

Traded Clusters In The San Diego Region

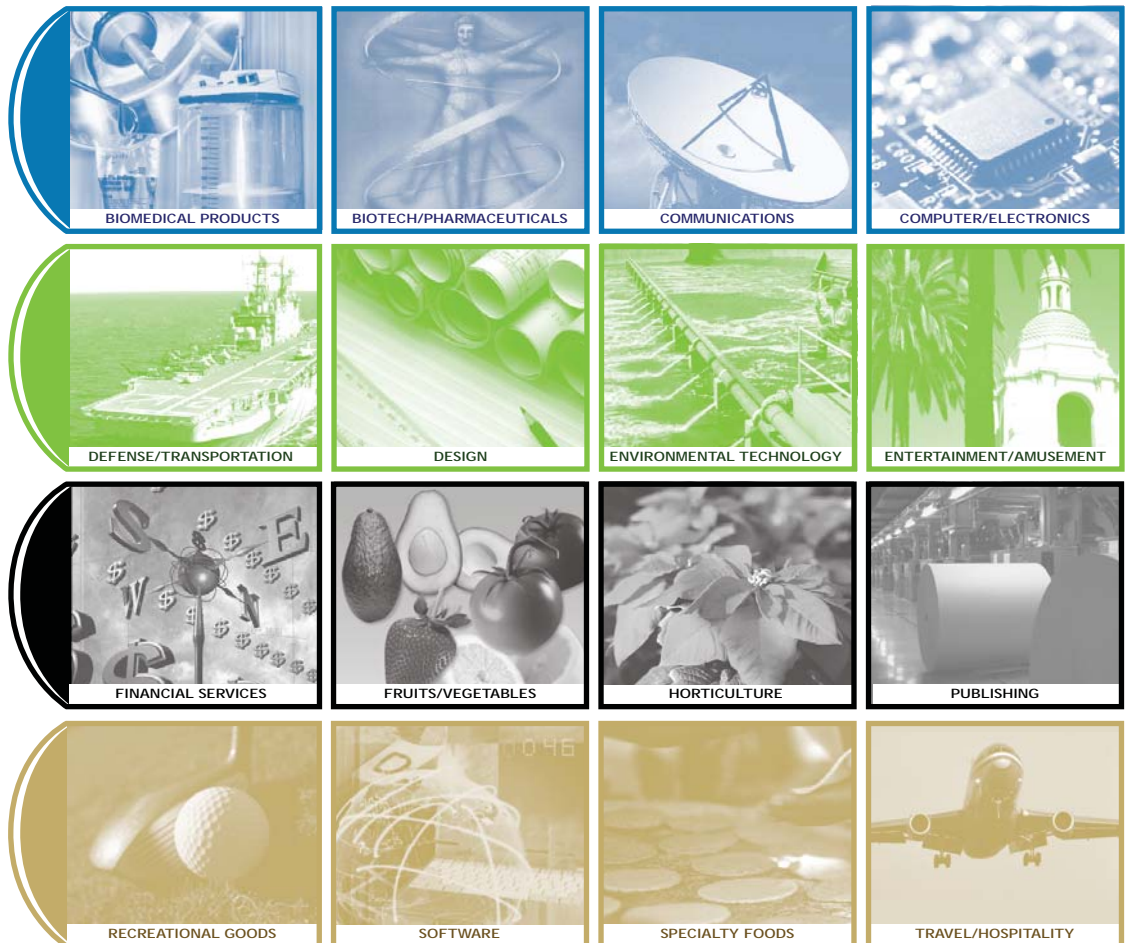


table of contents

Introduction: History and Significance	2
Changes to Cluster Definitions	3
Cluster Definitions, Employment, and Wages	3
Summary	7

FIGURES

1. Cluster Industry Wages Higher Than Regional Average.....	4
2. One-Quarter of Region's Employment is in Cluster Industries	4
3. Communications and Software Clusters are Top Wage Earners	6

TABLES

1. Cluster Definitions, Employment, and Wages - San Diego Region.....	8
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INTRODUCTION: HISTORY AND SIGNIFICANCE

During the early 1990s, the San Diego region experienced a severe recession that resulted in significant job losses across the region. In 1993 our unemployment rate rose to 8.4 percent. Conversely, during the national recession of the early 2000s, the San Diego region actually continued adding jobs to the economy. The unemployment rate peaked at only 4.7 percent in 2002. The difference between the two eras lies largely in the economic structure of the region during each recession.

One of the key differences between the region's economy during the early 1990s and its structure today is that the economic drivers have changed. The region's past economy was focused on defense industry manufacturing. Today the region's economy is diversified across many sectors, such as Biotechnology, Communications, Financial Services, Horticulture, and Travel and Hospitality. While the defense industry is still important to the region, it is balanced by a variety of other sectors. These sectors are often referred to as traded clusters.

