California Innovation Corridor

Introduction to Clusters: What are Clusters?[1]

Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a particular region or local economy. Clusters emerge because companies engaged in a similar industry recognize they can enhance their productivity through locating near each other, thus enhancing their ability to compete collectively and cooperatively.

Industry clusters typically possess four key characteristics that contribute to higher growth and generate higher wage occupations:

- **Critical mass/concentration**: in other words, more concentrated than average.
- **High Growth rates**: a tendency toward higher growth rates than other sectors.
- **High Multiplier effects:** not all jobs are equal in terms of their effect on other parts of the economy. For example, creating a job in an industry cluster typically creates two or three other jobs throughout the economy.
- Finally, and most importantly, some key reason, or some **locational competitive advantage** for the cluster to be here, today and in the future – Disney and Boeing are two examples of key reasons we have competitive advantage in their respective clusters, in Orange County.

2005 California Regional Economies Project[2]

According to the California Regional Economies Project, outward oriented industry clusters are important for regions because they drive the vitality of support and local-serving industries—without competitive, outward-oriented industries, communities cannot enjoy sustained increases in standard of living. Economists from Alfred Marshall (1890) to Michael Porter (1990) point to several benefits to companies from participating in industry clusters:

- o Access to a specialized workforce
- o Access to specialized suppliers
- o Access to business and technology networks

Clusters of opportunity are sectors of the economy identified by growth in one or more areas: value, jobs or wages. A cluster of opportunity elaborates on the concept of an economic cluster – traditionally seen as export-oriented, geographically-concentrated, and interdependent industry sector characterized by competing firms and buyer-supplier relationships, as well as shared labor pools and other specialized infrastructure – by linking it to the challenges of workforce development. The definition of a "cluster of opportunity" focuses not only on export-oriented sectors, but also population-driven sectors—as well as sectors that offer occupations with "career potential." Clusters of opportunity are a combination of related sectors that share one or more of these attributes.

---

1 Orange County Workforce Indicators Report, 2008-2009

2 http://www.labor.ca.gov/panel/pdf/Industry_Clusters_of_Opportunity_User_Guide_September_2008.pdf

www.InnovateCalifornia.net

Clusters of Opportunity within the California Innovation Corridor: A WIRED Project

The CIC Clusters of Opportunity were identified using economic data available from the California Employment Development Department (Labor Market Information Division) combined with the IMPLAN Input-Output System. Criteria used to determine the CIC clusters of opportunity are as follows:

- *Average Annual Growth Rate:* Employment growth rate averaged across the 13-county economic region of the CIC. A Cluster of Opportunity demonstrates growth rate of 3% or higher, except in Energy Production (1.91%) and Environmental/Waste Management (1.25%). For these two clusters, the lower *past* growth rate is offset by the high wages offered in Energy Production, and high multiplier effect offered by Environmental/Waste Management, as well as the ascendant nature of these industries in which California has played a significant role in nurturing, through the state's resources, policy requirements such as AB 32 requiring reductions in greenhouse gas emissions. California's strength in this area is due to its natural resources in sunshine, geothermal energy and wind. According to "Harvesting California's Renewable Energy Resources: A Green Jobs Business Plan," if 20 percent of California's energy were from renewable sources by 2010, Orange County alone could gain between 8,000 and 22,000 new jobs in companies emerging to address the new business opportunities with this energy target. Other examples of this emergent industry include Kern County, where in if all of the county's wind energy were to be harnessed, the industry can generate up to 30,000 jobs.

- *Location Quotient:* Also known as *export orientation*, this is a calculation that compares the percentage of employment in the CIC to the percentage of employment in its national counterpart. A ratio greater than one signifies that employment is more concentrated in the region than it is nationally – an indication of outward orientation and a source of comparative advantage.

