BAY AREA ECONOMIC FORUM

A Partnership of the Association of Bay Area Governments and the Bay Area Council

Phase 1

BAY AREA ECONOMIC FORUM ❖ BAYTRADE

A Baseline Economic Impact Report on
Bay Area International Airports,
their Relation to Jobs and Global Competitiveness,
and Recommendations for Future Analysis

Air Transport and the Bay Area Economy

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A BASELINE ECONOMIC IMPACT REPORT ON BAY AREA INTERNATIONAL AIRPORTS, THEIR RELATION TO JOBS AND GLOBAL COMPETITIVENESS, AND RECOMMENDATIONS FOR FUTURE ANALYSIS

Air Transport and the Bay Area Economy

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BAY AREA ECONOMIC FORUM
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Executive Summary

INTRODUCTION

This report focuses on the positive impact of the Bay Area's three international airports and their role as a linchpin for the ongoing economic vitality of the region. These airports are Oakland (OAK), San Francisco (SFO), and San Jose (SJC). Currently, the Metropolitan Transportation Commission (MTC), the Bay Conservation and Development Commission (BCDC), the Federal Aviation Administration (FAA), and the airports themselves are evaluating projected capacity demands and alternatives to meet them. To date, though, there has been no formal, regionwide inquiry into airport economic impacts.

The airports generate a clear ripple effect across the economy, starting with direct airport payroll, revenue and spending. Next come indirect and induced impacts from subsequent supplier and individual spending, then visitor spending and subsequent effects. Finally, further jobs and revenue are related to Bay Area businesses that depend upon air transport to operate.

This report is the conclusion of the first phase of a two-phase study on airport economic impacts. It compiles currently available data and identifies related areas of study for the Phase II report.

OVERALL ECONOMIC IMPACT OF AIRPORTS

The starting point for this study is a measurement of the quantifiable economic impacts of airports. The report uses a methodology developed by Martin Associates of Lancaster, Pennsylvania, and utilized for a range of North American ports and airports. The methodology systematically traces and measures the airport ripple effect using 100 percent direct surveys of the airports, tenants, and vendors of the airports, as well as large sample surveys of foreign and domestic visitors. These surveys are supplemented by customized computer models of spending and employment ratios.

This research shows that Bay Area international airports have a large and positive impact on the region's economy:

- The airports generated or supported $37.7 billion business revenues in fiscal year 1998-99.
- These revenues supported 470,000 jobs.
- These jobs generated over $13.2 billion in personal income.
- The business revenue and employment generated over $8.7 billion in federal, state, and local taxes.

AIRPORTS AND BAY AREA COMPETITIVENESS

The region's airports have an important relationship to global competitiveness.

Bay Area trade is growing quickly, with merchandise and service exports totaling at least $70 billion, and two-way flows of goods through Northern California amounting to nearly $110 billion annually.

Trade growth is driven by fundamental changes in the economy that allowed the Bay Area to export its way out of recession in the 90s: opening of world markets, integration of capital markets, and shrinking interaction costs for doing business globally.

Trade growth has strong positive impacts, fostering market diversification and improved business success rates.

Jobs at Bay Area firms of all sorts depend upon the availability of air transport to move people and goods. Some methodologies exist to calculate such *related jobs*, but the Forum recommends direct survey work in Phase II to gain better insights about the dependence on the airports of Bay Area employers and their

reactions to future airport constraints.

In addition, airport passenger and cargo capacity has a bearing on business decisions about startup, expansion, and relocation. The Forum recommends research into how future airport constraints may change business operations in the region.

Current and future airport constraints may lead to changes in ticket prices, schedule and route options that affect the quality and cost of air transport. Further survey work in this area is recommended.

The availability of worldwide air transport improves the competitiveness of the region by improving the quality of life. Extensive air connections make it easier for the region to attract top-quality talent from around the world to live, work, and go to school in the region.

Finally, the region must have an effective air transport system to maintain its role as a significant global player. The airports are an essential element of overall global economic infrastructure, and we should recognize the importance of maintaining their quality.

NEED FOR ACTION

Regional and national air capacity constraints will become a major problem over the next decade. MTC will prepare regional demand projections for airport service, from which the Forum will derive comparative economic impact scenarios.

In the meantime, flight delays and cancellations have measurable economic impacts for passengers, airlines, and the airports, while creating hurdles for effective business activities. In 1997, for instance, there were 16,337 flight operations at SFO that were delayed solely due to weather, and 3,250 flight operations were cancelled. These constraints reduced business revenue, personal income, tax revenue, and jobs from what they otherwise would have been. The question for Phase II will be what these losses amount to if future airport growth is constrained.

Airport constraints lead to a larger question about business behavior: to what extent will current and future flight delays, cancellations, and air cargo constraints influence employers in the region to expand or relocate elsewhere.

Between the challenge of airport constraints and economic losses on the one hand, and the fear of growth issues on the other, there is great need to identify win-win solutions. The region should work to find air transportation solutions that support continued economic prosperity while mitigating concerns about growth. Win-win solutions should actively be sought for noise, air quality, Bay preservation, and surface transportation mobility.

MOVING FORWARD

The question facing the Bay Area is not whether to embark on future growth or to limit it. The appropriate question is what will sustain and increase prosperity and equity in the region for the broadest possible population.

This Phase I study has shown that the airports have a far greater economic impact on the region than was previously recognized.

There are still important questions, though, that need to be examined in Phase II. The most important of these is to review constrained and unconstrained projections of airport capacity and calculate the economic losses of the constrained scenario. This data can then be compared to surveys of business leaders and airlines to assess the broader implications of airport constraints.

In any case, the region should adopt a policy of maximizing the net positive economic impacts of airports while minimizing the net negative non-economic impacts.

In conclusion, decisions to constrain airport capacity at its current planned levels should not be taken lightly. Failing to expand airport capacity will not only fail to win the positive impacts of airport growth, but could have unintended effects such as loss of businesses and visitors, with net negative economic and quality of life results.

Decisionmaking about such a set of vital economic assets should never take place without a sober examination of economic consequences. The Forum hopes this report contributes to effective regional decisionmaking.

Introduction

A Turning Point for Air Transport

This report and its successor seek to improve understanding among Bay Area policymakers regarding the economic impact of the region's international airports.

The year 2000 marks a key waypoint for Bay Area airports. San Francisco International Airport (SFO), which carries the bulk of long-haul and international traffic, already faces significant capacity constraints and weather-related delays and cancellations. Some analysts express concern that within ten to fifteen years, both Oakland International Airport (OAK) and San Jose International Airport (SJC) will also face serious capacity constraints. For all three airports, surface transportation linkages are already strained.

These concerns come at a time when the Bay Area economy is more dependent than ever before on fast, reliable, economical air transport for passengers, cargo, and documents. Yet transportation planning, regulatory approvals, and funding complexities are more time-consuming than ever. Action must be taken now to improve understanding about the opportunities and challenges of airport expansion.

Purpose

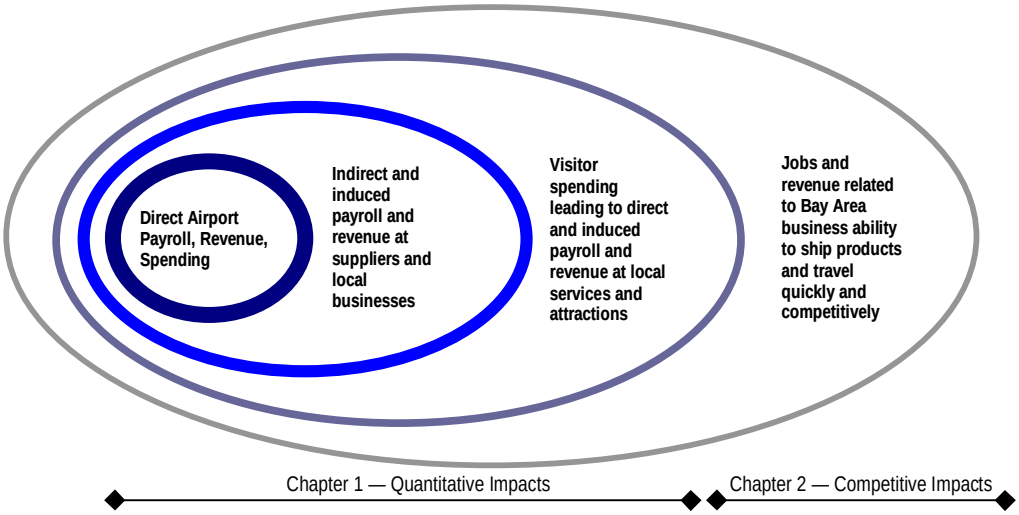
The Bay Area Economic Forum seeks to focus attention on the positive economic impact of airports and their role as a lynchpin for ongoing economic vitality of the region. Efforts are being undertaken by the Metropolitan Transportation Commission (MTC), the Bay Conservation and Development Commission (BCDC), the Federal Aviation Administration (FAA), and the airports themselves to foster sound transportation planning. To make appropriate decisions, finding the optimum approaches to support the public interest in both environmental protection and economic vitality, it is critical that the economic impact of airports is clearly understood.

This report does not attempt to duplicate the work of the other regional planning entities, nor does it try to explore environmental or other concerns. Rather, it attempts to lay out the logical progression of economic and related impacts reflecting the complex regional economic system that is the face of air transport today and in the future.

Ripples Across the Economy

The term *ripple effect* is often used to describe a progression of outcomes. The region's airports have an economic impact. It generates a logical progression of economic outcomes. The outcomes closest to the source — direct jobs and payroll, for instance — are clear to see, easy to measure, and would obviously change as a direct result of changes in airport operations. Further out are indirect and induced results, such as jobs and payroll at firms that are paid to supply airport vendors or that are patronized by

Airports Generate a Clear Ripple Effect in the Bay Area Economy



airport employees. Going further, the visitors who travel by air to the region for business or pleasure have an unmistakable impact, but one that is more difficult to measure definitively and to correlate to changes in airport capacity. Still further, the airports clearly support the competitiveness and vitality of businesses in the region and are as vital a utility as telephone service or electricity. These broader or related impacts are harder still to quantify and to correlate without question to specific levels of airport service.

This report traces this progression of economic outcomes. It will begin with the more direct impacts and the quantifiable data that have been collected so far. It will then turn to the broader, less easily measured — but in some ways more vital — issue of

business competitiveness. Third, it will discuss the resulting need for action regarding airport capacity. It concludes with recommendations for moving forward.

An Investigation in Two Phases

In short, this report does two things. It compiles currently available economic impact data on the three airports and identifies related areas of inquiry and impact that would be helpful for policymakers to understand more clearly. The Bay Area Economic Forum will undertake a Phase II study that directly researches many of these related impacts. The Forum plans to investigate, for instance, how major business employers in the region may adjust their operations based on airport capability to provide critical and competitive passenger and air cargo services.

In the meantime, the Bay Area Economic Forum, together with its sponsor organizations — the Association of Bay Area Governments and the Bay Area Council — hope the following information contributes to effective regional decisionmaking on some of our most vital economic assets: the Bay Area's regional airports.

Chapter

1

A Multi-Billion Dollar Job Engine

The Bay Area's international airports have a large, measurable direct and indirect impact on business revenue, jobs, and personal income in the region.

Airports enable the Bay Area economy to function. Despite their central role in supporting business and quality of life, the extent of their positive impact is poorly understood. Regional policymakers and voters need to make effective decisions about balancing investments in airports with other needs such as public transportation, environmental resources, noise reduction, and other concerns.

A starting point for effective decision-making is the direct, quantifiable positive impact airports make on our lives and livelihoods. Much of their effect can be measured, analyzed, and tracked. The measurement and analysis of economic impacts has become quite sophisticated over the past two decades, yet the general public seems to remain more aware of environmental impact rather than economic impact reports. This chapter seeks to improve public understanding of the excellent quantitative analysis of airport impacts available today. The subsequent chapter will consider the broader impact of airports on business climate and competitiveness.

