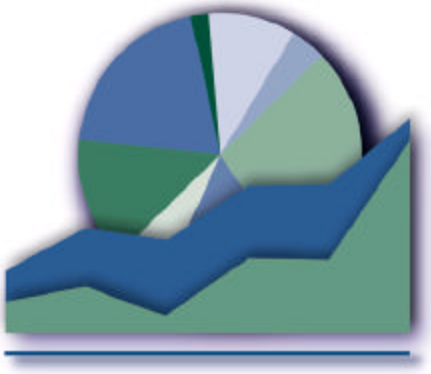
Sacramento Regional Research Institute
A JOINT VENTURE OF SACRAMENTO AREA COMMERCE AND TRADE ORGANIZATION AND CALIFORNIA STATE UNIVERSITY, SACRAMENTO



The Changing Structure of the Sacramento Region Economy

Prepared for

Sacramento Works, Inc.
The Local Workforce Investment Board and the Sacramento Employment Training Agency (SETA)

Prepared by

Sacramento Regional Research Institute
A Joint Venture of the Sacramento Area Commerce & Trade Organization and California State University, Sacramento

Dr. Robert Fountain, Director

April 8, 2003

400 Capitol Mall, Suite 1860
Sacramento, CA 95814-4436
916 491 0444

Contents

Sacramento Workforce Investment Board

The Changing Structure of the Sacramento Region Economy

Introduction

The purpose of this study is to identify changes which have occurred in the region's economic composition, and which are likely to occur in the coming decades. The desired outcome of the study is a better understanding of the changes in industry sectors, occupational categories, and education or skill levels of employees required to support the region's economic development.

Development economists differentiate between growth and development in describing a region's economic trends. Growth is an expansion along an established or known trend, in which the basic underlying structure of the region remains essentially the same, just larger. By contrast, development represents a change not just in size, but also in structure or composition. The methods used in this study are designed to detect and explain the developmental shifts in the Sacramento region's economy, not just the growth phases.

The development shift in the Sacramento Region's economic structure toward technology manufacturing in the 1980s caught the region off guard, and created a reactive environment for workforce training. The emergence of HP, NEC, and Intel as major Sacramento employers was not an expansion of trends previously known in this region. Major employers present in the region during the late 1970s would not have predicted the need for technology manufacturing workers (since none were technology manufacturers).

In this report, three methodologies are used to fully define the structural changes the region is undergoing.

1. Shift-Share Analysis

The type of analysis typically used for this purpose is the Shift-Share analysis. This is a process for separating changes in the region from those which are simultaneously occurring everywhere else in the State or Nation, and specifically identifying the economic activities unique to the local economy.

2. Economic Specialization

Economic specialization methodology was developed for use in this report. Previously this type of analysis was not used at the regional or State level due to its computational complexities. The method is based on regional structural comparisons that reveal the degree of specialization that the region has developed, and compares it to the specialization in other regions and the State to identify the local sectors with the strongest (and weakest) growth potential. This complex process yields a measure of the region's areas of specialization and their change over selected time periods.

3. Multiplier Analysis

The multiplier analysis is conducted using an econometric input-input model, and identifies a new structural parameter of the region's economy: the linkages between different industry sectors, the type of information now frequently described in terms of economic clusters. This analysis reveals a new issue in regional manpower analysis: the fact that increasing employment in some high technology sectors, open only to very highly-qualified employees, actually generates many intermediate and lower skilled jobs in other sectors which supply goods and services to the technology industry.

Historical Perspective of the Region's Development

The Early Days

The Sacramento region began its economic life, like most in Northern California, as an agricultural market economy. Cities of this type exist primarily as market areas for the sale and transportation of agricultural products, and as providers of materials and services for the dispersed agricultural producers. The economic success of this type of city depends on the productivity of its agricultural service area and its transportation capabilities to export the agricultural products.

Three events occurred over a relatively short period of time changed that agricultural pattern:

(1) The discovery of gold in 1848;
(2) The relocation of the California State Capitol in 1855; and
(3) The completion of the trans-continental railroad in 1869 (the western end started from Sacramento in 1863).

These development events contributed to a century of growth for Sacramento, but during that century much of the industrial and urban development of California and the US had little effect on the region. Only the military bases opened or expanded during World War II created any major structural changes in the region during this extended time. By the

1960s, the Sacramento region was out of sync with a primarily industrialized and urbanized California that had different economies, levels of income and wealth, types of housing units, and rates of economic and population growth.

The Post World War II Era

By the 1950s and 1960s the region's economy stood on three legs:

1. It served as the center of an agriculture-based region, providing the supply services, food processing manufacturing, and the transportation support to make it all work. In this respect, Sacramento was not very different from the other Central Valley cities like Stockton, Modesto, Fresno, and Bakersfield. There was very little manufacturing other than food processing, and very little private-sector financial and corporate administrative employment.

2. Sacramento also had the State of California government, with the major impact being the permanent infrastructure of the State agencies and departments. These provided a steady growth reflecting the growth of industry, population and income in California. A rapid increase in the role of Federal and State government during the 1970s produced a building boom in the region, and created the first shopping centers and new residential housing tracts beginning a long process of expansion that continues today.

3. The region also had three military bases, one (McClellan AFB) with nearly 15,000 military and civilian employees. The three bases, the Sacramento Army Depot, Mather AFB, and McClellan AFB, were a large economic sector of the region during and after World War II, and as recently as the early 1980's had nearly 19,000 government and civilian employees. This contributed to the very large government role in the region's economy. (By year 2000, Department of Defense employment in the region had dwindled to around 2,000).

Further, the nearby San Francisco Bay Area had emerged as one of the world's greatest tourism, financial, and technology centers, but very little of its vast wealth and influence reached Sacramento except through the State government.

A view of the Sacramento region in the 1970s gives a basis for the analysis of change. In that decade of change, the Sacramento region (which then included Sacramento, Yolo, and Placer Counties—El Dorado was listed as a rural county) was in a very high-growth mode not seen since the gold rush. In 1972, the region with a population of about 800,000, less than half our current level, built about 21,000 new housing units and in 1977 they built about 20,000. Even in today's region (defined in this report to include Sacramento, Yolo, El Dorado, and Placer Counties) with about 2 million residents, we do not achieve those numbers.

The economy of that time was dominated by the government sector, which topped 40 percent of all employment in 1975. The fastest growing civilian employment sectors included Retail Trade, Public Utilities, and the Services sector (primarily medical and legal services). The Manufacturing sector was very small, with the largest areas being Food Processing and Lumber & Wood Products.