Traded clusters are groups of interrelated, export-oriented industries that bring new money into the region. Industries within a cluster have business transactions with one another, and thus are interdependent. Cluster companies often participate in local industry associations, fostering collaboration and the exchange of knowledge. Companies within a cluster also compete with each other for market share, which drives innovation and productivity.

Companies within clusters tend to be among the region's leaders in research and development funding, patent awards, and other key indicators of innovation. Many of the clusters also pay high wages, although some do not. All clusters are economic drivers for the region because they are export-oriented.

San Diego's regional traded clusters were first identified as a result of the 1998 Regional Economic Prosperity Strategy (REPS), which was developed to address the recession and economic restructuring of the early 1990s. Originally, the clusters were determined by a committee of local industry and economics experts. The current method relies upon committee input and a methodology based on sound principles and practices that can be replicated for other regions (see Methodology section on page 7), minimizing the subjectivity of the committee-based approach.

CHANGES TO CLUSTER DEFINITIONS

The cluster definition methodology has been updated to reflect several changes. The federal government instituted an entirely new industry classification system since the cluster definitions were last determined in 2000. The North American Industry Classification System (NAICS) replaces the older Standard Industrial Classification (SIC) system, first developed prior to World War II. The NAICS industries focus on the work occurring at a particular business location, rather than the industry to which the business is attached. For example, the corporate headquarters for a computer manufacturer would have been classified as a manufacturing industry under the old SIC system, but is classified within the management industry under the NAICS system. Furthermore, NAICS includes more refined service categories and reflects new developments in technology (such as the Internet and telecommunications).

In addition to changes in the industrial classification system, the region's economy has changed in the years since the clusters were last defined. The prior definitions, established in 2000, relied upon 1998 data. The definitions presented here, based on 2003 employment and 2002 wage data, reflect the current structure of the San Diego economy.

The cluster definitions were reviewed in depth by a technical advisory committee composed of individuals from both the public and private sector. Committee members included economic development, academic, and industry representatives. Although 2002 and 2003 data were used to define the industry clusters, 2005 employment and wage data are presented here to provide the most up-to-date snapshot of the clusters.

CLUSTER DEFINITIONS, EMPLOYMENT, AND WAGES

The San Diego region has 16 clusters with a total of 320,067 local jobs in 2005. These cluster jobs represent one-quarter of the region's total employment. On average, cluster jobs pay higher wages (\$51,018) than the regional average (\$43,801). (See Figures 1 and 2 on page 4.)

The smallest San Diego regional cluster is Recreational Goods, with 3,188 jobs. The largest is Entertainment and Amusement, with 104,354 jobs. This cluster has the lowest annual wage, with an average of \$16,143 per worker. This relatively low figure is largely driven by food service and restaurant jobs. These jobs are more than twice as likely to be part-time, and therefore pay lower annual wages than jobs in other industries. The highest paying cluster is Communications, with an annual average wage of \$112,825.

Each cluster is described in more detail in the following sections. Table 1 on page 8 lists the industries in each cluster, the total cluster employment, and the average annual wage. Figure 3 (page 6) illustrates the range of average annual wages paid among the clusters.

Biomedical Products

In 2003, San Diego region institutions (both public and private) received more than a billion dollars in funding from the National Institutes of Health (NIH). Only Boston and New York City received more health research funds, demonstrating San Diego's position as one of the nation's premier research locations.

The Biomedical Products cluster consists primarily of products for surgical, medical, dental, and laboratory applications. However, there also is a great deal of research in the Biomedical cluster. One change from prior years is that Electromedical Apparatus

Manufacturing is now included in the Computer and Electronics cluster due to its buyer-supplier relationships with that cluster.

Number of Employees: 7,534
Average Wage: \$65,050

Biotechnology and Pharmaceuticals

The San Diego region is a national leader in total venture capital funding received by local companies. Between 2000 and 2004, more than one-third of the region's venture capital funds received went to Biotechnology and Pharmaceuticals companies.

As a national leader in federal research funding received for Biotechnology and for Biomedical Products, it is not surprising that the region has a strong concentration of jobs in the Research and Development (R&D) industry. In fact, more than half of the region's R&D jobs are in Biotechnology. In addition to research, this cluster also includes the manufacture of medicinal and diagnostic substances.

