Five Centers for Regional Innovation

Industry Clusters in Local Economic Development

Acknowledgements

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Executive Summary

The field of economic development constantly evolves, as does the world of business. The successful economic developer manages to link strategies with those variables influencing the business community as it evolves. This report examines five Centers for Regional Innovation projects supported by the Economic Development Administration in different regions to highlight successes and best practices. By analyzing successful approaches to supporting economic development in five different regions, each in a different state, and each with different circumstances, practitioners can learn why it's important to evolve, keeping pace with the needs of the communities they serve.

The commonality between the five case studies included in this analysis was the criteria set out by EDA's Austin Regional Office – innovation and clusters. But in each case, these were tackled using strategies that were well suited for that region. This report reinforces why economic development is rarely achieved with "off the shelf" strategies but rather, a methodical process that assesses the opportunities against the assets, the gaps, and the resources necessary.

In Arkansas, the approach was a good lesson on how to get started. The UALR's work focused on how best to assess the potential for innovation among existing clusters of businesses and to look at those variables that would matter in their state – availability of workers needed for knowledge-based jobs and the presence of infrastructure, particularly broadband. Their process provided a thorough analysis of the presence of businesses with innovation potential, the gaps in systems needed to support these businesses, the measures for gauging progress, and the strategies for building on growth potential in existing clusters.

Despite considerable skepticism about economic development's ability to start new clusters, The Pecan Street Project in Austin attempted exactly that. With all of the right stakeholders involved, it was evident that Austin had the potential to develop a new cluster, a hybrid between clean energy technology and communications, with a focus totally on innovation. The strategy for this project involved nudging along the non-profit responsible for Pecan Street, so the gathering of resources and industry support would enable the marriage of residential energy consumption with digital smart grid systems capable of monitoring that consumption in smaller time increments than had been done before. This cluster will grow as much as innovation continues, linking more types of energy generation and uses with IT systems.

In Tulsa, the case study shows best practices for growing an industry cluster, in this case, Information Technology/ Software. The i2E not-for-profit investment corporation is not called a business incubator, but certainly succeeds as one, providing a menu of services designed to help early stage businesses identify new opportunities. This case fits the concept of economic gardening, a less frequent but very important strategy for an economic development program, which understands the importance of growing the businesses already active in a community. The Tulsa project worked at growing human capital and entrepreneurial capacity but most importantly, it networked all the stakeholders together to realize this as an organized cluster with inner support mechanisms.

The New Orleans case presents a great lesson in economic development – how to leverage assets in line with your business goals. Often an economic developer is faced with finding a building for a business; in this case, they were seeking businesses for a building and this is also an important capability, particularly for areas being redeveloped. Using a targeted approach to increasing the presence of advanced manufacturing, this project also integrated a strategy for commercialization opportunities and the linkages between the business community and universities in the region. In addition to finding targeted tenants for a specific building, the project brought together and formalized relationships across a multi-disciplinary group of players to support ongoing growth and innovation in the advanced manufacturing space.

Albuquerque's project explored several types of economic development activities, ranging from industry cluster support to micro-business development. This represents a holistic approach to make sure every seed is fertilized. The project focused on getting the basics right and addressing known needs in their community, working to identify resources, build capacity online, conduct outreach and marketing, and promote a wide variety of local businesses.

Rather than focus on the promotion of a single cluster, this region's approach involved a series of smaller initiatives designed to optimize existing economic activities taking place in that community to build growth momentum.

Key Lessons Learned

1. **Informed analysis is key**. Compiling economic data and speaking with businesses and community leaders is a key component of an economic development strategy. Attempting to create or support an industry cluster without first analyzing the available information is putting the cart before the horse.

2. **Partners are essential**. Successful and innovative clusters are ones with strong linkages between firms, across industry sectors, and with the academic community. Economic developers can play an essential role in creating and strengthening the linkages that exist in a community to support innovation.

3. **To better understand a cluster in your community, look at the value chain**. It is not enough to have a bunch of companies in a sector. Rather, good economic development involves identifying gaps in the value chain associated with production in a given cluster. Working with partners to address those gaps can create substantial growth and innovation in a cluster.

4. **Innovation and cluster support activities look different in different places**. In economic development there is really no substitute for understanding and responding to the needs of the local community. Simply attempting to copy what worked elsewhere because it worked there is only a safe strategy if your community is exactly the same as that one – and that's never the case.

5. **Clusters are constantly dying and being reborn**. The lifecycle of a cluster is a natural phenomenon. Economic developers can serve their communities by aiding the innovation process that drives growth of new and existing clusters. Apply existing assets and capacities in innovative ways to spur growth, rather than focusing exclusively on existing sector strengths.

6. **A cluster, for as much as we like to be engaged in the trending strategies for economic development, is fundamentally just a grouping of businesses whose sum is greater than the parts**. At the end of the day, use of innovative strategies will be the best insurance to keep those businesses viable.

Introduction

In 2009, the Economic Development Administration funded five Centers of Regional Innovation Projects, designed to bolster economic development and growth through innovation. This report outlines in case study form, the courses taken by each of the five Centers for Regional Innovation, highlights key outcomes from those efforts, and catalogues lessons learned. Additionally, for each community where a Center for Regional Innovation project was conducted, data are presented to highlight the presence of local clusters and the nature of the economy for the communities in question.

This report also builds on those case studies with a broader examination of clusters as an economic development paradigm. With an eye toward local economic developers, the first section of this report analyzes the nature of cluster development, support for existing clusters, the lifecycle of clusters, measuring cluster strength, cluster resilience, and more.

Part I: Overview, Theory and Influence of Cluster Lifecycles and Their Role in Economic Development

As communities adjust to an uneven recovery from the Great Recession and shifting labor market trends in a post-recession economy, many have shown strong interest – along with federal- and state-level partners - in identifying and promoting new ways of supporting broad-based and resilient economic growth. Much of this effort has centered on 1) supporting a region's capacity for innovation in its commercial and entrepreneurial activity and 2) the development and growth of industry clusters, which can have long-term beneficial impact on a regional economy with the incorporation of innovation. While industry clusters as well as innovation have been studied for many years, both separately and with respect to their relationship to one another, there is considerable need for more information as it relates to applying theory in communities to strengthen innovation environments and produce competitive industry clusters.

The purpose of this study is to summarize the application of innovation in economic development tools and business development activities by five regional economic development organizations in Albuquerque, Austin, New Orleans, Tulsa, and University of Arkansas Little Rock (on behalf of RDOs in the state). The Centers for Regional Innovation Projects, funded by the U.S. Economic Development Administration Austin Regional Office in 2009, provide an opportunity to consider the viability of clusters as well as the application of innovation when undertaking an economic development strategy based largely on industry clusters at a local or regional level, with a special focus on how the life cycles of a cluster can predict long-term success of this economic development strategy.

The Definition and Study of Clusters

There are many different ways to define clusters. Michael Porter, a prominent figure in the development of cluster theory, defines clusters as groups of industries related by knowledge, skills, inputs, demand, and other linkages in a region (Porter, 2003). In other words, clusters are geographically-defined sets of like firms (e.g., firms producing similar products), firms engaged in similar activities (e.g., firms co-locating R&D facilities to be near talent), or firms related through input supplier relationships (e.g., firms that buy from and sell to each other).

The study of clusters draws heavily from the economic literature on agglomeration economies. Agglomeration economies refer simply to the benefits that firms get by location near to each other. Researchers have found the competitive advantage firms derive from this geographic concentration can essentially be classified as either or both of 1) lowering input costs through agglomeration economies or 2) increased innovation or productivity from knowledge spillovers (Wolman and Hincapie, 2015).

The study of clusters builds on this concept and adds to it the notion that policy can influence the way firms choose to co-locate and the magnitude of the agglomeration benefits generated. Cluster-based economic development strategies have used historical examples such as Silicon Valley, the Research Triangle, Hollywood or Wall Street in order to

describe the ways in which a particular industry came to be highly concentrated within a particular location. Several additional studies have been supported by the Economic Development Administration within the United States Department of Commerce, including a 2013 study by Delgado, Porter and Stern into the empirical definition, description and categorization of industry clusters, making possible the U.S. Cluster Mapping project, which also received funding support by the EDA.

Clusters as an Economic Development Strategy

As more is known about clusters and the value that they are capable of generating for a region's economy, communities have increasingly pursued economic development strategies that not only seek to support existing clusters, but also look to create new ones. There is no formula for when a community has the assets required to build an industry cluster; quite often one begins organically when a business locates in an area due to product suppliers, processing capacity by another firm, and workers with specific expertise. Once a few more related businesses move in, the local economic developer discovers the beginning of a cluster.

Though much evidence exists to outline the benefits of existing clusters, evidence is less available with respect to economic development's ability to spur the development of new clusters. As Cortright (2006) states, "the tantalizing paradox of clustering is that it implies that the location of economic activity is not preordained and that, therefore, public policy… can make a difference. Yet at the same time it is virtually impossible to say what it takes to successfully create a new industry cluster in a particular place." In short, setting out to create a cluster from scratch is a difficult endeavor. New clusters that are created tend to spin off organically from existing ones, such as the solar industry in Ohio growing from an existing base of glass and manufacturing expertise.

Once a cluster exists, however, there are many different strategies used to support cluster growth. These strategies vary based on the different conditions and stages of development of existing clusters, so having an accurate assessment of an industry cluster is important for economic development efforts. This review of the Projects examined in this report offers the opportunity to explore how five very different regions developed economic development strategies with the goal of new business development boosted by innovation within the frame of an industry cluster.

Measuring Cluster Strength Over Time

Successfully developing and growing clusters requires the ability to measure the size or strength of a cluster over time. Clusters can be evaluated according to a number of metrics; however, clusters are most commonly assessed based on the concentration of a given industry within a particular location (as measured by establishments, wages, and, most commonly, employment) relative to the concentration of the same industry at a broader, usually national, level. This practice ordinarily utilizes the employment Location Quotient (LQ) as an indicator of overall cluster strength, relying on industry employment as a barometer of a cluster's role within a particular economy.

While LQ is a useful tool in quantifying clusters, it is not a complete measure of cluster strength. Clusters represent a highly complicated set of relationships between labor, institutions, corporations, markets, infrastructure, intellectual property and other factors that each contribute to the relative strength or weakness of a particular cluster and its ability to adapt over time. This report primarily relies on LQ as a measure of cluster strength to facilitate comparison across clusters and for simplicity's sake; however, economic developers must obtain more complete information to more fully assess the conditions of clusters in their own communities.

A General Framework for Understanding the Lifecycle of Clusters

At any given time, clusters exist in different phases. Clusters tend to follow a life cycle of birth, growth, maturity and decline (Menzel and Fornahl, 2007). The following matrix (Figure 1) was developed as a means of outlining different stages of cluster development as measured by the Location Quotient (LQ) of an industry within a particular geographic location (left axis) in relation to the growth of that industry cluster over a certain period of time; in this case measured by the shift-share of the industry cluster (bottom axis). The shift-share is one measure of growth commonly applied to

the analysis of clusters; however other growth measures, including the change in LQ, employment, etc., could also be applied to this matrix. The relationship between these two measures produces quadrants within which a given cluster can be categorized according to the stage of growth that it is experiencing. These include clusters that are weakly concentrated (low LQ) but growing, clusters that are highly concentrated and growing, clusters that are highly concentrated but declining and clusters that are weakly concentrated and declining. A subsequent categorization is applied in (Figure 2), wherein clusters are labeled, depending on their position within or between each quadrant as either Nascent/Underdeveloped, Growth, Mature, or Decline. While a given cluster may fall into each of these categories periodically, over an extended period of time a cluster can be expected to enter each stage from the point of its emergence to the point (if such a point ever comes) of its decline. Together, these four stages mark the primary stages of a cluster's lifecycle.