Hewlett-Packard and the New Silicon Valley

The region's future was changed drastically in the 1980s when Hewlett-Packard developed a very large site in Roseville. HP was a pioneer in that move—the region was largely unknown except for its role as the State Capital, and there was no assurance that the region could provide the skilled technicians and engineers for this operation. In fact, it did not do so—the skilled workforce was largely imported from the San Francisco Bay Area, a somewhat easy task once the incentives of affordable housing, underutilized transportation, and easy-going lifestyle was understood.

Subsequent technology expansion included Intel in Folsom, NEC in Roseville, and the short-lived Packard Bell operation at the then-closed Sacramento Army Depot. Along with these industry leaders came the hundreds of smaller supplier and support firms which now round out the region's technical sectors. The region's nickname as the "The New Silicon Valley" was widely quoted. It provided the key ingredient to the linking of our region to the economies of the San Francisco Bay Area, which has had a pervasive and enduring effect on the structure and expectations of the region.

Data Analysis: The Sacramento Region in the 1980s and 1990s

Methodology

The growth of the Sacramento region during the 1980s and 1990s is analyzed in the following sections in a much more rigorous way than the preceding sections. There are three types of questions to be answered in this analysis:

1. What were the characteristics of the region's economic growth during each of these periods, and what events shaped the region's growth?

2. Which sectors grew faster or slower than their same-sector counterparts statewide, and how did this growth affect the region's economic structure?

3. To what extent did the region's structure, regional advantages and disadvantages, and other factors actually influence the economic growth outcomes?

The analysis below contains two methods for identifying these structural changes, discussed briefly here: shift-share analysis and specialization analysis.

If we were to do a sector-by-sector analysis of the region's economic structure, we would find that the largest sectors include Local Government, especially education; Retail Services; Medical Services; and Public and Private Utilities such as the telephone and electricity providers. Further, these same sectors would receive most of the employment growth over most time intervals.

This outcome, however, is of little value, since virtually every industrialized region in the world has the same dominant sectors. The relevant comparisons of this type of data is achieved by expressing the contribution of these sectors not in absolute numbers or growth rates, but rather in terms of their contribution to the region's changes in economic structure. This analysis demonstrates that each of these sectors varies significantly in its composition and specialization.

Shift-Share Analysis

The growth of a region is a result of many factors, with various sectors of the region's economy contributing different strengths and weaknesses to the overall performance. The shift-share analysis identifies two specific aspects of the region's economic performance.

First, some regions have above average growth because they happen to contain the industries which are the fastest growing everywhere during that time period, or conversely, have little employment in the sectors which have low growth everywhere. This is called the share component, meaning a favorable relative share of the region's composition in high-growth industry sectors contributes to its growth. This primarily depends on the structure of the region's economy.

Second, a region may have above average growth because some of its industry sectors outperform their counterparts elsewhere. Called the shift component, this indicates the sectors in which some unique local advantage for that sector allows it to outperform the industry sector elsewhere. This identifies the region's unique local advantages.

In economic development and manpower planning applications, the share (structural) part of the analysis identifies what the major employment opportunities might be at present, but the shift sectors (unique advantages) indicate the sectors in which the region might readily achieve extraordinary success in creating new economic activity.

Economic Specialization Analysis

The economic specialization analysis is based on a technique which allows a region's structure, and changes in structure, to be compared to those of other regions and the State.

The specialization analysis is based on the changes in the region's location quotients over time. The location quotient is simply the comparison between the percentage of the region's employment in a given sector to the percentage of the State or Nation's employment in the same sector. The ratio indicates a relative level of concentration in

the region. For example, if State Government employment in the Sacramento region were 30 percent of employment, while for all the regions of the State, the average is about 15 percent, Sacramento's location quotient for the State Government sector is the ratio of these percentages, or about 2.0. If a region has a location quotient over 1.0, it has a degree of concentration or specialization in that sector. If its location quotient is lower than 1.0, then it has a relative deficiency in that sector.

The change in location quotients over a period of time gives insight into the changing specialization of a region. For example, if a region has a location quotient of 1.0 for technology manufacturing in 1980 and 1.2 in 1990, the degree of specialization in this sector has increased 20 percent over the decade.

Some regions have sectors which are increasing in specialization because the supporting and complementary firms in other sectors are present, allowing mutual advantages to occur. These groupings of over-performing sectors are referred to as Clusters, and are often identified by high inter-industry multipliers shared by the Cluster's sectors. In this report, the inter-industry multipliers have been estimated using an econometric model called IMPLAN, developed by the University of Minnesota for the purpose of identifying the impacts which one sector of the economy has on other related sectors. This approach is used to identify potential scenarios of development for the region.

Analysis by Decade: The 1980s and the 1990s

Because the period of the 1980s appears to be quite different in outcomes than that of the 1990s, the analysis is conducted separately for the two time intervals, with conclusions from each used subsequently in the analysis of the region's potential.

The 1980s

The table shows that the region's employment grew by about 36 percent over the decade, or nearly 157,000 jobs. The highest number of new jobs was in the Services sector, while the highest growth rate was in construction. On the other hand, this was true for many of the State's regions, so it does not contribute to the understanding of the uniqueness of the Sacramento region. That view is obtained in the following analysis.

Sacramento-Yolo
Economic Composition in
and Growth During the 1983-1990

Industry	Employment	Percent of 1990 Employment	1983-1999 Change	1983-1990 % Change
Total, All Industries	600,000	100.0%	157200	36%
All Government	161,300	26.9%	12500	8%
Trade	132,600	22.1%	27700	26%
State & Local Government	132,000	22.0%	10900	9%
Services	129,800	21.6%	42900	49%
Retail Trade	117,400	19.6%	33000	39%
State Government	85,000	14.2%	na	na
Local Government	69,100	11.5%	na	na
Finance, Insurance & Real Estate	39,800	6.6%	15300	62%
Health Services	39,400	6.6%	na	na
Local Education	37,400	6.2%	na	na
Manufacturing	37,400	6.2%	8400	29%
Construction	32,700	5.5%	14800	83%
Federal Government	29,400	4.9%	1600	6%
Wholesale Trade	254,00	4.2%	5000	25%
Transportation & Public Utilities	24,000	4.0%	1700	8%
Durable Goods	22,900	3.8%	6900	43%
Business Services	22,200	3.7%	na	na
Nondurable Goods	14,600	2.4%	1600	12%
Total Farm	9,000	1.5%	1300	5%
Food & Kindred Products	7,300	1.2%	1400	24%
Lumber & Wood Products	4,800	0.8%	1600	50%
Industrial Machinery	4,300	0.7%	1700	65%
Electronic Equipment	4,200	0.7%	na	na
Computer & Office Equipment	3,000	0.5%	na	na

na = not available in comparable form 1983 data so growth could not be computed.
Farm employment for 1990 is estimated from civilian employment.
Source: Employment Development Department.
Sacramento Regional Research Institute, 2002.

Note: indented titles are sub-categories of larger (not indented) sectors.