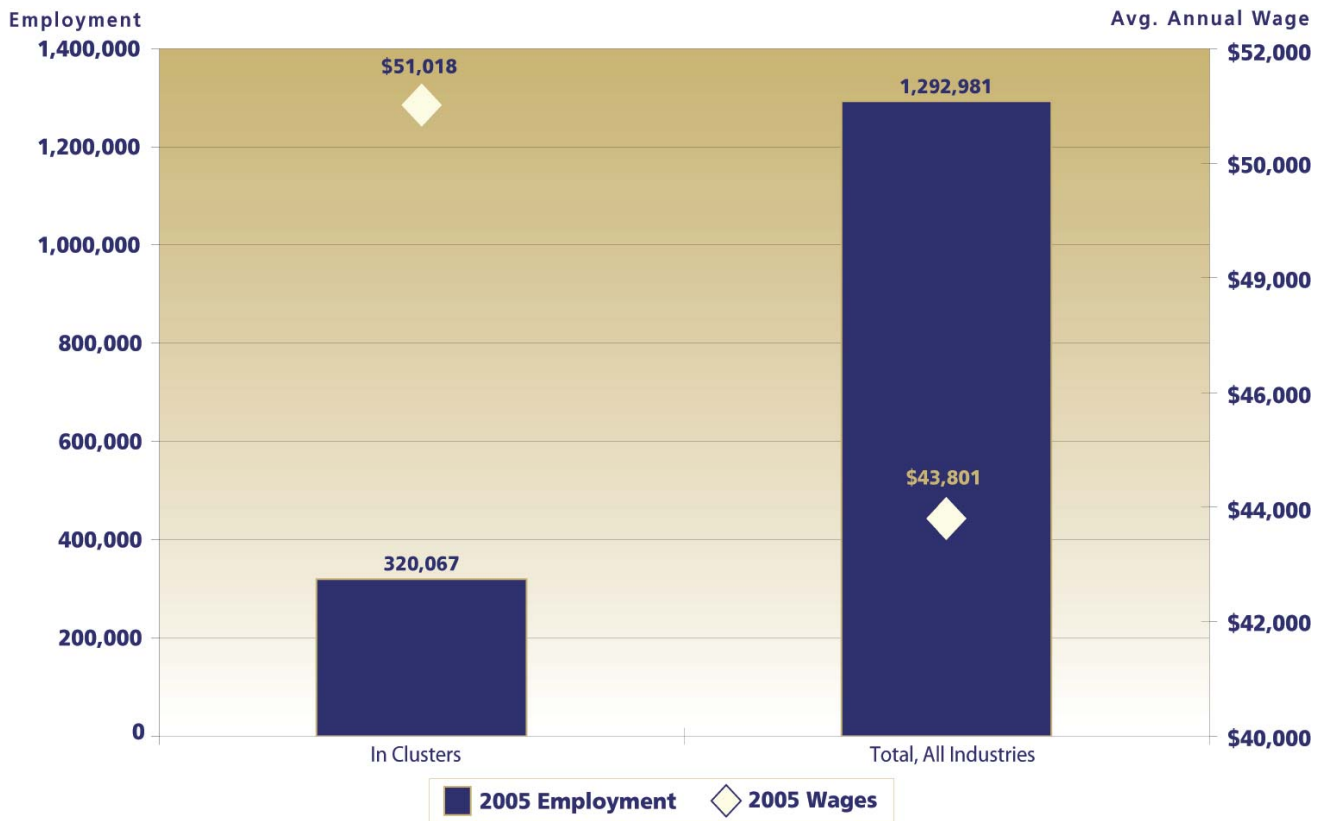
Number of Employees: 21,776
Average Wage: \$80,022

Communications

San Diego's Communications cluster includes equipment manufacturing, communications service, and research and development. The region is home to both globally-recognized wireless communications companies, as well as dozens of small companies (50 or fewer employees). The region attracts a significant amount of venture capital for telecommunications, accounting for roughly eight percent of local venture capital funding since 2000. In 2004, the region also received one of only 27 competitively-awarded Technology Opportunity Program research grants from the National Telecommunications and Information Administration.