Figure 1

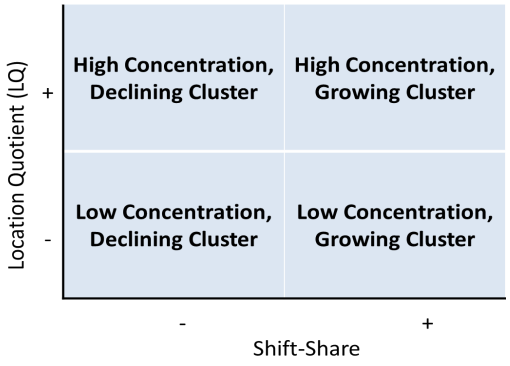
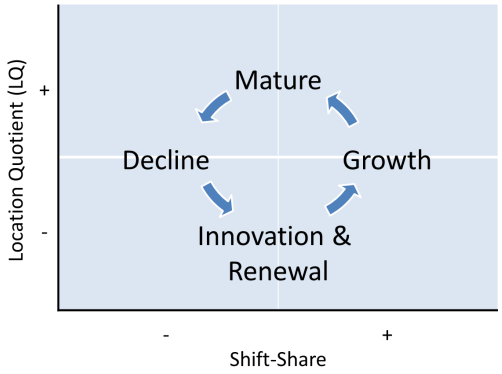
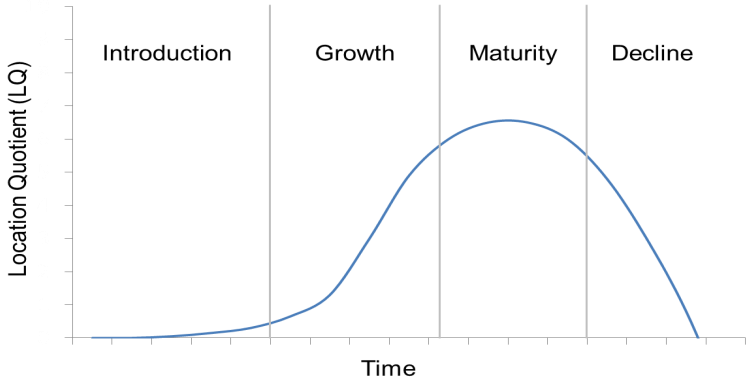


Figure 2



An alternative representation of the cluster lifecycle can be shown by graphing a cluster's Location Quotient over several years. Such an illustration is provided in the following figure.

Figure 3



In this model, a cluster is introduced to a particular location in a nascent form (i.e. a relatively minimal level of employment within a given industry or no industry presence at all). A period of growth is experienced to bring the cluster to a period of maturity. The cluster then declines until it once again has a relatively minor presence or has disappeared from the area (either by atrophy or by relocation).

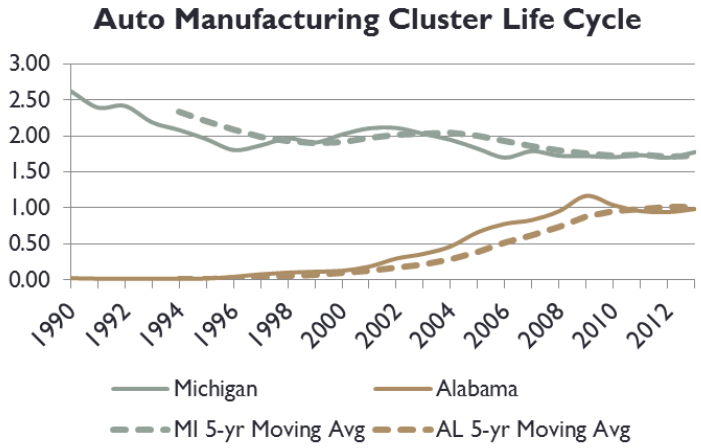
Under countless circumstances, this cycle may alter course. Declining clusters can be reinvigorated by product or process innovation, creating new periods of growth. Nevertheless, over an extended period of time, as product demand, production processes, or other market circumstances change, businesses in a cluster either adapt (potentially creating a new cluster around a different product/activity) or decline. This pattern gives shape to the notion of a cluster lifecycle.

The Lifecycle of Clusters – An Illustrative Example from the Automotive Sector

An example of the manner in which the cluster lifecycle can have descriptive value can be found in the Auto Manufacturing Clusters of Michigan and Alabama during the period between 1990 and 2013. As illustrated in Figure 4, in 1990, Michigan held an Auto Manufacturing LQ of over 2.5, indicating that employment in the Auto Manufacturing sector was over two and a half times larger for Michigan than national employment levels for that industry. Michigan's Auto Manufacturing LQ in 1990 reflects the state's historical primacy as a center for the automobile industry. However, as the graph illustrates, Michigan's Auto Manufacturing LQ declined sharply during the first half of the 1990s, reaching an LQ of 1.80 in 1996 before stabilizing and growing modestly until the early 2000s at which point it began to decline once again.

This tells a somewhat different story than would be found by examining changes in total industry employment alone. Rather than simply reflecting a national, industry-wide decline in auto employment with Michigan following the national trend (in which case Michigan's Auto Manufacturing LQ would remain relatively constant), the analysis of the state's Auto Manufacturing location quotient offers a story of an industry that is shifting away from Michigan or which is becoming a less significant piece of the overall state economy. By considering changes in LQ over time, one is able to consider not just changes in employment by a particular industry in a particular location, but to gauge the health of a particular cluster.

Figure 4



In contrast to the trend in Michigan, the Auto Manufacturing sector in Alabama was historically nonexistent. While relatively minor growth in the sector could be seen beginning in 1995, the location of auto manufacturing facilities by Mercedes-Benz and Honda in Alabama in 1998 and 1999 respectively served as catalysts for growth of the auto manufacturing industry in the state. With both auto plants beginning production in the latter years of the decade and with the increase in production in the years that followed, the rising Auto Manufacturing LQ presents the emergence of a new Auto Manufacturing cluster based in Alabama. By 2000, Alabama had an Auto Manufacturing LQ of 0.13, which compares to an LQ of 2.02 in Michigan at that time. With the attraction of major production facilities by Toyota and Hyundai in 2001 and 2002, the cluster can be seen as having entered a new stage of growth, such that by 2005 Alabama's Auto Manufacturing LQ had risen to 0.66 and, by 2010, 1.04. This growth coincided with a period of decline and stagnation for the Auto Manufacturing cluster of Michigan which, by 2010, had an Auto Manufacturing LQ of 1.71. Although Michigan clearly remains a stronger center for the Auto Manufacturing sector as measured by industry employment location quotient, the period stretching between 1995 and 2010 saw the introduction and rise of a new cluster in Alabama.

Within the framework of the prototypical cluster lifecycle, the period of growth illustrated would suggest the Auto Manufacturing cluster of Michigan as having gone from a state of maturity to a period of decline. One must remember, however, that LQ is only one indicator of cluster strength. In this case, the LQ of Auto Manufacturing in Michigan

should prompt further inquiry into the industry from policymakers. Examination of other indicators (e.g., total employment, production, etc.) as well as discussion with firms themselves is essential for understanding the growth trajectory of a cluster and its position in the lifecycle. In the case of Michigan, the cluster has benefited from numerous changes in the auto industry, government support and other factors that have combined to extend the life of the cluster and added to its strength.

Factors that Influence Cluster Strength and Development

There is no established definition of what makes a cluster "strong." An examination of LQs for an area can identify major sectors of employment, but assessing the potential for growing existing clusters depends on an understanding of the forces that drive businesses to cluster together in the first place. Economic development efforts to enhance cluster strength should focus on creating and developing conditions where businesses can derive the following values (Wolman and Hincapie, 2015):

1) *Access to Qualified Labor.* Firms choose to cluster in places where they know it will be easy to find qualified and talented workers. Locating near other firms engaged in similar activities expands the labor pool, making it easier to find talented employees and replace poor ones. Often, these clusters are also located near sources of workforce training, such as a major university. Economic developers can support this benefit by helping to connect educational and workforce institutions with employer needs.

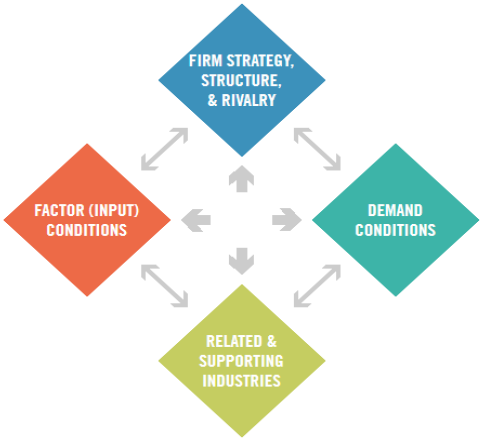
2) *Lower Input Costs.* Firms choose to cluster to reduce cost, and by virtue of producing the same quantity at a lower cost, raise productivity. This phenomenon is most obvious in resource sectors, where firms locate close to resource deposits they intend to extract (e.g., energy along the U.S. gulf coast). However, it is also observed in supplier relationships, where different segments of a production value chain locate near to each other to minimize transit costs (e.g., electronics components manufacturers and mobile phone manufacturers). Economic developers can support this effort by recruiting and supporting businesses which are related through supplier/purchaser relationships.

3) *Knowledge Spillovers.* Firms choose to cluster together in the hopes of ideas will move quickly from one firm to another (by employees changing firms, employee professional networks, etc.). One prominent example of this effect is in the entrepreneurial and venture capital ecosystem in Silicon Valley.

4) *Market Size.* In some cases, firms cluster together because their product serves such a specific niche, that only certain locations have enough market demand to support that industry. Online commerce has mitigated this issue for many firms, but in those industries where physical presence is needed to conduct commerce, location in a large enough market to have adequate demand remains essential.

Another way to conceptualize the benefits firms derive from clusters, and hence how cluster strength can be supported, is presented by Michael Porter (1990). Presented from the perspective of business or industry competitiveness, the diamond model stresses that firms act by necessity under the influence of broader environmental conditions in order to maximize competitiveness. The model can also be used to evaluate the conditions that influence the development of a particular cluster, as factor (input) conditions interact with demand conditions, firm strategy, structure and rivalry, and related and supporting industries. While conditions may change due to forces beyond the control of local economic developers or policy makers, they can in certain instances be influenced at a local level as part of a deliberate strategy to support the development of a cluster.

Figure 5 – Michael Porter's Diamond Model



The cluster lifecycle can be seen as a reflection of how these factors come together to lead a new cluster to a state of maturity and, alternatively, how they can lead to a cluster's decline. Considering the diamond model in the context of a cluster's lifecycle offers the potential for developing strategies to sustain and strengthen a cluster within a community or region. Existing or proposed clusters that focus on innovation, as in the case of the five Centers, may find that factors shift more rapidly and therefore may, in some cases, be better positioned to influence or take advantage of those shifts in order to accelerate a cluster's development along the lifecycle.

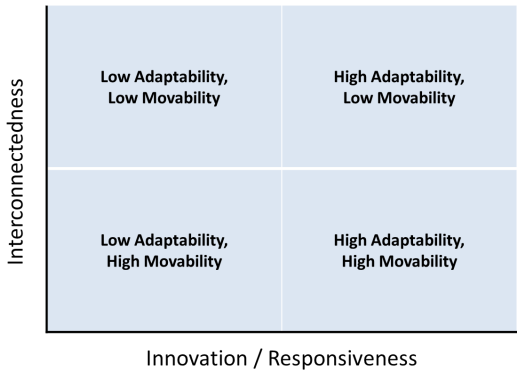
Cluster Resilience, Disruptive Innovation, and Competition

Cluster Resilience

Communities that pursue an economic development strategy focused on clusters rely on the expectation that the cluster will be able to preserve or expand its strength over time. For this expectation to be met, the firms, institutions, labor resources and linkages that support the cluster must be sufficiently tied to the region. Threats to cluster viability emerge when the elements that support the cluster are removed by some mechanism (e.g., population outflows, regulatory shifts, etc.).

While the model for the cluster lifecycle described earlier in this report can be useful in evaluating a given cluster over the course of time, a different approach related to cluster resiliency can help communities to evaluate how likely an existing cluster may be to grow, decline or relocate in the years to come. For a community, those clusters which involve highly innovative firms and those clusters which are tightly linked with location (e.g., through proximity to resources, linkages to other firms, etc.) can be considered more resilient clusters. In analyzing the five regions featured as part of this study, the following matrix was developed to assist in considering how susceptible an existing or proposed cluster might be to significant change or relocation.

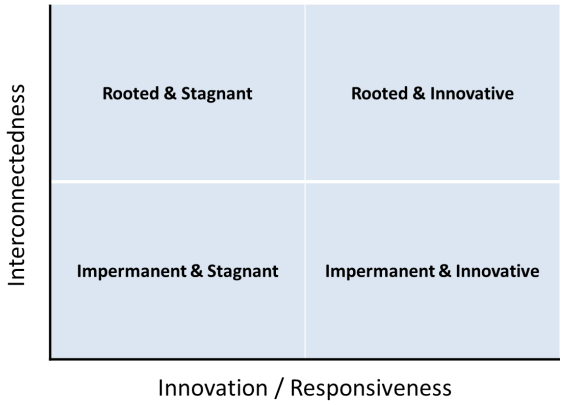
Figure 6 – Cluster Resiliency Matrix



The Cluster Resiliency Matrix illustrates the relationship a cluster's interconnectedness has with its geographic location and its responsiveness to change through innovation or altered business practices. Comparing these two factors allows for the categorization of clusters within four categories based on whether or not they are highly or minimally adaptable and whether they are highly or minimally movable from their geographic location. Ideally, a community would work with firms to strengthen their cluster so that it moves toward the top-right corner of that matrix.