Shift-Share Analysis of the 1980s

Shift-share analysis provides a view of how much the region's growth is due to its unique local advantages. The Sacramento region grew by about 157,000 jobs during this period, an annual rate of about 4.5 percent. The State of California grew at an annual rate of about 3.2 percent during that period; if Sacramento had been like California, it would have had 49,000 less employment growth over that period. Most of the region's relatively faster growth can be attributed to the local advantages that made some sectors grow faster in the region than their counterparts statewide or nationwide.

Unique Regional Advantages

While the previously discussed composition of the region is a great contributor to its stability and growth, it does not identify sectors in which the local economy excelled due to some internal advantage. This local advantage was the source of over 34,000 additional jobs over this interval, an important contributor to the region's success.

Industry/Sector	Added Growth Due to Regional Advantages
Total, All Industries	34,159
City and County Government	23,867
Finance, Insurance & Real Estate	9,492
Retail Trade	8,978
Manufacturing	6,266
State & Local Government	5,992
Services	5,350
Construction	5,291
Paper, Printing & Publishing	1,950
Industrial Machinery	1,789
Finance	1,199
Food & Kindred Products	1,080
Mining	(232)
Wholesale Trade	(712)
Federal Government	(790)
Transportation & Public Utilities	(1,667)
Total Farm	(3,861)

Data Source: Employment Development Department
Sacramento Regional Research Institute, 2003

The table shows the sectors in which the region's growth performed especially well or especially poorly compared to the same sectors statewide. The sector with the largest added growth due to regional advantages was City & County Government (which does not include education), accounting for about 70 percent of the region's uniqueness. Other regions of the state developing at similar rates of growth did not add as much City & County Government as Sacramento. Other sectors showing unique local advantages included Finance, Insurance, & Real Estate; Retail Trade; Manufacturing; State & Local Government, the Services sector (which includes health services and business services); and Construction.

By contrast, some of the region's sectors did worse than their counterparts statewide. These are sectors in which the region's performance was unpredictably low. The lowest was the Farm sector, which produced 3,861 fewer jobs than its statewide counterpart would indicate. Other under-performing sectors were Transportation & Public Utilities; Federal Government (due to the Base closures); and Wholesale Trade.

Economic Specialization Analysis for the 1980s

The data in the table indicates the percentage change in the degree of specialization over the seven-year period from 1983 to 1990.

The highest change is in Local Government—during this interval, the degree of specialization in Local Government increased by 230 percent. Other high levels of specialization increase occurred in Food Processing, Industrial Machinery manufacturing (which includes high technology manufacturing), Finance Insurance & Real Estate, and Construction.

By contrast, the region decreased its level of specialization in all government sectors except Local Government, and in Transportation & Public Utilities, Wholesale Trade, and Services (which includes Business Services, Medical Services, and others). This does not mean that there was not growth in these sectors; it just means that they were not growing as fast as their statewide counterparts, so we were losing our relative advantage in these sectors. (Note that Total Farm and Retail Trade remained approximately unchanged in specialization during this period.)

Changes in Degree of Specialization
Sacramento Region, 1983-1990

Local Government	230%
Canned, Cured & Froz. Foods	93%
Industrial Machinery	58%
Finance, Insurance & Real Estate	21%
Manufacturing	11%
Construction	10%
Food & Kindred Products	9%
Lumber & Wood Products	5%
Total Farm	3%
Retail Trade	0%
Services	-4%
Wholesale Trade	-10%
Federal Government	-11%
Transportation & Public Utilities	-14%
Government	-17%
State & Local Government	-18%

Farm employment for 1990 is estimated from civilian employment.
Source: Employment Development Department.
Sacramento Regional Research Institute, 2002.

Note: indented titles are sub-categories of larger (not indented) sectors.

Summary of the 1983 to 1990 Period

The period from 1983 to 1990 was one in which the region's composition began its major change from a government-agriculture dominated economy to one with more diversity and increasingly similar to the statewide economy. During the period, virtually all government sectors except local government were a relative disadvantage for the region. Federal saw nearly an 11 percent decrease, but State Government also provided a low contribution to the region's growth and development. By contrast, the region was busy creating a high technology manufacturing sector, virtually from scratch, and while this added thousands of new jobs and provided a qualitative change to the nature of the region, the region still remained below the statewide average composition in high technology manufacturing. The strongest elements of the region's economy during the decade were those sectors related to housing construction, including Construction, Local Government (especially education), Finance Insurance & Real Estate, and Retail Sales. At the end of the period, the region had moved substantially toward a more typical mainstream California economy, but had not, by any means, lost its State Capital type of economic structure.

The 1990to 2000 Decade

The 1990 to 2000 decade saw the region's economy in a different phase. The region's employment growth was now a product of a maturing and diversified economy, some sectors of which were performing far better than their statewide counterparts.

During this decade, the region grew by 167,000 jobs, an annual rate of about 2.5 percent, while the State grew at a much lower annual average of about 1.5 percent—the region's growth rate was about 66 percent higher that that of the State. It is important to note that the 1991 to 1993 recession occurred during this decade. The region added about 71,000 more jobs than it would have at the State's growth rate.

Economic Composition in 2000 and Growth During the 1990-2000 Period Sacramento-Yolo Region

Industry/Sector	2000 Employment	Percent of 2000 Employment	1990-2000 Change	Percent Change 1990-2000
Total, All Industries	**829,000**	**100%**	**229,000**	**38%**
Major Economic Categories				
Services	202,300	24%	72,500	56%
Government	182,900	22%	21,600	13%
Trade (Retail & Wholesale)	153,000	18%	20,400	15%
Construction	47,700	6%	15,000	46%
Manufacturing	50,300	6%	12,900	34%
Finance, Insurance & Real Estate	52,500	6%	12,700	32%
Economic Sub-categories				
Business Services	57,100	7%	34,900	157%
Local Government	95,400	12%	26,300	38%
Retail Trade	141,500	17%	24,100	21%
State Government	101,200	12%	16,000	19%
Construction	47,700	6%	15,000	46%
Manufacturing	50,300	6%	12,900	34%
Finance, Insurance & Real Estate	52,500	6%	12,700	32%
Health Services	48,700	6%	9,300	24%
Amusement, Including Movies	14,300	2%	6,400	81%
Electronic Equipment	10,600	1%	6,400	152%
Engineering & Management	18,600	2%	4,800	35%
Industrial Machinery	8,700	1%	4,400	102%
Computer & Office Equipment	6,600	1%	3,600	120%
Transportation & Public Utilities	27,500	3%	3,500	15%
Wholesale Trade	26,600	3%	1,200	5%
Air Transportation	3,200	0%	1,200	60%
Transportation	13,900	2%	900	7%
Hotels & Other Lodging Places	7,500	1%	700	10%
Total Farm	8,900	1%	(100)	-1%
Primary & Fabricated Metal	2,000	0%	(100)	-5%
Lumber & Wood Products	4,600	1%	(200)	-4%
Food & Kindred Products	6,900	1%	(400)	-5%
Canned, Cured & Froz. Foods	900	0%	(1,500)	-63%
Federal Government	12,900	2%	(16,500)	-56%

Farm employment for Yolo in 1990 estimated from civilain employment.