- *High Employment:* Absolute value of employment, different from growth rates in percentages. This value, combined with the multiplier of that cluster, identifies not only clusters offering employment opportunities for California workers in the cluster, but creates multitudes of additional employment opportunities beyond the cluster. CIC Clusters show absolute employment of over 100,000 in the corridor, except in Energy Production (97,943) and Environmental (27,060). For these two emerging clusters, the lower absolute current employment is offset by the high wages offered in Energy Production, and high multiplier effect offered by Environmental/Waste Management,

- *High Multiplier Effect:* The economic impact for economic sectors are identified through creating numerical values that summarize how investment spent in a sector produces an economic impact throughout the rest of the local economy. A higher value multiplier indicates a higher degree of interaction in the regional economy. For example, if the manufacturing cluster is said to have a multiplier of 1.7, then for every ten employees hired in manufacturing, a total of 17 jobs will be generated throughout the entire CIC. Spending in clusters with higher value multipliers will likely produce more benefit to the economy as a whole. CIC Clusters have multipliers greater than 1.7, and combined with absolute employment, measures the real impact to the corridor economy.
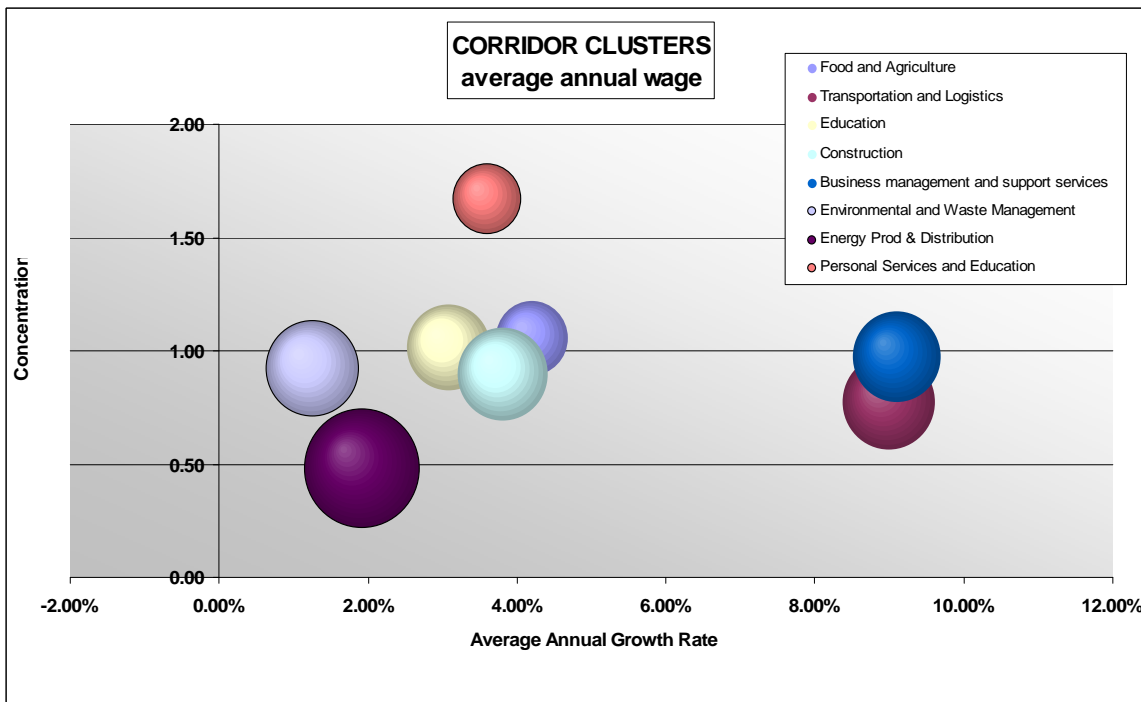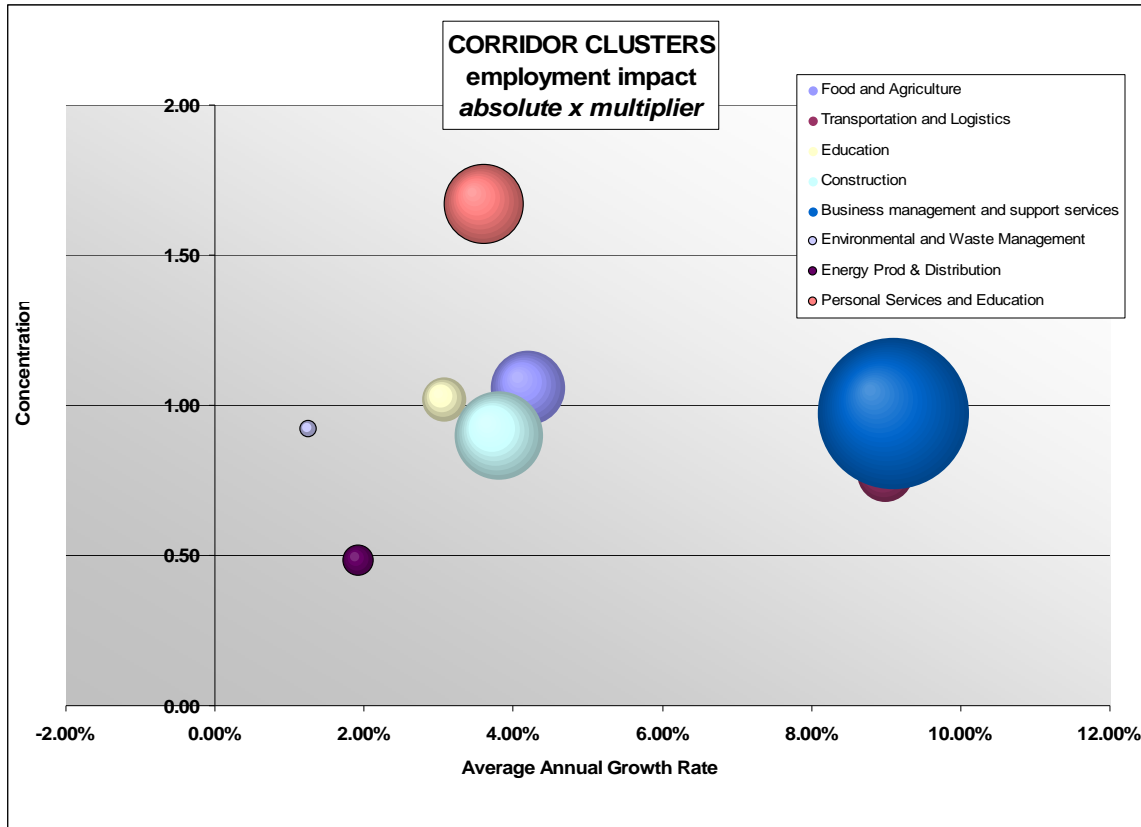
The CIC Clusters of Opportunity was determined and assessed using the above criteria and with the model provided by the 2005 California Regional Economies Project, and are as follows:

Name of cluster	Average annual growth rate (2001-2006)	Concentration Relative to CA	Employment (2006)	SAM Multiplier	Average Annual Wage
Food and Agriculture	4.20%	1.06	532,708	1.73	$ 30,803
Energy Prod & Distribution	1.91%	0.48	97,943	1.58	$ 75,725
Construction	3.81%	0.90	755,223	1.70	$ 48,340
Transportation and Logistics	8.98%	0.77	298,608	1.80	$ 49,457
Environmental and Waste Management	1.25%	0.92	27,060	1.73	$ 49,124
Education	3.07%	1.02	178,418	1.86	$ 41,049
Personal Services and Education	3.60%	1.67	546,618	1.85	$ 27,243
Business management and support services	9.09%	0.97	2,052,758	1.81	$ 44,416

Source: Industry Analysis, California Innovation Corridor 2001-2006, State of California Employment Development Department

The impact of these clusters on other sectors of the economy is demonstrated in the following chart.

www.InnovateCalifornia.net

CORRIDOR CLUSTERS
employment impact
absolute x multiplier

Legend:
- Food and Agriculture
- Transportation and Logistics
- Education
- Construction
- Business management and support services
- Environmental and Waste Management
- Energy Prod & Distribution
- Personal Services and Education

Y-axis: Concentration (0.00, 0.50, 1.00, 1.50, 2.00)
X-axis: Average Annual Growth Rate (-2.00%, 0.00%, 2.00%, 4.00%, 6.00%, 8.00%, 10.00%, 12.00%)

CORRIDOR CLUSTERS
average annual wage

Legend:
- Food and Agriculture
- Transportation and Logistics
- Education
- Construction
- Business management and support services
- Environmental and Waste Management
- Energy Prod & Distribution
- Personal Services and Education

Y-axis: Concentration (0.00, 0.50, 1.00, 1.50, 2.00)
X-axis: Average Annual Growth Rate (-2.00%, 0.00%, 2.00%, 4.00%, 6.00%, 8.00%, 10.00%, 12.00%)

www.InnovateCalifornia.net

Methodology of Multiplier Development

Aggregate Cluster Multipliers

An important step in developing a sustainable cluster-based economic and workforce strategy is identifying which business sectors produce the greatest impact relative to the investment made in them. The purpose of this analysis is to identify which economic sectors produce the most "bang for the buck". Aggregate Cluster Multiplier Analysis tells policy makers "how" it should be done, in terms of where investments should be made in the economy.

