ECONOMIC DEVELOPMENT AND THE KNOWLEDGE ECONOMY IN CALIFORNIA'S INLAND EMPIRE:

PROGRESS OR STAGNATION?

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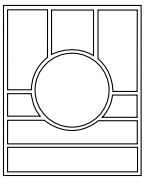

The Tomás Rivera
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ECONOMIC DEVELOPMENT AND THE KNOWLEDGE ECONOMY IN CALIFORNIA'S INLAND EMPIRE:

PROGRESS OR STAGNATION?

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INTRODUCTION

"In order to get real collaboration between organizations in the Inland Empire we need to look for issues and look for leaders. The issue is that we live in the biggest parking lot in the state, and it is growing..."

—Community Leader, San Bernardino County

The Inland Empire region of Southern California is the fastest growing area in the state according to the 2000 Census. Between 1990 and 2000, Riverside and San Bernardino counties added 700,000 to their population totals, an increase of 26 percent. While more and more people were moving to the region, economic reports have indicated that they were not always working in the region. While it is not clear whether this is a result of the low level of high-skill, high-wage job opportunities in the region, it is nonetheless an important fact of economic life.

Despite the fact that the two-county region is 27,000 square miles (or larger than ten states), as many as one-third of working adults commute out of the region to find work.

Despite the fact that the two-county region is 27,000 square miles (or larger than ten states), as many as one-third of working adults commute out of the region to find work. Interestingly, this has occurred at the same time that the Inland Empire has witnessed the highest level of job creation in the state.

This report seeks to uncover the reasons why professional, high-tech, and high paying jobs are not as prevalent in Riverside or San Bernardino counties as in neighboring counties, as well as in key comparison regions across the country. The focus of this analysis will be on how the existing situation enables or deters the creation of a high-skills, high-wage, more technology-intensive economy in the region. While primarily focusing on economic development, the project will also speak to other issues and challenges facing the region, particularly in terms of the talents, skills, aspirations, and daily experiences of the people of Riverside and San Bernardino counties.

Economic trends over the past ten years have led to the evolution of a knowledge economy, ultimately driving long-term trends and with enormous implications for California and other regions in the United States. Some characteristics of a regional knowledge economy include:

- Entrepreneurial, start-up firms are the major source of new ideas, products, innovations, and job growth. Speed-to-market defines relative advantage, and those firms that are more nimble and that can rapidly pull together virtual alliances of their peers will have significant advantages.

- New products and services utilize knowledge content, whether in terms of embedded technology or expertise-based know-how. The knowledge economy is more "weightless" than in the past when durable goods and immovable capital assets were the hallmark of the U.S. economy.

- Traded goods and services involve global markets, which in turn have been enabled by relatively recent advances in communication

and transportation technologies. Of these, the Internet and various approaches to electronic commerce have had extraordinary impacts.

- One or more research and development (R&D) centers, often a research-intensive university, a major federal facility, or both, are present in the region.

- Human resources are one of the dominant ingredients in economic success. Being able to retain and attract the best and the brightest talent is a key feature of states, regions, and metropolitan areas that are succeeding economically.

- Public policies tend to be oriented toward supporting these economies, at both macro- and micro-levels of intervention. These include traditional types of business infrastructure (e.g., transportation systems), as well as newer elements (e.g., high-speed Internet access) that support new, knowledge-intensive companies.

PROJECT APPROACH

To examine the patterns of economic development in the Inland Empire region, a three-tiered research approach was implemented over 18 months. The first tier included analysis of secondary data from the U.S. Census Bureau, and presented comparisons between the Inland Empire and other regions that have a national reputation for being well ahead of the curve in terms of developing high-skill, high-wage, knowledge economies. They include: San Diego County, Salt Lake County, and the Research Triangle Park region of North Carolina, which incorporates parts of Durham, Orange, and Wake counties.

The second tier of research involved in-depth interviews with key stakeholders and policymakers in the Inland Empire region. And finally, a public opinion survey was administered of working adults to determine their attitudes about economic development and the future of the Inland Empire.

In particular, we have focused on:

1. human resources and educational opportunity
2. economic assets and job opportunity
3. research and development practices in the region

As data is presented in each domain, we also include observations from our field interviews with community leaders in San Bernardino and Riverside counties and findings from our public opinion survey.

In full, the findings from all three components suggest that the region is full of potential, but falls short on coordination and implementation. What is important to consider in weighing the attributes of these various communities is that the Riverside and San Bernardino counties are developing economies with a recent surge in population and job growth. This report strives to outline the policy goals needed for local civic, business, and academic leaders to shape the future of the region into a thriving, knowledge-based economy.

I. HUMAN RESOURCES

"The university is the key because it has fresh voices and new perspectives. We need to open up communication doors between San Bernardino State and UC Riverside..."

—Community Leader, Riverside County

Recent studies of the location decisions of fast-growing, technology-based firms indicate that adjacency to knowledge sources (e.g., universities) and the availability of a highly skilled workforce are at least as important as traditional incentives such as tax breaks, site development assistance, and regulatory relaxation.

Most economic analyses of regions do not begin with an examination of human resources. More traditional economic research frameworks treat labor as merely one input variable to the mix. However, a strong argument can be made that in the context of the emerging global, knowledge economy human resources are much more important. For example, recent studies of the location decisions of fast-growing, technology-based firms indicate that adjacency to knowledge sources (e.g., universities) and the availability of a highly skilled workforce[I] are at least as important as traditional incentives such as tax breaks, site development assistance, and regulatory relaxation. Similarly, based on state-level analyses[II], there seems to be a growing relationship between educational performance indicators and the presence of a strong and growing private sector that produces high-wage, high-skill jobs.

STAGES AND PHASES

The human resources of a region do not depend on any single domain of educational or training programming, but are better thought of as a system of loosely linked activities that starts in infancy and continues throughout life. In effect, the educational experience is a multi-stage, interdependent system that can break down at any phase. Because the knowledge base of the economy is continually growing and changing, the existing and emerging workforce must keep pace; the related educational and human resource infrastructure of a region must also be responsive to these changes.

THE IMPORTANCE OF TRANSITIONS

As a series of linked activities, the human resources system of a region often breaks down in the transitions between different components of the system. For example, while high schooling may be generally adequate, if successful matriculation to college does not occur, the workforce implications can be significant. Similarly, if large groups within a region tend to have higher dropout rates during high school, the workforce pipeline will be reduced.

ALL SKILL SETS ARE NOT EQUAL

The emerging knowledge economy is not being built around the same skill sets that were standard in the era of traditional manufacturing. Some job categories are growing at a significantly faster rate than the norm, and some degrees are more desirable in the eyes of employers than others. For example, despite painful restructuring in the dot-com sector of the high-tech economy, the

demand for those skilled in information technology (IT) disciplines continues to be healthy. More significantly, jobs that are "IT-enabled" (e.g., computer-assisted part design) are in demand alongside core IT jobs (e.g., software engineers), and there are more of such jobs in the aggregate, with many of them emerging in industries that are not traditionally seen as high-tech (e.g., precision manufacturing).

In looking comparatively across regions we will be attentive to the levels of educational attainment. Embedded within the research approach are sets of overarching analytic questions that will be expressed in several of the comparative performance benchmarking results, including:

What are the comparative levels of educational attainment?

> **Do Inland Empire residents achieve comparable levels of educational attainment, such as degrees earned or years of school completed, when contrasted with other regions?**

Are there mismatches between employer needs and workforce characteristics?

> **If the workforce is over-qualified relative to the jobs available in the region, symptoms of "brain drain" will emerge. If the opposite is true, it may be difficult to recruit or retain companies that demand a well-educated workforce.**

THE DATA

For ease of presentation, the comparative benchmarking results in this chapter are presented in terms of phases and stages of the skills pipeline. We will first describe general population trends, then go on to discuss educational attainment and workforce characteristics. The comparison groups are the Inland Empire counties (Riverside and San Bernardino), San Diego County, Salt Lake County in Utah, and the Research Triangle Park counties of North Carolina (Durham, Orange, and Wake).

TABLE 1
POPULATION TRENDS

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
2000 Population	3,254,821	2,813,833	898,387	969,387
1990 Population	2,588,793	2,498,016	725,956	699,066
% Change	26%	13%	24%	39%

Source: 2000 Census, SF3

This data was drawn from several sources, including: (1) the National Center for Education Statistics; (2) the U.S. Census Bureau; and (3) databases available from Quality Education Data Inc.

The Inland Empire was the most populous among the four regions compared, with 3,254,821 million people in 2000 (Table 1). These numbers have implications for human resource development and education. Rapid changes in population tend to put great stress on educational systems, particularly if the incoming families are younger and have school-age children.

EARLY DEVELOPMENT

The challenge faced by families during the birth to 5-year-old timeframe is to get their children "ready to learn" on a full-time basis by the time they enter school. Accomplishing this goal involves a mix of physical, social, and cognitive development activities. Many of these happen in the context of the nuclear family, through the processes of parenting, sibling interaction, and community influences. However, the research literature[III] increasingly points to the significant role adjuncts to the nuclear family play, in the form of preschool programs, Head Start, and other private community organizations such as churches. These influences are particularly important in families with non-English speaking adults or where, because of economic

TABLE 2
PRESCHOOL ENROLLMENT AND TOTAL NUMBER OF SCHOOLS AVAILABLE

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
3-and 4-Year-Olds Enrolled in Preschool	37%	48%	43%	61%
Total Number of Early Childhood Schools	759	818	202	429
Child to Preschool Ratio	343	240	397	154

Source: Quality Education Data, 2003, 2000 Census, SF3, Table PCT23, and NCES/CCD 2001-1997 enrollment data.

