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The Economics of Land Use

ECONOMIC IMPACT ANALYSIS OF CALIFORNIA'S COMMERCIAL AIRPORTS

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California Airports Council

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1. Introduction and Summary of Findings

1.1 Introduction

This report details the economic impacts that annually occur at commercial airports in California, and updates findings from a previous economic study done on behalf of the California Airports Council (CAC) in 2014. The economic contribution of commercial airports in California is significant, and these activities that occur at the airports create ancillary effects across the entire state economy. With a GDP that rivals most of the developed nations in the world, infrastructure is a key foundation to California's continuing economic success. Airports enable efficient trade and movement of people and goods; the direct economic activity of airports alone has statewide impacts and represents an important source of jobs.

The impacts discussed in this report primarily analyze the direct activities that occur at the airports themselves, the jobs that they create, and the ancillary benefits that they generate through buyer-supplier relationships with other businesses throughout California. It should be noted that this report does not attempt to quantify other impacts that occur from economic activities that air transportation enables, such as tourism and the essential supply chain roles for business-to-business logistics and retail trade.

1.2 Direct Employment Generation

In order to quantify the economic effects from California airports, the CAC team distributed a survey to all of the California Airports Council member airports. The survey asked the respondents to identify the number of workers at each airport, and distribute out these jobs by category, including fixed-based operations, customer service, concessions, maintenance, security, administration, and others. These categories are identical to the ones use in the 2014 study.

Airport Survey Results

Altogether, replies were received from 24 commercial airports in California. The data included responses for calendar years 2022 and 2023 (where information was received for both years, the analysis used 2023 data). It should be noted that not all of the responses came from the survey. Some replies came in the form of economic studies that member airports had commissioned on their own. Not all of the responses were complete, so the averages from completed surveys to fill in the missing data as needed.

The survey found a total of about 119,700 employees working at the commercial airports. These jobs covered a wide range of different functions. **Table 1-1** shows the job totals for the responding airports. California's two most heavily trafficked international airports (Los Angeles and San Francisco) also had the large portion of the total employment.

In addition to the total jobs by location, the survey identified the number of jobs by airport function. As shown in **Table 1-2**, the jobs are very evenly distributed across a broad range of on-site activities, with customer service, ground transportation, and cargo operations creating the largest number of jobs.

Table 1-1. Airport Survey Findings – On-site Jobs by Location

Airport	Jobs [1]
Bishop	106
Burbank	4,156
Camarillo and Oxnard	454
Concord-Byron	128
Del Norte	58
Fresno	1,725
John Wayne Airport	3,437
Long Beach	1,323
Los Angeles	49,711
Mammoth	16
Monterey	216
Oakland	9,670
Ontario	4,158
Palm Springs	666
Sacramento	3,862
San Bernardino	3,425
San Diego	4,952
San Francisco	24,558
San Jose	4,571
San Luis Obispo	532
Santa Barbara	787
Santa Maria	161
Santa Rosa	359
Stockton	667
Total	119,697

Source: CAC Airport Employment Survey

[1] Jobs include employment by category, and includes a combination of full-time, part-time, and temporary jobs. Temporary jobs were annualized based on the number of days worked. Los Angeles and Ontario job totals are based on the badge count. Due to data inconsistencies, the "other" job category was not included for San Francisco.

Table 1-2. Airport Survey Findings – On-site Jobs by Function

Category	Jobs [1]
Fixed-base operations	7,023
Aircraft maintenance/repair	9,988
Air traffic control	496
Security	14,873
Ground transportation	4,173
Administration	7,941
Ground support	10,939
Customer service	20,068
Terminal personnel	5,959
Retail/restaurants	8,535
Cargo operations	14,544
Catering/airline meal preparation	3,479
Other [2]	11,678
Total	119,697

Source: CAC Airport Employment Survey

[1] Jobs include employment by category, and includes a combination of full-time, part-time, and temporary jobs. Temporary jobs were annualized based on the number of days worked.

[2] Other jobs include a combination of transportation services and core air transportation sectors. The badge count data for LAX also included construction and communications/information technology functions. Those sectors were calculated separately. Due to data inconsistencies with an independent economic report for 2021 for San Francisco, the "other" job data for SFO was not included in the total.