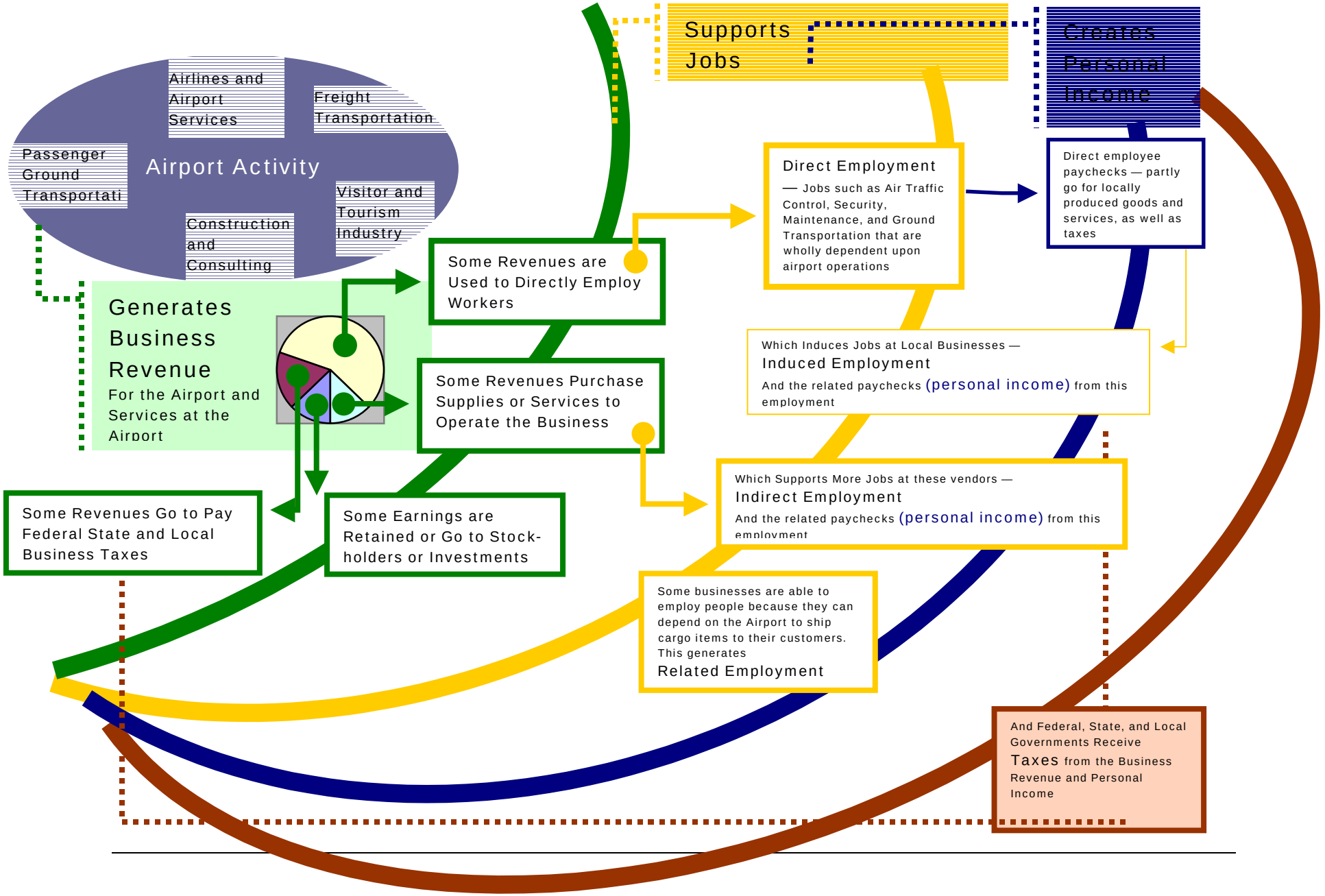
How to Quantify the Economic Impact of Airports

Thanks to economic modeling developed by Martin Associates, Bay Area decisionmakers can analyze the extensive economic impact of Bay Area airports and even compare them with other airports around the nation. Simply put, airport activity — everything from passenger departures, skycaps, taxis, and concessions to construction, cargo handling, and maintenance — generates revenue. This revenue employs people; it purchases goods and services. Dollars from these pocketbooks are largely spent locally in our communities. In addition, these individuals and businesses pay taxes to support schools, police, roads, and other federal, state, and local services.

FIGURE 1 illustrates this model.

A MULTI-BILLION DOLLAR JOB ENGINE

FIGURE 1 MEASURES OF ECONOMIC IMPACTS GENERATED BY AIRPORT ACTIVITY



There is an inherent challenge in developing the numbers related to these impacts in a defensible way. The Martin Associates approach is the most defensible and carefully researched methodology available today. It appropriately identifies Airport-related activities and takes steps to ensure the most direct and accurate data collection, using direct interviews and surveys, published airport statistics, and local economic development data to measure the actual impact. The direct impacts do not utilize any "input-output" models, which tend to infer the impact from broader macroeconomic trends and multipliers. The indirect and induced impacts use carefully tailored input-output models that are specific to the Bay Area and airport sectors, using direct survey data.

To understand this methodology, the following points summarize key definitions, data collection, data comparability between airports, and the scope of the analysis by airport. *Please see the Appendix for more details on the quantitative methodology.*

Definitions

As outlined in Figure 1, the economic impact of airport activities consists of business revenue, which supports employment, generates personal income, and increases tax revenues at the local, state, and federal levels.

Employment Impact

Bay Area airports have four job impacts on *individuals*:

- Direct employment means jobs that are directly generated by airport activity and that would vanish if activity at Bay Area airports were to cease.

- Induced employment means jobs created throughout the Bay Area because *individuals* directly employed due to airport activity spend their wages locally on goods and services such as food and housing.

- Indirect employment consists of jobs generated due to the purchase of goods and services by *firms* dependent upon airport activity. These are jobs with such firms as construction contractors, caterers, janitorial and security firms, suppliers of aircraft services, local office supply companies, business services firms, and aircraft parts supply.[1]

- Related employment refers to jobs at manufacturers, agribusiness, exporters, and others using Bay Area airports for air cargo shipments.[2]

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[1] It should be noted that if the supplying firms are located on airport and exclusively related directly to the particular airport, they are counted as direct jobs. If they are off-airport, they are counted as indirect jobs.

[2] In this report, related employment is only provided for reference, with the note that it is not as defensible as the other calculated impacts. Still, it is important to recognize. In the Martin Associates methodology, related employment does not count the entire employment of such firms — just the portion that is related to use of the airports for transacting business. Nor does it refer to air freight companies, which are already counted in the categories above. Jobs in the Bay Area are clearly tied to airport capacity. While such jobs are not as

Business Revenue Impact

Airport activity directly generates revenue for *firms* that provide air passenger services, cargo services, general aviation facilities and service, and ground support services. As noted in Figure 1, this revenue is dispersed throughout the economy in several ways: to hire people to provide the services, to purchase goods and services from third parties, to pay for the use of airports, and to make federal, state, and local tax payments. The remainder is used to pay stockholders, retire debt, or make investments, or is held as retained earnings. The methodology focuses on the portion of the revenue impact that can be definitely identified as remaining in the Bay Area.

Personal Income Impact

This is a measure of the personal income received by *individuals* identified in the employment impact. This includes the salaries, wages, and other income paid to people through the direct, induced, and indirect, employment impacts.

Tax impacts

Both firms and individuals described above pay *taxes* to federal, state, county, and municipal governments. In addition, the airports themselves make direct payments to their local municipality.

Economic Impact Sectors — Airport-Generated and Visitor-Generated Impacts

Take a moment to consider the diverse economic system supported by airports. For the purposes of this report, the various impacts on business revenue, employment, personal income, and tax generation can be evaluated based on two areas of activity — airport-generated and visitor-generated.

Airport-generated activity

Airport-generated activity includes four essential sectors that are directly tied to airport operations:

1. *<u>Airline/airport service</u> consists of airlines, general aviation, and firms providing support services to airlines, passengers, and the Airport — including catering, skycaps, janitorial, security, fueling, retail tenants, federal agencies, and parking services. Jobs in this category are typically located on airport property.*

2. *<u>Freight transportation</u> encompasses the movement of air cargo, which consists of air freight (traditional heavy air cargo and express packages) and U.S. mail transported on dedicated freight airlines and in the cargo section of passenger airlines. It also includes the freight forwarders and trucking firms involved in handling the cargo. Jobs in this category are located both on and off the airport.*

3. *<u>Passenger ground transportation</u> includes all transportation of individuals to and from Bay Area airports and includes both drivers and supporting reservation and*

directly dependent upon the airports as are the direct and induced jobs, they do reflect the importance of the airports as a catalyst for economic development and competitiveness. If Bay Area air cargo capacity was reduced, this employment could be lost to other areas. In addition, a large and growing number of firms — in fields such as management consulting, technology development, telecommunications — have many jobs dependent upon *passenger* travel capacity at Bay Area airports. While this related employment impact might be even greater than for firms using cargo facilities, this impact has not been measured.

maintenance employees for car rental, buses, taxis, limousines, airport shuttles and hotel vans.

4. *Contract construction/consulting services span a wide range of companies providing services and materials to Bay Area airports. They include construction and remodeling firms, architects, planners, engineers, retail suppliers, service companies, and other consultants.*

Visitor-generated activity

Visitor-generated activity is a distinct fifth sector that is measured and evaluated independently based on surveys of business and pleasure visitors. Domestic and international passengers use the Bay Area's international airports to arrive in the region. They come for many purposes, including business, pleasure, and conventions. These out-of-town visitors purchase lodging, food, and entertainment once they leave the airport — creating jobs throughout the region at hotels, motels, restaurants, gift shops, taxi and charter tours, theaters, tourist attractions, sporting events, and travel agents.

Data Collection and Analysis

Direct surveys and interviews provide the most defensible and accurate measure of the economic impact in these five sectors. For all results, throughout the extensive data collection process, care was taken to ensure that impacts were not double-counted.

For the four direct airport sectors, Martin Associates worked to obtain responses from 100 percent of the companies engaged in work with the airports.

For the visitor industry, a 100 percent survey is not feasible, so extensive sampling surveys of actual visitors were used to calculate impacts. The magnitude of economic impact generated by visitors using the airports depends upon the volume of visitors, the duration of their stays in the Bay Area, the amount of money they spend, and the types of purchases made. Martin Associates conducted an in-terminal random survey of 3,000 passengers departing SJC in 1998. For SFO, Polaris Research and Development conducted an in-terminal random survey of 1301 passengers departing from the airport in 1997. For Oakland, the Metropolitan Transportation Commission undertook a survey of air passengers using the Oakland International Airport and the results of this 1995 study were used to calibrate the Martin Associates model.

The interviews, city revenue reports, and federal data together supplied direct business revenues, direct airport jobs, payroll data, spending by airport-connected firms, and resulting indirect jobs. To estimate induced jobs, a sophisticated model of individual spending patterns was developed specifically for the Bay Area and assessed against the direct revenue and payroll data. Local, state, and federal taxes were derived from official sources.

The appendix provides detail on data collection, as well as a summary of interview responses by type of firm. The appendix also provides an important discussion of the existing methodology for calculating related jobs and the Forum's recommendation for improvements in this approach.

Comparability

The individual airport models allowed data for all three airports to be updated for a single, common year. The methodology used has also been used to assess the economic impacts created by airport activity at other major North American airports. The results of these other impact studies may be directly compared with this one:

Baltimore-Washington International Airport
Hartsfield Atlanta International Airport
Seattle-Tacoma International Airport
Portland International Airport
Minneapolis/St. Paul International Airport
Lester B. Pearson International Airport (Toronto)
Reagan National and Dulles International Airports (Washington, DC)
Sacramento International Airport
Stapleton International Airport (Denver)
General Mitchell International Airport (Milwaukee)
Harrisburg International Airport

Scope of This Report's Findings

This report only reviews the activities of the three international airports located in the Bay Area — Oakland International Airport (OAK), San Francisco International Airport (SFO), and San Jose International Airport (SJC). It does not include analysis of the many general aviation airports in the region.

Summary of Economic Impacts

Bay Area international airports have a major positive impact upon the prosperity of Bay Area residents at all levels, as well as providing tax revenues for state and local governments. The known economic impacts will be presented in detail in subsequent sections, but here is an overview of the results.

- Bay Area International Airports generated $37.7 billion in direct business revenues in fiscal year 1998-99. Roughly two-thirds of this amount was generated by SFO, nearly a quarter by Oakland International and about an eighth by San Jose International.

- These revenues supported nearly half a million jobs. Nearly 470,000 jobs were generated by airport operations, visitors to the region, and associated spending. This does not count employment at companies relying on the airports to transport their employees or ship their products.

- These jobs generated over $13.2 billion in personal income for residents of the Bay Area. Of this amount, $6.3 billion was generated by personal spending in the economy.

- This business revenue and employment generated over $8.7 billion in federal, state, and local taxes. Nearly $2.9 billion alone went to the state, cities, and counties for local services.