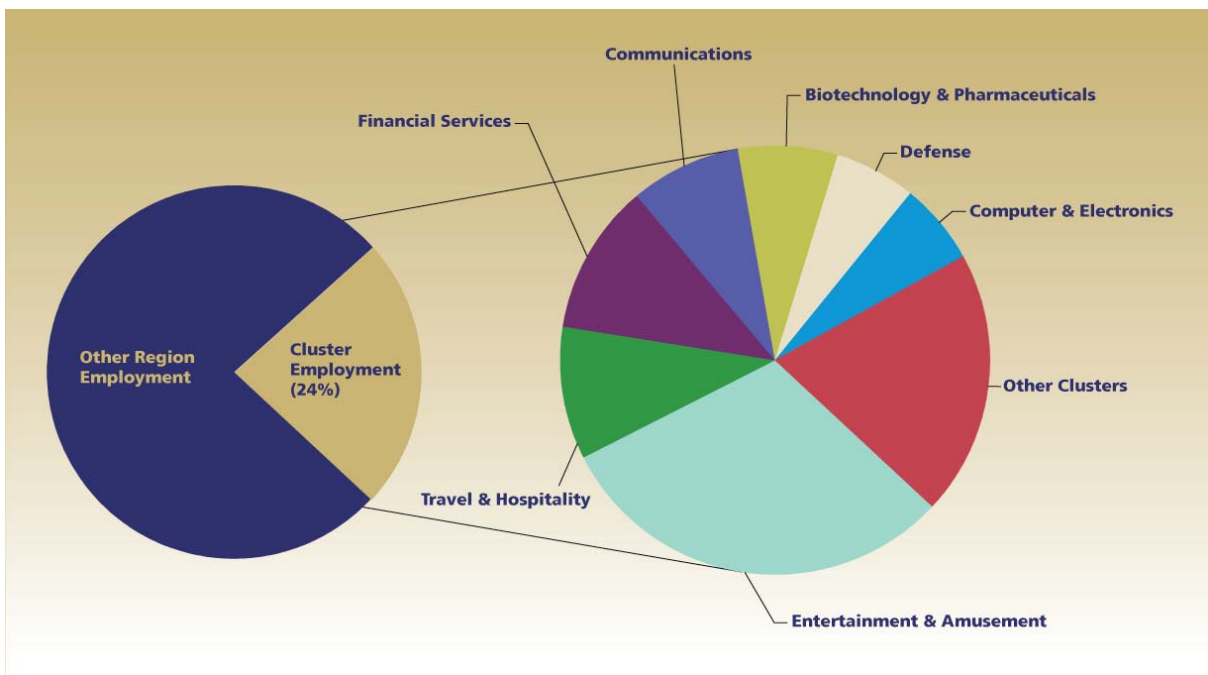
Number of Employees: 25,469
Average Wage: \$112,825

FIGURE 1. CLUSTER INDUSTRY WAGES HIGHER THAN REGIONAL AVERAGE



Source: California Employment Development Department; compiled by SANDAG.

FIGURE 2. ONE-QUARTER OF REGION'S EMPLOYMENT IS IN CLUSTER INDUSTRIES



Source: California Employment Development Department; compiled by SANDAG.

Computer and Electronics

The Computer and Electronics cluster in San Diego is largely composed of manufacturing industries. San Diego computer and electronics companies attracted more than half a billion dollars in venture capital funding since 2000.

Number of Employees: 15,396

Average Wage: \$78,826

Defense and Transportation Equipment

Given San Diego's large military presence, it is no surprise that the region has a thriving Defense and Transportation Equipment cluster. This cluster continues to evolve as shipbuilding takes on increasing significance and aircraft manufacturing declines in local importance.

Number of Employees: 20,301

Average Wage: \$71,185

Design

The Design cluster is a branch of what was formerly known as "Business Services." This newly defined cluster incorporates the design principles required for architecture; engineering; and interior, industrial, and graphic design.

Number of Employees: 6,510

Average Wage: \$61,831

Environmental Technology

The Environmental Technology cluster relates to those industries that improve environmental conditions—both indoors and out—either through the manufacture of analytical or cleaning equipment, or through design and consulting services.

Number of Employees: 13,720

Average Wage: \$70,321

Entertainment and Amusement

The Entertainment and Amusement cluster reflects San Diego's international reputation as a tourist destination. At the heart of this industry are local attractions, such as Balboa Park with its museums and the zoo. The cluster also includes other recreational activities, such as athletic events, theatre, and dining.

Number of Employees: 104,354

Average Wage: \$16,143

Financial Services

Financial Services includes banking and lending institutions, as well as investment services. While the Financial Services sector is not generally thought of as a venture capital magnet, the San Diego region has been awarded more than \$100 million in venture funding for Financial Services since 2000.

Number of Employees: 36,260

Average Wage: \$73,103

Fruit and Vegetables

San Diego produces roughly half of the nation's avocados. (California produces approximately 90 percent of the nation's avocado crop by volume, and San Diego produces about half of that.) Thus, it is no surprise that the region has a strong fruits and vegetables cluster.

Other regional specialties include citrus and other fruits and vegetables, such as lemons, limes, strawberries, and tomatoes. The market value of all fruits and vegetables produced in the region was \$260 million in 2002. The Fruit and Vegetables cluster includes these farming production activities, as well as related farm services and fruit and vegetable canning.

Number of Employees: 3,702

Average Wage: \$22,647

Horticulture

More than three quarters of the poinsettias in the nation come from San Diego. While this is but one example, it clearly demonstrates San Diego's preeminence in the field of horticulture. In 2003, San Diego County accounted for more than four percent of the nation's and 20 percent of the state's sales of nursery products, amounting to \$616 million. Likewise, San Diego accounts for 20 percent of the state's greenhouse square footage.

Nursery and Tree Production and Floriculture Production are thriving industries in the region. Those, along with their supporting industries, make up the Horticulture cluster.