TABLE 3
HIGH SCHOOL EDUCATIONAL ENROLLMENT STATISTICS

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
9th Grade Enrollment (1997-98)	53,025	37,290	13,864	11,752
12th Grade Students (2000-01)	39,988	29,467	12,860	7,980
Diploma Recipients (2001)	34,521	25,681	11,878	7,193
% Change From 9th Grade to Diploma	-35%	-31%	-14%	-39%
% Of 12th Grade Students With Diploma	86%	87%	92%	90%
% Of Seniors Planning to Attend College	56%	65%	60%	70%

Source: Quality Education Data, 2003, 2000 Census, SF3, Table PCT23, and NCES/CCD 2001-1997 enrollment data

TABLE 4
CLASSROOM INFORMATION TECHNOLOGY MEASURE

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Total K-12 Public Schools With IT	755	634	225	190
Low	35%	21%	25%	18%
Average	38%	43%	54%	62%
High	14%	20%	12%	4%

Source: Quality Education Data, 2003.
Note: Percentages are standardized by the total K-12 public schools included in the QED listing.

TABLE 5
POST-SECONDARY CAPACITY

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Total Four-Year Colleges	10	30	3	10
Total Undergrads (1998)*	116,128	207,914	45,428	69,013
Population Age 18-24**	317,335	319,755	116,523	120,443
% Undergrad (18-24)	37%	65%	39%	57%
Total Higher Ed Enrollment*	125,325	234,348	51,740	92,689
Population Age 18-29**	523,851	536,448	194,285	207,847
% Higher Ed (18-29)	24%	44%	27%	45%

**Source:* National Center for Education Statistics, 1998
***Source:* 2000 Census Bureau

constraints, there is limited access to learning materials, books, and other experiences. As a result, one important regional benchmark is the extent to which younger children are exposed to formal educational experiences prior to entering kindergarten.

Compared to other regions, the Inland Empire has the lowest percentage of 3- to 4-year-olds who are enrolled in preschool, at 37 percent, with one school available in the region for every 343 children under the age of five (Table 2). A higher percentage of 3- to 4-year-olds are enrolled in school in San Diego County (48 percent). Across the regions, the highest percentage of preschool enrollment is found in the Research Triangle Park area, at 61 percent. Because of the learning preparation early childhood education provides for the elementary and high school years and the lower rates of participation in the Inland Empire, it is clear that the Inland Empire K-12 system must provide an even greater role in its residents' education.

Furthering the trend of lower educational attainment, more than one-third of ninth graders in the Inland Empire do not graduate from high school (Table 3). The Inland Empire also has the lowest percentage of twelfth grade students with a high school diploma and those planning to attend college.

The next set of data examines a technology measure developed by Quality Education Data (QED) that indicates the presence of IT in schools[IV]. Schools with a higher technology presence can be assumed to have the equipment that would make it possible for technology to have a substantial impact on students' education and skills mix. The Inland Empire shows the highest percentage of schools falling in the "low" level of technology presence at 35 percent (Table 4). Further, the number of schools in the "average" technology

range (38 percent) is more than double the number in the "high" technology range (14 percent).

Higher education leaders recognize that a highly skilled workforce is a major part of a successful high-tech/information economy. One way to examine the ability of a region to produce such a workforce is to analyze the trends in transitions between various educational systems. Yet, that is only one part of the process. Regional economies must also be able to provide sufficient post-secondary educational opportunities to meet the business demand for high-skilled workers. Furthermore, regional economies seeking to attract knowledge-intensive companies must stimulate growth in specific academic fields to increase the supply of professionals pertinent to a high-tech industry.

A key benchmark is higher education enrollment among a region's college-age population (18-24). The Inland Empire has only 37 percent of college-age residents enrolled in post-secondary education, the lowest across all five areas (Table 5). In contrast, two of the comparison regions have more than half of their college-age population pursuing some form of higher education: San Diego County has the highest percent of college-age students enrolled with a 65 percent figure, followed closely behind by Research Triangle Park with 57 percent.

If we expand the college-age population to the 18-29 age category, we find that the Inland Empire has only 24 percent of students enrolled in higher education, once again the lowest finding across all four comparison areas. Research Triangle Park and San Diego County have about the same percent of their population in higher education, 45 percent and 44 percent respectively; almost double the figure for the Inland Empire (Table 5).

TABLE 6
EDUCATIONAL ATTAINMENT FOR THE POPULATION 25 YEARS AND OVER

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
College Degree or Better	24%	37%	35%	51%
High School or Some College	51%	46%	52%	37%
Less Than High School	25%	17%	13%	12%

Source: U.S. Census Bureau Summary File 3, 2000

TABLE 7
TOTAL DEGREE AWARDS, 1998

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Total Associate's Degrees	5,680	7,433	2,627	1,118
Total Bachelor's Degrees	5,104	11,925	4,706	10,823
Total Master's Degrees	1,557	5,363	1,483	3,868
Total Doctoral Degrees	144	555	205	953
Total Degrees Awarded	12,485	25,276	9,021	16,762
% Graduate Degrees	14%	23%	19%	29%
Total Undergraduate Degrees	10,784	19,358	7,333	11,941
% Associate's Degrees	53%	38%	36%	9%
% Bachelor's Degrees	47%	62%	64%	91%

Source: National Center for Education Statistics, 1998

TABLE 8
DEGREES BY DISCIPLINE, 1998

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Total Bachelor's, Master's and Ph.D. Degrees Awarded	6,805	17,843	6,394	15,644
% Computer Information Science	1%	3%	2%	2%
% Engineering	0.5%	4%	6%	10%
% Math	1%	1%	1%	2%
% Biological Sciences	9%	7%	3%	8%
% History and Social Sciences	9%	10%	16%	12%

Source: National Center for Education Statistics, 1998

"We should do nothing to improve transportation. The more you improve it, the more incentive you give people to drive out of the region for jobs. We need more substance not more roads..."

— Community Leader, San Bernardino County

The Inland Empire reports the lowest rates of college-educated adults at 24 percent and also the highest rate of adults without a high school diploma at 25 percent (Table 6). In contrast, Research Triangle Park has the highest rate of adults with a college degree or better at 51 percent and the lowest rate of adults without a high school diploma at 12 percent.

As stated earlier, growth economies require highly skilled workers who are often recipients of four-year degrees. Colleges and universities in the Inland Empire lag behind in the number of bachelor's and graduate degrees awarded (Table 7). Only 14 percent of all degrees are master's or doctoral degrees, the lowest of any region. Similarly, among the undergraduate degrees, less than half (47 percent) was for four-year bachelor's degrees. In contrast, nine out of ten undergraduates obtained four-year degrees in Research Triangle Park.

Data from the 2000 Census on workforce patterns revealed that 29 percent of the people who live in the Inland Empire work outside of the two-county region, the highest rate for any region in the country.

TYPE OF DEGREE AWARDS

Beyond enrollment and access to higher education is the development of skills in specific disciplines that fit the needs of high-growth economies such as high-tech and bio-tech. The Inland Empire does not fare very well in terms of producing engineers, at 0.5 percent (Table 8). However, it is doing relatively well when it comes to training people in the biological sciences, with the highest percent of bachelor's degrees in biology across the four regional economies. Table 8 also shows that a greater percentage of students—across all four regions—continue to be more inclined to pursue academic degrees in the social sciences rather than the hard sciences.

WORKFORCE CHARACTERISTICS:

THOSE WHO STAY AND WORK AND THOSE WHO LEAVE

There are a number of ways to characterize the workforce of a region. One of the indicators that states and regions worry about is the extent of "brain drain." That is, what percent of the most talented residents permanently leave to seek more remunerative or personally rewarding work elsewhere. Or, perhaps of more diagnostic utility, one can examine those who live and work in a region, versus those who live in a region, but work elsewhere. Much has been written about interstate "brain drain" of key scientific and technical talent, but the same thing can happen within a region.

Many people living in the Inland Empire are finding work outside of the region. While it is not clear whether this is a result of the lower level of high-skill, high-wage job opportunities in the region, it is nonetheless an important fact of economic life. Data from the 2000 Census on workforce patterns revealed that 29 percent

of the people who live in the Inland Empire work outside of the two-county region, the highest rate for any region in the country (Table 9).

By comparison, only 3 percent of people in San Diego County work outside the county and 6 percent in Salt Lake County. While the figures for Research Triangle Park indicate that 23 percent of its population works "outside the county," this is somewhat misleading in that most of these residents work in one of the three counties that comprise the Research Triangle Park area, and that the population centers of those counties are all within 15 miles of Research Triangle Park, the high-tech magnet in that region.

TABLE 9
TRANSPORTATION TO WORK

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Total Workers 16 and Over	1,249,224	1,299,503	438,627	511,895
Worked in County of Residence	70%	96%	94%	77%
Worked Outside County of Residence	29%	3%	6%	23%
Drove Car, Truck, or Van to Work	91%	87%	89%	91%
Drove Alone	74%	74%	76%	78%
Carpooled	18%	13%	13%	12%
Public Transportation	2%	3%	3%	2%
Less Than 30 Minutes	58%	65%	72%	68%
30 to 44 Minutes	18%	22%	20%	22%
45 to 59 Minutes	8%	7%	4%	6%
60 or More Minutes	15%	6%	4%	4%
Left House for Work Before 6:00 am	20%	13%	10%	5%

Source: U.S. Census Bureau Summary, File 3, 2000.