Figure 2 shows the summary of these impacts:

Bay Area International Airports
Fiscal Year 1998-1999

	OAK		SFO		SJC		
	Airport Generated	Visitor Industry	Airport Generated	Visitor Industry	Airport Generated	Visitor Industry	Total
Business Revenue (millions)	**$ 3,990**	**$ 4,573**	**$ 15,417**	**$ 9,134**	**$ 1,245**	**$ 3,376**	$ 37,734
Individuals Employed							
Direct	10,392	63,440	34,893	145,890	5,888	51,191	311,694
Induced (by personal spending)	5,484	27,978	20,020	62,823	3,230	22,268	141,803
Subtotal	*15,876*	*91,418*	*54,913*	*208,713*	*9,118*	*73,459*	*453,497*
Indirect (by firm spending)	2,240	-	11,649	-	817		14,706
Total Jobs	**18,116**	**91,418**	**66,562**	**208,713**	**9,935**	**73,459**	468,203
Personal Income (millions)							
Direct	$ 297	$ 1,147	$ 1,317	$ 2,525	$ 153	$ 909	$ 6,348
Induced (by individual spending)	$ 310	$ 1,143	$ 1,300	$ 2,518	$ 159	$ 907	$ 6,337
Indirect (by firm spending)	$ 79		$ 415		$ 31		$ 525
Total Income	**$ 686**	**$ 2,290**	**$ 3,032**	**$ 5,043**	**$ 343**	**$ 1,816**	$ 13,209
Local Purchases (millions)	**$ 119**	**$ -**	**$ 674**	**$ -**	**$ 58**	**$ -**	$ 851
Taxes (millions)							
Federal Personal/Corporate	$ 263	$ 820	$ 1,090	$ 1,805	$ 141	$ 650	$ 4,770
Federal Aviation Specific	$ 248		$ 778		$ 72		$ 1,098
State/Local	$ 111	$ 562	$ 409	$ 1,283	$ 61	$ 451	$ 2,877
Total Taxes	**$ 622**	**$ 1,382**	**$ 2,277**	**$ 3,088**	**$ 274**	**$ 1,102**	$ 8,745
Direct Payment to City (millions)	**$ 3**		**$ 21**		**$ -**		$ 24

Figure 2 Summary of Economic Impacts

Business Revenue

The movement of passengers and cargo generates revenue for firms in each of the five categories of airport-related activity. For example, in the airline/airport service sector, revenue is received by airlines for sales of tickets to passengers and by catering firms. It includes fueling services supporting the airlines, airport charges for storage of private aircraft, and airport tenants who sell retail merchandise to passengers in the airport. In the freight transportation sector, airlines receive revenue from transporting air cargo and freight forwarders receive revenue from arranging air transportation for the cargo. Similarly, rental car agencies and the firms providing ground transportation receive revenue from transporting passengers to and from the airport, while contract construction and consulting firms receive revenue from development and maintenance projects. Finally, companies from hotels and restaurants to amusement parks, sightseeing attractions, and souvenir shops earn revenue from passengers visiting the Bay Area.

Direct Revenue Impacts by Sector 1999
($millions)

	OAK	SFO	SJC	Total
Airline/Airport Service	$ 1,258.5	$ 12,872.8	$ 821.5	$ 14,952.8
Freight Transportation	$ 2,634.9	$ 1,978.9	$ 259.3	$ 4,873.1
Passenger Ground Transportation	$ 82.9	$ 560.4	$ 131.7	$ 775.0
Contract Construction/Consulting Services	$ 13.3	$ 4.3	$ 32.9	$ 50.5
Total Airport Direct Business Revenue	**$ 3,989.6**	**$ 15,416.4**	**$ 1,245.4**	**$ 20,651.4**
Visitor Industry Revenue	$ 4,572.9	$ 9,133.6	$ 3,376.2	$ 17,082.7
Grand Total All Sectors	$ 8,562.5	$ 24,550.0	$ 4,621.6	$ 37,734.1

Figure 3 Business Revenue Impacts

Figure 3 details business revenue impacts for Bay Area International Airports in 1999. These revenue figures represent total payments made for the purchase of products and services directly related to activity at the airports.

It is interesting to note that the revenue figure for Oakland is relatively high, given the number of flight operations, because of the large amount of air freight. San Jose, on the other hand, is relatively low because of the high proportion of short haul traffic.

The major components of visitor-generated revenue are hotels, retail businesses, restaurants, entertainment businesses, and in-town transportation services. The majority of visitors to the region stay in a hotel or motel, making hotel revenues the highest component of visitor revenues. Visitor spending and length of stay patterns vary depending on the purpose of the trip, with foreign country residents staying longer in the region than U.S. resident visitors. For instance, according to SFO, 58 percent of enplanements at the airport in 1999 were by visitors (i.e., not passengers on connecting flights and not Bay Area residents). Of these 10.5 million visitors, 32 percent were foreigners. A total of 1.2 million foreign visitors traveling on business spend an average of $267 per day over an average stay of 4.5 days. The 2.2 million foreigners traveling for pleasure spend an average of $287 per day, staying 4.7 days. Nearly 68 percent of visitors were domestic travelers, with 2.9 million traveling on business, spending $193 per day and staying 2.9 days. A total of 4.2 million domestic pleasure travelers spend on average $201 per day and stay 3.7 days.[3]

Job Impact

People are employed and receive paychecks based on the business revenue received from transporting and feeding passengers, supporting private aircraft, moving mail and goods, constructing and maintaining facilities, and serving visitors. The various categories and definitions of jobs are detailed in the section on methodology. Direct jobs are at the airport. Induced jobs come from the purchase of goods and services by individuals out of their paychecks. Indirect jobs are generated from the purchase of goods and services by businesses out of their revenue. Visitor-generated jobs come from serving travelers who stay in the Bay Area. And related jobs are found at

[3] *The Economic Impact of San Francisco International Airport*, SFO, December 1999.

companies that depend upon the airport to transport their products to customers around the world.

Nearly 3.6 million individuals are employed in the nine-county Bay Area.[4] The annual direct, induced, and indirect activity of the three international airports accounts for 2.7 percent of these jobs. Counting visitor-generated direct and induced jobs brings the total to 13.2 percent of employment. This impact is provided in detail in Figure 2, but the general categories break down as follows:

51,173	Direct airport site-generated jobs
28,734	Induced jobs due to the purchases made by the 51,173 job holders
14,706	Indirect jobs due to the purchases made by airport-dependent firms
373,590	Direct and induced jobs generated by visitors arriving via the airports
468,203	**Bay Area annual job impact of the airports**

Related jobs cannot be definitively tied to the Bay Area, so they are not included. Survey work is planned in Phase II to collect first-hand data on related jobs, rather than estimating related jobs based on multipliers. See page 18 for a further discussion of related jobs.

Figure 4 details these employment impacts by sector.

Employment Impacts by Sector 1999

	OAK	SFO	SJC	Total
Airline/Airport Service	6,751	29,886	3,793	**40,430**
Freight Transportation	2,997	2,179	777	**5,953**
Passenger Ground Transportation	541	2,799	1,019	**4,359**
Contract Construction/Consulting Services	102	30	299	**431**
Total Airport Direct Jobs	**10,391**	**34,894**	**5,888**	**51,173**
Visitor Industry Direct Jobs	**63,440**	**145,890**	**51,191**	**260,521**
Grand Total All Sectors	73,831	180,784	57,079	311,694

Figure 4 Employment Impact

[4] 3.5549 million civilian employment, from California Employment Development Department data for second quarter 1999, as reported in the *Bay Area Economic Pulse*.

Airport/Airline services account for 79 percent of all direct airport jobs — a total of 40,430. Most people immediately think of passenger airlines when they think of an airport. Although passenger service makes up the bulk of employment in this sector, there are many other jobs:

- Passenger airlines accounted for the most jobs in this sector.
- Airline catering firms supply in-flight meals to the airlines. Their employees include drivers and delivery crews as well as kitchen employees.
- The federal government employs Customs agents, FAA control tower and security personnel, Immigration and Agricultural inspectors, and Coast Guard personnel at the airports.
- The cities of Oakland, San Francisco, and San Jose employ police, crash/fire/rescue, maintenance, custodial/janitorial, engineering, and many other crafts and trades needed to operate major airports.
- Retail concessions include sellers of food, beverages, and merchandise at the airports. Aviation services include firms that clean, fuel, and provide ramp and other aircraft services to commercial airlines and general aviation customers.
- Security/skycap firms conduct passenger screening in the terminals and provide baggage assistance.
- Airport parking employees work for operators such as the AMPCO company.

Freight transportation is a significant job generator. Based on 1998 tonnage, SFO and OAK are the 13th and 14th largest aipports in the United States for handling air cargo. This sector includes freight airlines, forwarders, air courier firms, and the US Postal Service. A total of 5,953 jobs exist in this sector for all three airports. Scheduled passenger airlines also employ individuals in moving freight, but such jobs are included in the airline/airport service sector instead of in this figure.

Passenger ground transportation is used by airport passengers to travel between their particular airport and their final destination in the Bay Area. This sector includes shuttle van services, buses, taxis, limousines, and car rental firms. Since the drivers for these various firms may also drive to and from other locations, the job counts for this sector were adjusted downwards by the percentage of time these employees spend on airport fares, as reported by the various firms. This sector employs 4,359 people.

Contract construction and consulting work is created at SFO by ongoing maintenance and minor refurbishment. During 1999, an average of 431 construction workers and consultants were working at the airports. This does not include construction workers and consultants working on SFO's infrastructure construction program, Master Plan construction or the BART-to-SFO construction program. These impacts are available in detail in a separate report from SFO, *The Economic Impact of San Francisco International Airport, December 1999, Chapter 8.*

Visitor-industry jobs are even greater than the site-generated jobs. During 1999, a total of 260,521 direct jobs in the Bay Area are estimated from the spending by visitors and subsequent respending of this income.[5] As noted in the section on business income, the primary expenditures driving these jobs were at hotels, retail businesses, restaurants, entertainment businesses, and in-town transportation services. Additional detail on visitor industry impacts may be obtained from each individual airport in their respective economic impact studies.

For instance, because of their higher expenditures, foreign visitors create more jobs in the Bay Area than domestic visitors. Based on the SFO surveys, every 1000 domestic pleasure travelers enplaning at SFO generate 11.5 jobs in the Bay Area from their direct and induced spending, while every 1000 foreign pleasure visitors generate 19.5 jobs.[6]

The place of residence of airport site employees is shown in Figure 5. The percentage distribution data from the original surveys were applied to the 1999 operations data to provide the update for this report. Consequently, the data are best used as a general indicator of community dependence upon the airport rather than a precise figure for today's residency patters.

[5] It should be noted that this number is generated by a different methodology than used in the 1999 Bay Area Economic Forum and Bay Area Council report *The Bay Area: Winning in the New Global Economy.* To be able to compare regions across the country, that report employed a sector analysis that defined a tourism industry cluster of Standard Industrial Code categories, estimated the tourism-related percentage of employment in these categories, and calculated a final set of numbers based on these percentages. The numbers contained herein are derived from actual spending patterns of visitors and revenue reported by actual businesses. The Forum makes no representation as to which methodology is more accurate, and stresses that each should be used in the context of its specific report.

[6] *The Economic Impact of San Francisco International Airport*, December 1999.

Number of Airport Site Employees by Place of Residence

County	OAK	SFO	SJC	Total
Marin	114	628		**742**
Sonoma	42	314		**356**
Solano	447	1,640		**2,087**
Napa	31	209		**241**
Contra Costa	1,050	2,128		**3,178**
Alameda	6,277	4,711	615	**11,602**
Santa Clara	291	2,896	4,369	**7,556**
San Mateo	208	14,864	153	**15,225**
San Francisco	197	6,630		**6,827**
Santa Cruz			182	**182**
Sacramento	208			**208**
Other / Detail Not Available	1,528	872	570	**2,970**
Total	**10,392**	**34,893**	**5,888**	**51,173**

Figure 3 Direct Employees by Place of Residence

Personal Income

When business revenue turns into payroll for direct employees at the airports and visitor industries, it constitutes personal income. This payroll is a clearly identifiable local impact. In turn, part of these paychecks is re-spent; part goes toward savings and taxes. The portion that is re-spent produces an induced income impact, much of it local. The methodology for obtaining personal income impacts is described in detail in the methodology section above. Figure 6 summarizes the airports' income impacts.

Personal Income Impact Fiscal 1998-99 ($ millions)

	OAK	SFO	SJC	Total
Direct Personal Income	**$ 1,444**	**$ 3,842**	**$ 1,062**	**$ 6,348**
Site-generated	$ 297	$ 1,317	$ 153	$ 1,767
Visitor -generated	$ 1,147	$ 2,525	$ 909	$ 4,581
Induced (by individual spending)	**$ 1,453**	**$ 3,818**	**$ 1,066**	**$ 6,337**
Site-generated	$ 310	$ 1,300	$ 159	$ 1,769
Visitor -generated	$ 1,143	$ 2,518	$ 907	$ 4,568
Indirect (by firm spending)	**$ 79**	**$ 415**	**$ 31**	**$ 525**
Grand Total All Sectors	$ 2,976	$ 8,074	$ 2,159	$ 13,209

Figure 4 Personal Income Impacts

As a result of the direct employment of 51,173 airport site workers (see line labeled "Direct" in Figure 2), nearly $1.8 billion of direct site-specific wage and salary income was created. The respending of this $1.8 billion of income within the Bay Area creates additional induced jobs, with nearly $1.8 billion in further personal income and consumption purchases within the state. In addition, visitors coming to the Bay Area via the airports directly support over $4.5 billion of direct wage and salary income in

the visitor industry. The respending of this income creates additional induced jobs and additional personal income within the state of more than $4.5 billion. Again, foreign visitors have more impact on personal income generation because of higher spending.