Data source: Employment Development Department.

Sacramento Regional Research Institute, August 2002.

Note: indented titles are sub-categories of larger (not indented) sectors.

Shift-Share Analysis

The real story about the region in the 1990 to 2000 decade is the contribution of local sectors which grew much faster than their counterparts elsewhere in the State, due to some unique locational advantage. This aspect contributed over 65,000 extra new jobs.

Added New Jobs Due to Unique Regional Advantages
Sacramento Region 1990-2000

Industry / sector	Added New Jobs
Total, All Industries	65,015
Services	22,659
Manufacturing	15,153
Business Services	14,305
Local Government	12,139
Finance, Insurance & Real Estate	11,991
Retail Trade	11,102
Local Education	7,557
Electronic Equipment	6,072
Construction	5,000
Industrial Machinery	4,180
Computer & Office Equipment	3,773
Amusement, Including Movies	2,692
County Government	2,407
State Government	2,283
Engineering & Management	2,125
Automotive Dealers & Service	2,043
City Government	1,933
Eating & Drinking Places	1,722
Food Stores	1,405
Communications & Public Util.	968
Chemicals & Allied Products	683
Health Services	623
Hotels & Other Lodging Places	448
Transportation Equipment	424
Air Transportation	171
Lumber & Wood Products	134
Mining	(47)
Primary & Fabricated Metal	(66)
Farm Production	(84)
Paper, Printing & Publishing	(452)
Farm Services	(476)
State Education	(481)
Food & Kindred Products	(485)
Total Farm	(713)
Communications	(718)
Wholesale Trade	(845)
Personal Services	(1,182)
Transportation & Public Utilities	(1,730)
Retail-General Merchandise	(2,136)
Transportation	(2,427)
Federal Government	(9,379)
SACTO-CSUS Sacramento Regional Research Institute April 2002	
Data Source: Employment Development Department	
Data adjusted to include major Yolo County sectors.	
Indented titles are subcategories.	

Note: indented titles are sub-categories of larger (not indented) sectors.

The table shows that a large number of private sectors participated in this unique local advantage. This included Business Services; Finance, Insurance & Real Estate; Electronic Equipment, and Construction all adding over 5,000 extra new jobs. Even the government sectors including Local Government (City and County governments), Local Education, and State Government (but not Federal Government) all added jobs faster than their counterparts elsewhere.

Other local sectors lost ground, however. Unpredictably low growth occurred in Federal Government, Transportation, Retail-General Merchandise; Transportation & Public Utilities, and Personal Services all grew slower than their counterparts elsewhere, all having at least 1,000 fewer new jobs than predicted. Note also that all of the farm-related sectors, including food processing, performed at lower levels than their counterparts. State education, which includes CSUS and UC Davis, also grew slower than their counterparts elsewhere.

Sacramento PMSA Change in Degree Specialization 1990-2000

Electronic Equipment	111%
Industrial Machinery	74%
Electric, Gas & Sanitary Serv.	40%
Manufacturing	31%
Business Services	22%
Finance, Insurance & Real Estate	14%
Local Government	4%
Engineering & Management	2%
Construction	2%
Hotels & Other Lodging Places	-2%
Communications & Public Util.	-3%
Retail Trade	-4%
Health Services	-6%
State Government	-7%
Food & Kindred Products	-10%
Wholesale Trade	-12%
Communications	-15%
State Education	-18%
Trucking & Warehousing	-20%
Transportation	-22%
Total Farm	-23%
Federal Government	-47%

Sacramento Regional Research Institute. September 2002.
Data Source: Employment Development Department.

Note: indented titles are sub-categories of larger (not indented) sectors.

The 1990 to 2000 Economic Specialization Analysis

The decade of the 1990s showed a remarkable change in the areas of specialization for the Sacramento Primary Metropolitan Statistical Area (PMSA—Sacramento, El Dorado, and Placer Counties). The region's specialization in Electronic Equipment increased by 111 percent (or more than doubled), while other manufacturing sectors also showed sharp increases in specialization. This confirmed the view of the region as achieving a rapid change to a technology manufacturing region, even though the total amount of manufacturing was still relatively low compared to other regions.

The other sectors in which the region was increasing its specialization included Business Services (of which information technology is a major component), Finance Insurance & Real Estate (the region was gaining a financial sector, not just real estate related to home construction), and Engineering & Management Services (some related to technology, some to information technology).

Meanwhile, the region was losing its level of specialization in a number of its historical specialty areas, including a continuing loss of Federal Government (as McClellan AFB continued to wind down through the decade), farm production and services including

food processing, transportation, communications, trade, and even relative losses in Health Services and State Government.

The overall view is a region moving from its traditional government and farming specialization toward specializations in technology and business activities, more typical for California regions of similar size.

Summary of the 1990 to 2000 Decade

In summary, this decade was very different from the previous one in that the region's successes shifted away from those related primarily to population growth and housing construction, and with decreasing dependence on government and agriculture, to a growth scenario much more oriented to technology manufacturing and private sector business expansion. The two sectors with the highest unique local advantage between 1990 and 2000 were Business Services and Manufacturing, rather than the previous decade's highest advantage in City & County Government. This trend is typical in maturing economies, which move from a population-growth mode to one in which the region establishes its uniqueness and specializations.

Multiplier Analysis

During the decade of the 1990s a powerful new analytical model became available which can provide yet another view of the region's structure, one which allows the identification of the degree to which each sector is supported and strengthened by its relationships with other sectors. The model is an input-output model called IMPLAN, developed at the University of Minnesota specifically for the purpose of measuring how economic events in a given industry sector in a region affect other industry sectors, and the total economic impacts of all these interrelationships taken together.