Further, only 4 percent of workers in Research Triangle Park, 6 percent in San Diego County, and 4 percent in Salt Lake County commute more than 60 minutes. By comparison, 15 percent of workers in the Inland Empire do so. Only 5 percent of Research Triangle Park workers, 13 percent of workers in San Diego County, and 10 percent of workers in Salt Lake County, leave the house for work before 6:00 AM. The comparison figure for the Inland Empire is 20 percent.

Most remarkable is that the Inland Empire has roughly the same number of total workers as San Diego County, in a geographic area seven times as large, yet 29 percent leave the region to find work.

In order to get a better understanding of this relatively high rate of out-of-county commuting in the Inland Empire, the project conducted a survey of 929 employed adults living in the region. Paralleling the Census Bureau data reported in Table 9, we found that 33.6% of the respondents worked in locations other than San Bernardino and Riverside counties, with Los Angeles County (15.8%) and Orange County (9.8%) being the most frequent destinations. Of those who commuted outside their home county, the reasons for doing so are summarized in Table 10.

Clearly, a large number of workers from the Inland Empire are traveling to jobs in other counties that provide more monetary rewards as well as a better fit with workers' skills. And in fact, they are crowding the freeways. Among commuter respondents to the questionnaire, 79.7% were driving alone in their car, and another 14.5% were carpooling, with less than 5% using public transportation. This obviously adds to regional transportation overload and explains why a discouraging 33.7% of Inland Empire commuters claim to spend from 2 to 4 hours on the road every day commuting to work and back (see Appendix).

Interestingly, Inland Empire workers did not lack for alternatives to this state of affairs. In another part of the questionnaire, 77.6 % of respondents agreed that Riverside and San Bernardino counties needed more high-skill jobs, and a robust 83.9 % agreed that government agencies, universities and private industry should collaborate to produce those high-skill jobs in

TABLE 10
ANSWERS TO: WHAT IS THE MOST IMPORTANT REASON THAT YOU WORK OUTSIDE OF THE COUNTY WHERE YOU LIVE?

I can make more money elsewhere	21.4%
I worked at this company before I moved here	20.7%
I work in a specialized field, and there are few such jobs in this county	16.6%
There are more jobs in my field elsewhere	10.0%
There is a lack of jobs in this county	5.6%

Source: TRPI Inland Empire Public Opinion Survey, August 3-10, 2003

the region. Amazingly, 67.8% of survey respondents re-affirmed this latter objective even if it would demand a small increase in taxes. Furthermore, 82.3% of survey respondents thought it was a good or excellent idea to change the focus of economic development in the Inland Empire so that more time and resources are spent trying to recruit high-tech, high-skill companies, and at the same time 87.7% of respondents were positive about increasing assistance to startup new companies throughout the region.

At the same time, Inland Empire workers were also in favor of expediting commuting access to high wage jobs in other counties, with 81.8% viewing this as either a good or excellent idea. Nonetheless, they did draw the line in terms of certain schemes. For example, there has been talk in recent years of spending $3 billion to bore a tunnel through the Santa Ana mountains from the Inland Empire to Orange County. Among survey respondents, 20.6% viewed this as a terrible idea, another 26.6% saw it as a bad idea, and 42.5% thought this was a good or excellent policy option.

In the next section, a profile of Inland Empire industry will be presented, which may help explain some of these commuting patterns and the apparent interest in up-skilling and up-teching the regional economy, as well as creating more homegrown entrepreneurial options.

II. ECONOMIC ASSETS

"Changing from a blue-collar economy to a more mixed white-collar economy does not happen overnight".

— Community Leader, Riverside County

A COMPARATIVE INDUSTRY ANALYSIS

While the economic growth and job generation performance of the Inland Empire has been extraordinary over the past two decades, the purpose of this project was to look beneath the aggregate numbers into the types of jobs created and the economic transformations that have taken place. This section presents results from an industry analysis comparing the Inland Empire against the performance of San Diego County, North Carolina's Research Triangle Park counties, Salt Lake County, as well as the state of California. The purpose of this analysis is to look at a small number of industry sectors identified as comprising the primary ingredients of the knowledge economy to determine how the industry make-up of the Inland Empire compares with other regions.

The data used for these analyses are derived from U.S. Department of Labor employment statistics by sector and U.S. Census Bureau 2000 population figures. The key focus of the analysis is to determine whether the regional statistics of the Inland Empire, organized by North American Industry Classification System (NAICS) code, parallel those at the state and regional levels. One important indicator is a location quotient analysis, which provides an easy summary of a region's concentration in high-demand, emerging sectors as well as lower-demand, established sectors. Other useful information can be captured by examining longitudinal trends in employment patterns, thus giving early indicators of growth in key sectors.

EMPLOYMENT LEVELS BY SECTOR

As an overview, the top 25 leading industries by employment in the Inland Empire and California are compared. As evidenced in Table 11, San Bernardino and Riverside counties are primarily host to service and manufacturing- or warehousing-oriented industries. The industries that employ the most people in the Inland Empire include food services (722) and administrative services (561), while for the state of California, the top industries are administrative services (561) and professional, scientific and technical (541). While there is always a need for a large number of support and administrative service jobs, the Inland Empire lags considerably behind statewide employment in the science and tech sectors which ranks second statewide, but only eighth in this region. In addition, an industry such as computers and electronics (334), among the top ten employment sectors statewide, is not even among the top 25 sectors for the Inland Empire. Likewise, hospitals (622), a potentially important site of R&D, is the seventh leading employer statewide but ranks 24th in the Inland Empire region.

HOW DOES THE INLAND EMPIRE COMPARE AGAINST OTHER REGIONS?

As a point of comparison, Table 12 lists national location quotient analysis (LQA) metrics in selected industries for the Inland Empire, San Diego County, Salt Lake County and the Research Triangle Park counties. The table sorts the 15 industries by their Inland Empire LQA rating with overrepresented industries listed first (lines 1-8), and underrepresented industries next (lines 9-15). For example, the LQA rating for computer and electronics (334) is 0.61 in the Inland Empire suggesting that 39 percent fewer jobs are available in this industry in the region, while the rating is 2.01 in San Diego County, 1.62 in Salt Lake County, and 3.55 in the Research Triangle. These are large differences, and underscore

TABLE 11

OVERVIEW OF TOP 25 INDUSTRIES BY EMPLOYMENT: 2000

INLAND EMPIRE			STATE OF CALIFORNIA			
Rank	NAICS Code	Description	Rank	NAICS Code	Description	Inland Empire Rank
1	722	Food Services and Drinking Places	1	561	Administrative and Support Services	2
2	561	Administrative and Support Services	2	541	Professional, Scientific and Technical	8
3	235	Special Trade Contractors	3	722	Food Services and Drinking Places	1
4	621	Ambulatory Health Care Services	4	235	Special Trade Contractors	3
5	421	Wholesale Trade, Durable Goods	5	621	Ambulatory Health Care Services	4
6	452	General Merchandise Stores	6	421	Wholesale Trade, Durable Goods	5
7	445	Food and Beverage Stores	7	622	Hospitals	24
8	541	Professional, Scientific and Technical Services	8	334	Computer and Electronic Product Manufacturing	--
9	441	Motor Vehicle and Parts Dealers	9	422	Wholesale Trade, Nondurable Goods	12
10	623	Nursing and Residential Care Facilities	10	522	Credit Intermediation and Related Activities	17
11	713	Amusement, Gambling and Recreation Industries	11	551	Management of Companies and Enterprise	25
12	422	Wholesale Trade, Nondurable Goods	12	445	Food and Beverage Stores	7
13	332	Fabricated Metal Product Manufacturing	13	611	Educational Services	23
14	813	Religious, Grantmaking, Civic and Professional	14	813	Religious, Grantmaking, Civic and Professional	14
15	484	Truck Transportation	15	524	Insurance Carriers and Related Activities	--
16	326	Plastics and Rubber Products Manufacturing	16	452	General Merchandise Stores	6
17	522	Credit Intermediation and Related Activities	17	623	Nursing and Residential Care Facilities	10
18	721	Accommodation	18	441	Motor Vehicle and Parts Dealers	9
19	811	Repair and Maintenance	19	721	Accommodation	18
20	336	Transportation Equipment Manufacturing	20	531	Real Estate	--
21	233	Building, Developing and General Contracting	21	624	Social Assistance	--
22	448	Clothing and Clothing Accessories Stores	22	332	Fabricated Metal Product Manufacturing	13
23	611	Educational Services	23	233	Building, Developing and General Contractors	21
24	622	Hospitals	24	513	Broadcasting and Telecommunications	--
25	551	Management of Companies and Enterprises	25	713	Amusement, Gambling and Recreation	11

Source: U.S. Department of Labor Employment Statistics, 2000.

the distinctive characteristics of two different types of regional economies. In general, for every industry in which the Inland Empire has fewer job opportunities than the national average, the comparison regions all offer relatively more jobs. In addition, these industries are concentrated in knowledge-based sectors such as information and data processing (514), professional and scientific services (541), and broadcasting and telecommunications (513), which report higher wages. The combined average wage for these seven industries is $56,671 and only educational services (611) reports an average wage below $50,000 (although the value of a large education sector is more knowledge-based than income-based).