Tax Generation

Airport activity in 1999 generated government revenue through an assortment of tax payments by airport businesses, passengers, and employees. The tax impacts were estimated at all levels of government for airport site-generated and visitor-generated direct and induced impacts. Please see the section on methodology for more detail.

Tax Impact Fiscal 1998-99 ($ millions)

	OAK	SFO	SJC	Total
Federal Total	**$ 1,331**	**$ 3,673**	**$ 864**	**$ 5,868**
Site-generated Personal/Corporate	$ 263	$ 1,090	$ 141	$ 1,494
Visitor -generated Personal/Corporate	$ 820	$ 1,805	$ 650	$ 3,275
Federal Aviation Specific	$ 248	$ 778	$ 72	$ 1,098
State / Local Total	**$ 673**	**$ 1,692**	**$ 512**	**$ 2,877**
Site-generated	$ 111	$ 409	$ 61	$ 582
Visitor -generated	$ 562	$ 1,283	$ 451	$ 2,296
Grand Total All Sectors	$ 2,004	$ 5,365	$ 1,376	$ 8,745
Direct Payment to City	$ 3.2	$ 21.0	$ -	**$ 24.2**

Figure 5 Tax Impacts

Figure 7 details the revenue generated for federal, state, and local governments by airport activity. It should be noted that since the airports are self-supporting public enterprises that do not rely on any state or local taxes for their operation, the gross tax revenues are net revenues for the respective governments.

Question for Phase II

These quantified economic impacts demonstrate the critical role airports play in jobs and prosperity in the Bay Area today. There is a far more important consideration for regional transportation planners, elected leaders, businesspeople, and the public: the economic impact on the Bay Area economy if airport capacity is constrained or unconstrained in the future. This leads to a question for Phase II:

> What is the economic implication for the Bay Area of the regional airport demand projections being developed by the Metropolitan Transportation Commission, and of the relation of those projections to the regional airport infrastructure capacity?

Chapter

2

A Key Factor in Competitiveness

Airports are an essential public service — enabling businesses to operate, individuals to travel freely, and the region to participate in the global economy.

As a practical matter, it would be as difficult to operate a business today without modern, economical air transport as it would be to operate without a telephone or electrical power. Rapid telecommunications and the knowledge-based economy have not reduced demand for air travel; they have increased it. In fostering economic competitiveness and quality of life, the region's airports must not be taken for granted.

The preceding chapter outlined quantifiable economic impacts. This chapter seeks to clarify how deeply the region relies on effective airports to support its core functions. There are four other ways the Bay Area's international airports contribute to economic vibrancy and quality of life. Less easily measured, these benefits are also important to understand. Potentially, they represent areas for further quantitative and qualitative research.

Global Business Competitiveness

The region's knowledge-based economy, led by industries such as information technology telecommunications, bioscience, and business services, has greater international ties and greater dependence upon air travel than ever before. Workers at a Bay Area company may need to compete against firms in Ohio, Germany, and China by forming strategic alliances with companies in Japan and Mexico and by drawing talent from India and technology from the Netherlands. What does the region's international economy look like, is it a good thing, and how does it relate to the airports?

Bay Area Trade

There are two lenses through which to view international trade data. The first is to measure the imports and exports of products and services by firms with addresses in the Bay Area. The second is to measure the international inflows and outflows of goods and people through Bay Area ports and airports regardless of their origin and destination. The first approach is helpful for assessing the international linkages and competitiveness of Bay Area companies, while the second approach focuses on usage and competitiveness of Bay Area port and airport facilities. Either way, Bay Area international trade has grown dramatically.

Trade is growing

Since 1993, export of goods by businesses located in the nine-county region swelled nearly 42 percent from $30.2 billion to $42.8 billion in 1998.[7] The export of services refers to any instance in which a foreign individual or business purchases any non-tangible item, including purchases of consulting, engineering, financial services, advertising, software design and licenses, research and development, educational services, and foreign tourism. Although there is no established source of service export data, such transactions in the Bay Area are presumed to have grown at least as quickly as merchandise exports with a 1998 estimated value of more than $25 billion. Altogether, Bay Area exports total at least $70 billion.

The value of goods flowing in and out of the San Francisco customs district reflects the region's gateway role for trade. Customs District numbers may include shipments originating outside the Bay region—an Ohio modem manufacturer shipping to Taiwan via Oakland, for example, or a Colorado car dealership importing a shipment clearing customs in Northern California.

By the same token, those numbers may not capture shipments originating in or destined for the Bay Area which move through another customs gateway. Examples here might be a land/ocean shipment from Northern California to Brazil via a Gulf Coast port or Mexico and Canada traffic entering or leving the U.S. at the borders by truck or rail. From 1993 through 1997, SF Customs District exports grew from $29.4 billion to $48.1 billion, and imports grew from $38.9 billion to $58.8 billion, for a combined total of two-way trade flows valued at $106.9 billion.

Trade growth is driven by fundamental changes in the economy

The Bay Area exported its way out of the recession of the early 90s. Three primary forces enabled this trend: the opening of world markets enlarged export opportunities, the integration of capital markets facilitated cross-border investments, and shrinking interaction costs reduced the overall cost of doing business globally.[8]

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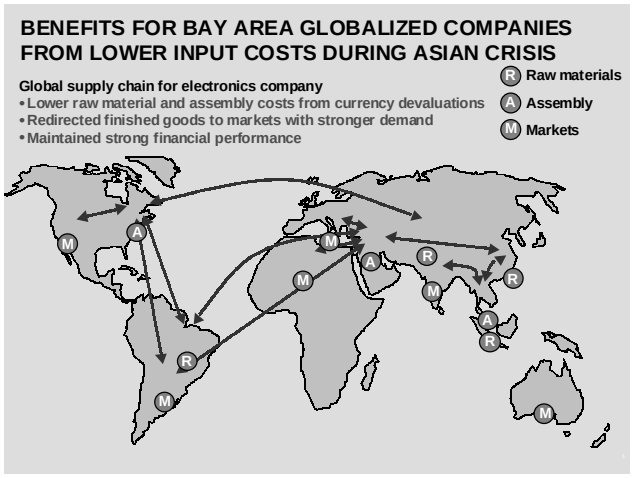
[7] U.S. Department of Commerce, International Trade Administration, *Exporter Location Series* as reported by BAYTRADE. Unfortunately, there is no comparable tabulation of imports by local companies available.

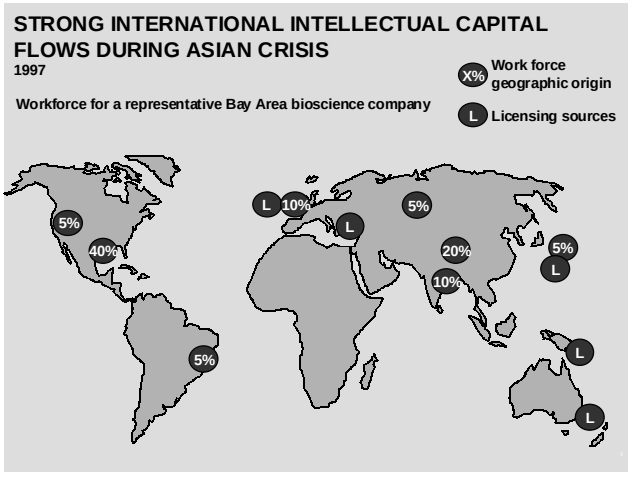
[8] *The Bay Area: Winning in the New Global Economy*, Bay Area Economic Forum and Bay Area Council, 1999, p.12.

These forces do not exclusively favor the Bay Area, however, so the extent of global competition is raised correspondingly. To stay competitive, Bay Area employers need to take advantage of the best talent, best technology, and best sales channels on a global basis. This rationalization of business is not a choice. To maintain employment in the Bay Area, the region's businesses must operate intelligently to stay competitive — or they will cease operation.

As highlighted in the Forum's most recent report on the Bay Area economy, this new globalized approach has a specific look:

> *A Bay Area bioscience company provides a good example. It uses licensing sources on three continents, and a majority of its Bay Area work force* [originally] *comes from outside the United States…* [with] *degrees from Bay Area graduate programs…*[9]





For some businesses, these trends also relate to the concept of "just in time" production. This concept, developed by Japanese businesses, involves undertaking production cycles just in time to meet customer demand. The goal is to provide a more responsive product or service more quickly for the customer while reducing inventory and other operating costs. Clearly, Bay Area businesses employing just-in-time strategies depend upon reliable and timely air transport services.

Trade growth has positive impacts

As these international and U.S. trade trends continue, businesses and workers need air transport to move goods, documents, and people — globally, quickly, and economically. But is this a good thing? Strong evidence suggests that it is. Trade allows businesses — and the region overall — to diversify customer bases and better weather market fluctuations. World markets are rarely simultaneously in deep recession; the Bay Area experienced this in the 1990s, using exporting to pull out of its prolonged recession. Second, finding a larger, global customer base allows companies

[9] *Ibid.*, p.13, including maps.

to obtain a better return. This is a particularly important outcome for companies whose products or services require high cost R&D that is easier to spread across a wider range of customers. It is also important, though, for workers and entrepreneurs. As the US Small Business Administration has documented, engaging in trade increases business success rates and generates higher wages for workers.

Air Transport and Global Competitiveness

Competitiveness means the ability to deliver to customers the products or services they want at higher quality and/or more cheaply than competing suppliers from outside the Bay Area. Customers can be consumers, businesses, or governments anywhere in the world. Air transport makes it possible for the region to participate competitively in the global economy, moving people, documents, and products quickly and cost-effectively. In the knowledge-based Bay Area economy, it would be perilous to overlook this obvious, common sense relationship. A knowledge-based business can easily move to a more business-friendly location, while it is relatively more difficult (or sometimes impossible) to move a manufacturing plant or an agricultural operation. It is important to identify the components of this relationship, and highlight opportunities for further research.

Jobs at Bay Area non-airport firms depend upon availability of air transport

The concept of *related jobs* was discussed in the previous chapter. Bay Area manufacturers, agribusiness producers, professional service firms, and other businesses rely on airports to engage in their day-to-day operations. They need to ship products, contracts, and materials; to send their sales force and professional staff to customers and affiliated businesses; and to receive subcomponents, raw materials, and express mail shipments.

This is a fundamental benefit of airports to the Bay Area. Moreover, this broader benefit is much larger in magnitude than the direct job impacts discussed in the preceding chapter.

Consider how differently the Bay Area's economy would operate without its major airports: many jobs at local non-airport businesses would disappear as well because it would be impossible for those businesses to engage in their day-to-day operations. Firms such as Bechtel and Oracle could not send to client sites the people involved in design teams. Firms such as Apple, Hitachi, or even Genentech would not be able to ship components and finished products. Moreover, small entrepreneurial firms would not even be able to build business beyond the Bay Area. The evaluation of future airport constraints should consider the overall economic impact on these businesses and the region if the future day-to-day needs for air transport cannot be met.

Existing methodologies to calculate related jobs — such as that described on page V of the Appendix — are input/output models that give a sense of magnitude of business reliance upon the airports. They are not, however, as defensible an approach as direct survey input from Bay Area companies. In addition, the Martin Associates methodology only focused on air cargo, and not on the hugely important professional

service firms such as banks, advertising agencies, engineering/construction firms, and technology/software design and development. These firms rely on airports for moving people, not products, for their business operations. This leads to a question for Phase II:

> Jobs at Bay Area non-airport companies depend on the ability of these businesses to move goods and people by air. Question for Phase II: What is a defensible estimate of these jobs today, and as they would be affected in the future by demand projection and available airport infrastructure?

Airport capacity has a bearing on business decisions about startup, expansion, and relocation

The transition to a knowledge-based economy, along with the explosion of startups and so-called dot-com businesses, has rapidly changed the nature of the Bay Area economy. Email and web-based information delivery may reduce the reliance of these businesses upon traditional transportation and shipment modes. Still, it also seems clear that the business plans of many new businesses and larger knowledge-based enterprises rely upon express delivery of products — imported from or exported to locations outside the Bay Area — and the ability of staff to travel as needed on a moment's notice.

Existing businesses may also be influenced in their decisions about expanding in the region based on the capacity and service level of the airports. Local and state governments spend significant resources trying to influence major businesses to remain in the region (business retention) or to locate new manufacturing, assembly, headquarters, or service facilities to the region (business attraction). At some point, the inability of airports to meet demand may impact the growth of existing businesses and the attraction of new ones.