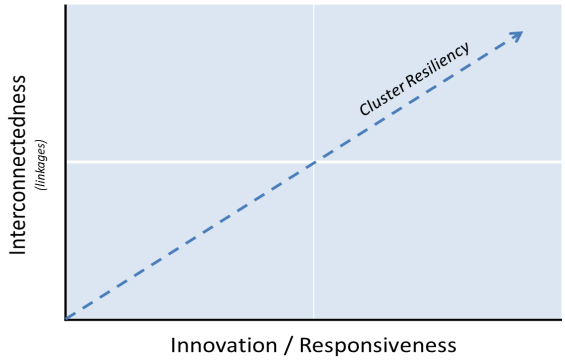
Presented in another way, Figure 7 translates the same concepts into a matrix which allows one to categorize clusters based on whether they are rooted and innovative, rooted and stagnant, impermanent and innovative, or impermanent and stagnant.

Figure 7 – Alternate Cluster Resiliency Matrix



As a cluster becomes highly responsive to change through innovation and as it becomes less susceptible to relocation due to stronger ties with the community or region in which it is located, the resiliency of that cluster increases (Figure 8). Therefore, communities or regions that seek to develop vibrant and competitive clusters that will be with them for many years to come, might evaluate current or potential clusters using the cluster resiliency matrix in order to develop strategies or make policy decisions that will increase the adaptability of targeted clusters while simultaneously looking for ways to secure the cluster to its location.

Figure 8



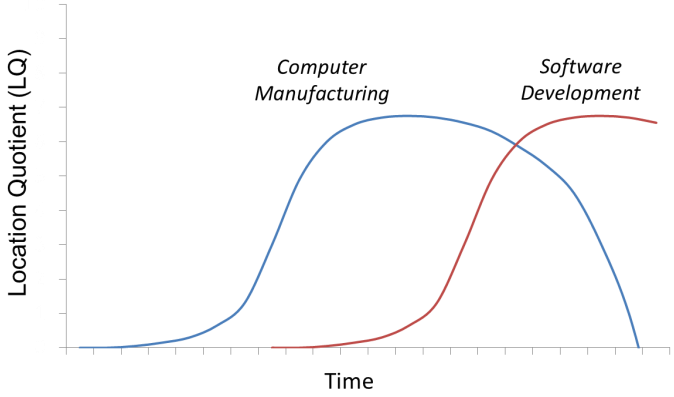
Disruptive Innovation

Through significant shifts in industry or the economy, the emergence of new competitors, or new technology, innovation reshapes the competitive landscape. Therefore, it is instructive to consider how such change might be modeled using the framework of the cluster lifecycle. The following figures are several scenarios that depict common events that can lead to major shifts in a cluster's lifecycle, either by prolonging its maturity, introducing new conditions that allow for a new growth stage, or by prompting or accelerating a cluster's decline.

The first scenario presented in Figure 9 illustrates the hypothetical replacement of one industry cluster with another in the same location over time. In this particular case, the industry clusters are Computer Manufacturing and Software

Development. After the introduction and growth of the Computer Manufacturing cluster in a hypothetical location, a nascent Software Development cluster emerges, perhaps in service to the software needs of the Computer Manufacturing cluster. Over time, by whatever forces in this hypothetical situation, the region's Computer Manufacturing cluster begins to decline. Through either the deliberate efforts of local economic developers or policy makers to offset this decline or by a more organic response from the private sector, local investment, technology infrastructure, business development activities, and labor are shifted to Software Development, enabling the replacement of the now declining Computer Manufacturing cluster with the growing or maturing Software Development cluster.

Figure 9

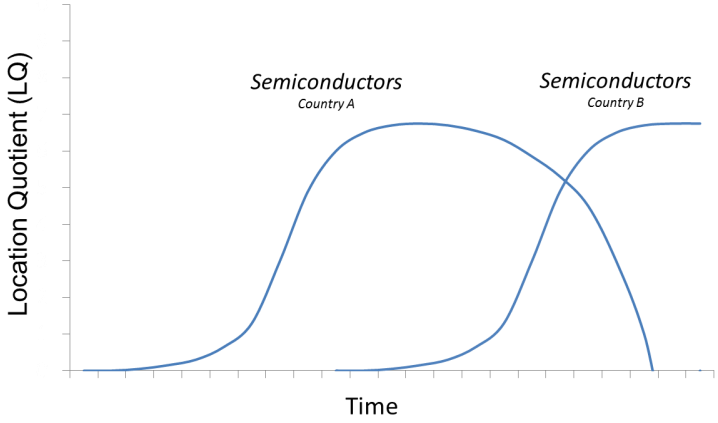


In addition to the deliberate or organic replacement of one cluster for another within a particular location, this scenario also provides an example of instances in which communities or regions support the diversification of their industrial base through the development of multiple clusters that are built around different industries. In doing so, such regions are better situated to absorb the decline of one industry cluster before its decline is even recognized as another rises around a different or related industry.

A second scenario involving the changes found in the cluster lifecycle can be seen in the relocation of a given cluster from one particular community, region or nation to another. In Figure 10, the relocation of a cluster of firms in the semiconductor industry from one country to another is depicted. After the successful growth and maturity of the cluster in Country A, the cluster's firms begin to take advantage of more favorable conditions that are found in Country B. Such conditions may include certain cost advantages including cheaper labor or transportation or may hinge on stronger access to a growing market. Whatever the cause, the relocation of the cluster's firms from one region or country to another becomes complete with the continued decline of the cluster in Country A and the growth and maturity of the cluster in Country B.

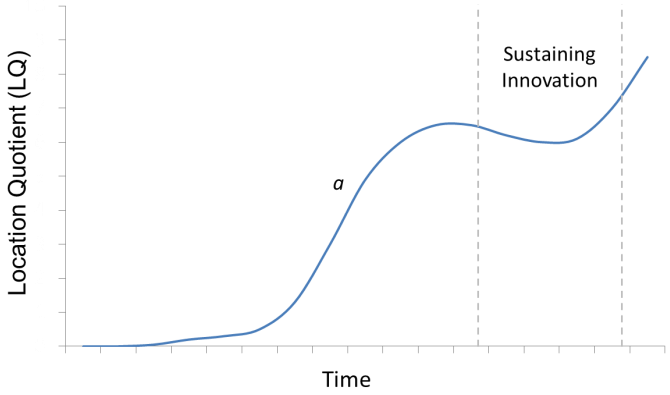
The timing of each cluster's growth or decline would, of course, vary greatly depending on the circumstances, and in some situations the two clusters may exist simultaneously at different stages along the cluster lifecycle for a considerable amount of time before one location finally replaces the other as the base for that particular cluster if, that is, a full relocation of the cluster does eventually take place. Although the scenario presented uses the Semiconductor industry as an example, other industries could also be featured, such as Film, Oil Production, or Auto Manufacturing. By this model, communities or regions can better identify which of their clusters might be susceptible to relocation and, likewise, how their conditions or assets might be well-suited to the needs of a cluster currently found in another, less competitive, location and, therefore, a ripe target for attraction.

Figure 10



To avoid the decline or loss of a cluster, there are many situations in which a cluster's growth can be extended or its decline averted by virtue of the introduction of outside forces or new innovation. Figure 11 illustrates a scenario in which a cluster is able to avoid a decline through innovation that sustains its existing activities and enables additional growth. The types of innovative activities that could sustain a cluster in this way include the development of new business processes, the widespread application of new technologies to existing industry practices, the creation of new local institutions that provide support to that industry, an upgrade or installation of new local or regional infrastructure on which the cluster relies, etc. Regardless of the source of the innovation, by its introduction, the cluster is able to extend its growth to a new threshold of maturity based on the added value of the innovation.

Figure 11

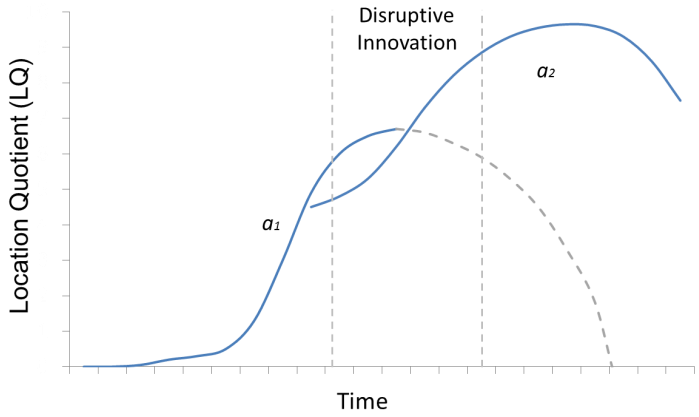


An example of this scenario can be found in the oil fields of Texas, many of which, until the introduction of hydraulic fracturing (also known as fracking) in the early 2000s had reached the full limits of their productive capacity. The emergence of new drilling techniques made possible the extraction of oil and gas that was previously beyond practical reach. As a result, many existing oil and gas clusters experienced a resurgence. Recognizing and understanding the role of sustaining innovation within the cluster lifecycle presents opportunities for economic developers and policy makers to identify the means, if any, of preserving their clusters.

The scenario depicted in Figure 12, below, involves an industry cluster being fundamentally changed by new innovation to the extent that it is transformed into a distinctly different cluster that builds off of the foundation of the former. This new cluster would therefore emerge at an already significant location quotient since it is building off of the existing cluster as the transformation takes place. In doing so, this scenario differs from cluster replacement in that it is not the decline of one cluster and the rise of a separate cluster. Rather, it is the introduction of some form of disruptive innovation that fundamentally alters the very nature of the existing cluster. One example of this could be found in the

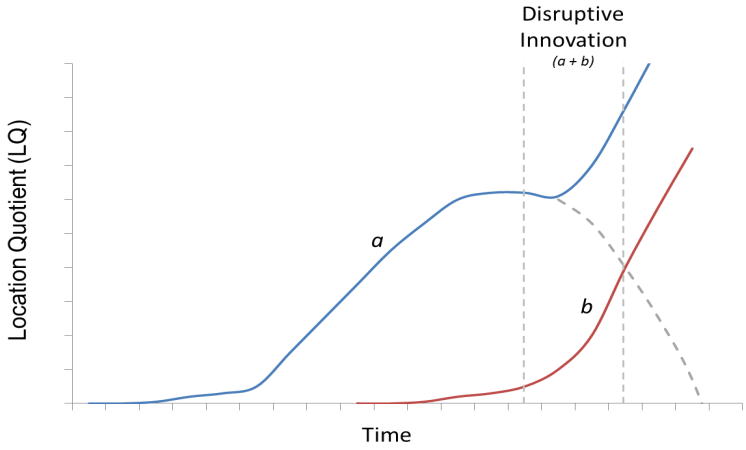
transformation of a print-based media cluster into a web-based media cluster due to the introduction of the internet. Although many of the same assets, institutions or linkages may support the cluster in its new state, the cluster and firms involved have experienced enough change to activities, end markets, inputs, etc. to be viewed as a different cluster with a different cluster lifecycle.

Figure 12



In certain circumstances, the proximity of two distinctly different clusters can have a significant impact on the growth, and therefore lifecycle, of one another. Such a scenario is presented in Figure 13. As illustrated below, the emergence of a new cluster (b) supports the growth of an existing cluster (a) where it might otherwise be headed toward decline. The new cluster could in itself present a significant new market for the existing cluster or a new source of investment. It could attract labor that introduces new knowledge or skills to the area that are particularly well-suited to or solve an unmet challenge of the existing cluster. It could focus or accelerate urban development in a certain location or of a certain form that proves favorable to the other cluster, either in terms of what its businesses might require or what its professionals might desire. The proximity of the two clusters could present a more convenient or otherwise attractive environment for investors or suppliers that serve both industries. Whatever the nature of the benefits shared between the two clusters as a result of their proximity to one another, the pairing of the two clusters enables them to either avoid a decline or to accelerate its growth beyond what it might be capable of supporting without the other cluster. In essence, the pairing of the two clusters stands as a form of disruptive innovation for one or both of the clusters. Examples of paired cluster innovation or of two strongly linked cluster lifecycles include the pairing of a Software cluster with a Creative Media cluster, the pairing of a Higher Education and Research cluster with an Advanced Manufacturing cluster, the pairing of a Clean Energy cluster with an Architecture and Construction Services cluster, or the pairing of an Entertainment and Leisure cluster with a Meetings and Conventions cluster.