The bottom half of Table 12 reveals that where jobs in the Inland Empire are overrepresented, the other regions are underrepresented. That is, while Riverside and San Bernardino counties offer more than the average number of employment opportunities in warehousing

"The reality is there is no region-wide effort to transform the economy and attract high-tech, professional jobs in the short or long term..."

— Community Leader, San Bernardino County

The industries that employ the most people in the Inland Empire include food services (722) and administrative services (561).

and storage and plastic and rubber manufacturing, the comparison regions all offer less than average employment. In the eight industries where the Inland Empire national LQA rating is greater than 1.0, the average wage is only $27,631 including a low of $15,743 for general merchandise stores (452). The averages are listed for the underrepresented and overrepresented industries, organized into two groups—the higher-tech, higher-paying sector versus the lower-tech, lower-paying industries. Taken together, the Inland Empire has an average LQA score in the higher-tech industries of 0.58, or 42 percent below the national average. At the same time, the rating of 1.65 for the lower-tech industries suggests that they provide 65 percent more jobs than the national average. Stated simply, the location quotient analysis empirically demonstrates that the region offers an abundance of low-paying jobs and fewer that pay well.

Not only do these industrial sectors lead the Inland Empire's economy in 2000, they are historically the fastest growing segment of its labor force. The region's inventory of industrial space grew by more than 100 million square feet since 1990, representing 35 percent of the total available space in Southern California. In the past decade, the Inland Empire accounted for over 50 percent of all industrial inventories built in Southern California, and is expected to grow to over 60 percent by 2005.

While the Inland Empire led the state in job growth with 275,000 new jobs between 1990 and 2000, most are in

TABLE 12

LOCATION QUOTIENT ANALYSIS OF THE INLAND EMPIRE AS COMPARED TO OTHER REGIONS: 2000

	NAICS Code	Industry Description	Inland Empire	San Diego County	Salt Lake County	RTP	Average U.S. Pay
1	485	**Transit and Ground Passenger Transportation**	1.01	1.12	0.41	0.53	$ 18,649
2	452	**General Merchandise Stores**	1.31	0.83	0.83	0.45	$ 15,743
3	332	**Fabricated Metal Product Manufacturing**	1.46	0.66	0.52	0.35	$ 35,874
4	811	**Repair and Maintenance**	1.51	1.17	0.96	0.82	$ 27,947
5	493	**Warehousing and Storage**	1.75	0.08	0.33	1.25	$ 29,694
6	484	**Truck Transportation**	1.78	0.40	2.16	0.52	$ 32,809
7	326	**Plastics and Rubber Products Manufacturing**	2.05	0.61	0.53	0.38	$ 32,286
8	337	**Furniture and Related Product Manufacturing**	2.32	0.67	1.00	0.19	$ 28,049
Lines 1—8		**Overrepresented Industry Average**	1.65	0.69	0.84	0.56	$ 27,631
9	514	**Information and Data Processing Services**	0.34	1.19	1.81	1.19	$ 63,407
10	541	**Professional, Scientific and Technical Services**	0.48	1.42	0.96	1.48	$ 53,110
11	551	**Management of Companies and Enterprises**	0.53	0.54	1.03	1.70	$ 73,555
12	513	**Broadcasting and Telecommunications**	0.56	1.06	1.11	1.36	$ 54,392
13	334	**Computer and Electronic Product Manufacturing**	0.61	2.01	1.62	3.55	$ 58,056
14	611	**Educational Services**	0.67	0.84	0.43	2.12	$ 24,453
15	511	**Publishing Industries**	0.87	1.24	0.75	1.03	$ 69,723
Lines 9 - 15		**Underrepresented Industry Average**	0.58	1.19	1.10	1.78	$ 56,671

Source: U.S. Department of Labor Employment Statistics, 2000.

TABLE 13

JOB GROWTH IN THE INLAND EMPIRE 1998-2001 BY NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM CODE

	NAICS Code	Industry Description	Employment 1998	Employment 2001	Raw Growth	Percent of New Jobs
		Total Industries	766,953	877,495	110,542	100.0%
1	235	**Special Trade Contractors**	44,923	61,741	16,818	15.2%
2	722	**Food and Drinking Place**	65,756	76,474	10,718	9.7%
3	233	**Building, Development and Contracting**	10,208	15,869	5,661	5.1%
4	541	**Professional, Scientific and Technical Services**	19,543	25,056	5,513	5.0%
5	713	**Amusement, Gambling and Recreation**	16,837	21,625	4,788	4.3%
6	561	**Administrative and Support Services**	58,545	62,385	3,840	3.5%
7	422	**Wholesale Trade, Nondurable Goods**	15,005	18,720	3,715	3.4%
8	421	**Wholesale Trade, Durable Goods**	24,968	28,142	3,174	2.9%
9	621	**Ambulatory Health Care Services**	33,502	36,643	3,141	2.8%
10	484	**Truck Transportation**	15,506	18,190	2,684	2.4%
11	445	**Food and Beverage Stores**	21,508	24,084	2,576	2.3%
12	444	**Building Materials and Garden Equipment**	8,089	10,663	2,574	2.3%
13	339	**Miscellaneous Manufacturing**	7,691	10,154	2,463	2.2%
14	448	**Clothing and Clothing Accessory Stores**	10,879	13,304	2,425	2.2%
15	623	**Nursing and Residential Care Facilities**	17,612	19,977	2,365	2.1%

Source: U.S. Department of Labor Employment Statistics, County Busniess Patterns, 1998-2001.

the lower-tech industries, with less demand for higher-skilled workers. As noted in Table 13, Riverside and San Bernardino counties added over 100,000 new jobs between 1998-2001, an absolute growth of 14 percent. However, the top three growth industries were special trade contractors (16,818 new jobs), food and drinking places (10,718 new jobs), and building, development and contracting (5,661 new jobs) which accounted for 30 percent of all job growth in the Inland Empire. While there was also strong growth in the professional and scientific service industry (5,513 new jobs, ranking it fourth), alone it accounted for only 5 percent of all new jobs in the region.

Further, among the top 15 growth industries, which accounted for 65 percent of all new jobs in the region, no other high-tech industry was found. Rather, low-tech professions in wholesale trade, truck transportation, building materials, and food and beverage stores accounted for thousands of new jobs in San Bernardino and Riverside counties.

GENERAL WAGE LEVELS

Another useful picture of a regional economy can be derived from looking comparatively at wage levels across a much wider array of industries. In Table 14, we present data on wages and payroll structure in the Inland Empire as compared to other regions. As can be seen, these low-skill industries do not provide attractive wages. It also appears that the presence of core high technology sectors correlate with wages of non-tech sectors. That is, high-paying, tech-oriented jobs increase the demand for goods and services and result in an overall elevated wage structure.

For example, wages in the Inland Empire are relatively low across the board. Household income for Riverside and San Bernardino counties in the 2000 Census (combined median income) was reported at $42,477, about 10 to 15 percent lower than the comparison regions' median income. Income in the Inland Empire negatively compares to $47,067 in neighboring San Diego County,

TABLE 14
WAGE STRUCTURE OF TOP 50 INDUSTRIES: 2000

	NAICS Code	Industry Description	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
1	722	Food Services and Drinking Places	$10,828	$12,196	$10,377	$11,604
2	561	Administrative and Support Services	$17,198	$22,424	$19,676	$24,470
3	235	Special Trade Contractors	$30,382	$33,707	$31,711	$31,863
4	621	Ambulatory Health Care Services	$37,773	$37,019	$40,158	$38,499
5	421	Wholesale Trade, Durable Goods	$36,522	$67,066	$41,801	$55,995
6	452	General Merchandise Stores	$17,242	$18,875	$16,494	$14,797
7	445	Food and Beverage Stores	$23,225	$21,604	$15,937	$14,387
8	541	Professional, Scientific and Technical	$35,227	$63,509	$51,112	$51,829
9	441	Motor Vehicle and Parts Dealers	$35,540	$38,325	$35,445	$39,559
10	623	Nursing and Residential Care Facilities	$17,632	$19,361	$18,518	$19,815
11	713	Amusement, Gambling and Recreation	$19,277	$19,053	$14,232	$21,336
12	422	Wholesale Trade, Nondurable Goods	$37,988	$40,773	$34,160	$50,223
13	332	Fabricated Metal Product Manufacturing	$34,488	$37,747	$32,362	$36,016
14	813	Religious, Grantmaking, Civic, Professional	$16,567	$19,053	$25,100	$21,630
15	484	Truck Transportation	$36,067	$30,907	$30,875	$33,417
16	326	Plastics and Rubber Products Manufacturing	$29,171	$35,851	$29,738	$44,171
17	522	Credit Intermediation and Related	$33,568	$42,934	$33,905	$37,499
18	721	Accommodation	$17,761	$20,324	$13,281	$16,504
19	811	Repair and Maintenance	$25,483	$26,187	$26,961	$27,848
20	336	Transportation Equipment Manufacturing	$29,885	$46,744	$48,536	$32,245
21	233	Building, Developing and Contracting	$35,311	$41,976	$35,459	$39,399
22	448	Clothing and Clothing Accessories Stores	$14,451	$15,033	$13,302	$13,075
23	611	Educational Services	$22,498	$23,246	$19,806	$26,770
24	622	Hospitals	$34,142	$35,086	$33,774	$34,358
25	551	Management of Companies and Enterprises	$45,455	$64,882	$51,227	$80,401
26	337	Furniture and Related Product Manufacturing	$24,798	$25,305	$28,713	$28,597
27	444	Building Material and Garden Equipment	$25,953	$27,647	$30,342	$27,612
28	234	Heavy Construction	$45,664	$43,999	$41,971	$36,248
29	339	Miscellaneous Manufacturing	$33,099	$41,139	$34,441	$45,700
30	812	Personal and Laundry Services	$15,606	$17,404	$16,071	$20,671
31	531	Real Estate	$26,927	$30,224	$26,467	$36,510
32	447	Gasoline Stations	$14,674	$14,758	$14,152	$22,496
33	327	Nonmetallic Mineral Product Manufacturing	$36,954	$34,396	$36,662	$36,782
34	524	Insurance Carriers and Related Activities	$38,961	$43,092	$37,827	$45,892
35	453	Miscellaneous Store Retailers	$14,343	$16,342	$16,663	$16,113
36	334	Computer and Electronic Product Manufacturing	$34,858	$69,207	$45,349	$49,917
37	446	Health and Personal Care Stores	$26,090	$25,947	$27,611	$19,198
38	511	Publishing industries	$36,611	$64,900	$51,715	$61,822
39	513	Broadcasting and telecommunications	$46,883	$59,989	$45,973	$48,796
40	311	Food Manufacturing	$39,844	$28,853	$29,122	$32,141
41	321	Wood Product Manufacturing	$25,080	$26,800	$23,474	$32,089
42	333	Machinery Manufacturing	$36,529	$46,101	$41,346	$40,372
43	532	Rental and Leasing Services	$22,154	$26,747	$25,340	$24,419
44	451	Sporting Goods, Hobby, Book	$13,572	$15,432	$14,278	$15,289
45	442	Furniture and Home Furnishing	$21,834	$28,786	$27,056	$23,342
46	624	Social Assistance	$16,689	$17,703	$16,969	$16,044
47	331	Primary Metal Manufacturing	$40,751	$37,992	$41,771	$56,067
48	454	Non-Store Retailers	$22,254	$31,529	$22,707	$47,833
49	323	Printing and Related Support Activities	$30,353	$34,161	$29,942	$35,791
50	221	Utilities	$51,883	$60,798	$56,578	$46,399