Bay Area businesses need the ability to express documents and parcels in a timely manner to customers and business partners. This is growing in importance as internet-based businesses increasingly rely upon express services such as the US Postal Service, FedEx, UPS, DHL, and others to deliver orders. Airport congestion is on top of worsening congestion on the roadways that serve the region's airports and surrounding communities. Highway and bridge congestion are already negatively impacting the ability of South Bay/Silicon Valley companies to send and receive air express shipments in a timely manner, particularly for morning delivery of shipments from outside the region.

It is important for policymakers to know whether their decisions about airport cargo and passenger capacity make it easier or harder to start, retain, or attract new businesses.

Businesses have been able to flourish in the Bay Area in part because of the ability of airports to offer significant and timely express shipping services. What level of importance does this play in future business competitiveness given the adequacy or inadequacy of airport capacity? Does this have an impact on business startup, retention, expansion, or relocation?

Similarly, businesses need to be able to move their sales personnel, consulting teams, customer service staff, and executives quickly and easily around the world. This is a prerequisite for remaining competitive.

The frequency and timeliness of flights, together with the number of destinations served, have a bearing on the ability of Bay Area businesses to operate. What role does airport capacity play in future business competitiveness? Does this have an impact on business startup, retention, expansion, or relocation?

Airline behavior

The highly competitive airline passenger and cargo industry employs economies of scale that drive the decisions to locate routes and schedule service. Aircraft need to be filled to certain levels at certain frequencies to make a given service economical for a carrier to provide. These economies affect the feasibility, frequency, cost, and connections of Bay Area passenger and cargo service to various destinations.

The use of hubs, ticket prices, and various sizes of aircraft are some of the tools to address these economic considerations. For instance, the use of hubbing allows airlines to lower fares and cargo rates while increasing service to smaller metropolitan areas that it otherwise would not be economical to serve. The bottom line, though, is clear: if it is not economical to offer a route or frequency of service, then Bay Area travelers and businesspeople will not be able to travel as easily, quickly, or inexpensively to that destination.

This raises difficult questions regarding the future mix of routes and schedules available in the Bay Area given constrained or unconstrained airport capacity — and what this airline behavior might mean for the Bay Area economy.

The starting point would be to identify key variables in airline behavior that affect the economic impact of flight operations. For instance, Bay Area hubbing activity may have expanded the airports' economic impact beyond what it would otherwise be by increasing the numbers of connecting passengers using terminal facilities, the use of maintenance and ground personnel, and revenues from flight operations. Or the use of larger aircraft may increase the economic impact per flight operation, but the net impact may be lower compared to smaller aircraft offering more frequent flights.

The second step would be to survey airlines regarding the significance of future constrained or unconstrained airport capacity. While airlines respond primarily to market demand, it would be helpful to know whether and how they would change service based on regional decisions, and what economic impacts such changes would produce for the Bay Area. Would there be higher ticket prices, fewer destinations served, less frequent flights? These are the components of another inquiry in Phase II:

> What economic impacts do airline choices have on the region, what are the most salient factors affecting airline behavior, and what should most concern regional policymakers about airport infrastructure as it affects airline decisions regarding future service?

Quality of Life — Travel, Family Connectedness

Part of the joy of living and working in the Bay Area is the quality of life, from the physical beauty of the region, to its amenities, to the vibrancy of its economy, and the diversity of its people. Quality of life has an undeniable economic impact. The airports play a role in quality of life that should be recognized. While the discussion immediately above dealt with decisions by businesses and airlines, this section considers decisions by individuals. While individual attitude about the region and its airports is difficult to translate into economic impact, there are a few points for regional policymakers to assess.

- The ethnic diversity of the region makes businesses more competitive by stimulating innovation and connections with other parts of the world. It enriches our lives by making our daily world less homogenous, more challenging, and more open to differing world views. Airports make it easier for individuals from around the world to live, work, and go to school in the region.

- While we have already extensively discussed the economic importance of the inbound travel and visitor industry to the region, outbound travel and tourism is also important. The ability to travel quickly, easily, and cheaply to a bountiful selection of destinations makes the region a more enriching and wonderful place to work and live. It allows us to experience places we otherwise would be unable to visit, to engage in activities we would otherwise be unable to try, and to stay connected with our families in ways we would otherwise be unable to sustain. The airports enable this positive impact on our quality of life and ability to attract excellent talent to the region.

The Forum welcomes public comment on the need to assess these impacts more fully, such as through surveys of the attitudes of foreign residents and outbound travelers.

International Stature

The preceding economic benefits all lead into a major, overarching benefit of the airports to the Bay Area. The airports allow the region to have an otherwise unattainable stature in the global economy and in the minds of billions around the world. Many of these positive economic benefits are already quantified in the business impacts already stated. For instance, the business revenue, visitor, and job impacts already encompass international business activity.

Still, it is not possible to discuss global competitiveness without noting a simple fact. The Bay Area cannot retain its existing quality of life without remaining a global player, and there must be a high quality and availability of air transportation to do so. The region is perceived as a gateway and boasts some of the busiest air traffic in the world.

It should continue to be a goal of the Bay Area to offer a first class experience for individuals, businesses, and governments from around the world who utilize our airports for travel and shipping. The airports are an essential element of our overall global economic infrastructure, and we should recognize the importance of maintaining their quality.

Chapter

3

The Need for Action

Potentially negative economic impacts can be reduced or eliminated with regional planning, cooperation, and leadership

If airport operation and growth were without negative impacts, the choices of regional planners would be exceedingly simple. Airports represent a complex economic system. With any such complex system, some bad goes along with the good. Often, the negative impacts can be mitigated or eliminated once they are understood, or at least effective planning choices can be made to maximize the positive impact while minimizing the negative impact.

The danger is that the region could hold up projects to improve airport capacity. Subsequently it could find itself in the midst of reduced visitor rates, businesses choosing to relocate, and a declining economic base — all without sufficient time at that point to act. By contrast, the opportunity is to evaluate issues related to improved airport capacity and find ways to mitigate them in ways that also enhance the region's economic vitality — so that appropriate action may be taken early on.

As demonstrated in the prior chapters, the positive economic benefits of the airports are either known, can be quantified with further research, or can be presumed. On the positive side, these benefits can be calculated to show the economic impact of various scenarios of capacity growth. Similarly, on the negative side, there are two separate issues to be addressed. One is to understand the negative economic effects of current airport limitations. The other is the need to develop win-win solutions for growth-related concerns.

The Economic Impact of Inaction

It is clear that there are negative economic consequences associated with lack of expanded capacity at Bay Area Airports. The direct economic impact of such problems as flight delays and cancellations is known and can be calculated. What are less well understood are subsequent medium-to-long term decisions by businesses and individuals that could reduce the competitiveness of the region in a constrained airport scenario.

Air Gridlock — A National and Regional Concern

As noted in the previous chapter and as outlined by Dr. George L. Donohue of George Mason University[10], the region's air transportation system must be expanded and improved to keep up with demand. Since 1960 rail and highway use has grown at the rate of the U.S. economy, while use of air transport has grown at four to seven times the rate of GDP in the same period. Among other trends, high-value freight movement is shifting to air and truck intermodal services in response to just-in-time logistics. The national air hub and spoke system is approaching a capacity crisis, and incremental changes are inadequate to avoid "hub-lock." Across the nation today, delays average 15 minutes per aircraft, and major hubs, including SFO, are becoming saturated. As airports reach higher levels of capacity saturation, delays greater than 15 minutes grow exponentially, jumping from 15 delays per 1000 operations at 80 percent capacity to 35 delays per 1000 operations at 90 percent capacity. For the Bay Area, this means that both weather and non-weather delays pose a growing future threat to business and leisure.

Flight delays and cancellations

SFO staff utilized the June 1998 DOT publication on the Economic Values for Evaluation of Federal Aviation Administration Investment and Regulatory Programs to evaluate weather-related flight delays and cancellations at SFO.[11] Although the findings are specific to SFO (OAK and San Jose do not suffer from the same intensity of weather-related cancellations and delays) and did not include air cargo impacts, this approach gives some insights into how to evaluate the economic impact of delays and cancellations on passenger traffic across the entire Bay Area, as well as what the magnitude of these impacts might be.[12] This section reviews the 1997 findings to demonstrate a negative economic impact that will grow in a constrained airport scenario.

FLIGHT DELAYS

Delays result in planes stranded on the ground, flight cancellations, additional holding by planes in the air, and terminals packed with frustrated passengers. The economic impact hits passengers, airlines, the airport, airport businesses, and airport-dependent

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[10] *21st Century Transportation: Limits to Growth?*, remarks by Dr. Donohue at the Future Flight Central NASA Ames Dedication, December 13, 1999.

[11] *The Economic Impact Estimate of San Francisco International Airport Runway System*, December 1999.

[12] With respect to delays, SFO used data from the FAA's Air Traffic Operations Network (OPSNET) to develop the percentage of weather-related delays of 15 minutes or more. Taking an average of passengers per commercial flight multiplied by the number of flights affected by delays of 15 minutes or more provides the number of passengers affected. Together, the number of delays or and number of passengers affected provide the basis for the analysis. The June 1998 Department of Transportation publication *Economic Values for Evaluation of Federal Aviation Administration Investment and Regulatory Programs* provided various data on the economic values of passenger time and aircraft operating costs. In addition, SFO financial data on concession revenue was used to determine the positive revenue from passengers spending more time in the airport terminals, spending more money in airport shops, as a result of delays.

jobs. At SFO in 1998, an estimated 24,270 flight operations were delayed 15 minutes or more, solely due to weather.

Passengers experience significant consequences from delays. In 1998, SFO staff estimated that the average economic value of passenger time amounted to $21.46 per hour for leisure passengers, $37.97 per hour for business passengers, and $29.38 per hour for all-purpose travelers. That year at SFO, nearly 2.5 million passengers experienced weather-related delays of 15 minutes or more. The total dollar impact to these passengers was at least $17.4 million, of which business passengers suffered $8.6 million, leisure passengers $7.1 million, and all other passengers $1.6 million.[13]

Airlines are gravely impacted by flight delays and presumably pass these costs on to consumers. Delays increase costs for crew, fuel and oil, food, rentals, insurance, taxes, maintenance, in-flight services, and miscellaneous expenses. In 1998, it was estimated that the operating costs of an air carrier is $3,865 per hour and for commuter air carriers $910 per hour. That year, weather-related delays at SFO cost airlines at least $20.3 million, of which $19.3 million was for air carriers and $981,000 was for commuter carriers.[14]

Airports, ironically, gain financially in the short run from delays. Although delays result in passenger dissatisfaction — and potentially choosing a different airport in the future — they may also result in increased passenger dwell times and more passenger expenditure in the terminal. At SFO, concession revenue generated by passengers delayed in 1998 was estimated to total $8.8 million.

CANCELLATIONS

Flight cancellations can also have significant economic impacts, since scheduled flights never took place and passengers for those operations, who were not accommodated on other scheduled flights, may never have departed or arrived at SFO, Oakland, or San Jose. SFO alone estimates that an average of 3,030 flight operations at the airport are cancelled each year.

QUESTIONS

These impact numbers underscore the stakes in choosing among airport expansion scenarios. How in the future, will SFO, OAK, and SJC be impacted by theses costs? Second, regardless of projected increases in demand for air travel and air cargo, are

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[13] While these amounts may differ from other delay calculations used by MTC or others, these are the best available numbers specific to air travel at this time. It is inherently difficult to assign a value to lost time — how much is it worth to miss a key business meeting, start a vacation late, or miss time with a son or daughter? Nonetheless, there is both an economic and emotional price for the frustration of delay. And in the Bay Area, the price is higher than at almost any other airport in the world. Whatever value is assigned to time, the impact is high.

[14] The net impact of these losses is unclear, as some of these costs clearly translate into additional business revenue for other airport services such as maintenance. Presumably, the costs borne by airlines are passed on in the form of higher ticket prices. If this is the case, most if not all of the cost is ultimately borne by passengers.

these acceptable economic losses? Third, increasing demand for air travel and air cargo could increase the potential number of flights in and out of Bay Area airports, with a corresponding positive increase in the economic benefits. What is the projected economic impact of this growth, given the proposed airport expansion scenarios? Would it be acceptable to lose this potential increase in economic activity in the region? For either of these questions, what would be the most cost-effective ways to reduce the losses?

The bottom line: policymakers need to know the cost of inaction both in terms of current levels of delays and delays as they are affected by future airport capacity.