Number of Employees: 6,516

Average Wage: \$30,185

Publishing

San Diego's Publishing cluster includes traditional book printing and publishing, as well as periodical, directory, and other publishing activities. Several publishers in the region have ties with other clusters. For example, local companies publish materials for the Defense and Transportation Equipment cluster. Other local publishers specialize in sports and recreation publications, which ties in with the Entertainment and Amusement and Recreational Goods clusters.

Number of Employees: 4,047

Average Wage: \$53,400

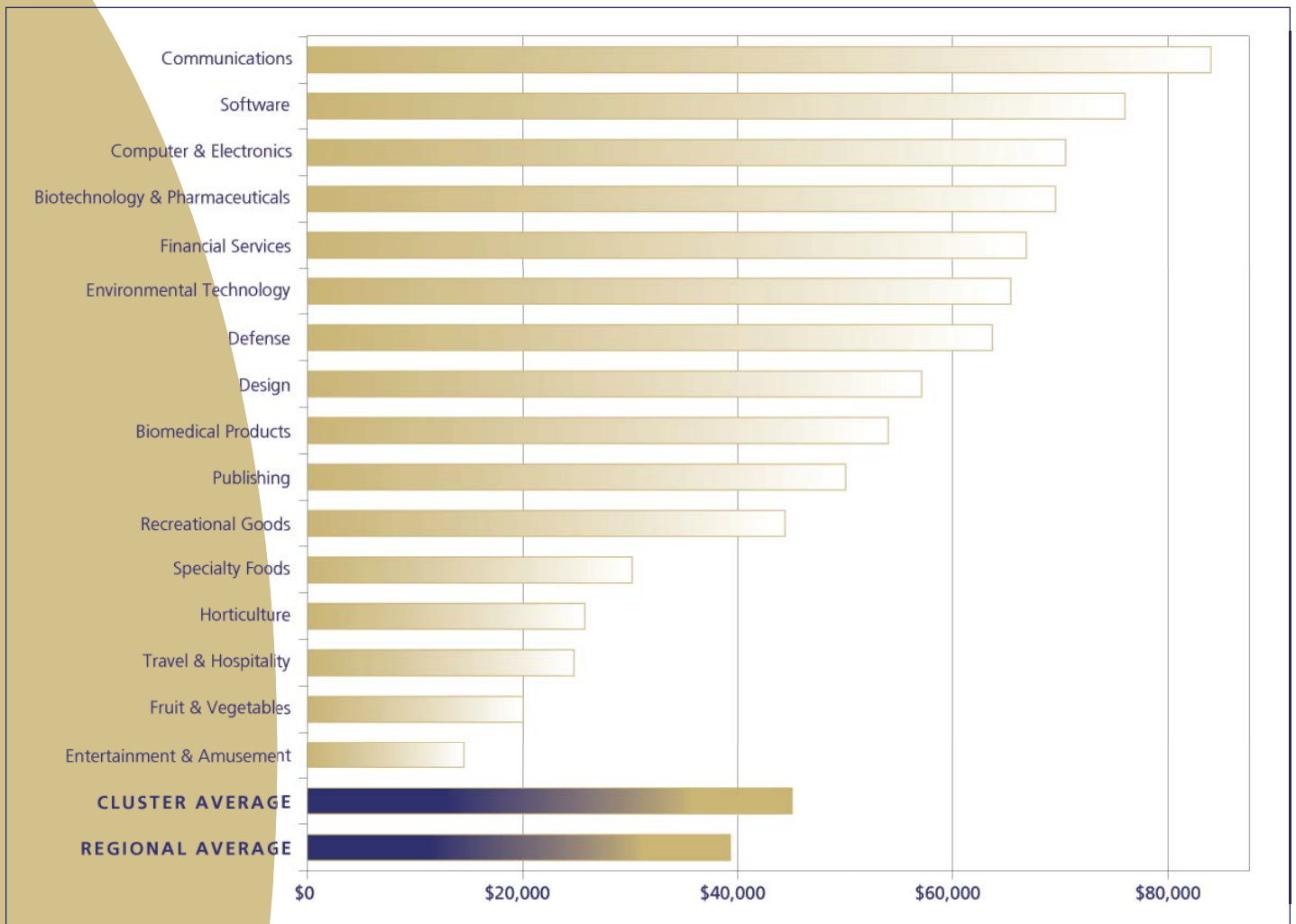
Recreational Goods

Recreational Goods is the only single-industry cluster in the region. With an extraordinarily high concentration of golf club, surfboard, and other recreational goods manufacturers in the region, it is clear that this industry is a highly export-oriented economic driver.

Number of Employees: 3,188

Average Wage: \$51,904

Figure 3
COMMUNICATIONS AND SOFTWARE CLUSTERS ARE TOP WAGE PAYERS



Source: California Employment Development Department; compiled by SANDAG.

Software

The region attracts a significant amount of venture capital for software development. Between 2000 and 2004, San Diego region software companies were awarded more than \$700 million in venture capital funding.