Source: U.S. Department of Labor Employment Statistics Wage Structure of Top 50 Industries: 2000

$46,899 in Research Triangle Park and $48,373 in Salt Lake County. A possible explanation of this may be found in the industrial structure operating in the Inland Empire.

TABLE 15
EMPLOYMENT CHARACTERISTICS: 2000

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Male Unemployment	7.9%	6.1%	4.6%	4.3%
Male Not in Labor Force	32.8%	26.9%	21.8%	21.4%
Female Unemployment	8.7%	6.1%	4.7%	4.2%
Female Not in Labor Force	48.1%	43.0%	36.1%	34.9%

Source: U.S. Census Bureau Summary File 3, 2000.

Examining the wages of the leading industries reveals a major economic disadvantage for the region. Table 14 reports the average payroll-to-employee wage ratio for the different industries in the Inland Empire as compared to the other comparison regions. Two points are immediately apparent. First, low-wage industries are abundant in the Inland Empire—ten of its top 25 leading industries average less than $25,000 in average employee salary. In San Diego County, six of their top ten industries average over $30,000 in pay. Among the comparison regions listed, the highest concentration of low-wage jobs is by far found in the Inland Empire. However, it is also the case that the same lower-skill, lower-wage sectors pay more in places like Research Triangle Park, San Diego County, and Salt Lake County. For example, as Table 14 reports, for the top 50 industries in the region, 45 recorded wages lower than at least one of the comparison sites. The five industries where the Inland Empire had higher rates of pay were less likely to be high-tech: food and beverage stores (445), truck transportation (484), heavy construction (234), nonmetallic mineral manufacturing (327), and food manufacturing (311). All things equal, within like industries, wages are considerably lower in the Inland Empire[v].

Second, the disparity is larger in moderate to high paying industries. For example, professional, scientific and technical (541) services average $63,509 in neighboring San Diego County but only $35,227 in the Inland Empire. Management of companies and enterprises (551) nets more ($51,227) in Salt Lake County than in San Bernardino and Riverside counties ($45,455), despite having a lower cost of living in Salt Lake County. Computer and electronic manufacturing (334) averages $69,207 in San Diego County compared to just $34,858 in the Inland Empire and the average pay in the publishing industries (511) in San Diego County is nearly double the pay rate compared to the Inland Empire (Table 14). In addition, there is support for the notion that high-tech, knowledge jobs boost the overall average wage (even for low-tech sectors). Research Triangle Park reports considerably higher wages for industries like wholesale trade nondurable goods (422) at $50,223, plastics and rubber manufacturing (326) at $44,171, and primary metal manufacturing (331) at $56,067.

Low-wage industries are abundant in the Inland Empire—ten of its top 25 leading employers average less than $25,000 in average employee salary.

We find that not only are wages lower, but unemployment rates are higher in the Inland Empire (Table 15). In 2000, among men, unemployment stood at nearly 8 percent in Riverside and San Bernardino counties combined, compared to just 6 percent in neighboring San Diego County and less than 5 percent in both the Research Triangle Park region and Salt Lake County (Table 14). Similarly, for women, the unemployment rate was the highest at 8.7 percent in the Inland Empire in 2000. Compounding this is the fact that more eligible adults are not in the workforce in this region (33 percent of men and 48 percent of women).

"The reality is there's no venture capital out here. Why would it come out here? People need to start getting smart and putting together real proposals for business start-ups..."

— Community Leader, Riverside County

AN ENTREPRENEURIAL ECONOMY?

Economically robust regions tend to have a healthy entrepreneurial culture. This typically includes an oversupply of young, fast-growing, high-wage companies—often technology-intensive—as well as a private and public infrastructure to support them. Over the last few decades, there has been a moving away from traditional economic development strategies based on recruiting already-established companies to another area, partly because the competition has become too costly in terms of public expenditures or lost tax revenues. Creating an environment conducive to start-ups has assumed much greater importance.

In terms of documenting the entrepreneurial economy, we have assembled comparative data on the presence of small, fast-growing, technology-oriented companies, as well as several associated infrastructure elements. The rationale and computation of these indicators are borrowed from ongoing work conducted by the Progressive Policy Institute[VI] (PPI). The metrics include:

1. The share of jobs in fast-growing "gazelle" firms (companies with over 20 percent growth in sales revenues for four consecutive years).

2. The degree of job churning (some fast-growing metropolitan areas have seen a great deal of job churning. In part, this is because fast-growing economies produce more start-ups, especially in locally focused industries such as restaurants, dry cleaners, or accountants. But a high churn rate also reflects a dynamism that leads to the death of old, outmoded firms and the creation of innovative, new companies that sell outside the metro).

3. The value of companies' initial public offerings (IPOs).

4. The rate of venture capital investments.

TABLE 16
INDICATORS OF ECONOMIC DYNAMISM

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Gazelle Firms	4.9%	10.2%	10.6%	7.2%
Job Churning	7.6	10.9	10.9	10.1
New Publicly Traded	0.3	6.9	2.4	2.5
Venture Capital	0.02%	1.01%	0.14%	1.35%

Source: Progressive Policy Institute Report, 2001.

As evident in Table 16, the Inland Empire lags considerably behind the comparison regions with respect to these measures of the new economy. Gazelle firms account for less than 5 percent of total employment in the region compared to over 10 percent in San Diego and Salt Lake counties, and 7 percent in the Research Triangle Park area. Similarly, the job churning measure reports lower levels of business start-ups in the Inland Empire than the comparison regions. Similarly, the "new

publicly traded companies" indicator places the Inland Empire dismally low, with only three-tenths of one percent of its overall metropolitan gross product being accounted for by IPOs. The final measure, the amount of venture capital invested as a share of the gross metropolitan product, goes hand in hand with the poor performance of IPOs: little to no venture capital is being invested in deals in the Inland Empire. As can be seen, the Inland Empire compares unfavorably to San Diego County, Salt Lake County, and Research Triangle Park on every one of these indices.

While the above data are discouraging from one perspective, they should not take away from the Inland Empire's record in job development in more traditional industries. Inland Empire communities can rightly claim to have had some successes in job creation. The vast warehousing and logistics industries and retail facilities are identified as key components of the regional economy and rightly so. The question is whether the region can long sustain its current trend of job creation given the relative lack of high-wage, high-growth, and technology-based companies.

III. RESEARCH AND DEVELOPMENT

"Currently there is no real connection between the universities out here, technology, and the community…"

—Community Leader, San Bernardino County

ACADEMIC RESEARCH AND DEVELOPMENT IN THE INLAND EMPIRE

One asset that a region needs to possess in fostering a high-wage, fast-growing knowledge economy is a robust university research community. University research tends to be supported by a variety of sources, primarily the federal government and to a lesser extent industry and private foundations. These external research and development (R&D) funds are an important cornerstone in constructing a successful research university.

TABLE 17
NATIONAL UNIVERSITY RESEARCH SPENDING RANKINGS: 2000

National Ranking	School
4	University of California, Los Angeles
6	University of California, San Diego
7	University of California, Berkeley
8	Stanford University
9	University of California, San Francisco
17	University of California, Davis
20	Duke University
28	University of Southern California
31	North Carolina State University
33	University of North Carolina
45	California Institute of Technology
50	University of Utah
67	University of California, Irvine
88	University of California, Santa Barbara
108	**University of California, Riverside**
128	University of California, Santa Cruz
129	San Diego State University
Not Listed	**California State University, San Bernardino**

Source: National Science Foundation, Budget of Total R&D Expenditures by State by Campus, 2000.