Air cargo constraints

There are no currently identified studies calculating the economic impact of various air cargo constraints. Given the needs of Bay Area business to remain competitive, it must be assumed that air cargo constraints pose a significant economic problem. Businesses need shipping solutions that can be accepted as late as possible, arrive as early as possible, offer deliveries within a guaranteed window, and that can reach any destination worldwide as quickly as possible. Delays, cancellations, timing constraints, limitations of destinations, problems with length or uncertainty of delivery times reduce the competitive edge of Bay Area business, or in the worst case, damage competitiveness if businesses elsewhere do not face the same constraints.

The question is whether there are quantifiable business impacts of air cargo constraints. If so, what are they currently, and what are they projected to be?

It is critical to know the cost of inaction with respect to airport capacity constraints on air cargo.

Business Behavior and Loss of Competitiveness

If businesses cannot move their people and goods in and out of the region with the timeliness and volume they need, they may be unable to remain in the region. So while the two preceding issues relating to passenger and air cargo delays focused on current and projected direct impacts, business behavior must also be considered.

A wide range of studies, particularly the Bay Area Economic Forum's comparative studies[15], highlight the changing nature of the economy. They emphasize how the Bay Area has transformed itself to a knowledge-based economy that is interlinked with other areas of the world for supplies of components, human resources, technology, manufacturing, assembly, and customers. Despite the importance of the internet and electronic data transfer and communication, this new Bay Area economy cannot function without air transport of people and goods that is reliable and competitive in terms of cost and timeliness. There is a line of thought in the Bay Area:that the economy does not need to grow any more, that the region is sufficiently prosperous and that it is possible to halt growth and maintain our current standard of living. Unfortunately, history is littered with examples of great economies that receded, marked by slowing growth, reduced competitiveness, and ultimately economic and political decline. If the Bay Area does not wish to share this fate, it must constantly remake itself and grow as it has managed to do repeatedly throughout its history.

There should be deep concern among policymakers about the potential loss of competitiveness of Bay Area business and the response of major employers to that loss of competitiveness. While airports play only a part in the overall formula for competitiveness, they are critical. So questions for Phase II include the following:

What is the economic cost of delays and cancellations based on the MTC projected demand scenarios? What are the economic costs of constrained cargo capacity? To what extent will current and future flight delays, cancellations, and air cargo constraints influence decisions by employers regarding expansion or relocation?

Airline Behavior

Airlines are among the businesses that might change their operations in the Bay Area with current or future runway, terminal, or other constraints.

[15] *The Bay Area: Leading the Transition to a Knowledge-Based Economy*, Bay Area Economic Forum, 1996, and *The Bay Area: Winning in the New Global Economy*, Bay Area Economic Forum and Bay Area Council, 1999.

What would airlines do in the event of a constrained regional airport capacity? In the constrained scenario, would they increase prices or choose to scale back hubbing and routing activities in the Bay Area if current and impending capacity constraints are not addressed? Which capacity constraints are of greatest concern or priority to passenger and cargo airlines?

Unlocking Win-Win Solutions

So there is need for action on two fronts. The first was discussed in the previous section: the Bay Area needs to understand and address the economic impact of inaction. This section covers a second area of action: regional policymakers need to identify and implement optimum solutions that mitigate negative impacts of growth while capturing its benefits. Particularly since this report outlines the massive economic impact of the airports on the economy, it is important to acknowledge the fear of growth and identify potential negative impacts associated with airport growth.

Addressing the Fear of Unbridled Growth

There is a fear that if the airports and other economic engines in the region are allowed to grow as much and as quickly as they would like, the Bay Area will become an unpleasant place to live. Some may even be concerned that *any* growth strategies are the wrong strategies as they lead toward increasing population, housing density, use of natural resources, environmental degradation, and materialism. These concerns are important context for the broader public debate about growth and airports, but they are too broad in nature to be addressed here.

Largely, though, specific problems drive the overall fear. Attacking growth *per se* and out of context is not a route to develop win-win solutions. Instead, by accurately identifying specific concerns and their causes, it is often possible to develop effective solutions. In particular, there are four specific negative economic impacts of growth associated with airports: noise, air quality, preserving the bay, and mobility.

Noise and Air Quality

Despite advances in technologies to reduce the noise generated by jet engines, aircraft noise is a primary concern for communities around airports. There are various strategies to mitigate each of these effects, from noise insulation programs to changing landing and takeoff flight plans and times. Bay Area airports, for instance, fund noise insulation programs. SFO's program is a national model, with the airport committing

up to $120 million to fund noise insulation for qualifying homes, buildings, and structures in local communities.[16]

Concerns about growth also lead to questions about air quality. Airports have linkages with air quality in two ways. First, the flight operations and associated ground operations generate air pollution from exhaust, evaporated fuels and solvents, and ground service vehicles. Second, transportation of passengers and cargo arriving and departing the airport generates exhaust from the various modes of private and public transportation.

Increases in air pollution do not necessarily have a steady correlation to growth of airports, however. The increases in passengers at Bay Area airports have partly been accommodated by larger planes with fewer flight operations per thousand passengers, potentially translating into a net reduction in air pollution per passenger. Similarly, increasing volumes of arriving and departing passengers increase the viability of alternative public transportation modes such as BART to the airport and, more recently, proposals to establish passenger and cargo water ferry service to the airports.

Policy makers need to assess and devise balanced solutions for noise and air quality as environmental concerns, when considering increased passenger, cargo and support activity at regional airports.

Preserving the Bay

The creation of the Bay Conservation and Development Commission was a major step toward preserving the distinctive beauty and ecological system of San Francisco, San Pablo, and Suisun Bays. Discussion of runway projects that involve new bayfill immediately raises the question of the economic impacts of reducing the size of the public resource of the Bay. Concerns range from eliminating marine habitat and requiring steps to replace or mitigate the loss; to creating potential long-term impacts from changing tides or toxics that will require steps to mitigate or clean up. On the positive side, however, Bay-constructed runways move flight operations further from populated areas, reducing noise in nearby communities and reducing their risk of damage from emergencies.

These impacts are difficult to quantify, and are the primary focus of BCDC. It is important, however, for BCDC to review the economic impact information contained in this report and in Phase II of this study.

[16] *The Economic Impact of San Francisco International Airport*, March 1998.

The Forum calls upon BCDC to consider the most appropriate ways to balance both the positive economic impacts of airport expansion, as represented by alternative approaches to increase airport capacity, and the public interest in the integrity of the Bay.

Vehicle Mobility, Congestion, and Public Transportation

Mobility issues are the number one concern of Bay Area residents and employers alike. In the December 1999 edition of the *Bay Area Poll*, the Bay Area Council reported that 38 percent of poll respondents cited transportation as the biggest problem affecting the region. This has been an increasing number, with only 12 percent of poll respondents in 1994 citing transportation as the number one problem facing the region.[17]

Increasing congestion has a broad array of economic impacts. These include increasing hours of work lost due to traffic delays or unreliable transportation; reducing reliability and timeliness of cargo shipments; potentially reducing the length-of-stay, frequency of return, and economic impact of visitors; increasing air pollution; and increasing stress-related illness and incidents.

Regardless of airport growth plans, the region currently has major challenges with respect to its surface passenger and cargo transportation system. The Metropolitan Transportation Commission, in its *Regional Transportation Plan*, is working to address these challenges.

Thoughtful planning should encompass a regional approach to reduce congestion at and around airports. For instance, SJC currently has insufficient air cargo capacity and international passenger service capacity to meet the needs of Silicon Valley and counties to the South. This puts a large number of cars and trucks onto Highway 101 and Interstate 880 every year, with related costs of congestion, highway maintenance, and air pollution. Roadway congestion is also increasingly affecting the regional operations of air courier services.

Yet expanded airport use does not necessarily need to put more cars and trucks on roadways, and thoughtful regional planning can work towards this goal. To some degree, expansion of these roadways and connectors is already planned in the *Regional Transportation Plan*. Some complementary alternatives exist, however, and are included in the *Plan*. These include express rail transit from the South Bay, expanded bus

[17] For the *Bay Area Poll*, the Field Research Corporation surveyed 607 residents of the nine-county Bay Area from October 20 through November 3, 1999. The percentage refers to the proportion of the sample which mentioned transportation in response to the open-ended question "What is the most important problem facing the Bay Area today?"

service from the South Bay, waterborne passenger and cargo service from the South Bay, and alternative airport capacity in the South Bay.

The appropriate question for planners is how to increase the economic impact of the airports while minimizing societal costs, and provide these optimum capabilities for today's demands and future cargo and passenger growth. How well do proposed transportation projects meet these needs?

While it is beyond the scope of this report to answer the questions, the Forum recommends attention to these issues in Phase II of this study or in work conducted by MTC or ABAG. It would be helpful to understand which alternatives are most attractive to the business community for reducing surface congestion related to airports. If it proves feasible, the following questions would be included in Phase II survey work.

How would businesses and airport tenants rank the various proposed solutions for addressing the mobility and reliability needs for their employees and cargo?

Chapter

4

Moving Forward

Regional decisionmakers need to weigh carefully the economic consequences of airport planning. Some of the information they need on direct impact is available, while further investigation is needed on the broader implications of action — or inaction.

Regional planners at the Metropolitan Transportation Commission and the Bay Conservation and Development Commission already have invested significant time and expertise in understanding the advantages and disadvantages of various transportation solutions. In generating this document, the Forum hopes to give the broad community of policymakers in the region the facts and factors they need to find optimum economic solutions.

Understand the Strong and Complex Positive Economic Impacts

The question facing the Bay Area is not whether to embark on further growth or to limit growth. The appropriate question is what will sustain prosperity in the region and increase prosperity and equity for the broadest possible base of the population. The best starting point is to understand the positive economic impacts of the existing system and see how these impacts may change given growth and non-growth scenarios.

We know that airports have a far greater economic impact on the region than was previously recognized:

- Airports generate or support over $37 billion in business revenue from direct services, support services, vendors, suppliers, and visitors.

- Airports support 468,000 jobs for direct services, support services, vendors, suppliers, and visitor services.

- Paychecks flow from the revenue described above, generating more that $13.2 billion of personal income.

- The airport operations, business revenue, personal income, and spending generate more than $8.4 billion in taxes to local, state, and federal governments.

- The Cities of San Francisco and Oakland obtain some $22 million in direct payments annually

- Airport-related projects that mitigate issues such as noise and transportation have an additional positive economic impact even while they are reducing the negative impact of airport operations. For instance, SFO's noise insulation program supported 988 jobs from 1995-97. The BART-to-the-SFO project will support 15,000 jobs between 1997 and 2002.

Clarify Less Understood Economic Impacts

The knowledge to fully evaluate the economic impact of airports is incomplete. The Bay Area Economic Forum recommends examination of as many of the following questions as is feasible.

- Review the constrained and unconstrained projections of airport capacity being developed by MTC and calculate the potential economic losses to the Bay Area of a constrained scenario. Relate these projections to the following topics.

- Survey major employers to calculate the extent that jobs and expansion plans at Bay Area businesses are related to the ability (1) of employees to travel through Bay Area airports, and (2) to ship goods and documents through Bay Area airports.

- Survey a range of businesses to assess how the timeliness, reliability, and destinations served for air cargo and passenger service affect their global competitiveness.

- Survey entrepreneurs, including minority- and women-owned business enterprises, to see how critical the airports are for startups in the region.

- Survey commercial real estate site consultants to assess how important airport passenger and cargo capacity is in recommending location to or relocation from the Bay Area.

- Survey passenger and cargo airlines to determine how they might change their service at Bay Area airports given expansion vs. constrained scenarios, and how this behavior might economically impact the region.

- Review MTC's evaluation of potential physical and technological enhancements to regional airports capacity and their potential effects on airline and consumer behavior.

- Survey foreign nationals working at Bay Area companies and attending Bay Area educational institutions to determine how the region's airport affect their decision to live in the region.

- Survey households to assess whether the availability of air transport is considered to have a net positive impact on the quality of life here.

- Interview foreign business travelers to determine whether Bay Area airports and surface transportation links make them more or less inclined to do business with the region, and what are the problems of greatest concern to them.

- What are the positive economic impacts directly associated with the expansion projects at the airports and the projects to increase surface transportation access to the airports?

The Bay Area Economic Forum will undertake research to explore as many of these issues as possible. While resource constraints may limit the number of research topics, it will be valuable at the very least to explore issues relating to business perception and behavior.

Identify How to Maximize Positive and Minimize Negative Impacts

Without meaning to over-simplify a complex subject, the goal of airport-related policies should be to maximize the net positive economic and societal impacts while minimizing the net negative non-economic impacts.

Think about the economic impacts as a bundle of things that can be assigned dollar values. It is a bundle of business revenue, jobs, personal income, level of government services, attraction of visitors, development of new business, success at selling internationally, length of commute times, overall healthiness of residents, and overall healthiness of the environment.