2. Economic Multiplier Analysis

2.1 Economic Multiplier Definitions

This section presents the findings from the economic impact analysis (EIA). EIAs identify economic effects that result from a site location (such as an airport) and estimate how these effects branch out into the broader economy and create ancillary effects throughout the state.

In order for an airport to operate, the airport and all of its business tenants need to initiate supplier relationships with other businesses. These suppliers support airport activities by addressing a wide range of needs such as capital equipment, utilities, commodities, business support, and other services. In addition, the employed workers will create economic activity through household spending. The EIA accounts for how these supplier relationships and household spending benefit the state economy by estimating their economic multipliers.

Using an input-output model and other data sources, this section estimates the total direct, indirect, and induced effects that originate from airport operations identified by the CAC Airport Employment Survey. The EIA documents the effects that occur as a result of ongoing on-site operations occurring at the respondent commercial airports. This section begins with an explanation of the types of impacts estimated in the EIA and the measures used.

Multiplier Effects

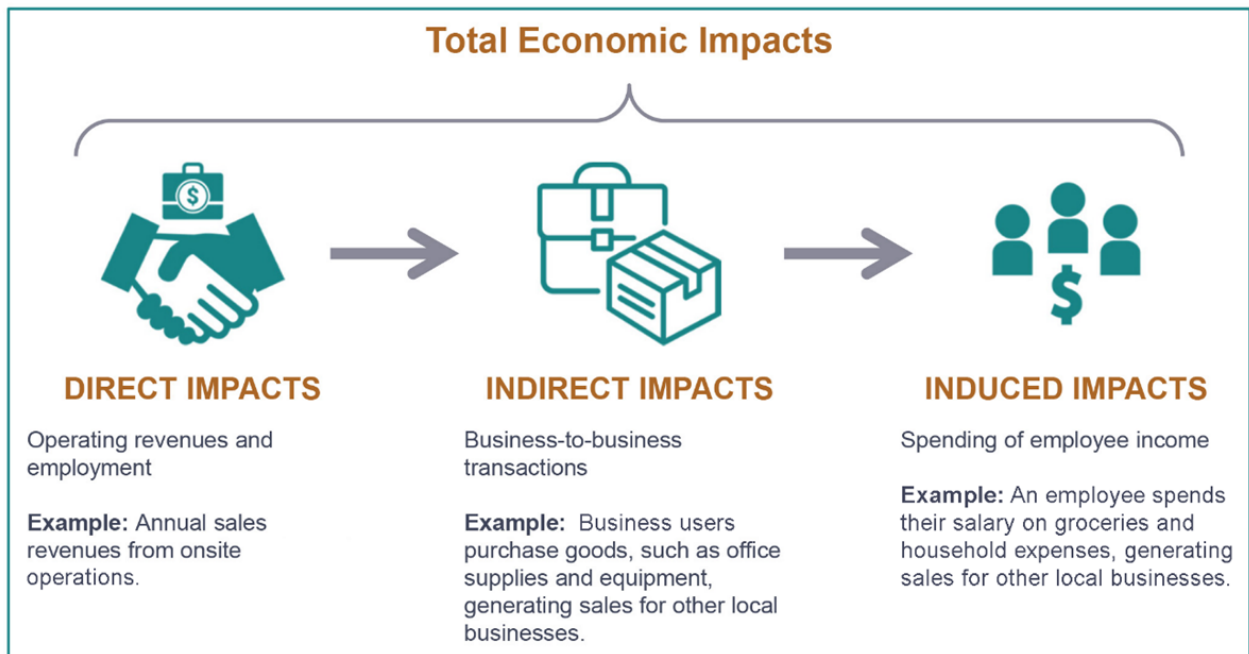
Economic impacts using an I/O model are based on an initial change in output or employment in a specific industry sector. The model then translates the initial change into changes in demand for output from other interdependent sectors, corresponding changes in demand for inputs to those sectors, and so on. These effects commonly are described as direct, indirect, or induced effects and generally are described below. **(Figure 1)** The total impact is the sum of the direct, indirect, and induced effects. The total effect measures the impact of a direct activity as it generates ancillary activity throughout the regional economy.