Figure 13



Although there are many other models that can be derived from the cluster lifecycle, the scenarios presented above offer a look at several of the most common situations that communities or regions may face as they attempt to support a cluster-based economic development strategy. For those seeking to establish a new cluster-based economic development strategy, either for a specific industry or for the regional economy as a whole, the cluster lifecycle can be a useful tool for identifying opportunities and recognizing challenges. While it may be difficult to clearly establish where along the lifecycle a specific cluster is or to determine with a high degree of confidence how that cluster's lifecycle will look in the future, the cluster lifecycle can be helpful in evaluating trends that are apparent and for determining what factors might be influencing their change.

Conclusion

Economic developers often speak of clusters in a way that gives them an aura of mystery and opacity. In reality, clusters simply reflect the colocation of connected firms. These firms benefit from this co-location through a variety of mechanisms, namely access to qualified labor, lower input prices, knowledge spillovers, and occasionally market size. The gains these firms realize spur economic growth in a community, and economic developers continue to look for ways to both create new clusters and support existing clusters in their communities.

The need for supporting existing clusters is particularly salient, as clusters in themselves tend to follow a life-cycle of birth, growth, maturation, and decline. Without innovation, clusters begin to decline, at which point they are either replaced (e.g., a semiconductor manufacturing cluster gives rise to a software development cluster) or they disappear.

While tools like location quotients are helpful in economic developers' efforts to monitor and evaluate the stage of a cluster, it is important to couple this analysis with qualitative information. Often, speaking with businesses engaged in a cluster can reveal coming trends, obstacles to future growth, and policy shifts that can spur further cluster development.

The following section highlights five instances in which economic developers, supported by funding from the Economic Development Administration, engaged their communities to spur cluster growth and innovation.

Part II: EDA Centers for Regional Innovation: Understanding, Supporting and Extending the Cluster Lifecycle

This section discusses five Centers of Regional Innovation established through grants from the Economic Development Administration. Each of these Centers set out to support cluster-based economic development through innovation – either in process (e.g., improved economic development capacity) or output (e.g., more innovative economic activities taking place).

Each of the projects undertaken by the Centers is outlined in greater detail below, and summary data of local clusters for each Center is presented.

Case Study: The Institute for Economic Advancement (Arkansas)

Innovating Arkansas through Cluster Analysis

Tasked by the EDA, the Institute for Economic Advancement (housed in the Business College at the University of Arkansas at Little Rock) set out to identify, classify, and analyze clusters across and specific to Arkansas. The analysis was meant to look at existing and potential clusters as well assessing strategies to capitalize on those clusters. The work was accomplished in two phases: a research phase and an analysis phase. The research phase involved the compilation of available data as well as defining the analysis to be specific to Arkansas industry and economic profile. The analysis phase refined the data into more distinct categories and looked for trends to reveal specific factors that drove innovation in certain regions. This report will go into more specific detail about the two phases as well as harp on how they aided in regional economic development.

Primary research

The first phase of the project focused on the identification and collection of relevant data. Given the lack of universally accepted definition for the term "cluster", IEA set out to identify and categorize what that term and the word "innovation" meant to Arkansas. This was done through holding dialogues in public forums, using economic indicators, creating comparisons with other states, and refining the data into categories.

In the early stages of the project, IEA held meetings involving people engaged in economic development or innovation and technology policy throughout Arkansas to discuss factors contributing to innovation, innovation readiness indicators, and prioritization of industry clusters. Alongside these meetings, a business survey was sent out to further seek input from the community. One insight from the collected feedback was an emphasis on making a distinction between "advanced manufacturing" operations within industries and "advanced materials" manufacturing and other materials production industries. Distinctions of this kind are important to cluster identification.

To inform the public meetings, data and information were collected to summarize the wide array of choices available to participants. This included data from the Stats America cluster project supported by EDA and developed with Michael Porter and data derived from various other studies and models. Generally speaking, the methodologies looked at indicators related to human capital, economic well-being, productivity, employment, and levels of education.

Once working definitions of clusters specific to Arkansas were made, the team began to pair clusters with potential for innovation through correlation statistics like number of patents per capita, access to educational institutions, startups per capita, etc. Pairing this data with community profiles can be instrumental for creating effective policy. To facilitate trend spotting and sharing of complex datasets, IEA created an inventory to showcase the assets, partners, capacities, and systems of each of the 14 geographic regions in Arkansas.

The last step of phase one was to collect spatial data to try and identify any spatial correlations between indicators or assets and the geography of the region. As surveys were mailed back and other results tallied, the spatial component would be an invaluable asset for decision-making at the local level.

Gap Analysis and Asset Mapping

The next phase for IEA was a further refinement of the asset inventory, the cluster analysis, and spatial data. This process would allow for the creation of new economic indicators specific to Arkansas and more appropriate strategies for economic development.

The asset inventory was refined to discover what program, system, asset, etc. existed both dependently and independently of specific clusters. Part of this process involved separating the inventory into the "seven pillars of community capital": political, financial, natural, built, social, cultural, and human. Using the refined asset inventory, the team performed a gap analysis by creating an index to find spatial gaps in the location of knowledge-based workers. By mapping the labor shed of "knowledge-based" jobs against total jobs within each region of Arkansas, the research team could figure out how the state measures up to the country. They could then ask questions about why some regions perform better than others or why some underperform. Furthermore, they could research how specifically higher education links to certain industry clusters and innovation.

Building off the first gap analysis, IEA then created innovation indexes using demographics, higher education statistics, employment information, quality of life indicators, business climate data, and other indicators used within the seven pillars of community capital. This information was used to create asset maps to visually display what is present and what is absent within each region.

Armed with new innovation data and maps, IEA published a report called "Adapting to a New Economy: Innovation and Industry Cluster in Arkansas". This report summarizes the results of their research into industry clusters and innovation in Arkansas with the following three goals:

1. To identify the industry clusters that exist in Arkansas, paying particular attention to innovation clusters.

2. To identify the conditions needed for the development of innovation clusters, and to perform a gap analysis of Arkansas communities based upon those conditions.

3. To identify economic development strategies and best practices that could serve to advance the growth of the clusters.

This report used experience from their point of view as well as elsewhere within the state.

Similar to their report, the last stage of their work was the identification of strategies specific to regions across Arkansas. They examined long-term strategies for regions beginning to build innovation as well as provided state-level strategies that could support innovation cluster development. Their main findings were that Arkansas had a lack of established paths to leadership in business and government and had physical infrastructure problems, such as poor broadband connectivity and overemphasis on traditional "industrial age" infrastructure. Articulating these findings in writing and in public is critical in beginning the path towards creating innovative economies.

Poised for Innovation

The data synthesized as a result of this grant puts Arkansas policymakers at local, regional, and state levels in a better position to make decisions regarding economic development. Furthermore, because this data has had the benefit of local input from many facets of the community, policy made as a result of this work will be more readily accepted. Through this research and the physical presence of the IEA and its training and outreach programs, the state is poised to for new innovation through the industry support and increased information.

Key Takeaways for Economic Developers

1. Local Knowledge Matters. The IEA project leaned heavily on meetings involving stakeholders and primary research before developing recommendations.

2. Data Driven Decision Making. Availability of cluster data allowed the IEA to identify gaps in economic development assets, creating a clear roadmap for next steps.

Arkansas Clusters at a Glance

Looking briefly at Arkansas' clusters reveals several trends. Specifically, Figure 14 shows a clear decline in the dominance of electrical equipment, appliance and component manufacturing, which fell from an LQ of about 3.5 in 2005 to 2.0 in 2012 and lost roughly 8,000 workers between 2001 and 2012. Primary metal manufacturing gained in LQ throughout the period, with LQ rising from 1.8 to 2.6 from 2001 to 2012. However, this is a case in which location quotient does not tell the complete story. Employment in primary metal manufacturing fell in Arkansas during this period. The fact that employment fell in Arkansas in this sector more slowly than it did on a national level accounts for the positive LQ growth in Arkansas.

Figure 15 shows Transportation Equipment Manufacturing and mining as two of the strongest growth clusters in Arkansas. Electrical Equipment, Appliance, and Component Manufacturing; Agribusiness, Food Processing, and Technology; and Forest & Wood Products were all high concentration clusters that saw declines from the 2001-2012 period.

Figure 14 – Top 10 Arkansas Clusters by LQ 2001-2012

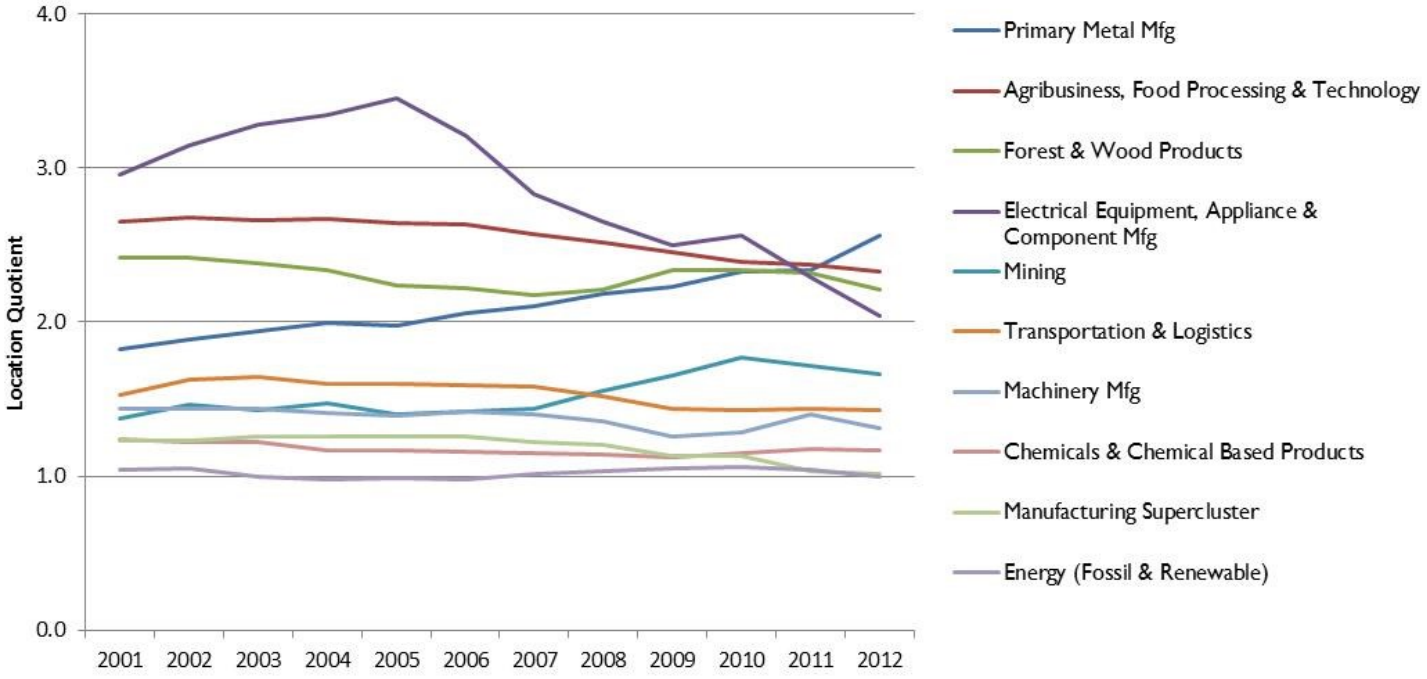
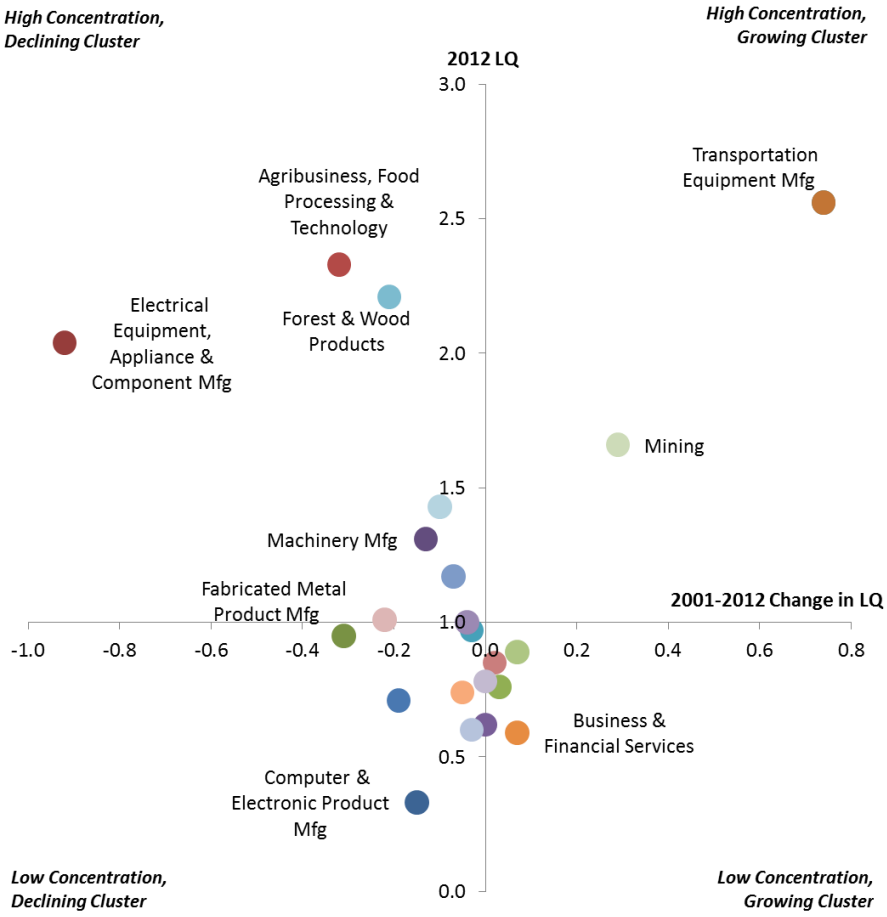