Think about the non-economic impacts as a bundle as well, in the way it *feels* to be here -- level of stress, beauty of the region, pleasure to live here, diversity, vitality and interest of job opportunities, level of innovation, vitality of cultural and travel amenities. These things can be illustrated as a goal matrix:

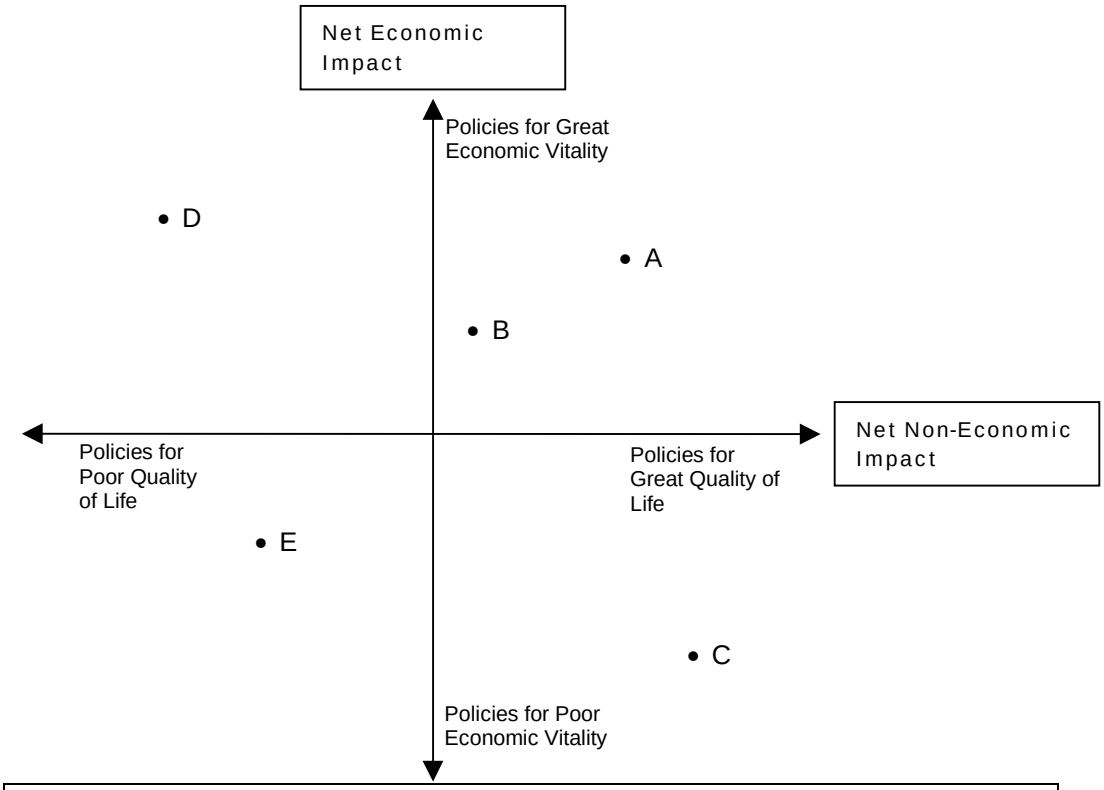

Figure 6 Goal-setting Matrix

The points labeled in the diagram correspond to four hypothetical intended and unintended outcomes of policy decisions relating to Bay Area airports. Point A is the optimum outcome or goal. Here the economic impacts are at their greatest. The greatest level of prosperity and greatest number of jobs are sustained while there is a net positive non-economic impact, with the Bay Area as a highly positive place to live and work. Point B is not a bad outcome — there is still vitality generated by the policy decisions, and the net impact on quality of life is still positive, but it is not nearly as positive as Point A. Point C greatly sacrifices economic vitality for a somewhat better net quality of life. Point D heavily sacrifices quality of life for economic vitality. And we would hope no one would consciously choose to make decisions that both sacrifice economic vitality and quality of life, but unintended consequences can deliver an outcome at Point E.

It is interesting that taken from a broad, strategic regional perspective economic vitality efforts actually coincide with efforts to enhance the quality of life. The table below places some of these efforts side by side to underscore the win-win opportunities underlying airport decisions.

Enhancing Economic Vitality	Enhancing Quality of Life
Meet demand for increased passenger service	Make use of the airports as pleasant as possible
Meet demand for increased cargo service	Increase options and reduce costs for leisure time of Bay Area residents
Meet the needs of Bay Area businesses for passenger and cargo service	Reduce stress related to non-airport and airport commutes
Improve surface transportation mobility and capacity related to passenger and cargo trips in and out of the airport to increase reliability and timeliness	Encourage innovative businesses to develop and remain in the region
Improve external perception of Bay Area throughout the U.S. and abroad	Ensure that government services funded by airport activity make our region safe, enjoyable, and culturally vibrant
Make the airports and region visitor-friendly	Reduce or mitigate noise
	Maximize Bay preservation
	Minimize air pollution

Of course, it is easy to identify these opportunities and another matter altogether to make the right decisions to attain them.

It may be helpful to consider a broad-based system to score airport expansion proposals based on their overall regional impacts on economic vitality and quality of life. Based on specific problem areas that generate low scores, it may be possible to identify other innovative approaches to bring scores up. Again, the first goal of policy makers should be to find win-win solutions that both enhance economic vitality and quality of life. When such solutions cannot be found, the second goal can be to balance the positives against negatives to choose whether to green light a project.

Conclusion

The Bay Area's international airports have a far greater combined economic impact than previously recognized. This increases the region's stakes in making the best possible decisions about airport projects. The decisions are not simply whether to give a project a green light. Choosing the status quo may seem to be a choice in favor of the region's current level of vitality. The economy is far more dynamic than that, though, and failing to expand airport capacity may have unintended effects such as loss of businesses and visitors, with net negative economic and quality of life results.

The Bay Area Economic Forum recommends policymaker review of and comment on the impacts identified in this study in preparation for the second phase of this project. The second phase will utilize interviews, surveys, and economic analysis to clarify some

of the less known and understood economic impacts. The Forum is particularly interested in understanding how airport decisions are interpreted by Bay Area businesses and potentially lead to changes in our ability to develop and retain business in the region.

The airports are vital assets for all residents and businesses of the Bay Area. It is our collective responsibility to foster their ability to continue to make our region the best place in the world to work and live.

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Appendix: Economic Impact Methodology

The Martin Associates quantitative economic impact methodology for Bay Area airports is thorough, carefully developed, and painstakingly researched. Here are more details.

There is an inherent challenge in developing the numbers related to these impacts in a defensible way. The appropriate identification of Airport-related activities and the quality of the data collected are critical. The Martin Associates Airport Economic Impact methodology applied in this study uses direct interviews and surveys, published airport statistics, and local economic development data to measure the actual impact. The methodology does not utilize any "input-output" models, which tend to infer the impact from broader macroeconomic trends based on broad and sometimes arguable assumptions.

To understand this methodology, the following points summarize key definitions, data collection, data comparability between airports, and the scope of the analysis by airport.

DEFINITIONS

As outlined in Figure 1, the economic impact of airport activities consists of business revenue, which supports employment, generating personal income, and increasing tax revenues at the local, state, and federal levels.

Employment Impact

Bay Area airports have four levels of impact on *individuals*:

- Direct employment means jobs that are directly generated by airport activity and that would vanish if activity at Bay Area airports were to cease.

- Induced employment means jobs created throughout the Bay Area because *individuals* directly employed due to airport activity spend their wages locally on goods and services such as food and housing.

- Indirect employment consists of jobs generated due to the purchase of goods and services by *firms* dependent upon airport activity. These are jobs with such firms as

construction contractors, caterers, janitorial and security firms, suppliers of aircraft services, local office supply companies, business services firms, and aircraft parts supply.[18]

- Related employment refers to jobs at manufacturers, agribusiness, exporters, and others using Bay Area airports for air cargo shipments. This does not count the entire employment of such firms — just the portion that is related to shipments via air cargo. Nor does it refer to air freight companies, which are already counted in the categories above. For firms that ship by air — in the software industry, for instance — jobs in the Bay Area are tied to airport capacity. Such jobs are not as directly dependent upon the airports as are the direct and induced jobs, but they do reflect the importance of the airports as a catalyst for economic development and competitiveness. If Bay Area air cargo capacity was reduced, this employment could be lost to other areas.[19]

Business Revenue Impact

Airport activity directly generates revenue for *firms* that provide air passenger services, cargo services, general aviation facilities and service, and ground support services. As noted in Figure 1, this revenue is dispersed throughout the economy in several ways: to hire people to provide the services, to purchase goods and services from third parties, to pay for the use of airports, and to make federal, state, and local tax payments. The remainder is used to pay stockholders, retire debt, or make investments, or is held as retained earnings. The methodology focuses on the portion of the revenue impact that can be definitely identified as remaining in the Bay Area.

Personal Income Impact

This is a measure of the personal income received by *individuals* identified in the employment impact. This includes the salaries, wages, and other income paid to people through the direct, induced, indirect, and related employment impacts.

Tax impacts

Both firms and individuals described above pay *taxes* to federal, state, county, and municipal governments. In addition, the airports themselves make direct payments to their local municipality.

ECONOMIC IMPACT SECTORS — AIRPORT-GENERATED AND VISITOR-GENERATED IMPACTS

Take a moment to consider the diverse economic system generated by airports. For the purposes of this report, the various impacts on business revenue, employment, personal income, and tax generation can be evaluated based on two areas of activity.

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[18] It should be noted that if the supplying firms are located on airport and exclusively related directly to the particular airport, they are counted as direct jobs. If they are off-airport, they are counted as indirect jobs.

[19] Related employment has only been measured for firms using air cargo facilities. However, a large and growing number of firms — in fields such as management consulting, technology development, telecommunications — have many jobs dependent upon *passenger* travel capacity at Bay Area airports. While this related employment impact might be even greater than for firms using cargo facilities, this impact is not calculated.

- *Airport-generated activity includes four key sectors that are directly tied to airport operations: Airline/airport service, Freight transportation, Passenger ground transportation, and Contract construction/consulting services.*
- *Visitor-generated activity is a distinct fifth sector that is measured and evaluated independently based on surveys of business and pleasure visitors.*

Each of these sectors is discussed below.

The airline/airport service sector consists of airlines, general aviation, and firms providing support services to airlines, passengers, and the Airport. Jobs in this category are typically located on airport property. The group consists of the following participants:

Airline / Airport Services

Passenger Airlines
General Aviation (e.g., corporate hangers, business aircraft, not-for-profit aviation services, flying clubs, etc.)
Airport Administration
Catering Firms
Janitorial Firms
Sky Caps
Security Firms
Aviation Service Firms (including fixed base operators)
Airport Retail Tenants (e.g., newsstands, retail shops, and food concessions)
Federal Government Agencies (e.g., Federal Aviation Administration and U.S. Customs)
Parking and miscellaneous on-airport services

Freight Transportation

Freight transportation encompasses the movement of air cargo, which consists of air freight (traditional heavy air cargo and express packages) and U.S. mail transported on dedicated freight airlines and in the cargo section of passenger airlines. Jobs in this category are located both on and off the airport and business include the following:

Cargo airlines
Freight forwarders
Passenger airlines
U.S. Postal Service
Trucking firms involved in transporting air cargo

Passenger Ground Transportation

Passenger ground transportation includes all transportation of individuals to and from Bay Area airports and includes both drivers and supporting reservation and maintenance employees. Jobs are found in all aspects of operation of the following services:

Car rental firms
Buses
Taxis
Limousines
Airport shuttle services
Hotel vans

Contract Construction and Consulting

A wide range of companies provide services and materials to Bay Area airports. The livelihoods of many residents depend on airport contracts for services that include:

Construction and remodeling firms
Architects and planners
Engineers
Retail suppliers
Service companies
Other consultants and vendors

Visitor Industry Services

Both domestic and international passengers make use of the Bay Area's international airports to arrive in the region. They come for many purposes, including business, pleasure, and conventions. These out-of-town visitors purchase lodging, food, and entertainment once they leave the airport — creating jobs in the retail and service industries throughout the region:

Hotels and motels
Restaurants
Gift shops
Taxi and charter tours
Entertainment businesses — from theaters and amusement parks to sporting events, parks, and sightseeing attractions
Travel agents

DATA COLLECTION AND ANALYSIS

Direct surveys and interviews provide the most defensible and accurate measure of the economic impact of the airports in these five sectors. For the four direct airport

sectors, Martin Associates worked to obtain responses from 100 percent of the companies engaged in work with the airports. For the visitor industry, this is not feasible, so extensive sampling surveys of actual visitors were used to calculate impacts.

Airport Sectors

Martin Associates estimated impacts for each airport based on interviews with firms in the economic impact categories described above. The detailed personal or telephone interviews were conducted with every service provider or major tenant at the airports. The results of these interviews were then used to estimate directly the baseline job and revenue impacts of Bay Area International Airports in the airline/airport sector, the air freight transportation sector, and the ground transportation sector. Data regarding purchases by the airports from local construction, engineering, service, and supply firms were used to estimate the job and revenue impacts in the construction/consulting sector industries. Figure 2 in the main body of the report shows a summary of these interviews.