- **Direct Impacts** – The direct impacts describe the economic effects attributable to a certain economic activity. In this case, the output generated by the on-site airport activity and facility operations.
- **Indirect Impacts** – Indirect impacts results from industry-to-industry transactions required to support direct economic activity. This effect is a measure of the change in the output of suppliers linked to the industry that is directly affected. For example, services and other commodities purchased from California

suppliers, and service contracts with employment services and other providers in the state.

- **Induced Impacts** – Induced impacts result from employee spending in the local economy. Specifically, the employees of direct and indirect job sites and businesses generate this effect by purchasing goods and services in California. For instance, employees of these businesses spend their paychecks on household needs such as groceries, retail purchases, health care, or mortgage or rent payments, all of which are considered induced effects.

Figure 1. Economic Impact Methodology



Source: Economic & Planning Systems, Inc.

Economic Impact Measures

For the economic impact analysis, the regional economy is defined as the state of California. The IMPLAN model generates the employment distribution and household profile for the State economy, which in turn determines the extent to which spending is captured and recirculated within the local economy. In the following sections, the regional economic effects described above are reported in three categories:

- **Employment** – Employment estimates the total number of jobs (both full-time and part-time) created as a result of ongoing on-site airport operations. Employment includes both direct on-site airport jobs, and off-site jobs generated through multiplier effects.
- **Labor Income** – Labor income reflects the estimated amount of direct, indirect, and induced annual employment income (salaries, wages, and benefits) resulting from the

associated employment. It is important to note that labor income is a component of industry output and not an additive economic impact.

- **Industry Output** – A measure of the value of goods and services produced in the State as a result of on-site airport activities and operations.

2.2 Economic Multiplier Findings

As indicated in the previous section, the airport employment survey found a total of about 119,700 jobs on-site at the responding airports. The survey also identified the employment by major airport function. In order to calculate the multiplier effects, the job counts by airport function were entered into the IMPLAN Cloud input-output model.¹ The model uses a dataset that estimates the multiplier impacts across the state of California.

Multiplier Effects for Jobs, Income, and Output

As shown in **Table 2-1**, the 119,700 jobs identified in the employment survey have a multiplier effect that creates more than two additional jobs elsewhere in California for every job supported at a commercial airport. The business-to-business relationships that support California's commercial airports, along with the induced effects generated through employee spending, create an additional 146,700 jobs. Altogether, more than 266,400 total jobs in California are supported by commercial airport activities. This impact is substantial and does not include the numerous other economic activities that depend on air transportation as an infrastructure asset, such as tourism and all industries that use air transportation as part of their supply chain. **Figure 2** provides an illustrative view of how on-site commercial airport activity supports other businesses throughout California.

The economic value of on-site airport activity is estimated as industry output, and the direct output for the airports surveyed totals \$41.0 billion. The multiplier effect for industry output creates a total economic effect of \$75.8 billion. This means that every dollar of economic activity generated at California commercial airports will nearly double that output across the rest of the state economy. Altogether, the economic impact of commercial airport operations in California represents over 1.2 percent of the total industry output in the state (total output of \$6.1 trillion), without accounting for the value of the industries that rely on air transportation as an infrastructure asset.

In addition, the labor income directly supported by commercial airports totals about \$14.2 billion. In turn, this supports another \$12.3 billion in multiplier

¹ The IMPLAN Cloud application uses datasets that differ significantly from previous versions of the IMPLAN application, including the IMPLAN3 model that was used to estimate the economic impacts in the 2014 study. In general, the multiplier values in the newer versions of the application have been reduced compared to previous versions.

income effects. The total labor income supported by California commercial airports is \$26.5 billion.