Sacramento PMSA Major Employment Sectors	Output ($ millions)	Employment	Employment Multiplier	Average Compensation
	$86,814	**952,658**		**$35,526**
State & Local Government - Non-Education	$9,943	158,464	1.5	$48,894
Eating & Drinking	$1,848	49,524	1.35	$12,782
State & Local Government - Education	$1,220	37,045	1.33	$32,933
Wholesale Trade	$3,378	31,057	2.14	$41,859
Personnel Supply Services	$673	28,029	1.25	$16,126
Doctors and Dentists	$2,672	27,925	2.03	$47,520
Miscellaneous Retail	$1,057	27,020	1.38	$13,175
Real Estate	$5,234	26,623	2.5	$10,818
Food Stores	$1,105	20,405	1.52	$27,101
Credit Agencies	$1,012	19,839	1.59	$29,689
New Residential Structures	$2,722	19,304	2.4	$22,016
Hospitals	$1,675	19,257	1.9	$47,827
Maintenance and Repair of Other Facilities	$1,443	19,240	1.76	$32,121
Federal Government - Non-Military	$1,019	16,752	1.53	$51,636
Automotive Dealers & Service Stations	$1,397	16,370	1.85	$34,942
Insurance Carriers	$2,214	14,489	2.66	$54,179
Accounting, Auditing and Bookkeeping	$675	13,264	1.58	$25,030
General Merchandise Stores	$444	13,117	1.34	$15,705
Computer and Data Processing Services	$1,407	12,854	2.1	$51,346
New Industrial and Commercial Buildings	$1,485	11,801	2.26	$32,540
Management and Consulting Services	$969	11,587	2.07	$32,709
Insurance Agents and Brokers	$682	11,489	1.67	$27,243
Semiconductors and Related Devices	$4,232	10,086	3.89	$121,753
Engineering, Architectural Services	$895	9,929	2.32	$34,243
Amusement and Recreation Services	$227	9,766	1.22	$6,553
Banking	$1,794	9,709	2.25	$36,461

Source: IMPLAN model for the Sacramento PMSA
Sacramento Regional Research Institute, 2003

The use of an econometric model can contribute to the knowledge of how a region's economy works by providing information on the inter-relationships between the various sectors, and can quantify the multiplier effect which occurs when new employment is added to the region. The multiplier effect is generated when new employment is added in one sector, but generates additional employment in other sectors that supply goods and services to the new or expanded firm (called the indirect impact) and consumer services to employees (called the induced impact). Indirect impacts include construction of facilities, provision of materials and supplies, utilities and local government services, and many other inputs which the new firm will need. Induced effects include provision of housing, health care, retail products, education, and all of the other consumer services which the added employees of both the new firm and the indirect firms will consume.

The table shows that the total economic production of the Sacramento region was about $86.8 billion, led by State & Local Government, which created about 9.9 billion in total output and employed over 158,000 employees. The average compensation (including both salaries and benefits) of all employees was about $35.5 thousand per year, with State & Local Government employees earning $48.9 thousand. The model generates a total of over 5,500 employment sectors, but the table is truncated to show only sectors with employment over one percent (9,500) of the region's employment.

One of the most useful products of this analysis is the generation of employment multipliers for each sector. The use of economic multipliers is a powerful decision making tool for economic development because it shows the total impacts of adding a new firm or new employment in existing firms, including the indirect and induced effects on other economic sectors. The table below shows the major private sector growth industries of the region, their total employment, and the multiplier for each. The sectors in the table are ranked by their employment multipliers.

Sacramento PMSA	Employment 952,658	Employment multiplier
Semiconductors and Related Devices	10,086	3.89
Insurance Carriers	14,489	2.66
Real Estate	26,623	2.50
New Residential Construction	19,304	2.40
Engineering, Architectural Services	9,929	2.32
New Industrial and Commercial Buildings	11,801	2.26
Banking	9,709	2.25
Wholesale Trade	31,057	2.14
Computer and Data Processing Services	12,854	2.10
Management and Consulting Services	11,587	2.07
Doctors and Dentists	27,925	2.03
Hospitals	19,257	1.90
Automotive Dealers & Service Stations	16,370	1.85
Maintenance and Repair of Other Facilities	19,240	1.76
Insurance Agents and Brokers	11,489	1.67
Credit Agencies	19,839	1.59
Accounting, Auditing and Bookkeeping	13,264	1.58
Federal Government - Non-Military	16,752	1.53
Food Stores	20,405	1.52
State & Local Government - Non-Education	158,464	1.50
Miscellaneous Retail	27,020	1.38
Eating & Drinking	49,524	1.35
General Merchandise Stores	13,117	1.34
State & Local Government - Education	37,045	1.33
Personnel Supply Services	28,029	1.25
Amusement and Recreation Services	9,766	1.22

Source: IMPLAN model for the Sacramento PMSA
Sacramento Regional Research Institute, 2003

Since the highest multiplier in these large sectors is the manufacturing of Semiconductors & Related Devices, with a multiplier of 3.89, this sector will be used as an illustration.

New Semiconductor jobs create a high multiplier two ways:

> **1. The Indirect or Supplier Impact.** This occurs when a semiconductor manufacturer purchases materials, supplies, and services from other firms in the region, increasing their business and creating employment increases. This includes purchases of real estate and services, utilities, shipping, packaging, vehicles, equipment, and many other items required by the semiconductor business.
>
> **2. The Induced or Consumption Impact.** This happens when the employees of the semiconductor manufacturer and the employees of the supplier firms spend their wages in the local economy for housing, transportation, health care, retail purchases, and all the other household consumption items. This supports increased employment in many other sectors, including housing construction, health care, retail sales, and even local government.

The Total Impact. The total is therefore the added semiconductor manufacture employment plus the added supplier firm employment plus the added consumer sector employment. The multiplier is the total employment increase divided by the semiconductor manufacturing employment.

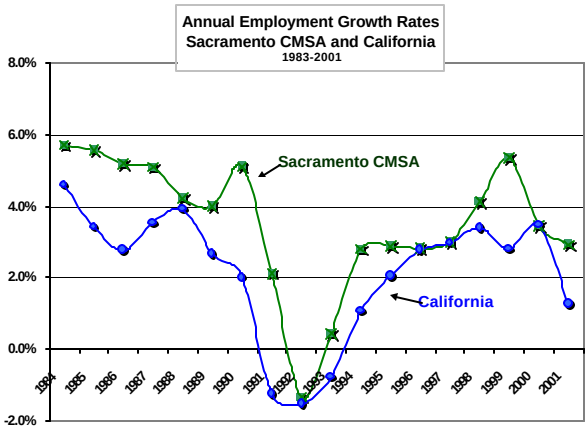
The linking of economic development and workforce development can be illustrated in an application of this economic multiplier information. Adding one new employee in semiconductor and related devices creates a total of 3.89 new jobs in the region, or 2.89 new jobs in the supplier and consumer sectors. The table shows in detail the types of new jobs that are created in these supplier and consumer sectors. These are not semiconductor manufacturing jobs, but are created as a result of semiconductor jobs. Many of these other jobs available to employees with a wide range of skills and educational levels. Ensuring an adequate supply of high technology employees may be a good strategy for creating employment opportunities for less highly skilled workers.