In addition to classroom hours spent with students, professors at the nation's leading universities spend hours on research, inventions, medical advancement, scientific breakthrough—projects that often result in inventions with commercial value. In conjunction with tenured faculty working on research projects, research centers and institutions housed within the university play a critical role in promoting R&D efforts. Numerous scholars of university research have demonstrated the economic significance of a strong research commitment[VII].

This section explores the number of grants received and total amount of research expenditures at colleges and universities in the Inland Empire. As the only research institution in the region, the University of California (UC), Riverside, is the primary point of analysis in many of the tables provided. A comparative focus is taken that contrasts R&D funds available in the Inland Empire with other California institutions, as well as the three national comparison regions: San Diego County, Salt Lake County, and North Carolina's Research Triangle Park.

In this section, we examine:

- National Science Foundation R&D rankings
- Total university expenditures on research and development
- Total university expenditures on science and engineering R&D
- Number of R&D projects underway in 2000
- National Science Foundation grant receipt success rate
- Ph.D.s in the regional workforce
- New inventions, new patents and license revenues

NATIONAL RANKINGS ON R&D SPENDING

The National Science Foundation (NSF) is among the largest federal supporters of college and university research. In 2000, the NSF contributed nearly $4 billion in grants and awards to academic institutions across the country. As part of its ongoing analytic responsibilities, the NSF creates a ranking of total research and development expenditures at each university in the country. While hundreds of colleges and universities nationwide receive NSF funds, we have summarized overall rankings for UC Riverside as well as for major institutions in California and in the three comparison regions.

As is evident in Table 17, UC Riverside, at 108th, is ranked much lower than the national comparison sites, which are all ranked in the top 50. What's more, California State University, San Bernardino, the second largest four-year college in the Inland Empire, did not receive enough R&D funding to be ranked in the NSF survey (nor did the smaller private school University of Redlands). In addition, within the state of California, only UC Santa Cruz ranks lower than UC Riverside among research schools. In fact, UC Riverside and UC Santa Cruz are the only two University of California campuses (among nine) that were not ranked in the top 100 R&D expenditure universities nationwide in 2000. While UC Riverside stands at 108th overall, four California institutions are among the top 10 national research universities: UCLA—4th, UC San Diego—6th, UC Berkeley—7th, Stanford—8th, and UC San Francisco—9th.

TOTAL AMOUNT OF R&D EXPENDITURES

While the previous rankings helped to define the overall research picture in the Inland Empire, it is important to examine the actual raw number of R&D expenditures at each campus to better assess where the region stands. Using NSF expenditures in fiscal year 2000, Table 18 compares the total amount of spending on R&D at 13 California institutions. In addition, the table reports the total number of full-time, tenure track professors at each school, the most likely solicitors of NSF grants. Using this number, we create a ratio of monies-to-faculty which allows us to examine not only the overall amount of money received for research, but the per capita rate at each campus.

Among the nine UC schools, three private, and one California State University listed in Table 18, UC Riverside was almost last in R&D grant money in 2000. Overall, UC Riverside spent roughly $83 million on research compared to UCLA, UC San Diego, and UC Berkeley which all spent over $500 million in 2000. Per capita, the 310 full-time professors at UC Riverside averaged about $270,000 research dollars compared to over $800,000 per professor at UC San Diego. On both accounts, raw total and per capita, the Inland Empire's only research-based institution lags far behind the rest of the state.

TABLE 18
TOTAL R&D EXPENDITURES BY UNIVERSITY: CALIFORNIA 2000

SCHOOL	Total R&D Amount	Full-Time Professors	Amount Per Professor
UC Los Angeles	$ 530,826,000	1,016	$ 522,405
UC San Diego	$ 518,559,000	630	$ 823,110
UC Berkeley	$ 518,514,000	874	$ 593,537
Stanford University	$ 454,780,000	1,667	$ 272,817
UC San Francisco	$ 443,013,000	299	$ 1,480,411
UC Davis	$ 364,789,000	874	$ 417,383
University of Southern California	$ 300,445,000	1,346	$ 223,226
California Institute of Technology	$ 222,666,000	293	$ 759,900
UC Irvine	$ 158,437,000	452	$ 350,369
UC Santa Barbara	$ 118,154,000	462	$ 255,933
UC Riverside	$ 83,580,000	310	$ 269,248
UC Santa Cruz	$ 56,212,000	223	$ 252,525
California State University, San Diego	$ 55,002,000	1,039	$ 52,939

Table 19 reports similar data, focused only on research money in the fields of science and engineering, which are often identified as the key R&D sectors in supporting a burgeoning knowledge economy (Tornatzky 2002). Here, the Inland Empire performs even worse than in the previous table. In Table 18 for overall R&D spending, UC Riverside was 85 percent lower than the leading institution, UCLA. When focusing only on science and engineering, UC Riverside's expenditures of $24 million are 94 percent lower than the leading institution, UCLA, which spent almost $400 million in this area.

While less than one-third of all R&D money spent at UC Riverside was on science and engineering (29 percent), three-quarters of R&D money at UCLA was spent on science and engineering. With only $24 million in NSF science and engineering expenditures in 2000, UC Riverside barely outspent Cal State San Diego ($23 million), which is considered a teaching institution, not a

While less than one-third of all R&D money spent at UC Riverside was on science and engineering (29 percent), three-quarters of R&D money at UCLA was spent on science and engineering.

research one. In addition, the per capita rate for science and engineering dollars at UC Riverside was among the lowest in the state at just over $75,000 per professor. In comparison, UC San Diego averaged $567,000 of science and engineering research funds per professor in 2000.

INLAND EMPIRE AND COMPARISON SITES

As in previous chapters, we extend our focus beyond just California to compare the Inland Empire to the three other regions. Consistent with the analysis in Table 18, academic institutions in the Inland Empire did not keep pace with research and development expenditures at other national universities. Table 19 reports both the overall and the science and engineering expenditures on R&D in fiscal year 2000 for six universities in the four regions. UC Riverside represents the research university in the Inland Empire, while we examine UC San Diego in San Diego County, the University of Utah in Salt Lake County, and the three universities that comprise the region of Research Triangle Park: Duke University, University of North Carolina, and North Carolina State University.

At the university-level, the institution in the Inland Empire is spending less money, and less money per student, on research than the comparison sites. UC Riverside reported $83.5 million in R&D expenditures in 2000, less than half as much as the University of Utah, which spent $187 million. UC San Diego, which ranked sixth nationally, spent the most of any single institution in the comparison group at $518 million for total R&D. The Research Triangle Park-area schools, Duke University, North Carolina State, and University of North Carolina, combined for over $900 million in R&D in 2000 (Table 20). While this reveals that academic R&D spending needs to be improved in the Inland Empire, a closer examination shows that the gaps in spending are more pronounced with respect to monies for science and engineering.

In science and engineering, UC Riverside is further behind, spending only about $24 million on research and development (down from $27 million in 1999). The other institutions are all national leaders in science and engineering expenditures, with Duke University, North Carolina State and the University of North Carolina combining for $590 million, UC San Diego spending

TABLE 19
SCIENCE & ENGINEERING EXPENDITURES BY UNIVERSITY: CALIFORNIA 2000

SCHOOL	Science and Engineering	Full-Time Professors	Amount Per Professor
UC Los Angeles	$ 398,565,000	1,016	$ 392,242
Stanford University	$ 377,918,000	1,667	$ 226,708
UC San Diego	$ 357,629,000	630	$ 567,665
UC San Francisco	$ 314,973,000	299	$ 1,052,541
UC Berkeley	$ 223,085,000	874	$ 255,363
University of Southern California	$ 215,200,000	1,346	$ 159,891
UC Davis	$ 182,208,000	874	$ 208,478
California Institute of Technology	$ 150,366,000	293	$ 513,160
UC Irvine	$ 102,447,000	452	$ 226,552
UC Santa Barbara	$ 75,745,000	462	$ 164,071
UC Santa Cruz	$ 34,729,000	223	$ 156,015
UC Riverside	$ 24,014,000	310	$ 77,360
California State University, San Diego	$ 23,460,000	1,039	$ 22,580

"I was surprised that UCR has as much going for it as it does..."

— Community Leader, Riverside County

$357 million, and the University of Utah at $56 million. These numbers from the National Science Foundation suggest that the Inland Empire needs to do a better job attracting R&D project money, and specifically within science and engineering fields. While only 29 percent of UC Riverside research funds are in the science and engineering fields, the other schools combine to average 62 percent of their research funds devoted to science and engineering.

NUMBER OF ACTIVE GRANTS AND SUCCESS RATE

Grant awards from the National Science Foundation are highly competitive and sometimes take years of preparation and revision to secure. By tracking the number of grant applications filed and received in a given year, we can compare the success rate of receiving an NSF grant for universities within each region.

Table 21 reports this information for the six comparison schools in the four regions for fiscal year 2000, as well as the total number of active grants in the year. While the success rate is important for determining how proficient each campus is at attracting research funds, the number of active grants is important because it speaks to the depth and breadth of research projects. Operating under the assumption that more active grants lead to more opportunities for new and different kinds of research, we see that once again, UC Riverside lags far behind the comparison sites. As of 2000, there were 58 active NSF projects in the Inland Empire compared to 173 in San Diego County, 108 in Salt Lake County and 343 at the three Research Triangle Park area universities.