Figure 15 Arkansas Clusters by LQ and Growth Trajectory



Case Study: The Pecan Street Project (Austin, TX)

Pecan Street Project: Creating an Energy Innovation Cluster

The Pecan Street Project was an investment backed by the EDA to create a clean energy cluster through introducing smart grid practices to an entire neighborhood. Underlying this approach was the re-imagining of Austin's energy distribution system in a way to maximize energy system gains and ensure the creation of new companies and jobs throughout the region. The project hopes to have a large impact in the Central Texas Region through activities that can be categorized into two areas: economic development and education/public awareness. This report will go into detail about the two areas and the specifics of their impacts on local innovation.

Economic Development

The Pecan Street Project has paved the way for innovation in economic development through networking, changing consumer behavior, research, and marketing the City of Austin as a place for clean energy.

At the beginning of the project, the team opened communication channels with 58 companies in the clean technology industry. Input was a critical part of the project. From companies and local interests that were heavily interested, a consortium was formed creating a network of private sector business, utility companies, university researchers, and public sector employees. Their work would focus on best practices for smart grid system architectures, performance metrics, and value propositions. By having a consortium of this caliber, researchers and companies have bought in to the outcome of the project and will continue to invest their time and effort as the project continues to be successful. The result of that investment is new relationships and partnerships that would not have existed in the first place.

The project has also been successful in altering typical consumer behavior through financial incentives. By offering incentives for solar panels, electric vehicles, and smart energy systems, the Pecan Street Project is poised to better create meaningful data for research. Through this project, the Austin is now home to the nation's highest residential concentration of electric vehicles. They have also increased the number of houses with solar panels in the project area from 11 to 210 homes and the number of volunteers with home energy management systems to 700. By creating changes in consumer activity, the results produced by the Pecan Street Project are particularly relevant to companies, entrepreneurs, policymakers, and other residents looking to explore energy markets and associated policies.

Research has been a critical component of Pecan Street's economic development strategy. Thanks to the changes in consumer behavior as stated previously, the project can offer data that doesn't exist in very many places in the world. This puts Austin on the map as a leading place for clean energy data collection and consumer usage.

Through this research and new consortium of interested entities, marketing the City of Austin as a place for clean energy and technology is an easy step. Marketing can lead to jobs as proven by the executive director of the Pecan Street Project who, with the help of The Greater Austin Chamber of Commerce, Austin Energy, Austin Technology Incubator, The University of Texas and The City of Austin, helped to recruit a major solar manufacturer to Austin who has the potential to create over 300 jobs. With data to share and activity to promote, the second part of the Pecan Street Project's impact on innovation, through education and public awareness, becomes equally important.

Education and Public Awareness

Members of the Pecan Street Project engaged in a number of activities to increase public, business, and policymaker education and awareness regarding clean energy and smart grid economic opportunities. These activities promote Austin as a place to do business, a place to invest, and a place to attract like-minded educators, researchers, and policymakers who want to learn more about clean energy and technology. Below is a list of a few of those activities:

- By invitation, members of the Project team attended a meeting at the White House to educate presidential advisors on Texas smart grid activities and Pecan Street activities and research findings.

- Held weeklong public events on smart grid and clean energy business opportunities targeted to entrepreneurs, policymakers, and the underemployed looking for new opportunities.

- Hosted regular bi-weekly meetings with the public to create a dialogue and exchange ideas about clean energy and smart grid practices.

- Frequently educated state, local and federal policymakers about smart grid systems and pecan street activities.

- Held a two-day retreat and technical workshop for companies of the Pecan Street Consortium to evaluate data results and commercial applications of new energy technologies.

- Co-hosted the Clean Energy Venture Summit and participated in the evaluation of proposals by companies in the clean energy field.

- Presented to national and regional audiences at SXSW, World Smart Cities Forum, North Carolina Smart Grid Leadership Forum, and the North San Diego Chamber of Commerce.

As the Pecan Street Project continues to educate decisions-makers and increase public awareness on clean energy and smart grid practices, Austin will continue to be looked to by industry and policy leaders setting the stage for future innovation and continued energy cluster development.

From the Neighborhood to the Region

As investment by the EDA to create a clean energy cluster, the Pecan Street Project has proved successful. By introducing smart grid practices to an Austin neighborhood, the project has placed Austin as a premier place for researchers, employers, and policymakers to learn about innovative practices as well as attract future investment through funding, job creation, and new development. The project focuses on activities of one neighborhood, but clearly has and will continue to see impacts throughout the Central Texas region.

Key Takeaways for Economic Developers

1. When Developing New Clusters, Target Sectors with Broad Support. The Pecan Street Project benefited from a partnership across local government and existing businesses.

2. Look to Include Universities. The Pecan Street Project's ongoing development is supported in key ways by activities taking place at the local research university.

Austin Clusters at a Glance

A quick survey of location quotients in Travis County, TX (where Austin is located) reveals the important role of computer and electronic products manufacturing and information technology in the Austin region. Both sectors stand out as major sources of employment in Figure 16. Data show that employment levels mirror LQs, with employment in both of these sectors declining over the 2001-2012 period.

Figure 17 reinforces this picture. It also highlights that growth is occurring in the Business and Financial Services, Printing and Publishing, and Education and Knowledge Creation Sectors.

Figure 16 – Top 10 Austin Clusters, 2001-2012

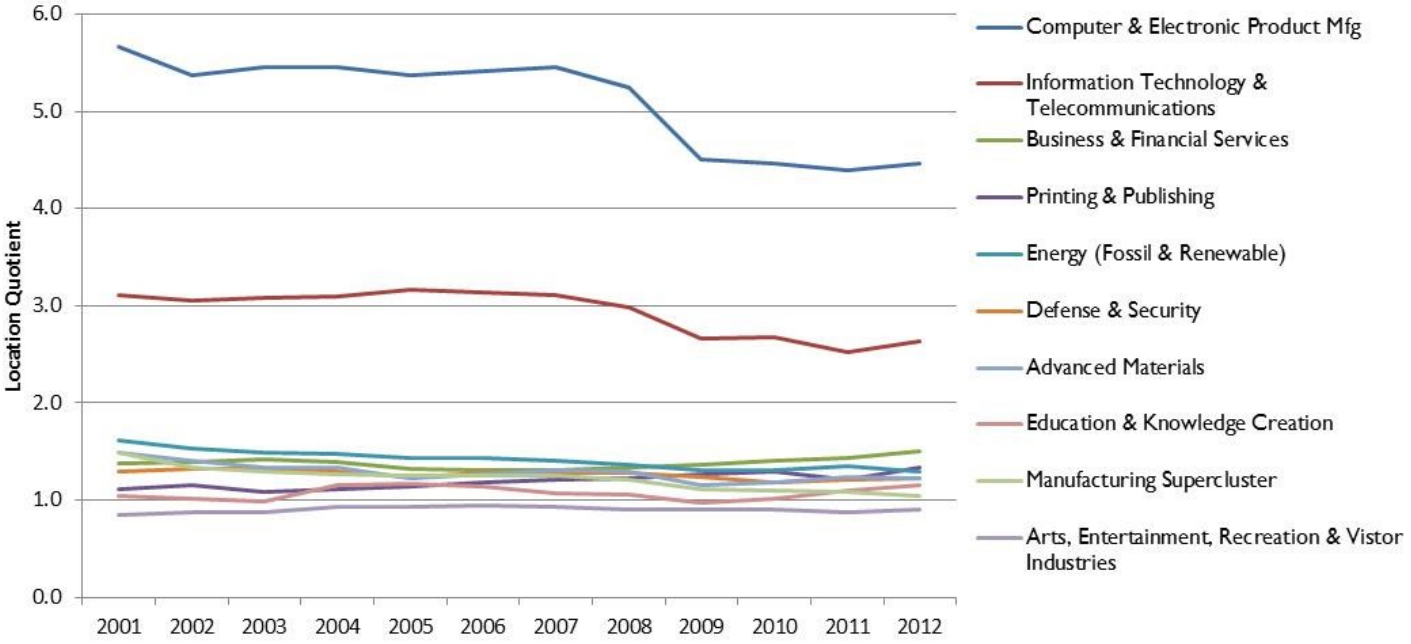
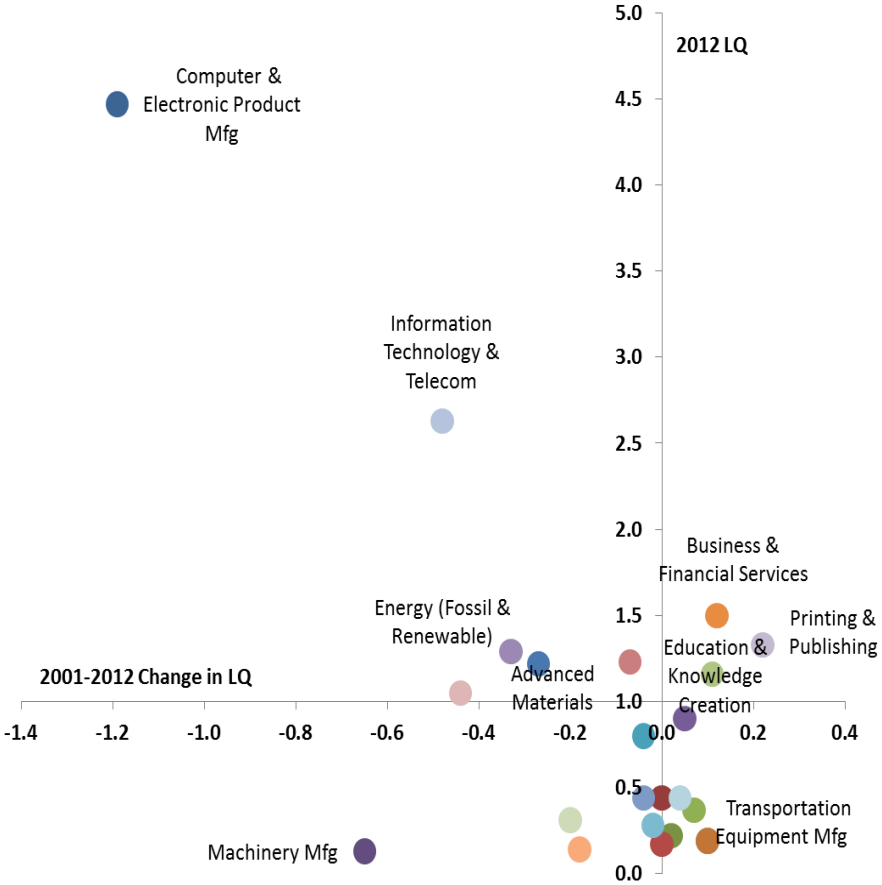


Figure 17 – Austin Clusters by LQ and Growth Trajectory



Innovation Through Diverse Investment (New Mexico Mid-Region)

In some regions it's common to focus an investment into one channel or industry with hopes of spurring innovation, however, the New Mexico Mid-Region Council of Governments (MRCOG), with the help of an EDA grant, has launched a four-part initiative to aid multiple industries as well as build capacity to strengthen a network of future innovation. The initiative looked at the Metro Albuquerque area as well as the state of New Mexico itself. Its goal was to strengthen the development capacity of Metro Albuquerque through online resources, to build a working collaborative to represent the state's agriculture industry, to start a home-based worker program to inform and support New Mexicans that work from home, and to analyze the region to discover potential or existing industrial clusters. This report will explain how, through this grant, the MRCOG worked to build innovation, create new opportunities, and take advantage of existing industrial cluster capacity.