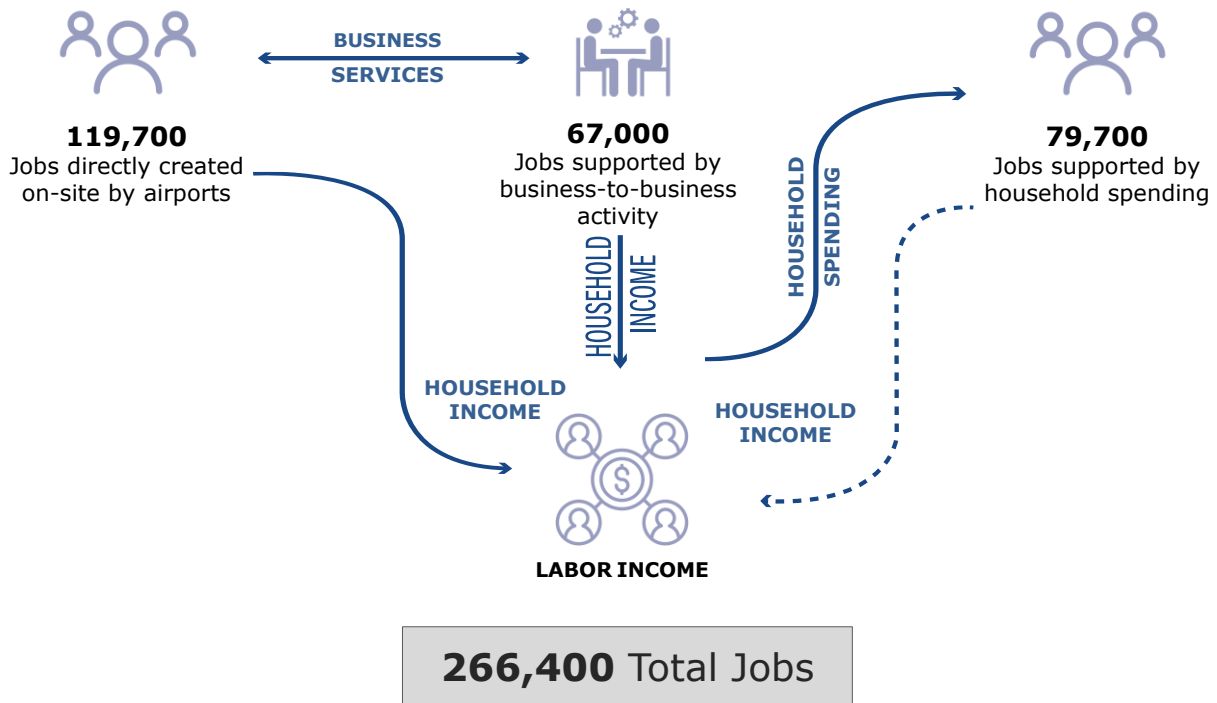
Table 2-1. Summary of Direct and Multiplier Effects of CA Commercial Airport Operations

Impact Category	Direct Effect	Indirect Effect	Induced Effect	Total Economic Effect [1]
Employment	119,696	67,017	79,686	266,399
Labor Income	\$14,203,967,380	\$6,400,074,604	\$5,922,084,668	\$26,526,126,653
Industry Output	\$40,988,297,731	\$17,519,511,138	\$17,244,383,226	\$75,752,192,094

Source: EPS, IMPLAN Cloud, and CAC Airport Employment Survey

[1] The total economic effect from the commercial airport operations includes the 24 airports that responded to the CAC Airport Employment Survey.

Figure 2. Summary of Effects from On-Site Commercial Airport Operations



Multiplier Effects by Industry Category

As shown in **Table 2-2**, the multiplier effects created by California’s commercial airports provide substantial benefits to other in-state businesses across all industry sectors, as a result of business-to-business and worker spending. The largest employment impact categories include retail trade/restaurants, other transportation sectors, health care, professional services, administrative services, and miscellaneous services. Commercial airports supported at least 10,000 jobs in each of these sectors.

