by which the objectives can be met.

> *"Globalization has fundamentally transformed the American economy. Regions—defined by economic rather than political boundaries—are the new building blocks of prosperity… In the 21st century, America's communities will derive economic strength by acting regionally to compete globally. Innovation and entrepreneurship are the new engines of job creation, productivity, growth and economic prosperity and healthy communities."* ***Report of the Strengthening America's Communities Advisory Committee, July 2005.***

The importance of economic prosperity should also be noted as it helps create the conditions for a healthy community. Benjamin M. Friedamin explains in his book ***The Moral Consequences of Economic Growth,***

> *"Economic growth—meaning a rising standard of living for the majority of citizens—more often than not fosters greater opportunity, tolerance of diversity, social mobility, commitment to fairness, and dedication to democracy."* In contract, when an economy stagnates, *"the resulting frustration generates intolerance, ungenerosity, and resistance to greater openness of individual opportunity."*

In other words, it is imperative that a region should develop an innovation driven sustained economic development plan that transforms the region into a productive framework in which everyone contributes and from which everyone receives benefits accordingly.

The Importance of Innovation for Economic Development:

The development of new ways to integrate knowledge, new products, processes and services can be called innovation. For regional economic success in a global economy, innovation

is the crucial weapon in the arsenal. As global competition erodes our traditional practices, the key to developing more jobs and more prosperity will be to create and deploy new products and processes.

Irrespective of the industrial sector, innovation is indispensable for creating new jobs and retaining the current jobs. The job growth that we have witnessed in the U.S. for the past couple of decades can be attributed to innovations in fields such as semiconductors, nanotechnology, life sciences, and alternative energy. In addition, our past innovations have contributed to an increase in our standards of living and made us more productive. To extend our productivity gains and counteract the effects our current recession, we should redouble our efforts towards technological innovation in products, services and processes

An innovative economy is at the core of regional vitality and quality of life. Without an innovative economy, any gains in social inclusion, livable community and collaborative governance are short-lived. An innovative economy facilitates regional vitality and quality of life through investments in educational systems, and the development of community infrastructure and amenities.

Finally, the challenges facing the world, such as a dependence on fossil fuels, environmental degradation, affordable drinking water, can only be solved by innovations in technology.

Evolving Nature of Innovation:

In the knowledge economy, to achieve economic and community success, regions (with a given set of industries) have to compete on the basis of increased productivity through innovation and not based on simple costs. In fact, there is no such thing as a "high tech or low tech" industry anymore, only innovative and non-innovative. Innovative ideas generate economic growth by reorganizing resources (natural, human and capital resources) in more efficient and productive ways.

According to the Pew Center on the States and the National Governors' Association (*Investing in Innovation, page 16*), there are four major ingredients that are necessary for the recipe of innovation:

- ***Expertise****—New discoveries, new knowledge, and new insights come from all people who are given the resources necessary for success.*
- ***Networks (Interaction)****—Face-to-Face is still very important for the exchange of ideas and synergy that creates new business models, marketing plans, or products.*
- ***Diversity****—Ideas will only get better when they are openly discussed and considered by a mix of people with a variety of research fields, backgrounds, approaches, and mindsets.*
- ***Application****—Ideas are useless unless used. The true proof of their value is in commercialization.*

Innovations are often unpredictable and disruptive; they do not occur in a straight line from research lab to development to commercialization.

> "*Innovation is often surprising and unexpected because the process by which new ideas emerge is serendipitous and interactive…. Interlocking threads of ideas, people and events are woven into a web of knowledge and – bingo – we get today's world of science and technology.*" ***–James Burke—British historian***

> *"New technologies set off a burst of innovation. Innovation, however, is not evenly distributed through time; it appears in groups or bunches. Entrepreneurs financed by credit make investments in the new technologies. If these innovation investments are successful, imitators follow and the economy embarks on an upward surge: prosperity. Then, an avalanche of goods falls on the market and dampens prices, rising costs squeeze profit margins, and the economy contracts: recession. Recessions are the normal process of adapting to the bunching of innovations during the preceding prosperity." (**Schumpeter, 1934**)*

The Importance of Collaboration and Networks for the Development of Innovations:

In an innovation economy the unit of innovation is the 'network;' ideas flow more freely within the networks and speed up the transformation of invention to innovation. This process is accomplished by tearing down traditional walls like those that once separated public institutions from private institutions, education from business and large firms from small firms.