Visitor Industry Sector

The magnitude of economic impact generated by visitors using the airports depends upon the volume of visitors, the duration of their stays in the Bay Area, the amount of money they spend, and the types of purchases made. The length of time a visitor may stay and how they spend their money is influenced by the purpose of their trip to the region, as well as whether the visitor is a domestic air traveler or an international traveler. For example, domestic and international business travelers tend to spend more per day on hotels than a visitor on a pleasure trip, but the business traveler may spend less time in the region. Similarly, an international business traveler — facing higher travel costs — will likely travel less frequently but spend more time in the Bay Area than will a domestic business traveler.

To estimate the economic impact of visitors traveling through Bay Area international airports, it was necessary to establish a detailed database of passenger characteristics. These include origin/destination versus connecting passengers, visiting versus area resident passengers, international versus domestic passengers, trip purpose, spending patterns, and length of time spent in the Bay Area.

For direct airport visitor-generated job and revenue impacts, Martin Associates conducted an in-terminal random survey of 1,301 passengers departing from SFO in 1997 and 3,000 passengers departing SJC in 1998. For Oakland, the Metropolitan Transportation Commission undertook a survey of air passengers using the Oakland International Airport and the results of this 1995 study were used to calibrate the Martin Associates model. These surveys collected the primary data for the database of passenger characteristics. The primary data were also carefully used in combination with secondary published data — such as Bay Area visitor industry statistics from the U.S. Census of Service Industries and Census of Retail Trade — to derive some of the airport impacts.

Business Revenue

Data for airport site-generated revenue were obtained directly from interviews with airport tenants or service providers, from revenue reports from the respective cities, or

derived from the airline industry averages for revenue per passenger or per pound of cargo.

Airport visitor-generated revenue was derived directly from passenger survey data on local expenditures by consumption category.

Direct Jobs

For the direct airport site-generated impact, employment data were obtained directly from all employers located at the airports or providing services supporting airport activity. Part-time employees were converted to a full-time equivalent number. Based on the function of each airport tenant or service provider, jobs were allocated to the air carrier, air cargo, or general aviation activity segments where applicable.

The direct visitor-generated employment impact was derived by determining the number of annual non-resident air passengers and their total expenditures, as obtained from the passenger survey, for each consumption category (such as lodging, meals, or entertainment). Published revenue/employee ratios were then applied to those visiting air passenger expenditures to determine the number of employees.

Induced Jobs

To estimate induced jobs, it is possible to calculate the re-spending of income by direct airport site-generated and visitor-generated employees (the calculation of personal income is described below). This is done by estimating the percentage of income that direct employees spend on various categories of expenditures (housing, food, etc.),[20] which translates into sales data for the places these employees make purchases. In the Regional Input-Output Modeling System (RIMSII), U.S. Census Bureau publications for the Oakland-San Jose-San Francisco Metropolitan Statistical Areas make it possible to calculate the employment generated by these sales. In actuality, a portion of income earned by induced employees is also re-spent, thus generating a second (and subsequent) round of induced jobs. Beyond the initial round of re-spending, however, the local employment impact cannot be reliably estimated. Only the initial round of induced jobs is included in this analysis.

Indirect Jobs

The surveys yielded information on purchases of goods and services by firms involved in airport activity. For example, airlines purchase such items as fuel, catering services, parts and office supplies from local firms. These purchases create jobs in these supplying industries. (Airports themselves also purchase services such as contract construction, utilities, and maintenance services from local suppliers, although most of these were included in the direct job impacts.) Jobs generated in these service-oriented firms are the result of the first round of purchases by the airlines and the airports. A second round of purchases then occurs by these firms serving the airports or airport-

[20] Martin Associates uses a specific income multiplier for the Bay Area based on a RIMSII model prepared for this use by the US Bureau of Economic Analysis. Martin Associates then develops appropriate re-spending categories and the Marginal Propensity to Consume based on area-specific data. Average expenditures by category are derived from the U.S. Bureau of Labor Statistics *Consumer Expenditure Survey*. This is not a generalized input-output model. It is the most accurate approach to estimating induced jobs from Bay Area airports.

related firms in the form of inventory purchases. For example, catering firms purchase food, janitorial firms purchase cleaning supplies, security services purchase uniforms, and rental car agencies purchase parts and fuel. To measure these impacts, each directly dependent firm was surveyed regarding its local purchases. Based on the Bay Area RIMS II model described in the footnote to the induced jobs, there are specific detailed ratios of jobs to sales based on local purchase patterns. Again, this approach is not a broad national multiplier. It is based on the results of the 100 percent survey of airport tenants and is highly localized.

Related Jobs

It is important, though difficult, to calculate jobs related to the ability of local companies to use the region's airports to conduct their daily business. Related jobs should be viewed only as a rough indicator of the importance of airports to the local business community. The calculation of related jobs — which relies on other published studies — is less defensible than for the direct and induced jobs which are based on primary surveys of airport users. For this reason, the summaries of economic impacts presented elsewhere in this report do not include related jobs, but we present the methodology here to introduce the concept. Bay Area firms rely on the region's airports to ship cargo to customers and to receive supplies and components. Jobs at these firms depend on the ability to move these goods and documents. To calculate these related jobs, it was important to factor out jobs at shippers, truckers, and other jobs already counted in the direct, induced, and indirect job impacts. In this analysis, Martin Associates takes an average value of air shipments per pound ($40/lb), multiplied by the pounds of air freight enplaned at Bay Area airports, to obtain a total estimated value of air cargo. A recent survey of national air freight shippers indicated that 946 jobs are related to every $100 million of air freight shipped.[21] Multiplying this ratio by the total value of cargo through Bay Area airports yields an estimate of related jobs.

It should be emphasized that these jobs are related to companies using the airports for shipping and not *directly* dependent upon the airports themselves. The level of employment by these users of the airports is determined by demand for the firms' products. Furthermore, since related jobs are not based on a survey of the companies involved, Martin Associates does not recommend that related jobs be relied upon when using the Airport Impact Model for airport planning decisions. Still, the calculation of related jobs is a critical indicator of the ability of Bay Area employers to conduct business. Moreover, this calculation strictly involves air cargo and not the hugely significant number of jobs related to Bay Area employers' ability to have workers travel easily to customers and business partners around the world.

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[21] Both the average value of air shipments and the relationship of jobs to air cargo are taken from *The Local and Regional Impact of National and Dulles International Airports*, prepared by Martin O'Connell Associates for the Metropolitan Washington Airports Authority, December 4, 1996. Although the survey was conducted for Washington, DC, area airports, the data are valid for Bay Area air cargo. It should also be noted that the jobs derived are at the manufacturers, agribusiness, and other employers shipping product and not at the air freight companies themselves. Jobs at the air freight companies are already included in the direct job impact.

Therefore, despite the caveats, the related jobs figure used in some reports for Bay Area and other national airports is credible. Adding up the related jobs for Bay Area airports identified in existing reports yields a number of nearly 600,000 jobs. Although this is a large number, it likely underestimates the importance of Bay Area airports to local employers for the reasons stated above. Moreover, a report on the economic impact of the airports certainly understates their importance without an examination of related jobs. The Bay Area Economic Forum recommends further survey work to improve understanding of the relationship of airport development to behavior and economic competitiveness of local businesses.

Personal Income

Total personal income for airport site-generated employees was obtained through collection of payroll or average annual salary information as part of the interviews.

For airport visitor-generated employees, visitor expenditures by consumption category were applied to published revenue/employee ratios and average employee wages (adjusted for the respective parts of the Bay Area) to derive personal income.

Induced personal income (income of individuals employed because of personal spending by site-generated and visitor-generated employees) was derived through use of a Bay Area income multiplier. Using data from the U.S. Bureau of Economic Analysis, the personal income multiplier for the Bay Area is $1.9972, meaning that for every dollar earned by individuals in the Bay Area, roughly 50 percent (~$.050) is re-spent for personal consumption in the Bay Area.[22] Of that $0.50, an additional 50 percent is re-spent, and so on, resulting in a total re-spending impact of just under $1.00 for every dollar of income received by California workers.[23] Unfortunately, this analysis is for statewide and not Bay Area specific spending, although a majority of this spending is likely based in the Bay Area.

Taxes

For all direct airport site-generated and visitor-generated employees, business revenue, and personal income, State and local tax payments were derived by estimating per capita tax burdens developed from data published by the State of California[24]. All State and local taxes are included in the analysis, with the State-level totals proportionally

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[22] The remaining $0.49 is used to purchase items produced out-of-state, to pay federal, state and local taxes, or to be held as savings.

[23] For example, in the initial round, one dollar is earned by John Smith, a Bay Area resident John will spend half of his dollar — 50 cents — in the Bay Area on goods and services. The 50 cents John spends turns into income for other people in the Bay Area, who in turn spend half of it — 25 cents — on Bay Area goods and services. Of this 25 cents, again 50 percent (or about 12 cents) will be used for further in-state purchases. These successive rounds of respending will continue until an additional $0.9972 of spending in the state is generated for every dollar of income. The original dollar plus the $0.9972 subsequent respending means a $1.9972 income multplier for the Bay Area. At each stage of the respending, additional jobs are created, called *induced jobs* in this report. However, to ensure defensibility, not all levels of induced jobs are estimated in this report.

[24] These include the annual report of the Office of the Controller, the annual *Financial Transactions Concerning Counties of California*, and *Financial Transactions Concerning Cities of California.*

applied to the airports' economic activities — including business revenue, employment, and spending of personal income — to estimate the tax revenue impact. A complete evaluation of taxes is included in the estimates:

state and local income taxes
state sales tax
motor vehicle registration and licensing tax
state motor fuels tax
county property taxes
local city taxes, such the possessory interest tax, utility consumption tax, sewer service charge tax, and business license tax.

Federal income taxes are also estimated, although such revenues cannot be considered an impact on the local area. Federal aviation-specific taxes on air passenger tickets, international air passenger processing, and enplaned cargo are estimated to show the contribution by Bay Area airports to the federal agencies which have regulatory and funding responsibilities related to aviation.

Data Handling and Avoiding Double-Counting

Where applicable, all survey results for the four airport sectors were allocated to the air carrier, air cargo, or general aviation activity segments. For all results, throughout the extensive data collection process, care was taken to ensure that impacts were not double-counted. In certain instances, business located on airport premises whose activities were not specifically related to aviation or serving passengers or cargo were not included in the direct impact results of the study. An example of this at SJC would be the *94th Aero Squadron* restaurant or the non-aviation tenants of the San Jose Jet Center, all of which are located airport property but which are not primarily dependent upon SJC activity.

COMPARABILITY

All the baseline data for all the airport and visitor surveys were used to develop impact models for each of the three airports, which allowed data for all three airports to be updated for a single, common year. These models also allow airport planners to estimate the sensitivity of impacts to changes in passenger levels, aircraft operations, passenger characteristics, labor productivity and work rules, air cargo levels, general aviation operations, and future activity levels. By entering new or projected flight and passenger data, the models can be used to generate annual updates and to evaluate the impacts of new airport projects or noise regulations.

The methodology used has also been used to assess the economic impacts created by airport activity at other major North American airports. The results of these other impact studies may be directly compared with this one. In addition to the three Bay Area international airports, Martin Associates has applied the methodology to assess these twelve other airports:

Baltimore-Washington International Airport
Hartsfield Atlanta International Airport
Seattle-Tacoma International Airport
Portland International Airport
Minneapolis/St. Paul International Airport
Lester B. Pearson International Airport (Toronto)
Reagan National and Dulles International Airports (Washington, DC)
Sacramento International Airport
Stapleton International Airport (Denver)
General Mitchell International Airport (Milwaukee)
Harrisburg International Airport

SCOPE OF THIS REPORT'S FINDINGS

This report only reviews the activities of the three international airports located in the Bay Area — Oakland International Airport (OAK), San Francisco International Airport (SFO), and San Jose International Airport (SJC). The methodology for all three airports is the same.

The analysis of SFO and SJC includes the impact of all services on airport property or administered by each airport, along with all indirect and induced effects. This includes all activities listed in the description of each economic sector.

The analysis of Oakland International Airport is the same as SFO and SJC, but to be clear, there are two different airport facilities at OAK — the North Airport and South Airport — and the analysis covers both of them. The South Airport includes Terminals I and II, related parking facilities, air cargo facilities, the United Airlines maintenance hangar, the air carrier runway and taxiways, and other aviation support facilities. The North Airport includes corporate hangers/general aviation facilities, the Alaska Airlines maintenance hangar, air cargo facilities, T-hangars, and three corporate/general aviation runways and associated taxiways.