The region's software cluster includes software programming services as well as software publishing and computer training.

Number of Employees: 13,963
 Average Wage: \$82,011

Specialty Foods

San Diego, in part because of its geographic location, has regional specializations in the production of foods such as tortillas and seafood. Those industries, combined with other food processing industries, form the Specialty Foods cluster.

Number of Employees: 3,815
 Average Wage: \$32,183

Travel & Hospitality

With over 27 million total visitors and 15.9 million overnight visitors in 2005, San Diego's Travel and Hospitality industry thrives. These visitors spent an estimated \$5.8 billion in the county in 2005. Local hotels and transportation services, which accommodate these visitors, account for the bulk of the Travel and Hospitality cluster. Local convention bureaus, travel agents, and tour operators round out the cluster.

Number of Employees: 33,516
 Average Wage: \$27,798

SUMMARY

The clusters defined above drive the San Diego region economy. Local cluster industries are national leaders in innovation, patent activity, venture capital, and research funding. These industries also are export-oriented, and thus bring new money into the region.

Clusters will continue to evolve over time. As new technologies emerge, clusters will develop around those technologies, while other clusters may fade in importance. Existing cluster industries may grow and evolve in ways that lead to the formation of new, or spinoff, clusters. For this reason, SANDAG will continue to monitor and update the definitions of the region's clusters.

DATA SOURCES

Data for this report are drawn from three main sources. The 2001 IMPLAN input-output model is used to determine industry buyer-supplier transactions. The NAICS-based industry employment (2003) and the payroll data (2002) are from the California Employment Development Department and the Bureau of Labor Statistics.

*Additional data sources in this **info** include the San Diego Regional Chamber of Commerce; the San Diego County Department of Agriculture, Weights, and Measures; and the San Diego Convention and Visitor's Bureau. Patent activity data are from the U.S. Patent and Trademark Office and health research funding information is from the National Institutes of Health. The United States Department of Agriculture National Agricultural Statistics Service, the 2002 Census of Agriculture, and the PricewaterhouseCoopers MoneyTree survey of venture capital funding for 2000 - 2004 also were used.*

METHODOLOGY

Step 1 Determine The Economic Drivers In The Region

Economic drivers are industries that are export-oriented, and thus bring outside revenue into the region. To determine the San Diego (SD) region's economic drivers, we look at employment concentration for each NAICS industry. The employment concentration, also known as "Location Quotient," is determined by the following formula:

$$\text{Location Quotient} = \frac{(\text{SD industry employment} / \text{SD total employment})}{(\text{U.S. industry employment} / \text{U.S. total employment})}$$

A location quotient equal to 1.0 means that the San Diego has the same share of regional employment in an industry as the nation does. A location quotient greater than one means that San Diego has a higher local concentration of employment in an industry than the national average.

To be considered a driver industry for preliminary analysis, industries should have a location quotient of 1.5 or greater. This means that on average, the driver industry is at least 50 percent more highly concentrated in San Diego than in the nation.

Step 2 Analyze Inter-Industry Transactions

The next step is to determine which other sectors have strong relationships (either buyer or supplier) with the driver industries. The IMPLAN model serves as the backbone of this step. IMPLAN is a mathematical model that represents inter-industry transactions in a region. Transactions are the dollar values exchanged as companies buy from and sell to each other during an average year. These transaction values are used to determine strong linkages between industries. The analysis focuses on sectors that are directly related to production of goods or services in driver industries. The analysis excludes retail, wholesale, and government sectors because they respond to economic conditions rather than drive the economy.

Some industries are important to more than one cluster (e.g., Research and Development has strong ties to Biomedical Products, Biotechnology, Communications, and Defense and Transportation Equipment). In these cases, the industry employment is divided proportionately among the clusters.

Step 3 Review The Results

The results of the above-described analysis, NAICS industry employment totals, industry research, and advice of the technical advisory committee all were used to make the final determination on the industries to include in each cluster.