> *"The new hybrid model, sometimes called "co-opetition," means that individuals and companies can compete ferociously, but collaborate at the same time to create knowledge. Through a wide variety of formal and informal relationships, networks organize the sharing and distribution of knowledge."—**www.innovatecalifornia.net***

Navi Radjou of Forrester Research has also described the emergence of the "global innovation networks model." Driving this model are four kinds of collaborators:

> *"Under the global innovation networks model, inventors serve as the intellectual powerhouses that conduct basic science research and/or design products and services that results in patentable inventions. Transformers provide multifunctional production and marketing services that convert inputs from inventors or other transformers into valuable business innovations for either internal or external customers. Financiers provide funding for both inventors and transformers, usually in return for intellectual property rights. Brokers serve as the matchmakers or facilitators in this system that find and connect the other three network entities . . . The global innovation networks model is a collaborative*

*ecosystem that allows businesses to innovate faster and grow more quickly." --**Bay Area Innovation Network Roundtable, pp. 6-7.***

The world-wide limited supply of innovative talent and the demand for innovation are the primary reasons for the emergence of such innovation networks.

"*A recent Forrester report suggests that more than processes and tools, talent will determine the winners.*"

Therefore, it can be argued that sustainable economic, social, and environmental innovation is the product of collaboration and networks rather than the lone inventor, the inspirational community leader, or the single policy initiative.

The Importance of the Region for Innovation:

Since networks are at the heart of innovation, it easy to understand the importance of having short geographical barriers between network components. The geographic clustering of innovative people, companies, academic institutions, research laboratories and government institutions is the most dominant mechanism for distilling ideas quickly and efficiently. When the components of a network are in the same place, this proximity increases the effectiveness of sharing knowledge, ideas, information, skills and experience.

Face-to-face interactions, between people of different educational backgrounds, accelerate the generation of innovative ideas and their implementation as innovations. Face-to-face interaction remains important in the Internet age.

"Although electronic communication is important, it is not a substitute for the trust, sharing, and intense interpersonal interaction essential for the innovation process. For this reason, the creative heart and soul of the economy (where the action is) will continue to be tied to place. Ultimately, place matters because people matter. Talented and creative people want to be where the action is, where their ideas stand the best chance of coming to fruition. Innovation is both place-based and globally-connected at the same time."
www.coecon.com/Reports/.../**INNOVATION**/InnovativeRegions.pdf

*"We are in urgent need of new concepts to explore how innovation works as an emergent, global, networked social phenomenon . . . an expanded palette of social and community networks, connecting players regionally and globally to find needed resources on a worldwide basis. Entrepreneurs can now go global through such mechanisms, which connect them to potential partners, markets, or manufacturing in any other part of the world. Such brokering and facilitation mechanisms also link clumps of small and high-growth, science-based companies to their counterparts around the world." **John Kao, Innovation Nation, p. 190, 195.***

Regional capabilities also matter—especially to companies that are innovation-based. William F. Miller of Stanford University has explained the imperative of "regional habitats" in innovation-driven economic development:

> *"What works? What is effective are "people and place" policies. What does not diffuse away quickly are infrastructure and workforce. Although a few key people may be mobile, large numbers of the workforce are not mobile. Polices that support the education and training of the workforce, that support research combined with education, that support a modern infrastructure, and support the development of institutions that facilitate collaboration between business, government, and the independent sector will have lasting effects of building capacity that does not diffuse away. Develop the people and places—the habitat for living and working." -**Regionalism,Globalism, and the New Economic Geography, p. 15.***

Key Ingredients for Regional Innovation Economy:

Social, economic, and environmental factors are important for regional innovation. Regional assets include: innovative companies, human capital with education, skills and creativity, entrepreneurial universities, mechanisms to promote effective public and private partnerships and communities with quality environment.

For promoting a robust innovation and strengthening their ability to compete in the global marketplace, regions should focus on innovation-driven economic models not on cost-driven economic models. The key differences between these models are described in Table 2.