Development Alliance

The first focus of the initiative was to create a number of online resources, hosted on a new website, to strengthen capacity for development. The initiative was about more than just access to resources and tools, however, as it brought together real estate interests, local government, and economic development organizations to promote business growth. The site, now readily available at http://nmsitesearch.com/, offers an extensive property search feature with interactive GIS layers and also provides community profiles of various towns throughout the region. The search feature has mapping layers displaying traffic, zoning, broadband connectivity, demographics, and amenities. The community profiles act as a portal to further explore economic, demographic, social, and other kinds of data on the various cities and villages surrounding Albuquerque. Next to this data are a number of resources intended to facilitate business expansion or relocation like information on tax incentives, workforce statistics, local competitive advantages, and transportation data.

After the website was established, the team has since worked to aggressively to market the site. By capitalizing on social media, increasing search engine optimization, marketing via Google Ads, and creating informative videos, the team has worked to increase web activity to the site with hopes of increasing physical and economic activity in New Mexico.

Agriculture Collaborative

The second focus of the initiative looks to support the agricultural industry at large by creating an Agriculture Collaborative. The Collaborative was responsible for marketing, event planning, creating online services, and attracting funding for all things agricultural. Their hope is to create activity that spills over across the farming community, unemployed population, restaurant industry, and anyone concerned with local food.

Through an online presence on the web and social media, the Collaborative can act as a marketing tool for all farmers in Metro Albuquerque. At the Collaborative homepage, a blog covers topics ranging from relevant state policy issues to introducing new farms, farmers, and available apprenticeships. The presence on social media helps because it's the easiest and cheapest way to create a dialogue about local food issues and spread information about news, initiatives, or important events.

The Collaborative began and continues to sponsor monthly meetings, a Local Food Festival and Field Day, and "landlinking" workshops focused on technical assistance and peer mentoring. As stated on their website, the meetings are an opportunity for anyone interested in local food or agriculture to learn something new, share ideas, and network. The Local Food Festival and Field Day is an annual event that highlights local food and business through a wide variety of activities like music, cycling tours, children's activities, and informative workshops on agriculture. The last type of event that the Collaborative organizes is "landlinking" workshops.

LandLink, the online service created by the Collaborative, is a program started to "link" agricultural landowners with existing or aspiring farm and ranch operators. The goal of LandLink is to get the next generation of farmers and

ranchers to meet the future demand of an aging agricultural workforce. This program also has an online presence and has created a community to increase dialogue and general communication.

The Collaborative has also been instrumental in seeking funding for regional agricultural concerns by consistently applying for grants. The grant funding has been a continual asset to work, research, and organizing.

Home-Based Work

Recognizing the importance of New Mexicans in the region that work from home, the team put together a program to support that network through technical assistance, research, and marketing materials. The program was a pilot program called "Live Work NM" that had the potential to be replicated in other places if successful. The theory was to also attract more residents from out of state who fall under the category known as "solitary economic base workers". The program has three main efforts: recruiting, converting, and supporting and expanding.

Solitary economic base workers work from home, a studio, workshop or mobile platform, like coffee shops, and typically produce a product or service that is sold outside of the local economy. This means they are bringing new money into the economy making it bigger. Because of this distinction, Live Work NM has teamed with a group of real estate professionals to recruit these workers and try to sell them homes in the area.

If these types of workers are not outside of the state, then they can be found within New Mexico as local unemployed or underemployed residents ready for conversion. The conversion effort involves holding meetings and workshops to help residents understand how to make their own business plan, handle finances, and other important entrepreneurial activities. By attending meetings and workshops, eventually the attendees can learn to become self-sustaining entities and provide new activity.

If the recruiting and conversion efforts became successful, then there would be a need to be a focus on supporting and expanding the solitary economic base worker community. This means creating ongoing services, amenities, and events to cater to these workers.

Live Work NM was established at three test sites: Rio Rancho, Albuquerque, and Los Lunas. Los Lunas proved to be a success while the other two are ostensibly shut down. However, the replicability of the project has been successful, as two other communities within New Mexico have appeared in Sandoval and Bernalillo.

Cluster Analysis Research

The final focus of the grant has been researching potential and existing clusters in New Mexico to better understand the innovation landscape of the entire state. By better defining what a cluster means to New Mexico, especially for regional industries, legislation can be better crafted to serve the state's economy.

One example of this has been work with the New Mexico Optics Association who helped to introduce research on Directed Energy and associated entrepreneurial opportunities to the state legislature to inform future policy. Albuquerque is one of the few places in the world where a student can study optics in high school and continue that education through to a Ph.D.

The team also developed a scope of work to map the alternative energy/green technologies cluster in the four-county Metro Albuquerque area. New Mexico is ranked number two in the U.S. for potential in solar energy, thanks in part to the Los Alamos National Laboratory, which focuses a lot of resources in to research and development of alternative energy products.

The strongest asset of the research has been the incorporation of local input. This included using 30-40 local public and private sector participants to help define terms for health services; science and technology; and alternative energy/

green technologies. Heavy input means better information which can lead to better policy for facilitating a comfortable business climate.

Combining Innovation

The MRCOG has taken their innovation grant and applied it to the region in a unique way by addressing economic development in a four-part initiative. The creation of the development alliance hopes to bring new business and economic activity by improving marketing and availability of information on the web. The Agricultural Collaborative has reinforced the presence of an already strong agricultural community and taken their impact online and beyond. The Home-Based Worker pilot program sought to leverage a special set of workers by attracting a greater community and supporting the current one. Undergirding all of the above activity, the research gained in the cluster analyses will aid in creating locally specific and timely inform policy and information. The MRCOG has proven that grant money does not have to be focused in one place, but can actually be equally beneficial with a diverse approach.

Key Takeaways for Economic Developers

1. A Diverse Approach Can Work. The MRCOG split the EDA grant among five different projects, targeted to different elements of a growth strategy.

2. Be Creative in Identifying Assets. Identification of the NM region as a good place for at-home work is a creative way to develop a cluster outside of a typical industry sector approach.

New Mexico Mid-Region Clusters at a Glance

The Mid-Region of New Mexico can claim a number of high-tech clusters, particularly in computer and electronic product manufacturing, energy, and information technology. Figure 18 illustrates both the prevalence of those sectors, and also the heavy losses those clusters took during the Great Recession. Though LQs have started to grow again, they haven't fully recovered their pre-recession levels.

Figure 18 – Top 10 New Mexico Mid-Region Clusters, 2001-2012

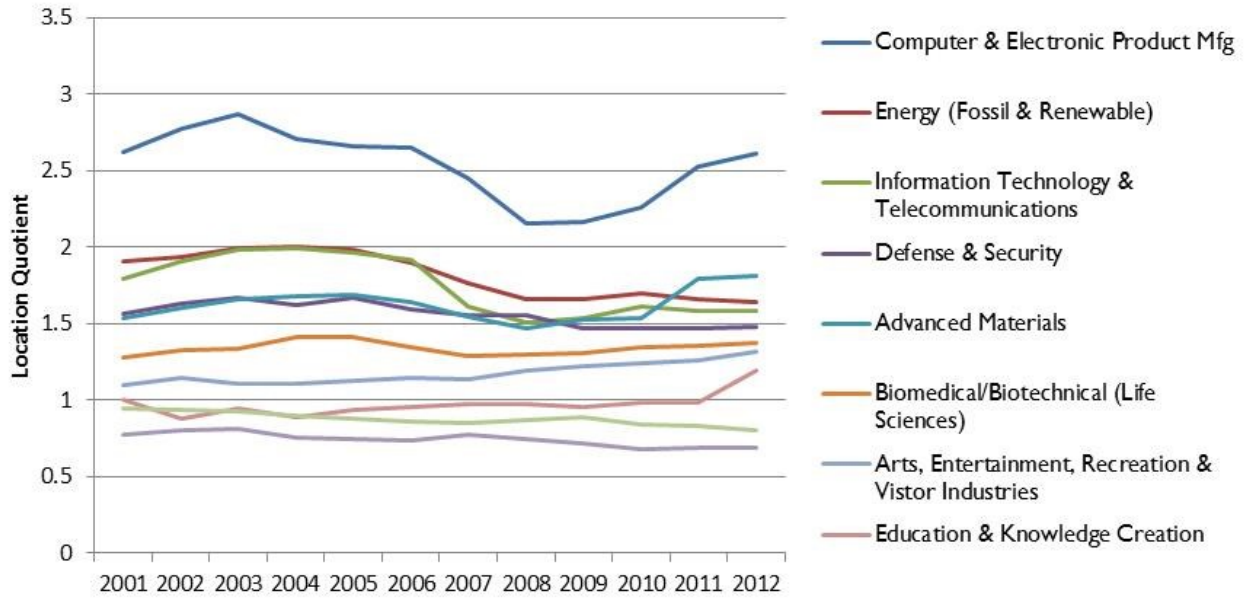
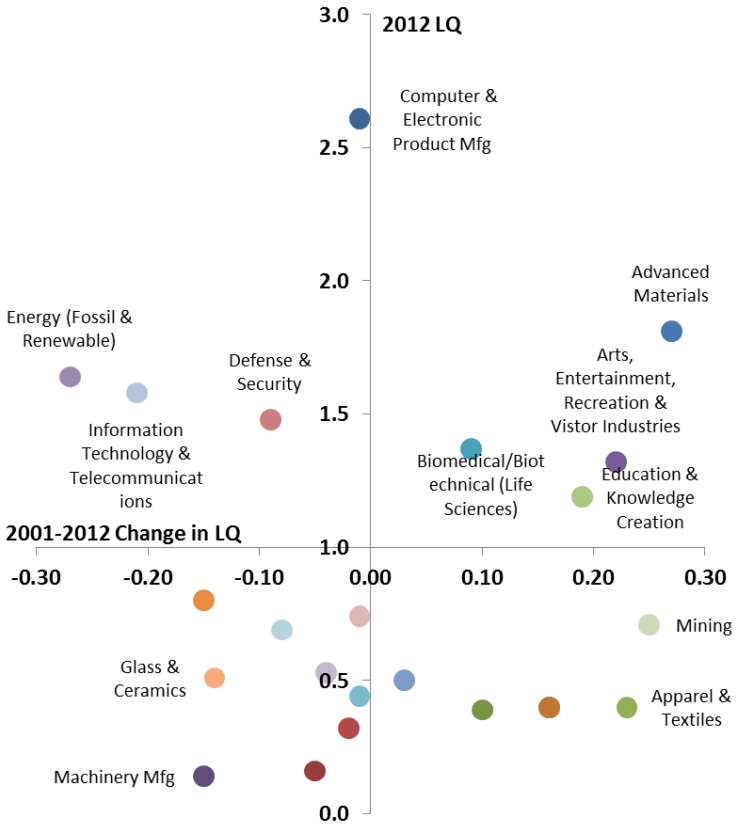


Figure 19 shows strong growth in a large number of clusters, including advanced materials, education & knowledge creation, and biomedical.

Figure 19 - NM Mid-Region Clusters by LQ and Trajectory



Creating Innovation Through New Connections (New Orleans, LA)

New Orleans is generally known for its rich culture, history, and architecture, but it is also home to one of the world's largest manufacturing facilities, as well as to eight reputable universities. Looking to strengthen the connections between those universities, surrounding facilities, government, and community, the New Orleans Regional Planning Commission (RPC) sought out ways to market the area's innovative capacity in a way to attract further investment.

Aided with a grant from the Economic Development Administration, the RPC has taken an approach focused on achieving more pronounced technology commercialization practices across the region. During the grant time-period, the RPC led two specific projects that successfully improved the competitiveness and capacity of both the stakeholders involved on the project and the region at large. The first project was the refinement of an economic development strategy in conjunction with the NASA owned Michoud Assembly Facility. This project helped to refine an existing plan and performed a market valuation study that changed NASA's approach to land use and perspective toward private sector tenants. The second project was a wider-scale approach to build university-innovation capacity through the creation of an asset inventory, an organized working group, and reoccurring workshops. These accomplishments would serve as a place to inform and generate ideas for spurring collaborative and innovative ideas.