Further, UC Riverside reported the lowest success rate for receiving NSF grants in 2000 at 28.9 percent, with the other schools all in the mid-to-upper 30 percent range. The numbers reported in Table 21 go far to suggest that the Inland Empire is having difficulty securing external research funds. Not only do they have the fewest active grants, but they are the least likely to be awarded a grant, with only 35 new grants awarded in 2000 out of 121 applications.

TABLE 20
TOTAL R&D EXPENDITURES FOR RESEARCH UNIVERSITIES BY REGION: 2000

REGION	Total R&D Amount	Science and Engineering
Research Triangle Park	$ 903,643,000	$ 590,498,000
San Diego County	$ 518,559,000	$ 357,629,000
Salt Lake County	$ 187,661,000	$ 56,736,000
Inland Empire	$ 83,580,000	$ 24,014,000

MEASURING HUMAN CAPITAL

Beyond dollars earmarked for research and development, an important indicator is also the human capital available for high-end R&D projects. While the previous tables focused mostly on R&D within the academic environment, this measure of research capacity examines the full range of human capital available to each region by way of persons with a doctorate degree. While this measure does not capture the full extent to which R&D human resources are accessible, it is a good approximation, as we would expect the number of public and private sector firms devoted to R&D to correlate to the number of Ph.D.s in a given geography. Further, as Adams and Sveikauskas note (1993), doctorate degrees in the workforce have been shown to correlate with the presence of high-tech economies.

TABLE 21
ACTIVE NATIONAL SCIENCE FOUNDATION GRANTS AND SUCCESS RATE: 2000

	Active Grants	Awarded 2000	Applied 2000	Success Rate
Inland Empire	58	35	121	28.9%
San Diego County	173	78	204	38.2%
Salt Lake County	108	51	144	35.4%
Research Triangle Park	343	198	545	36.3%

Source: National Science Foundation/Division of Science Resources Statostocs. Survey of Research and Devlopment Expenditures at Universities and Colleges, Fiscal Year 2000.

TABLE 22
RESEARCH CAPACITY AS MEASURED BY PH.D.s PER CAPITA

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
Doctorate Degree	11,153	27,269	6,365	19,062
Workforce	858,433	1,052,214	480,875	531,939
Ph.D.-to-Workforce Ratio	12.99	25.92	13.24	35.83

Source: U.S. Census Bureau Summary File 3, 2000 and County Business Patterns, 2000.

The results in Table 22 are consistent with the evidence reviewed above and show that the Inland Empire lags in research and development capacity. Specifically, the Ph.D.-to-workforce ratio (normalized by a factor of 1000) is the lowest in the Inland Empire region at 12.99, only half the capacity of San Diego County (25.92) and just one-third that of Research Triangle Park (35.83).

INVENTIONS, PATENTS, AND LICENSING REVENUES

While the NSF grant award and expenditure data reviewed above is an excellent measure of the research capacity of a region, it is important to also examine inventions, patents, and license approvals for the relevant research universities. Generally, a university's office of technology transfer tracks the number of inventions, patents, licenses, royalties and revenues that professors and research centers within the university obtain for a given year. This information is organized and collected by the Association of University Technology Managers (AUTM) and distributed annually. These markers are important to the knowledge economy because they demonstrate the ability of the university to work with private industry in the region to develop new and useful technologies in the health, sciences, and engineering fields (among others).

With regard to inventions, patents, and license revenues earned, the Inland Empire continues to lag behind other regions in academic/industry collaboration and advancement. Only 30 new inventions were recorded at UC Riverside (and none at San Bernardino State University) in 2000, compared to 439 at schools in the Research Triangle Park region, 265 in San Diego County and 187 in Salt Lake County (Table 23). Similarly, only 13 patents were awarded in the Inland Empire, the lowest by far for any of the regions in the study. Finally, this resulted in low levels of license revenues generated by academia in the Inland Empire. UC Riverside reported just over $1 million in revenues from licenses, a fraction of what was reported in Salt Lake and San Diego counties and Research Triangle Park whose research universities generated a combined $19 million in license revenues.

TABLE 23
INDEX OF R&D ACHIEVEMENTS: 2000

	Inland Empire	San Diego County	Salt Lake County	Research Triangle Park
New Inventions	30	265	187	439
New Patents	13	59	28	124
License Revenues	$1,174,000	$7,715,000	$3,837,000	$7,783,000

Source: AUTM, 2000.

CONCLUSION AND POLICY IMPLICATIONS

Based on the data reported in this report we have concluded that the Inland Empire's regional economy presents a distinctly mixed picture. In contrast to the three comparative regions, the Inland Empire is a developing economy. This region has witnessed extraordinary population and job growth in a relatively short period of time. Its physical infrastructure has generally kept pace and has become a Southern California destination for affordable, quality housing.

On other dimensions, the Inland Empire is not keeping pace with California and the nation. As technology comes to play a larger role in the knowledge economy of the 21st century, it is important that the Inland Empire adjusts its strategies to attract and develop a larger number of higher-skill, higher-wage industries. The analyses presented here suggest that the Inland Empire continues to overemphasize industries such as manufacturing and warehousing at the expense of other, knowledge-intensive sectors. This will most likely exacerbate the intense problems of inter-regional commuting alluded to here. More and more residents will hit the freeways each morning to seek options outside the region. This can be avoided by addressing the imbalances noted in the report, specifically by focusing on the human resources and educational opportunities, economic assets and job opportunities, and research and development practices in the region.

HUMAN RESOURCES AND EDUCATIONAL OPPORTUNITY

EARLY DEVELOPMENT

The Inland Empire needs to increase the percent of children who participate in preschool programs and the availability of day care and infant care.

K-12 PERFORMANCE

The Inland Empire needs to increase the percent of students who receive a high school diploma and the percent of students who plan to pursue higher education. In terms of educational inputs, the Inland Empire must increase access to computers and technology in the classroom.

POST-SECONDARY

The Inland Empire needs to increase higher education enrollment, the percent of people pursuing bachelor's degrees, and the number of people pursuing degrees in the field of engineering. That means:

- High school students should be better prepared to qualify for admission to a four-year university.
- Community colleges should facilitate and encourage transition to a four-year institution and the pursuit of an academic track that will eventually award a bachelor's degree.
- Educational agencies, across grade levels, need to encourage the pursuit of careers in the hard sciences.

WORKFORCE

Once again, the data indicates that relative to the other comparison areas, the Inland Empire needs to increase the percent of people with high school diplomas, the percent of people with bachelor's degrees, and the percent of people with advanced degrees.

ECONOMIC ASSETS AND JOB OPPORTUNITY

The data summarized above strongly suggest that the Inland Empire lags behind the state of California and other regional comparison sites in moving into the knowledge economy, which is characterized by a larger number of higher-skill, higher-pay jobs as well as a greater presence of technology-based companies. This is not to say that economic development efforts in the region have been a failure. There is voluminous evidence that economic growth has been robust, but nonetheless confined to industries that have fewer opportunities for higher-skill, higher-pay employment.

Over the next few years the Inland Empire needs to "stretch its legs" economically-speaking. Building on its notable past successes in fostering general economic growth, and hoped-for improvements in K-16 education, it needs to expand it efforts to build, attract and create new kinds of companies and jobs. There needs to be several components of this effort:

THINK AND ACT AS A TECHNOLOGY REGION

One of the most important differences between the Inland Empire and some of the comparison sites for which data were analyzed is the clear self-identity that the latter have as technology regions. Illustratively, while there are many economic development agencies and programs located in the counties and municipalities that constitute the Research Triangle Park of North Carolina, virtually all of them tie their fate, identity and activities to what happens in and to the region. Everybody wins if a new federal lab locates in the Park, or a technology start-up really takes off in terms of revenue growth. As a result, there is a great deal of planning and programming that is collaborative and cuts across nominal organizational boundaries. The Inland Empire could do much better in this regard. There are relatively few region-wide, economic development-collaborative initiatives and fewer still that focus on technology-based economic development. As a first step, the following action could be taken:

Convene a region-wide commission, with a charge to develop and implement strategies that would move the Inland Empire into the knowledge economy. The commission would involve industry, education at all levels, government, and the existing economic development infrastructure. Its first deliverable should be a comprehensive, actionable plan for the region.

A SOFT INFRASTRUCTURE FOR ENTREPRENEURIAL DEVELOPMENT

There are two basic approaches to expanding knowledge economy companies and jobs. The traditional economic development approach involves industrial recruitment. This involves approaching existing companies that are operating successfully in another county or state, and selling them on the idea of moving their operations – and jobs – to the Inland Empire. In this context, "selling" typically involves a mixture of various incentives that include, for example, plant site development, assistance in worker training, cutting red tape, and favorable tax treatment. This has been the primary toolkit of economic development programs in the Inland Empire, and one that has been quite successful in bringing many companies to the region.

Unfortunately, it works less well for technology-based companies. These companies are also looking for the highest quality in K-12 educational programs, a skilled workforce, access to cutting-edge university research, and an environment that includes livable housing and recreation. It is also true that it is increasingly difficult to recruit any already-established technology companies. Every region wants them and the bidding gets ferocious.

There is another strategy that may have considerable more relevance to the Inland Empire. That is, to get better at growing its own knowledge economy companies. Rather than relying primarily or exclusively on industrial recruitment approaches, an alternative strategy is to focus on small and new companies that are trying to use technology to build products, capture markets, and improve productivity and efficiency. In other words, public policy and economic development strategy attempts to "nurture gazelles" (fast-growing small companies) rather than to "hunt buffaloes" (recruit larger companies with economic incentives). Adoption of this strategy as an adjunct to existing economic development approaches would mean the strengthening of what some describe as the *soft infrastructure for entrepreneurial development*. Some of the typical elements of such a strategy—all of which typically involve creative public-private partnering —include the following:

- Expansion of industrial extension programs that provide assistance to *already-established* small companies to improve their information systems and technology, manufacturing processes, and product development technology and methods.