Table 2
(Adapted from Bay Area Innovation Network Roundtable)

Key Characteristics	**Cost-Driven Economic Development Model**	**Innovation-Driven Economic Development Model**
Focus	Domestic competition Zero sum game	Global competition and collaboration Positive sum game
Logic	More inputs (land, labor, capital) create more output The lower the costs of inputs, the higher the profitability of outputs	More efficient and innovative use of higher-value inputs (physical, human, knowledge resources) creates more profitable output

Goal	Growth of jobs	Increasing productivity and per capita income
Approach	Incentives to attract or retain cost-driven firms and industries	Investments in talent and infrastructure to support innovation-driven clusters
Role of economic development practitioners	Lead industry attraction and marketing efforts to firms and industries	Broker innovation networks, connecting inventors, financiers, and transformers, to produce results
Performance metrics	Quantity of jobs, number of firms attracted/retained	Quality jobs, wage and income growth, innovation (e.g., patents, commercialization, start-ups, etc.)

Innovation-Driven Economic Model:

Henry Etzkowitz argues, in his recent book entitled "*The Triple Helix*," that any innovation driven economic model for knowledge-based society should be based on the multiple, reciprocal and intertwined relationships between academia-industry-government.

> *"This Triple Helix intersection of relatively independent institutional spheres generates hybrid organizations such as technology transfer offices in universities, firms and government research labs and business and financial support institutions such as angle networks and venture capital for new technology based firms that are increasingly developing around the world."*
>
> *The Triple Helix describes this new innovation model and assists students, researchers, and policy-makers in addressing such questions as: How do we enhance the role of universities in regional economic and social development? How can governments, at all levels, encourage citizens to take an active role in promoting innovation in innovation and, conversely, how citizens can encourage their governments? How can the firms collaborate with each other and with universities and government to become more innovative? What are the key elements and challenges to reaching the goals?"*

Navi Radjou of Forrester Research has described four kinds of people key to the innovation process:

> *"Inventors serve as the intellectual powerhouses that conduct basic science research and/or design products and services that results in patentable inventions. Transformers provide multifunctional production and marketing services that convert inputs from inventors or*

> *other transformers into valuable business innovations for either internal or external customers. Financiers provide funding for both inventors and transformers, usually in return for intellectual property rights. Brokers serve as the matchmakers or facilitators in this system that find and connect the other three network entities."* ***--Bay Area Innovation Network Roundtable, pp. 6-7.***

Although innovation brokers, inventors, transformers and financiers are all important in making the region innovative, one could argue that innovation brokers (individuals who have strong networks and relationships with researchers, engineers, innovators, transformers and investors) play a major role.

The major steps that need to be completed for transforming the region into an innovation hub include: 1) identification of regional institutions of innovation, 2) development networks within these institutions of innovations, 3) development of triple helix relations between academia, government and industry, 4) defining the metrics for economic development success.

> *"Research and experience have shown that not only assets like talent, capital, and physical infrastructure, but regional networks, culture, and community quality of life are critical cornerstones for regional innovation. Regional innovation brokers must analyze not only the assets, but the networks and culture of innovation that translates assets into economic and community benefits. And, they must focus on the community quality of life that is critical to the people who drive innovation."*

Based on our research, outlined below is an innovation-driven economic model (Figure 1) for regions whose goals include meaningful jobs and quality of life through sustainable innovative economy.

There are three major parts to the model:

1) regional assets,
2) strategies and
3) goals.

As pointed out in the introduction, regions need to assess their assets first. These assets include:

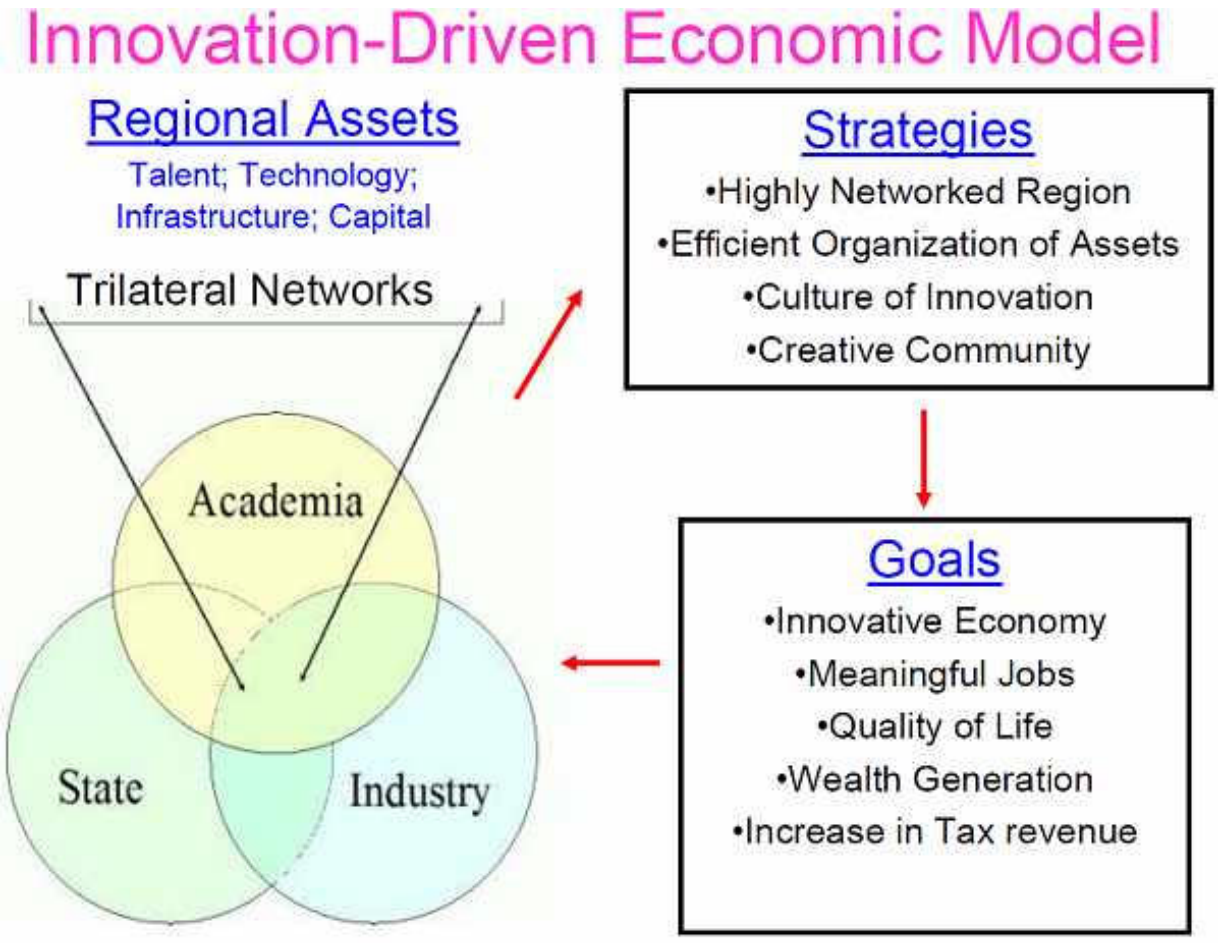
a) regional talent,
b) technology,
c) infrastructure and
d) the availability of capital.

The trilateral networks that exist in the triple helix relationships between academia, government (state), and industry influence these assets.

The region should also be very clear about its economic development goals (e.g. innovative economy, meaningful jobs, quality of life). Depending on the strength of the their assets and their goals, regional strategies to implement this model should be decided. This plan cannot be stagnate though as it should evolve and adapt with the changes in the region because assets and the strengths of region do change with time.

Another important factor that should be pointed about the model is that there exists a feedback loop between assets, strategies and goals, as indicated by the arrows. As tax collection increases in the region, regions can reinvest those resources in the networks, thus improving the asset base.

Figure 1: Proposed Innovation-Driven Economic Model



The Binghamton Region:

Binghamton University, in addition to its traditional roles of workforce development, and the creation of knowledge creation needs to emphasize its efforts on knowledge commercialization (e.g. invention disclosures, patenting, licensing, entrepreneurial spin-offs), 4) creation of innovators and entrepreneurs, attracting global talent and serving as an incubator for innovation.

Optimum Role of Regional Government—Regional science and technology policy should tailor to the regional industry background and research intensity of the region. They should support a research center that addresses some of the long range problems of these firms. Provide incentives to the university to develop a more flexible networking/interacting system with local firms. Promote a change in values of regional economic development organizations from a focus on subsides to firms to enhancing conditions for knowledge based economic development. They should create venues that bring people, from industry and university and government, for the purpose of generating new strategies and ideas.

21st century thinking is highly dependent on complex thinking and network theory. Networks are abstract concepts that can be generalized and incorporated into just about every aspect of our life. Take friendship for example. It is a well known fact that some people get along better with others. This social network can be looked at as a system with nodes, and and the connectivity of these nodes which can be referred to as links. Nodes represent the components of a network so in the case of the friendship model they would be individuals and the links are represented by how friendly one individual is to another. These links are dynamic and can be represented by weights because some people are just more friendly with others.

Another example of where network theory is commonly applied is biology