Michoud Assembly Facility Fine Tuning

The Michoud Assembly Facility (MAF) is a NASA owned manufacturing facility that once constructed fuel tanks for the Space Shuttle Program. It is one of the largest manufacturing facilities in the world, is home to the University of New Orleans' Center for Advanced Manufacturing, and is an international attractor for human capital, investment, and prestige.

Today, the Space Shuttle Program is inactive, but NASA continues to use the facility for production and assembly of similar space components as well as lease extra space to private sector tenants. Recognizing the importance of the MAF to the region and to the University of New Orleans, RPC proposed assistance in the development of a strategic development plan focusing on tenanting and land use. The strategic plan involved the RPC, NASA, Eva Klein & Associates, and NASA contractor Jacobs Technology. The group worked to understand the competitive advantage of the MAF, narrow down what type of companies would be interested in using the facility, understand a better value for their properties, and recognize how to transition to a campus that welcomes private sector entities as tenants.

The result of the project was a set of strategies informing NASA on how best to proceed with the facility, a market analysis identifying opportunities and real estate principles specific to the MAF, and the creation of a new dialogue within NASA about achieving its organizational objectives while cultivating an environment conducive to private businesses.

The following six questions were the focus of the new strategies recommended for implementation:

1. The Product: What Are We Selling?

2. The Competition: Who is the Competition and What are Competitors Offering?

3. Target Market Segments: To Whom Are We Selling Our Product?

4. The Price: What Should We Charge for Rent and For Various Services?

5. Promotion and Marketing Program: How Do We Promote Our Product?

6. Sales Strategy: How Do We Achieve "Sales" or Close Deals?

These six questions helped to narrow down the focus of the project and would begin to change NASA's attitude and approach to selling their vacant space.

Eva Klein and Associates performed the market analysis, which identified the best market niches and opportunities for MAF to target as well as provide a primer for understanding real estate principles and how they should be applied. MAF is a government owned facility with certain financial obligations, like participating in public-private partnerships at full cost recovery. Rental rates were often exceedingly high due to the number of service and amenity provisions. Even if companies didn't use the facility's amenities, the price remained high. After the study, NASA altered its pricing rates for future tenants and has seen a change in the amount of space offered to manufacturing.

Alongside the change in rates and tenant type, new perspectives have emerged at NASA with respect to being competitive in the marketplace, attracting the "right kind" of tenants, and generating additional revenues through land use.

At the close of this project, RPC continued to work with universities and other organizations throughout the region and looked to further develop commercialization opportunities. This led to their next project entitled, "Closing the Loop on University-based Research & Innovation."

Closing the Loop

Succinctly referred to as "Closing the Loop", this project sought to build innovation capacity in universities throughout the region. By bringing groups together to collaborate, network, and share ideas, the region would have opportunities to capitalize and market itself as a whole. In pursuit of this idea, the project sought to accomplish three main tasks: create a database of regional higher education assets; organize a working group of university leaders and representatives from local economic development organizations; and sponsor workshops to discuss specific innovation-inspired ideas.

The database is a list of research programs, capabilities, and brief descriptions of a regional facilities and organizations involved in the technology and bioscience field. Along with delivering the database, the team wrote out documentation needed to advance and maintain the database for future additions and ongoing work. By providing continuity, the asset has potential to grow larger.

It was previously envisioned that with more growth and development the database could eventually turn into a website. That website could share and highlight stories of innovation, be a repository for similar research fields, and have a job board. Continuing this vision, RPC hired a writer to interview "rock star" researchers and learn more about some of their success stories.

The second task for RPC was the creation of the working group. This group served as an advisory board to meaningfully steer the project. Furthermore, discussions of the working group would go on to inform topic areas for the workshops. The members of the working group would also serve as promoters of the working group by advertising to their respective organizations and also through their physical attendance.

When it came to running the workshops, RPC decided to plan them to address both industry specific topics and cross cutting issues that incorporated the academic and educational missions of the universities. For the industry specific workshops, RPC hoped to focus on existing and emerging research assets with special attention to those with a physical presence, such as the planned Tulane Riverfront Campus. Additionally, one workshop focused exclusively on how to enhance university-industry relationships for research in the life and biosciences. For the cross cutting issues, RPC devoted one workshop to best practices and another to ethos and culture that must be in place for innovation to thrive in a university setting.

At the conclusion of the project, next steps were suggested to provide continuity for all of the work. In addition to maintenance and upkeep of the asset inventory, the creation of an entity devoted to inter-university collaboration and incorporating EDOs and industry was suggested. This idea was well received, but further definitions and terms of conditions would be needed before they could move on.

Future Innovation

The RPC's approach of strengthening regional connections not only improved the relationships between government and regional universities; it laid the groundwork for future innovation. For other regions looking to learn from this work, the key takeaway is a focus on collaboration and creation of shared assets. In the case of the Michoud Facility, the RPC, recognizing the importance of the facility to the University of New Orleans and the region, assisted in the improvement of NASA's land use practices and policy. In the case of "Closing the Loop", RPC led the creation of a shared asset database and set the stage for future conversations about innovation through the working group and workshops.

Key Takeaways for Economic Developers

1. Look at Underutilized Community Assets. The New Orleans RPC saw a facility with great potential that was not being realized and worked with partners to identify new opportunities for it.

2. Don't Forget Process Innovation. Innovation does not have to mean the production of new high-tech products. In this case, re-allocating an existing asset sparked new growth.

New Orleans Clusters at a Glance

New Orleans, as represented by data from Orleans Parish, claims strong clusters in arts, entertainment, and recreation, as well as in education and knowledge creation. Figure 20 also highlights clusters that have struggled in recent times, notably transportation equipment manufacturing, which rose considerably in LQ between 2005 and 2008, but fell to a LQ of 0.3 by 2012.

Figure 20 – Top 10 New Orleans Clusters, 2001-2012

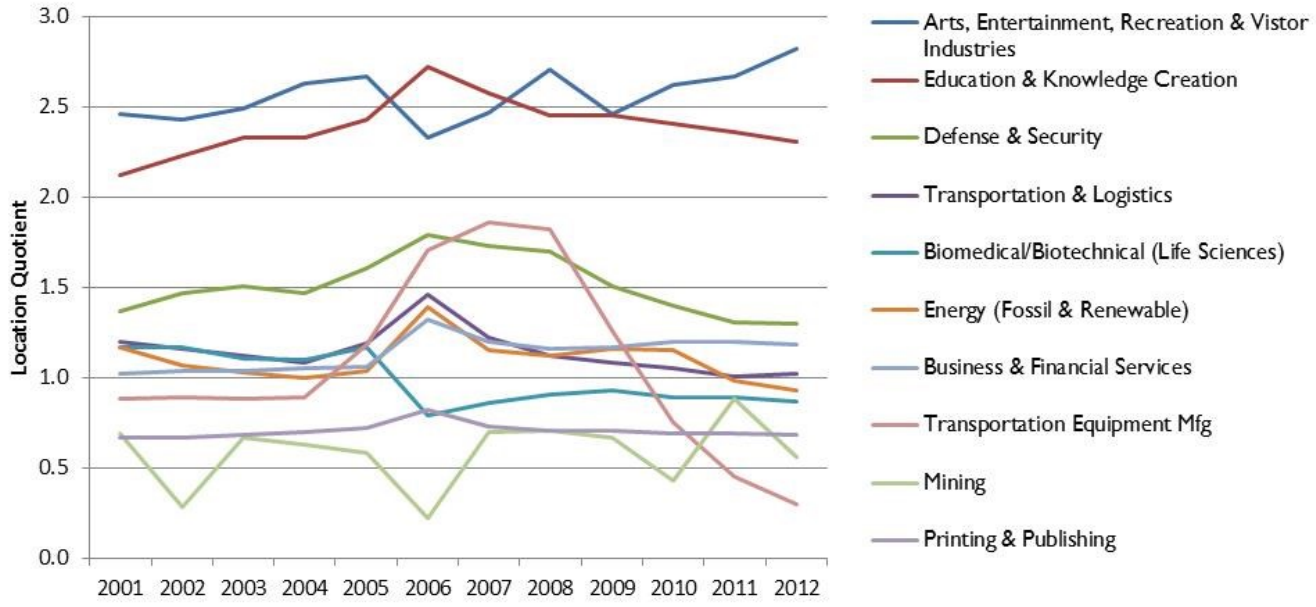
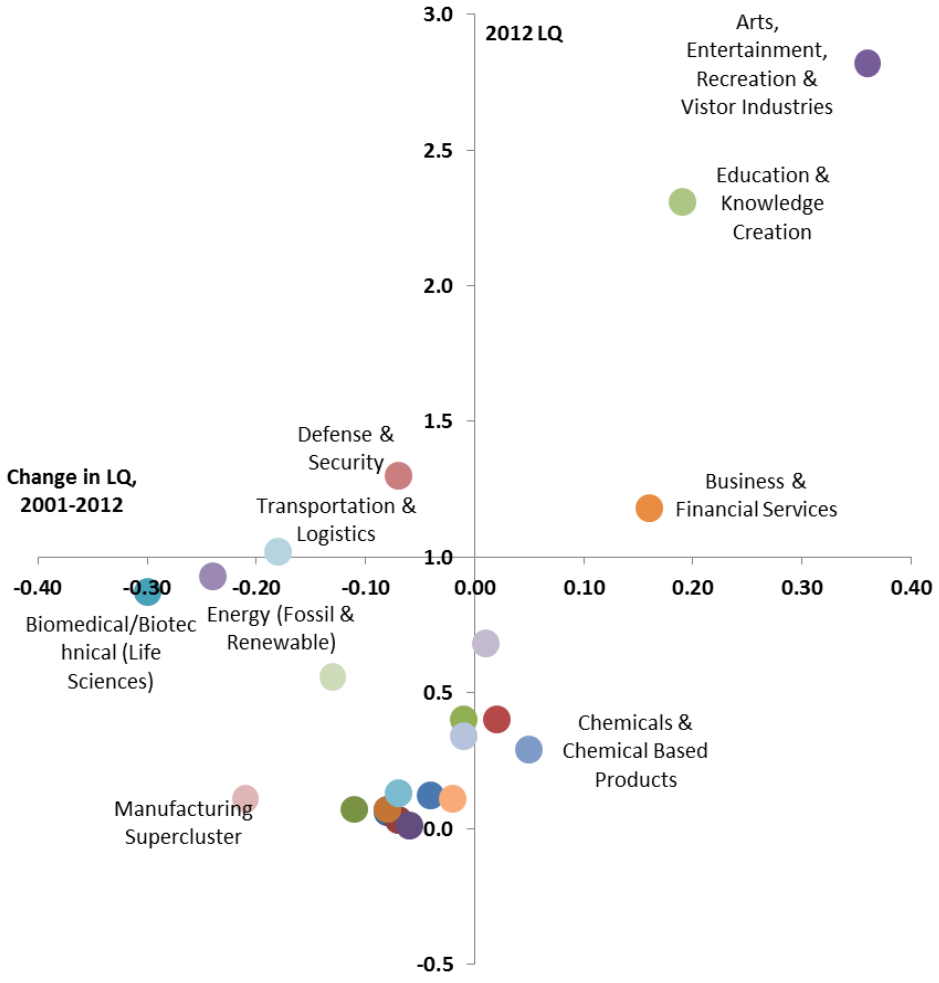


Figure 21 highlights the needs identified by the New Orleans RPC to support innovation and industrial growth, particularly in sectors outside of arts and entertainment.

Figure 21 – New Orleans Clusters by LQ and Trajectory



Regional Innovation Strategies for Building Human Capital and Capacity (Tulsa, OK)

As part of a Long Term Industry Plan Award, the Economic Development Administration has brought together Tulsa's regional government, INCOG, and a local not-for-profit investment corporation, i2E, to design and implement a regional innovation strategy targeting early-stage companies and entrepreneurs in the IT/Software industry. The strategy can be summed up by its dual focus: Build and Grow Human Capital and Build Entrepreneurial Capacity. According to a recent economic impact analysis, the project assisted 29 start-up companies, created new professional relationships among IT professionals, and was responsible for the creation of 91 new tech jobs. It also helped both local economic developers and regional project participants better understand the landscape of the IT/Software industry. Not only will local economic developers and i2E staff be better able to design, offer, and deliver more appropriate products and services, but the project participants have gained invaluable knowledge that can only be gained through operating a business.

Perhaps the greatest outcome of the project has been i2E's Business Immersion Program. The business model of the program identifies and nurtures early stage companies, accelerates the process of finding scalable solutions to reach the market, and broadens the support network at the local, state, and national level. The program's best quality is that it was designed to be replicable for other regions and also other industries. This report will focus on the dual approach of INCOG and i2E, the implementation of the regional innovation strategy, and demonstrate how their success can be replicated in other regions and with other industries.