Additional Private Sector Jobs Created by 100 New Semiconductor Manufacturing Jobs	289
Eating & Drinking	19
Wholesale Trade	18
Personnel Supply Services	14
Maintenance and Repair Other Facilities	11
Miscellaneous Retail	10
Computer and Data Processing Services	9
Doctors and Dentists	8
Legal Services	6
Hospitals	5
General Merchandise Stores	5
Real Estate	5
Food Stores	5
Hotels and Lodging Places	5
Banking	5
Other Business Services	5
Automotive Dealers & Service Stations	4
Amusement and Recreation Services	4
Accounting- Auditing and Bookkeeping	4
Credit Agencies	4
Management and Consulting Services	4
Services To Buildings	4
Detective and Protective Services	3
Motor Freight Transport and Warehousing	3
Insurance Carriers	3
Other Medical and Health Services	3
Automobile Repair and Services	3
Domestic Services	3
Labor and Civic Organizations	3
Apparel & Accessory Stores	3
Federal Government - Military	3
Social Services	2
Engineering- Architectural Services	2
Furniture & Home Furnishings Stores	2
Job Training & Related Services	2
Laundry- Cleaning and Shoe Repair	2
Beauty and Barber Shops	2
Building Materials & Gardening	2
Miscellaneous Repair Shops	2

Source: IMPLAN model for the Sacramento PMSA
Sacramento Regional Research Institute, 2003

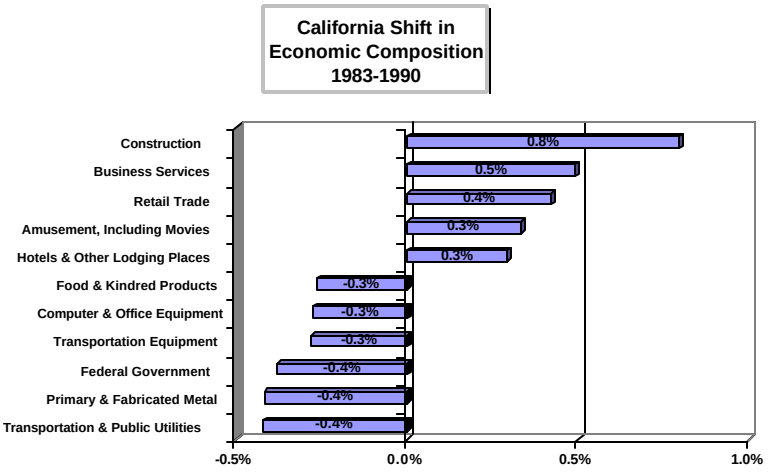
The State of California Growth

This section will provide a view of how the Sacramento region's growth has differed from that of the State of California. The adjacent chart shows that the Sacramento region's growth has equaled or exceeded that of California during every year since 1983, on an annual basis (California has exceeded the growth of the region during some months during this time period). During some periods, especially the middle 1980s and during 1999, the region has significantly exceeded the California growth rate.



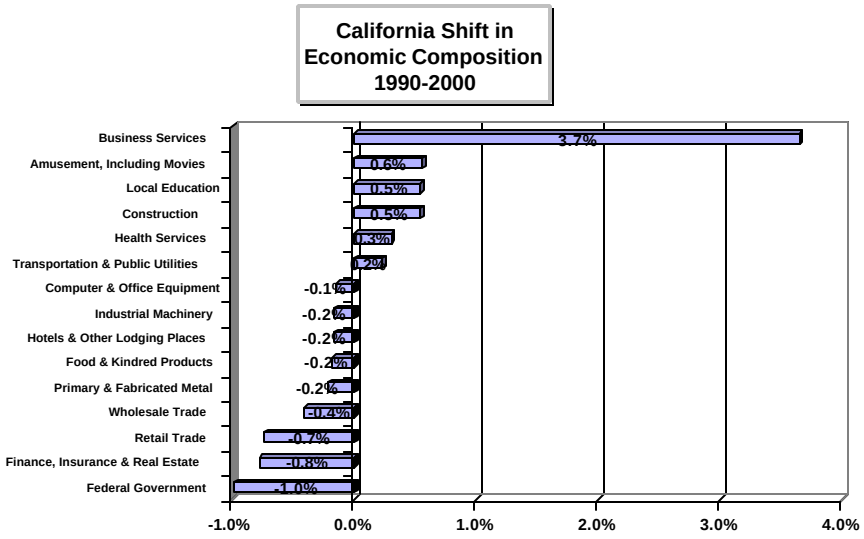
Data Source: Employment Development Department
Sacramento Regional Research Institute, 2003

The difference has been one of composition as well as one of magnitude. During the 1980s, California's strongest increases economic composition were in Construction, Business Services, and Retail Trade, while it declined in composition in Transportation & Public Utilities, Metals, Federal Government, Transportation Equipment, and Computer & Office Equipment. In most respects, the Sacramento region grew in the same sectors as California, but grew even faster in those sectors. This represents a time period in which the region came to resemble the more urbanized regions of the State in a way it had not previously done.



Data Source: Employment Development Department
Sacramento Regional Research Institute, 2003

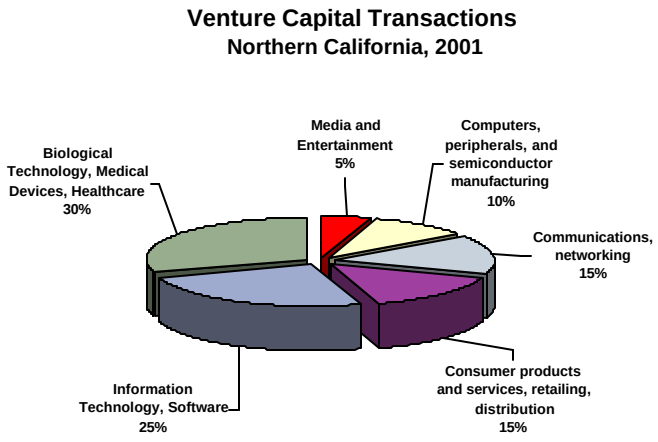
During the 1990 to 2000 decade, the region's growth was similar to that of the State in some respects (Business Services, Local Education, and Construction) but different in many others. In particular, the region was rapidly growing in virtually all aspects of manufacturing of computers and electronic components at a time when the State was reducing its emphasis on those industries; the region grew in Retail Trade at a time when the State was reducing its concentration in retail; and the region grew very little in Health Services at a time when the State was expanding more vigorously in that sector.



Data Source: Employment Development Department
Sacramento Regional Research Institute, 2003

Venture Capital Investment in Northern California

One view of the expected shifts in employment structure of California's regions is reflected by the investment in venture capital, widely accepted as an indicator of the directions of future technology. The graph below shows the venture capital transactions in Northern California (including the Sacramento region) during 2001, the latest data available.



SACTO-CSUS Sacramento Regional Research Institute, February 2002.
Source: PriceWaterhouseCoopers: Venture Economics \National Venture Capital Association Moneytree Survey.