Table 1
CLUSTER DEFINITIONS, EMPLOYMENT, AND WAGES - SAN DIEGO REGION

INDUSTRY CODE	DESCRIPTION	2005 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
BIOMEDICAL PRODUCTS			
327215	Glass Product Manufacturing		
339112	Surgical & Medical Instrument Manufacturing		
339113	Surgical Appliance & Supplies Manufacturing		
339114	Dental Equipment & Supplies Manufacturing		
339115	Ophthalmic Goods Manufacturing		
339116	Dental Laboratories		
541710	Research & Development in the Physical, Engineering & Life Sciences ¹ (10%)		
BIOMEDICAL PRODUCTS TOTAL		7,534	\$65,050
BIOTECHNOLOGY & PHARMACEUTICALS			
325411	Medicinal & Botanical Manufacturing		
325412	Pharmaceutical Preparation Manufacturing		
325413	In-Vitro Diagnostic Substance Manufacturing		
325414	Biological Product (except Diagnostic) Manufacturing		
541380	Testing Laboratories		
541710	Research & Development in the Physical, Engineering & Life Sciences ¹ (60%)		
BIOTECHNOLOGY & PHARMACEUTICALS TOTAL		21,776	\$80,022
COMMUNICATIONS			
334210	Telephone Apparatus Manufacturing		
334220	Radio & Television Broadcasting & Wireless Comm. Equipment Manufacturing		
334290	Other Communications Equipment Manufacturing		
517110	Wired Telecommunications Carriers		
517211	Paging		
517212	Cellular & Other Wireless Telecommunications		
517310	Telecommunications Resellers		
517410	Satellite Telecommunications		
517510	Cable & Other Program Distribution		
517910	Other Telecommunications		
541330	Engineering Services ¹ (15%)		
541710	Research & Development in the Physical, Engineering & Life Sciences ¹ (10%)		
COMMUNICATIONS TOTAL		25,469	\$112,825
COMPUTER & ELECTRONICS			
334111	Electronic Computer Manufacturing		
334112	Computer Storage Device Manufacturing		
334119	Other Computer Peripheral Equipment Manufacturing		
334310	Audio & Video Equipment Manufacturing		
334412	Bare Printed Circuit Board Manufacturing		
334413	Semiconductor & Related Device Manufacturing		
334414	Electronic Capacitor Manufacturing		
334417	Electronic Connector Manufacturing		
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing		
334419	Other Electronic Component Manufacturing		
334510	Electromedical & Electrotherapeutic Apparatus Manufacturing		
334613	Magnetic & Optical Recording Media Manufacturing		
335999	All Other Miscellaneous Electrical Equipment & Component Manufacturing		
COMPUTER & ELECTRONICS TOTAL		15,396	\$78,826

Table 1 (continued)

INDUSTRY CODE	DESCRIPTION	2005 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
DEFENSE & TRANSPORTATION EQUIPMENT			
325613	Surface Active Agent Manufacturing		
333611	Turbine & Turbine Generator Set Units Manufacturing		
334511	Search, Detection, Navigation, Guidance, Aeronautical & Nautical System		
336411	Aircraft Manufacturing		
336412	Aircraft Engine & Engine Parts Manufacturing		
336413	Other Aircraft Parts & Auxiliary Equipment Manufacturing		
336611	Ship Building & Repairing		
541710	Research & Development in the Physical, Engineering & Life Sciences ¹ (10%)		
DEFENSE & TRANSPORTATION TOTAL		20,301	\$71,185
DESIGN			
541310	Architectural Services		
541330	Engineering Services ¹ (10%)		
541340	Drafting Services		
541410	Interior Design Services		
541420	Industrial Design Services		
541430	Graphic Design Services		
541490	Other Specialized Design Services		
DESIGN TOTAL		6,510	\$61,831
ENVIRONMENTAL TECHNOLOGY			
333319	Other Commercial & Service Industry Machinery Manufacturing		
334513	Instruments & Related Products Manufacturing for Measuring & Displaying		
334514	Totalizing Fluid Meter & Counting Device Manufacturing		
334515	Instrument Manufacturing for Measuring & Testing Electricity & Electronics		
334519	Other Measuring & Controlling Device Manufacturing		
541330	Engineering Services ¹ (30%)		
541620	Environmental Consulting Services		
541690	Other Scientific & Technical Consulting Services		
ENVIRONMENTAL TECHNOLOGY TOTAL		13,720	\$70,321
ENTERTAINMENT & AMUSEMENT			
532292	Recreational Goods Rental		
611620	Sports & Recreation Instruction		
711110	Theater Companies & Dinner Theaters		
711120	Dance Companies		
711130	Musical Groups & Artists		
711190	Other Performing Arts Companies		
712110	Museums		
712120	Historical Sites		
712130	Zoos & Botanical Gardens		
712190	Nature Parks & Other Similar Institutions		
722110	Full-Service Restaurants		
722211	Limited-Service Restaurants		
722212	Cafeterias		
722213	Snack & Nonalcoholic Beverage Bars		
722310	Food Service Contractors		
722320	Caterers		
722330	Mobile Food Services		
722410	Drinking Places (Alcoholic Beverages)		
ENTERTAINMENT & AMUSEMENT TOTAL		104,354	\$16,143

Table 1 (continued)