Table 2-2. Summary of Multiplier Effects of CA Commercial Airport Operations by Industry

NAICS Code	Industry Description	Multiplier Employment	Multiplier Income	Multiplier Output
11	Agriculture, Forestry, Fishing and Hunting	505	\$30,246,933	\$120,547,748
21	Mining, Quarrying, and Oil and Gas Extraction	414	\$29,822,278	\$281,451,643
22	Utilities	172	\$42,221,367	\$202,261,332
23	Construction	1,423	\$118,569,236	\$310,286,552
31-33	Manufacturing	2,801	\$314,573,683	\$4,624,011,684
42	Wholesale Trade	4,909	\$592,096,982	\$2,025,166,135
44-45, 722	Retail Trade and Restaurants	31,918	\$1,472,359,584	\$3,752,258,901
48	Transportation and Warehousing	24,248	\$2,439,202,800	\$3,358,351,295
51	Information	2,713	\$634,349,330	\$2,169,228,458
52	Finance and Insurance	10,745	\$1,067,835,585	\$2,997,750,903
53	Real Estate and Rental and Leasing	9,518	\$659,486,454	\$5,578,020,483
54	Professional, Scientific, and Technical Services	6,863	\$877,751,446	\$1,676,164,942
55	Management of Companies and Enterprises	3,748	\$627,066,740	\$1,094,018,552
56	Administrative and Support and Waste Managen	11,826	\$841,066,320	\$1,742,666,424
61	Educational Services	3,304	\$213,758,277	\$317,893,032
62	Health Care and Social Assistance	15,354	\$1,255,400,278	\$2,146,405,403
71	Arts, Entertainment, and Recreation	3,199	\$201,079,475	\$421,540,992
721	Accommodation	439	\$26,760,578	\$67,361,083
81	Other Services (except Public Administration)	10,296	\$566,073,200	\$1,021,082,445
92	Government and Non-NAICS	2,307	\$312,438,727	\$857,426,358
	Total	146,703	\$12,322,159,273	\$34,763,894,364

Source: EPS, IMPLAN Cloud, and CAC Airport Employment Survey

[1] The total economic effect from the commercial airport operations includes the 24 airports that responded to the CAC Airport Employment Survey.

Appendix

Appendix A: Methodology

Airport Employment Survey

California Airports Council staff distributed an employment survey form to the managers at all of California's commercial airports. The survey form and instructions distributed to the airports can be found in Appendix B. Respondents were asked to fill out the survey to the best of their knowledge, and some of the survey responses did not provide full data.

The initial survey distribution requested data for calendar year 2022. Due to low initial response, a second survey distribution was made for calendar year 2023 data. After additional follow up by CAC staff, survey responses for 2022 and/or 2023 data were received from 24 responding airports.

Missing data was filled in by using the average distributions of jobs for the other airports that provided more complete data. Los Angeles provided the database of badged employees for each airport. Ontario and Santa Rosa airports provided independently commissioned economic studies that included a total employment count, but used different categories from those used in the CAC survey. Where categories used in the independent studies did not reconcile with the categories used in the CAC survey, the distribution by function used the overall average distribution of jobs for the other airports.

Economic Multiplier Analysis

The total direct employment count comes from the airport employment survey. For every airport, the survey provided the on-site jobs for each of the responding airports. These jobs were categorically assigned by major airport function.

The application used to interpret the data and generate the impact calculations is the IMPLAN Cloud input-output model. This application calculates impacts and buyer-supplier relationships for 528 individual industry and commodity categories. The application is now cloud-based and updated continuously. It should be noted that the IMPLAN platform was substantially updated in 2023, with a sectoring setup. This has had the effect of reducing the multiplier values in most sectors compared to previous versions of the application.

The industry classification system used in the IMPLAN model approximates (yet differs from) the commonly used North American Industry Classification System (NAICS). Each of the airport functions included in the employment survey were assigned a NAICS code and accompanying IMPLAN code. Table A-1 shows the job count by airport function, and the code(s) assigned to those categories. These jobs were entered into the IMPLAN model to calculate the direct and multiplier effects.

Table A-1. On-Site Jobs by Airport Function (Listed by NAICS and IMPLAN Code)

Category	Jobs [1]	NAICS Code	IMPLAN Code
Fixed-base operations	7,023	48819	402
Aircraft maintenance/repair	9,988	48819	402
Air traffic control	496	488111	402
Security	14,873	561612	457
Ground transportation	4,173	485, 5321	400, 432
Administration	7,941	48811	402
Ground support	10,939	481	396
Customer service	20,068	481	396
Terminal personnel	5,959	481	396
Retail/restaurants	8,535	44-45, 722	385-395, 491-493
Cargo operations	14,544	481112, 481212	396
Catering/airline meal preparation	3,479	7223	493
Other [2]	11,678	481, 48811	396, 402
Total	119,697		

Source: CAC Airport Employment Survey

[1] Jobs include employment by category, and includes a combination of full-time, part-time, and temporary jobs. Temporary jobs were annualized based on the number of days worked.