The largest category is the biological technology sector, which received about 30 percent of all venture capital. This is widely viewed as the

result of two trends: the application of new biological knowledge which has emerged from the Human Genome Mapping Project, as that knowledge is converted into pharmaceutical products and other health applications; and the aging of the population, with its increased demand for medical services. The relevance of this topic for Sacramento is the major role which UC Davis is expected to play in the emerging biotechnology industry, resulting from its worldwide leadership position in medicine, agriculture, and veterinary medicine.

The next major sector is information technology, which refers to the application of digital information technology and data analysis to virtually all phases of industry, business, and government. It is expected that the gains of the technology-manufacturing boom of the 1990s will be dwarfed by the value of the software and applications of this technology, in much the same way that Microsoft has eclipsed the fortunes of the hardware-manufacturing firms.

This concept is very important for the Sacramento region, in that it has three major advantages in information technology:

1. The State's largest information technology user: State Government, which is just beginning its transition to "e-government."

2. Two of the State's largest IT firms: both HP in Roseville and Intel in Folsom, which have largely transformed from the manufacture of technology hardware to the software and network services of information technology applications.

3. Not one but two nationally known information technology universities. UC Davis has key programs in Computer Science, Computer Engineering, and Programming Language and Software Engineering. CSUS has a nationally known "E-MBA" program, one of the State's most prolific computer sciences programs (strongly supported by HP and Intel), and programs in information science, Internet information authoring, and other IT applications programs.

These regional advantages give the region the potential to shape itself into a core location for this industry, achieving a position of industry leadership rather than a secondary expansion outpost for the San Francisco Bay Area.

Conclusions

Changes in Degree of Specialization Sacramento Region, 1983-1990	
Local Government	230%
Canned, Cured & Froz. Foods	93%
Industrial Machinery	58%
Finance, Insurance & Real Estate	21%
Manufacturing	11%
Construction	10%
Food & Kindred Products	9%
Lumber & Wood Products	5%
Total Farm	3%
Retail Trade	0%
Services	-4%
Wholesale Trade	-10%
Federal Government	-11%
Transportation & Public Utilities	-14%
Government	-17%
State & Local Government	-18%

Farm employment for 1990 is estimated from civilian employment.
Source: Employment Development Department.
Sacramento Regional Research Institute, 2002.

Note: indented titles are sub-categories of larger (not indented) sectors.

The conclusions of this report show that the region is in a state of rapid change in its economic and employment structure, a process economists would call development rather than growth. The structural change is all the more important because of the extended period before HP in which the region did not resemble other major California areas, and did not play a major role in the business or technology evolution which California had been experiencing.

The 1980s showed a strong shift in economic composition, with major shifts due to the growth of the Finance Insurance & Real Estate, Retail Trade, and Manufacturing sectors, in addition to the usual government sectors. During this time, the region began to show sharp increases in specialization of these trends previously not experienced in the region. By contrast, the region began decreasing its specialization in a number of sectors in which it had previously concentrated, such as State Government, Transportation (railroads), Federal Government, and Wholesale Trade (related to agricultural products).

The 1990s exhibited even stronger and more rapid shifts in composition. During this decade the manufacturing and business services sectors dominated the shifts in economic specialization, while the region's specialization in Lumber & Wood Products, Government, agricultural food processing, Transportation, and Wholesale Trade declined. The region also reduced its specialization in Health Services, as the rest of the State started catching up with the increasing HMO coverage.

Change in Specialization Sacramento-Yolo Region 1990-2000	
Major Economic Categories	
Manufacturing	20%
Finance, Insurance & Real Estate	9%
Services	-5%
Construction	-6%
Trade	-12%
Government	-15%
Transportation & Public Utilities	-21%
Total Farm	-26%
Economic Sub-categories	
Electronic Equipment	97%
Computer & Office Equipment	96%
Industrial Machinery	62%
Business Services	12%
Amusement, Including Movies	3%
Local Education	-3%
Local Government	-4%
Engineering & Management	-5%
Retail Trade	-9%
Hotels & Other Lodging Places	-11%
Air Transportation	-11%
Lumber & Wood Products	-14%
State Government	-14%
Health Services	-15%
Wholesale Trade	-19%
Primary & Fabricated Metal	-19%
Food & Kindred Products	-22%
State Education	-23%
Transportation	-29%
Federal Government	-51%
Canned, Cured & Froz. Foods	-63%

Data Source: Employment Development Department
Sacramento Regional Research Institute, 2002.

Note: indented titles are sub-categories of larger (not indented) sectors.

Another conclusion about the region came from multiplier analysis based on econometric models of the regional structure. That view shows that the linkage between economic sectors can cause new jobs in one sector, perhaps a high-technology sector requiring very high levels of skills and education, which may induce a large number of jobs in apparently unrelated industry sectors, many of which have moderate or lower skill requirements. This finding shows that we may have been missing some opportunities to link our economic development analysis with workforce development analysis to create a better view of the region's workforce needs and job training opportunities.

Additional Private Sector Jobs Created by 100 New Semiconductor Manufacturing Jobs	289
Eating & Drinking	19
Wholesale Trade	18
Personnel Supply Services	14
Maintenance and Repair Other Facilities	11
Miscellaneous Retail	10
Computer and Data Processing Services	9
Doctors and Dentists	8
Legal Services	6
Hospitals	5
General Merchandise Stores	5
Real Estate	5
Food Stores	5
Hotels and Lodging Places	5
Banking	5

Source: IMPLAN model for the Sacramento PMSA
Sacramento Regional Research Institute, 2003

The multiplier analysis shows that there are a number of large economic sectors that actually create more jobs in related sectors than occur in their own industries. The importance of this finding is that economic development activities focused on specific technology or higher-income industries may actually create significant improvements in employment opportunities for medium and low skilled employees in linked or related sectors, and that relationship can be identified and quantified.

Scenarios of the Sacramento Region's Future Development

The conclusions reached in this report show four consistent underlying forces shaping the region's composition and development:

1. The influence of the region's traditional sectors of specialization, including State Government, Federal Government, and Farming-related activities (including food processing) are diminishing, and will be replaced by other activities at an increasing rate over the coming decades.

2. The continuing strength of the housing construction and community-building process (including local government and local education) is far beyond what the existing population of the region demands, and shows the role of the region as providing a housing function for the adjacent San Francisco Bay Area. This is especially true in the area of Senior and Retirement housing as seen in the Placer County developments by Del Webb and others, and demographers predict that this will increase to even higher levels for several decades.

3. The expansion of business sectors, especially information services and financial activities show the region as coming of age in its business structure, more typical of a similar sized region. There is evidence to show that some of that expansion is due to the emergence of Sacramento as a business center serving not only the population of the currently-designated Sacramento region, but also serving an increasing Central Valley population.