INDUSTRY CODE	DESCRIPTION	2005 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
FINANCIAL SERVICES			
522110	Commercial Banking		
522120	Savings Institutions		
522130	Credit Unions		
522190	Other Depository Credit Intermediation		
522220	Sales Financing		
522291	Consumer Lending		
522292	Real Estate Credit		
522298	All Other Nondepository Credit Intermediation		
522310	Mortgage & Nonmortgage Loan Brokers		
522320	Financial Transactions Processing, Reserve & Clearinghouse Activities		
522390	Other Activities Related to Credit Intermediation		
523110	Investment Banking & Securities Dealing		
523120	Securities Brokerage		
523130	Commodity Contracts Dealing		
523910	Miscellaneous Intermediation		
523920	Portfolio Management		
523930	Investment Advice		
523991	Trust, Fiduciary & Custody Activities		
525110	Pension Funds		
525190	Other Insurance Funds		
525920	Trusts, Estates & Agency Accounts		
525930	Real Estate Investment Trusts		
525990	Other Financial Vehicles		
533110	Lessors of Nonfinancial Intangible Assets		
FINANCIAL SERVICES TOTAL		36,260	\$73,103
FRUIT & VEGETABLES			
111219	Other Vegetables (except Potato) & Melon Farming		
111310	Orange Groves		
111320	Citrus (except Orange) Groves		
111333	Strawberry Farming		
111336	Fruit & Tree Nut Combination Farming		
111339	Other Noncitrus Fruit Farming		
115114	Postharvest Crop Activities (except Cotton Ginning)		
115115	Farm Labor Contractors & Crew Leaders		
115116	Farm Management Services		
311421	Fruit & Vegetable Canning		
311422	Specialty Canning		
FRUIT & VEGETABLES TOTAL		3,702	\$22,647
HORTICULTURE			
111411	Mushroom Production		
111419	Other Food Crops Grown Under Cover		
111421	Nursery & Tree Production		
111422	Floriculture Production		
115112	Soil Preparation, Planting & Cultivating		
541320	Landscape Architectural Services		
HORTICULTURE TOTAL		6,516	\$30,185
PUBLISHING			
323117	Book Printing		
511120	Periodical Publishers		
511130	Book Publishers		
511140	Directory & Mailing List Publishers		
511199	All Other Publishers		
PUBLISHING TOTAL		4,047	\$53,400

Table 1 (continued)

INDUSTRY CODE	DESCRIPTION	2005 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
RECREATIONAL GOODS			
339920	Sporting & Athletic Goods Manufacturing		
RECREATIONAL GOODS TOTAL		3,188	\$51,904
SOFTWARE			
511210	Software Publishers		
541511	Custom Computer Programming Services		
611420	Computer Training		
SOFTWARE TOTAL		13,963	\$82,011
SPECIALTY FOODS			
112310	Chicken Egg Production		
112390	Other Poultry Production		
112511	Finfish Farming & Fish Hatcheries		
112512	Shellfish Farming		
112519	Other Animal Aquaculture		
114111	Finfish Fishing		
311412	Frozen Specialty Food Manufacturing		
311615	Poultry Processing		
311711	Seafood Canning		
311712	Fresh & Frozen Seafood Processing		
311812	Commercial Bakeries		
311830	Tortilla Manufacturing		
311941	Mayonnaise, Dressing & Other Prepared Sauce Manufacturing		
311991	Perishable Prepared Food Manufacturing		
311999	All Other Miscellaneous Food Manufacturing		
SPECIALTY FOODS TOTAL		3,815	\$32,183
TRAVEL & HOSPITALITY			
481111	Scheduled Passenger Air Transportation		
481211	Nonscheduled Chartered Passenger Air Transportation		
487110	Scenic & Sightseeing Transportation, Land		
487210	Scenic & Sightseeing Transportation, Water		
488111	Air Traffic Control		
488119	Other Airport Operations		
488190	Other Support Activities for Air Transportation		
488310	Port & Harbor Operations		
488330	Navigational Services to Shipping		
561510	Travel Agencies		
561520	Tour Operators		
561591	Convention & Visitors Bureaus		
561599	All Other Travel Arrangement & Reservation Services		
721110	Hotels (except Casino Hotels) & Motels		
TRAVEL & HOSPITALITY TOTAL		33,516	\$27,798
TOTAL REGIONAL CLUSTER EMPLOYMENT		320,067	\$51,018
Region Total (all industries) Employment & Wages		1,292,981	\$43,801
Share of Region Total Employment in Clusters		25%	

¹ This industry is split among two or more clusters. The percentage listed after the industry name is the proportion of employment allocated to that industry.

info

info presents information produced as part of the San Diego Association of Governments' overall planning program. The series contains population, housing, employment, land use, transportation, criminal justice, and other data, as well as occasional reports on other subjects of general interest. This report is financed with federal funds from the U.S. Department of Transportation, state funds from Caltrans, and local funds from SANDAG member jurisdictions.

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Formatted data reports and raw data can be extracted from the Profile Warehouse and the Data Warehouse. The site also provides access to several mapping applications.

Customized data, reports, and maps also are available through the SANDAG Service Bureau. For information, please call (619) 699-1900.