Using IMPLAN software from MIG (*Minnesota IMPLAN Group*), aggregate cluster multipliers were produced by creating an aggregation scheme and applying it to the model. In other words, the economic impact for economic sectors are identified through creating numerical values that summarize how investment spent in a sector produces an economic impact throughout the rest of the local economy. These values are called "multipliers.[3]"

Multipliers are a combination of these:

1. **Direct effects** are the changes in the industry used to describe the events being analyzed. In other words, direct multipliers reflect the direct impact of dollars spent in that particular economic sector (e.g. manufacturing). If fifty employees are laid-off by a manufacturing firm, then the direct effect is fifty employees reduced in manufacturing.
2. **Indirect effects** are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries. In other words, indirect multipliers reflect how dollars spent in a particular economic sector create impacts in other economic sectors which have a benefit in the overall local economy. For example if a manufacturing firm lays off fifty employees, then all the companies that purchased materials from that manufacturing firm will also lose business and might end up having to lay off twenty-five employees (collectively) all across the local economy.
3. **Induced effects** reflect changes in spending from households as income/population increases or decreases due to the changes in production. Induced effects are the local economic effects created through the economic effect of that sector of the economy. In other words, if a manufacturing firm lays off fifty employees, those fifty employees will shop less from many other companies (grocery stores, gas stations, clothing stores) which may end up having to lay off workers from lower demand for their products (separate from manufacturing) and "downstream" in effect from the action of the analyzed sector (e.g. manufacturing).

---

3 IMPLAN uses several multiplier options, the primary two being Type I and Type SAM. The difference is that Type SAM includes induced effects from household income and spending. Their formulas are as follows:

Type I= (direct effect + indirect effect)/direct effect

Type SAM= (direct effect + indirect effect + induced effect)/direct effect

Cluster Investment and Economic Development

The CIC Clusters were chosen to reflect both key economic drivers for the CIC economy and industries that are central to workforce development. Understanding employment trends in these clusters can and should influence workforce and economic development policy. In addition, understanding comparative salary levels and salary growth trends is vital for education and workforce development policy. This information, combined with information from the indicator on cluster employment growth trends, allows workforce development professionals and the business community to understand how the CIC economy is performing in terms of generating jobs at differing salary levels. For example, if growth of low wage jobs is not balanced by growth of high wage jobs, there will be problems –- especially so in a high cost of living location like areas within the CIC – San Diego, Orange County, Santa Cruz, and Santa Barbara are strident examples[4].

In the case of lower-paying clusters, workforce development policy in those sectors should focus strongly on skills development to provide avenues for wage growth that otherwise might not exist. Workforce development policy should also attempt to identify skill ladders that can move employees from lower paying agricultural or food service jobs to jobs in the technology clusters that have higher wages and more rapid wage growth.

Why use clusters? The answer is easy – cluster analysis bring to the surface identifiable targets for investment, and it bring forth the opportunity to identify emerging clusters that replace traditional clusters, and for the economic developer to ride the wave front of the ascendency, investing in growth-driving technologies and growth-supporting skilled workers. Identifying emerging clusters such as Energy Production and Environmental/Waste Management also brings into focus the direction of policy advocacy – if we want the potential for new jobs in these clusters to be realized – and for them to maximize their multiplier effects - in the California Innovative Corridor, then the implementation of legislation driving these clusters must be encouraged, observed, and supported within the Corridor and beyond.

Cluster investments are two-pronged; the approach include both workforce *and* economic development. Economic development must grow beyond, and pull ahead of, the hitherto practiced pursuit of property development and sales tax. Workforce development *is* economic development; the integrated approach focuses on retaining high value clusters and employment, followed by attraction of new players in both talent and capital investment. Clusters on a regional level are almost invaraibly different than clusters defined on a local (county or city) level; the economic drivers of a region are more diverse and less fluid than that of those found within smaller geographic traunches. Defnining and assessment clusters within the larger context of a California Innovation Corridor provides the economic decision makers an integrated tool, by which to focus increasingly limited workforce investment funding, and by which economic development funds can be leveraged to maximize returns to the local economy.

---

4 Orange County Workforce Indicators Report 2008-2009

www.InnovateCalifornia.net