- Expansion of programs—such as technology business incubators—that provide business and technology assistance to *start-up* companies that are focusing on high-margin, high-knowledge markets.

- Expansion of debt and equity capital that is focused on technology-intensive industry.

- Expansion of technology-focused industry associations and networking events.

- Expansion of technology-oriented entrepreneurial training and education programs, from high school through graduate school.

There are a number of other elements and national "best practices" in this area that Inland Empire stakeholders need to study and emulate; these are but examples.

RESEARCH, DEVELOPMENT AND TECHNOLOGY TRANSFER

Virtually every high-wage, knowledge-intensive regional economy in the U.S. is anchored by one or more research and development centers, often a research-intensive university, a major federal facility, or both. In fact, a small number of universities have developed significant expertise and mission focus[VIII] in moving their R&D into regional economic development.

However, equally important as the sheer amount of R&D performed by these centers are the policies, practices and "culture" that they invoke to move the fruits of research into industry. Academic folklore notwithstanding, it is quite possible—and in fact desirable—for universities to be world leaders in fundamental science and concurrently to be excellent at university-industry cooperative research or the "technology transfer" of their inventions to industry via patenting and licensing. In fact, those universities that are located in robust knowledge economy regions (e.g., such as the Research Triangle of North Carolina, or San Diego, or greater Atlanta) tend to do all these things well, along with incorporating many elements of the soft entrepreneurial infrastructure alluded to above.

As described in earlier sections of this report, the level of university and industrial R&D in the Inland Empire falls far below what it needs to be in order to help fuel a regional knowledge economy. For example, the level of research expenditures and associated technology transfer activity at UC Riverside (UCR) is growing, but is still considerably below what it needs to be a nationally prominent research institution and, more important for this analysis, a factor in jump-starting a knowledge-intensive regional economy.

Stakeholders in the Inland Empire, leadership in the UC system, and political interests in the State of California need to make a commitment to expedite a transition to research and technology greatness for UCR. Many of the elements of such a transition are well known, but some that are particularly relevant for our analysis of the regional economy include the following:

- Expansion of UCR research expenditures to a top-40 level in the foreseeable future.

- Expansion of endowed research chairs at UCR—in a manner akin to the Georgia Research Alliance—in areas that reflects both existing disciplinary strengths as well as emerging strengths in the Inland Empire knowledge economy.

- Expansion of UCR's technology transfer capacity, performance and support culture and rewards to national standards of excellence.

- Expansion of the UCR's level of industry-sponsored research.

In addition to UCR, the region is fortunate in being home to Cal State San Bernardino, a network of smaller private colleges and universities (e.g., The Claremont Colleges, the University of La Verne), as well as a rich cadre of community colleges. These regional higher education institutions have roles that can contribute mightily to the growth of high-wage, high-skill jobs and companies. Building on their existing core programs, there are other opportunities for expansion of their mission, including:

- Expansion of regional higher education's role in the soft infrastructure for entrepreneurial development.

- Expansion of regional higher education's role in industrial extension activities and programs.

- Expansion of two- and four-year degree programs that reflect the emerging knowledge economy strengths of the region, as well as the best future bets.

- Expansion of non-degree and certificate programs that reflect the needs of the growing knowledge sector in the region.

SUMMARY

Unfortunately, this report has been heavier on describing rather than proscribing. The latter needs to be done by leaders in the Inland Empire who are already mindful of much of what we have presented in this report. Hopefully, however, this report will serve to educate and inform other responsible individuals in the region who have heretofore had some difficulty in separating the forest from the trees of their day-to-day responsibilities. The authors of this report are firmly convinced that the Inland Empire is on track to become an even more prominent part of California's future. The nature of that prominence—and the opportunity structure for its residents—has yet to be determined.

APPENDIX

SURVEY OF EMPLOYED WORKERS LIVING IN THE INLAND EMPIRE

Selected Results 9/17/03

1. What is the most important reason that you work outside of the county where you live?

I can make more money elsewhere	21.4 %
I worked at this company before I moved here	20.7 %
I work in a specialized field, and there are few such jobs in this county	16.6 %
There are more jobs in my field elsewhere	10.0 %
There is a lack of jobs in this county	5.6 %
This is a temporary situation, and I will be changing jobs soon	3.5 %
My company moved away from my county	3.5 %
Other (specify)	15.9 %
Don't know/refused	2.8 %

2. What is the second most important reason that you work outside of the county where you live?

I work in a specialized field, and there are few such jobs in this county	16.8 %
I can make more money elsewhere	14.9 %
I worked at this company before I moved here	11.0 %
There is a lack of jobs in this county	10.6 %
There are more jobs in my field elsewhere	9.6 %
This is a temporary situation, and I will be changing jobs soon	2.9 %
My company moved away from my county	2.6 %
Other (specify)	14.1 %
Don't know/refused	17.5 %

3. On average, how much total time, in hours and/or minutes, do you spend commuting everyday to and from your job?

30 minutes to 1 hour	21.7 %
1 to 1 1/2 hours	18.9 %
1 1/2 to 2 hours	12.8 %
Less than 30 minutes	12.1 %
2 to 2 1/2 hours	11.0 %
3 to 4 hours	10.3 %
2 1/2 to 3 hours	8.2 %
More than 4 hours	4.2 %
Don't know/refused	0.9 %

4. REGARDING THE JOB OPPORTUNITIES CURRENTLY AVAILABLE TO RESIDENTS OF THE INLAND EMPIRE REGION, PLEASE TELL ME WHETHER OR NOT YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

4a. Riverside and San Bernardino counties need more high-skill jobs.

Agree	77.6 %
Neither	11.6 %
Disagree	7.2 %
Don't know	3.6 %

4b. Government agencies, universities, and private industry should collaborate to produce more high-skill jobs in the region.

Agree	83.9 %
Disagree	8.2 %
Neither	4.7 %
Don't know	2.9 %
Refused	0.3 %

4c. Would you still agree with this point of view if it would demand a small increase in your taxes?

Yes	67.8 %
No	29.4 %
Don't know/refused	2.8 %

5. Improving commuting access to high wage jobs in other counties. Do you think that idea is:

Good	51.3 %
Excellent	30.5 %
Bad	6.5 %
Terrible	3.6 %
Neither good nor bad (don't read)	3.4 %
Don't know	4.7 %

6. Spending $3 billion to build a tunnel through the Santa Ana mountains to decrease commute times to Orange County. Do you think that idea is:

Bad	26.6 %
Good	25.9 %
Terrible	20.6 %
Excellent	16.6 %
Neither good nor bad (don't read)	4.4 %
Don't know	5.8 %
Refused	0.1 %

7. Increasing business assistance to startup new companies throughout the Inland Empire region. Do you think that idea is:

Good	61.7 %
Excellent	26.0 %
Bad	4.7 %
Neither good nor bad (don't read)	2.6 %
Terrible	2.0 %
Don't know	2.7 %
Refused	0.2 %

8. Increasing the size and quality of research programs at the University of California Riverside. Do you think that idea is:

Good	56.8 %
Excellent	23.3 %
Bad	6.0 %
Neither good nor bad (don't read)	5.3 %
Terrible	2.3 %
Don't know	5.9 %
Refused	0.4 %

9. Changing the focus of economic development in the Inland Empire region so that more time and resources are spent trying to recruit high-tech, high-skill companies. Do you think that idea is?

Good	57.5 %
Excellent	24.8 %
Bad	5.5 %
Neither good nor bad (don't know)	5.2 %
Terrible	1.1 %
Don't know	5.7 %
Refused	0.3 %

10. Expanding the number and size of technology-oriented industry associations in the Inland Empire region. Do you think that idea is?

Good	62.4 %
Excellent	18.3 %
Bad	5.9 %
Neither good nor bad (don't read)	5.3 %
Terrible	1.2 %
Don't know	6.2 %
Refused	0.6 %

11. Thinking about all of these six options that I have just read, which do you think is probably the best way to increase access to high-skill jobs among residents in this region?

Business assistance to start-up new companies	24.5 %
Changing economic development focus to high-tech, high-skill jobs	19.3 %
Improving commuting access to jobs in other counties	15.6 %
Expanding technology-oriented industry associations	15.2 %
Increasing research opportunities at UC Riverside	11.1 %
Building a tunnel through the Santa Ana Mountains in Orange County	6.9 %
Don't know/refused	7.4 %

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[IV] Indicators used in for this measure include modems, CD-ROMs, interactive videodiscs, satellite dishes, networks, cable television, computers, VCRs, monitors, presence of an ILS system, presence of a World Wide Web browser or homepage, and the number of subscriptions to on-line services.

[V] Wages normalized to cost of living were also computed, and showed no differences. These additional results are available upon request.

[VI] See *The Metropolitan New Economy Index: Benchmarking Economic Transformation in the Nation's Metropolitan Areas*. http://neweconomyindex.org/metro/

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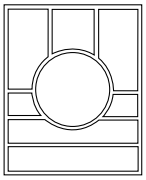

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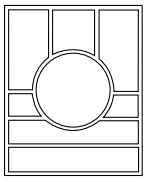

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