Building and Growing Human Capital

The project team, consisting of INCOG and (after the EDA Planning Grant) i2E, first focused on building and growing human capital. Human capital can be best described as the skills, knowledge, and experience, which improve value to any region, business, or individual. This process involved identifying and recruiting talent, strategic planning, and networking.

Identifying and recruiting talent began internally with the selection of an industry committee and partnerships in the IT/Software community. Meetings were later set up to better understand the activities and recent innovations in the industry. The team's activities included: meeting with Tulsa University to learn about the Institute for Information Security's research in cyber security; attending the Oklahoma Aerospace Summit & Expo; and researching various state policies in cyberspace, aerospace, and wind energy. When the team was ready to implement the project, they began to recruit externally and brought on Mr. Shintaro Kaido who has extensive industry experience as an investor, entrepreneur and engineer. Mr. Kaido was charged with delivering advisory services as well as initiating the research and management efforts required to target companies and entrepreneurs. He helped transition the talent recruiting focus from internal to external.

Strategic planning with industry partners and leaders allowed the team to identify with confidence the direction they wanted move. Strategic planning allowed them to identify benchmarks, create a roadmap, and take stock of the external environment.

With a plan in place and the people to run it, the team could now focus on developing and implementing that plan through outreach, training, and networking. Discussion forums, client luncheons, and networking sessions were held to help cultivate relationships with local IT talent, provide IT leaders with a broader perspective of the industry, and assist in the sharing of knowledge amongst Tulsa IT companies. Networking creates two important avenues for knowledge creation: one with experts passing on knowledge to budding entrepreneurs and another with two non-competing business sharing information and best practices. The team also connected with Tulsa WebDevs, the largest and most active local software developer group, to identify how both organizations could work together and accomplish similar goals and objectives. I2E also hosts WebDevs' monthly meetings and supports "hackathon" events (collaborative, public programming), which take place 3-4 times per year.

Between all of these activities, the team stressed the importance of outreach as an ongoing process. Reoccurring receptions, luncheons, forums, and other forms of networking act as a space to actively cultivate relationships and explore connections between businesses, scholars, and entrepreneurs.

Build Entrepreneurial Capacity

The second focus for the project team was building entrepreneurial capacity. Capacity building involves understanding the obstacles and the environment that inhibit a person or business from achieving their goals. This process required curriculum development, the offering of advisory services, small business assistance, the creation of a Business Immersion Program, and, again, a focus on nurturing relationships and networks.

Because a Business Immersion Program was the centerpiece of this focus, developing an appropriate curriculum was crucial. The research that went into this step helped the team further their understanding of the IT/Software industry's best practices as well as similar programs that operate throughout the country. In the end, the Immersion Program had three main objectives:

1. Identify and nurture very early stage IT/Software companies in the Tulsa area.

2. Accelerate the process of finding a scalable problem-solution fit, building a sound foundation for the new enterprise, and locating growth capital.

3. To provide the most extensive pre-proof of concept acceleration program in Oklahoma.

The program enrolled four to five pre-revenue/early-stage companies per class per year. The duration of the program would be at most 20 weeks and would provide a variety of metrics to help identify business model and product or service uncertainties through a variety of hypothesis testing. The best practice is to find the core value and run tests until an optimal problem-solution fit can be found. The chosen space for this program was located downtown at i2E's Tulsa Office, which became a convenient space for entrepreneur visibility and networking.

In addition to the Immersion Program, the team also offered special services geared towards similar businesses. Financial analysis, development of operational strategies, investment structuring, and market analysis were available to interested IT/Software companies as advisory services. Furthermore, small business research assistance was used to help participants understand new topics in relevant technologies and help them apply for future grants in the IT/ Software field.

Undergirding the focus of building entrepreneurial capacity, similar to human capital, is forming and sustaining strong networks and partnerships through reoccurring forums, meetings, and luncheons. Again, the idea is that they will aid in the creation and transfer of knowledge amongst industry members and ensure the impacts of the project are long lasting or repeatable.

Outcomes and Impacts

The main outcomes for the region have been the creation of jobs, equity, and capital via new products and services. Specific impacts as reported by i2E Tulsa clients have been:

- The raising over $8.3 million in equity and debt capital.
- The Creation of over $25.6 million in revenue.
- An average annual wage of $57,141.
- The Introduction of 46 new products or services to the market.

- A reported job growth rate of 66%.

Other more general impacts have been that local economic developers better understand the IT sector and are thus better prepared to design products and services targeted to meet the industry's needs and demands. Regional entrepreneur participants have also gained invaluable business experience in the Immersion Program and now better understand how to quickly and cheaply adjust their products and services to problem-solve and reach the marketplace faster.

How can this be replicated?

The outcomes have yielded many insights, but most notably is that the project can be replicated in several ways. First, the business model used by the Business Immersion Program is extremely helpful on many levels and can be applied to other regions and sectors, not just the tech sector. Second, partnerships or committees could be formed to improve the understanding of both local economic developers and businesses to give greater perspective and context of the industry at large. Third, the relationships and networks formed can be strengthened and nurtured through reoccurring luncheons, forums, events and meetings to discuss and trade new ideas, problems, and solutions.

Through a focus on building and growing human capital and entrepreneurial capacity, the Tulsa region has seen great gains and positive impacts in the tech sector. The biggest have been increased jobs, capital, and knowledge creation as well as networks and partnerships that have laid the groundwork for future innovation. These have all been made possible through the intervention, leadership, and grant funding of INCOG, i2E, and the EDA to not only improve Tulsa, but also demonstrate a model that can be replicated in other regions.

Key Takeaways for Economic Developers

1. New Clusters do not Necessarily Need to Start with Recruitment. This strategy involved targeting local early-stage companies in an undeveloped local cluster: information technology.

2. Clusters Require Connection. Supporting networks among entrepreneurs and other stakeholders through luncheons, forums, and other events helped create the kind of network connections that lead to clusters.

Tulsa Clusters at a Glance

Tulsa (measured at the county level) boasts a strong manufacturing sector. Figure 22 highlights strong growth in Tulsa's machinery manufacturing cluster, as well as sustained strength in fabricated metal manufacturing and electrical equipment, appliance, and component manufacturing.

Figure 23 reinforces this point, showing much of Tulsa's strength lies in manufacturing. It also shows the relative weakness of the IT cluster in Tulsa, a circumstance the Regional Innovation Center project in Tulsa is hoping to address.

Figure 22 – Top 10 Tulsa Clusters, 2001-2012

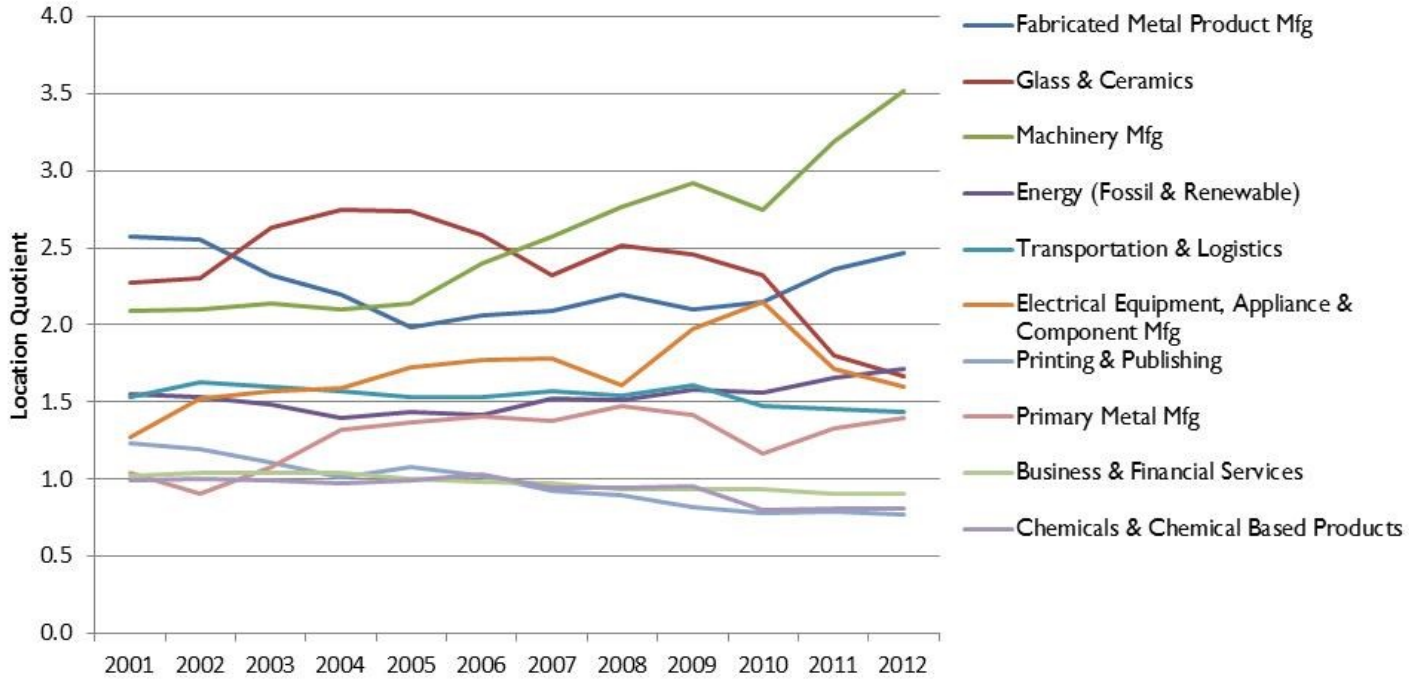
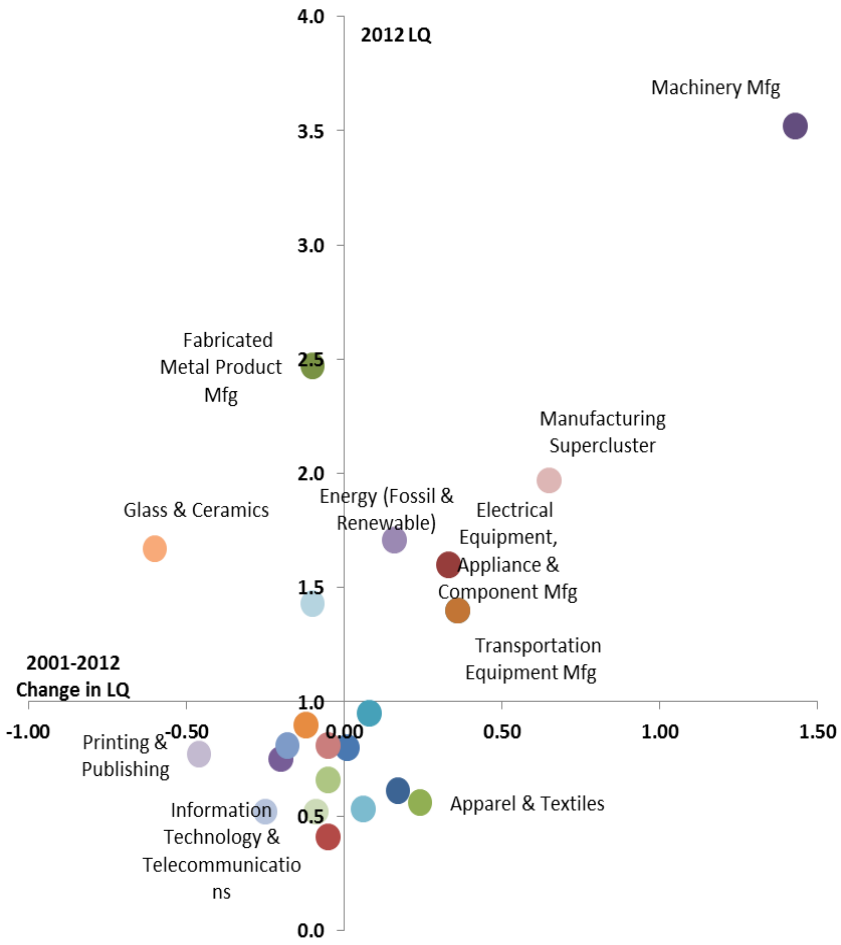


Figure 23 – Tulsa Clusters by LQ and Trajectory



Conclusion

Each of the projects outlined above highlights the variety of tools at the disposal of local economic developers. They also highlighted the importance of taking an approach driven by a rich knowledge of the community in which the project took place. As key stakeholders in regional economies, local economic developers can be critical catalysts for the kind of projects that help clusters form and support the continued growth of clusters.

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