[2] Other jobs include a combination of transportation services and core air transportation sectors. The badge count data for LAX also included construction and communications/information technology functions. Those sectors were calculated separately. Due to data inconsistencies with an independent economic report for 2021 for San Francisco, the "other" job data for SFO was not included in the total.

The main dataset for the IMPLAN model used for this analysis comes from the 2023 Bureau of Labor Statistics dataset, and the analysis used an individual dataset for the state of California. These matrices contain the assumptions about worker productivity (industry output per employee), the regional purchase percentage (amount of business-to-business activity that occurs in California), and the production functions, which distribute the inputs and supplier services by industry category.

The economic impacts estimated by the model fall into one of three categories -- direct, indirect, and induced. The report refers to the indirect and induced effects as "multiplier effects." These calculated impacts are annual. In this analysis, direct impacts represent the estimated jobs, labor income, and industry output that

result directly from the on-site airport activities. Indirect impacts represent the estimated effects that result from business-to-business commodities and services provided by suppliers. Induced impacts represent the potential effects resulting from institutional spending that includes the spending at local businesses by the workers. These impacts generally affect retail businesses, health services, public services, and personal services providers.

The input-output model data file for California contains default assumptions regarding the economic relationships between different industries. This default data includes the estimated average industry output and labor income per employee for every industry category represented in California.

Appendix B: CAC Airport Employment Survey

Information for Airport Economic Impact Study

Airport Employment	Direct Jobs	Temporary Jobs	Average Days Worked Per Year (Temp. Workers Only)
1) Fixed-base operations			
2) Aircraft maintenance/repair			
3) Air traffic control			
4) Security			
5) Ground transportation			
6) Administration			
7) Ground support			
8) Customer service			
9) Terminal personnel			
10) Retail/restaurants			
11) Cargo operations			
12) Catering/airline meal preparation			
13) Other			

Notes:

Airport Total	Direct Jobs	Square Footage*
Other Tenants on Airport Property		
Industrial		
Distribution		
Retail/Food Service		
Business Park/Office		
Lodging		

Notes:

Tenant Total	
Total	

* Fill in the square footage only if job counts are not available

Capital Improvement Expenditures (Last 3 Years)	
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Survey Instructions

This section will tally up the number of direct and temporary jobs by category. This section covers those jobs that are directly generated by the airport operations, and would also include any tenant or other leased operations that occur on-site.

Please refer to the descriptions of each job category, as shown below.

1. Fixed-base operations

This would apply to the jobs created by general aviation operators.

2. Aircraft maintenance and repair

This includes any maintenance and repair operations that occur at the airport, including contract operations and maintenance facilities directly operated by commercial and cargo airlines.

3. Air traffic control

This category includes all government and private sector personnel involved in the air traffic control operations.

4. Security

This includes all federal, local, and private sector workers involved in airport security. Police personnel should only include that work directly at the airport site.

5. Ground transportation

This category includes any personnel based at the airport, including car rental, transportation arrangement, and similar functions. It would not include any vehicle operations that are based off- site.

6. Administration

This includes all personnel involved in airport administration, including engineering and noise monitoring.

7. Ground support

This category includes the personnel involved in runway operations and baggage handling.

8. Customer service

This category includes the personnel that are involved in customer service functions, such as airline service/check-in desks, skycaps, and information desk personnel.

9. Terminal personnel

This would include any additional support personnel for terminal operations such as maintenance workers.

10. Retail/restaurants

This category includes any employment generated by retail store tenants, personal service providers (such as shoe shine and massage), and restaurant/food service operators.

11. Cargo operations

This category includes all dedicated cargo operations that are based on-site.

12. Catering/in-flight meat preparation

This includes any operations involved in preparation for in-flight meals and other catering services. This does not include any restaurant tenants.

13. Other

This category would include any jobs at the airport that do not fit the other categories. This also includes any jobs where detailed descriptions are not available.