4. The emergence of not only manufacturing of technology products, but also the expansion of information services demonstrates another potential: a regional specialization in technology sectors including newly emerging sectors not yet established to the same level in the adjacent San Francisco Bay Area as was the technology manufacturing sector which migrated here. As a result, the Sacramento region may find itself at the vanguard rather than the rear guard of these emerging technologies.

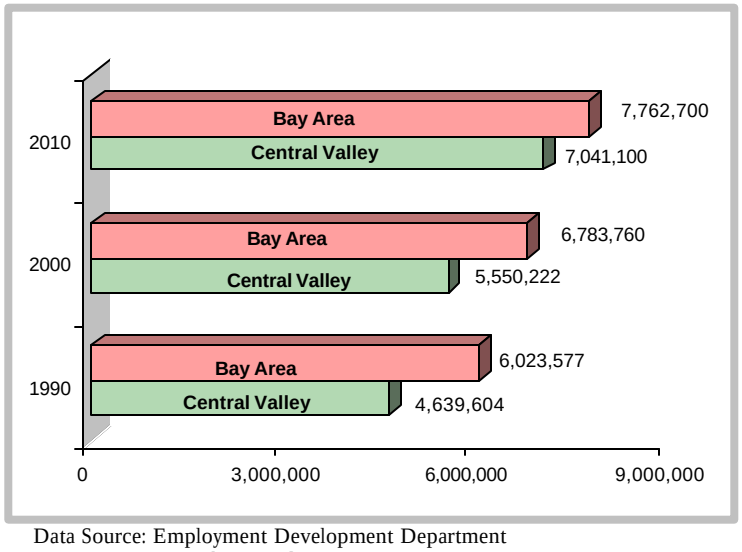
These concepts lead to the identification of three primary scenarios for the region in coming decades.

Scenario 1: Absorption into the San Francisco Bay Area

The Sacramento region has become increasingly linked to the East San Francisco Bay Area economies and populations during the past decade, and the extreme housing and transportation problems limiting population growth there have created expansion into the Sacramento and other Central Valley regions. This is especially true for retirement housing, but is also linking workers who can use telecommuting or other non-peak-hour commuting between these regions. The linkage with the San Francisco Consolidated Metropolitan Statistical Area (CMSA) actually occurs on I-80 between Davis (part of the Sacramento CMSA) and Dixon (part of the San Francisco CMSA), and the growth in Fairfield and Vacaville shows how these links are becoming more strongly established. This scenario shows a future for the Sacramento region which supports continued strength in expansion of housing and its related sectors including retail, local government, health care, and other residence-serving sectors.

Scenario 2: Center City of the Central Valley

Most of the external views of the Sacramento region focus on the San Francisco Bay Area linkage, but meanwhile demographers are viewing the Central Valley areas of California as the locus of most of the State's future population and economic growth. The regions from Bakersfield to Red Bluff are all experiencing extremely rapid growth, and going through urban transitions not unlike the one that the Sacramento region experienced in the 1980s. It is almost certain that the Central Valley population will exceed that of the San Francisco Bay Area in a few decades. As that unfolds, these intermediate-sized regions will require increasing access to the "higher order" urban services which cannot be provided at that scale, such as specialized legal and corporate accounting services, extremely specialized medical care, high-end retail, air transportation, professional sports, and cultural and artistic entertainment. The central city function for the Central Valley is currently being served by Sacramento in some specialties, and the San Francisco Bay Area centers in others. However, Sacramento has a unique locational and spatial ability to expand to effectively serve this increasing Central Valley population. This scenario will require a rapid expansion of the Sacramento region's downtown or central city types of services (but not necessarily located in the existing City of Sacramento downtown) and will feature increasing specializations in legal, medical, financial, retail, and entertainment services.



Data Source: Employment Development Department
Sacramento Regional Research Institute, 2002

Scenario 3: The Multi-Technology Cluster

The multi-technology cluster identifies a cluster of technology industry sectors in the region, and the potential for the region to serve as an incubator or creator for new industry development that originates here in the region, rather than being imported from the San Francisco Bay Area.

In this scenario, the region generates its own unique economic niche by combining its potential for high technology manufacturing, biotechnology manufacturing, and information technology into a multi-technology cluster with the sectors linked by a workforce that shares similar skills. The benefits to the region far exceed the outcome from the other two scenarios. This scenario will, however, also creates a large demand for workforce quality.

Regional Technology Cluster Assets:

Technology Manufacturing

- An existing industry and infrastructure

Biotech

- UCD medical, agricultural, and veterinary schools
- Established biotech firms such as Genentech

InfoTech

- State Government is the state's biggest consumer of IT
- HP and Intel in the Sacramento region have converted from manufacturing to major producers of IT services
- CSUS and UCD are both nationally known IT universities

The Next Step

If there is a downside to this new knowledge about the region, it is the absence of a link between the economic analysis and the manpower training implications. While it is possible to project the industry sectors where the region is gaining (or losing) relative specialization, the region is not yet able to convert that information into occupational categories and ultimately into manpower training requirements. There are a number of factors whch motivate the need for this analysis:

1. The Sacramento region's economy is in a state of restructuring. Shifts underway include changes from manufacturing and goods distribution to a more services-based economy; a rising importance of the information technology sector; and a high reliance on construction and related services.

2. Even within industries, business processes are changing, creating a shift in the occupational categories used in creating specific goods and services. One of the most prevalent trends is the substitution of digital processing and technology to processes that were formally more labor intensive. As a result, the mix of occupational categories within specific industries is changing.

3. Simultaneously, qualified employees have become more mobile between occupational categories, as many of the basic occupational skills can be used in a variety of occupations. The differences in required skills between a records technician, insurance claims adjuster, and State of California Analyst II are disappearing, leading to a homogeneous skill-set.

4. Finally, within specific occupational categories, the levels and ranges of skills and training required are increasing. One such shift is occurring in the move from manual skills to digital technology skills. Further, changes in required skills are evident in the slow increase in the quality or level of general education desired by employers—even at the high school graduate level for the most entry-level positions.

The relevant underlying asset from both the economic development and workforce development points of view is the education and training knowledge base of the workforce. The knowledge base can be established for a wide range of skill levels even when it cannot be linked to specific occupations. Included in this knowledge base are concepts such as: literacy in language, math, and science; a broad knowledge of computer software applications (not necessarily the electronics technology aspect); and a social and ethical adaptation to the business environment. It is evident that this knowledge base is increasingly portable between industry sectors and occupational categories; therefore, the change of focus would benefit a wide range of occupations and industries.

This approach would link the economic development and manpower development processes in a way that meets the needs of both approaches. The linkage could potentially translate into a labor force that can adapt quickly to unpredicted changes in economic or occupational trends, avoid occupational obsolescence, and stimulate the ability of the region to accommodate innovation—all of which are key economic development objectives.