

UNIVERSITY of CALIFORNIA • IRVINE
THE HENRY SAMUELI SCHOOL OF ENGINEERING



CEE 298 – Freight Transportation

Dr. Stephen G. Ritchie

Project 2 – Air Freight Transport of Agricultural Products in California

Spring 2012

June 6, 2012

Sravanthi Sridhar

Table of Contents

1.0 Introduction.....	1
2.0 Current Role of Air Freight in California.....	2
3.0 Airports in California	3
4.0 Future Role of Air Freight in California.....	6
5.0 Data Sources	8
6.0 International Air Cargo System	10
7.0 Air Cargo System in California	12
8.0 Current Issues.....	12
9.0 Recommendations.....	14
References	16

1.0 Introduction

California’s agricultural trade has been growing over the past several years and the increase in air freight of these products have also increased substantially. The purpose of air transport is to deliver the commodity to the market before its commercial life expires. In the case of perishable items such as fruits, vegetables, and even flowers, this is highly important. An overseas grocery store can only be expected to pay the premium price if the fruits or vegetables are delivered fresh and in good condition physically and nutritionally. There is a period of time when these commodities can be transported and delivered. If the product is delivered during this period of time, then the grocery stores are willing to pay the premium price. For example, California fresh cherry shippers have become highly dependent on air freight to get their shipments to the overseas markets. Organic produce are also prime examples of commodities that uses air freight very much. Figure 1-1 below shows a typical agriculture shipping scenario.

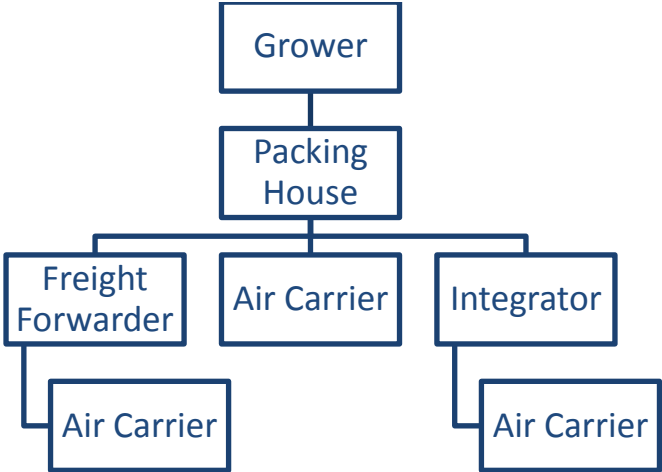


Figure 1-1: Typical Agriculture Shipping Scenario

The simple logistics of moving air freight is said to be more complicated than transporting passengers. This involves packaging, document preparation, arranging insurance, picking up goods from shippers, and facilitating customs clearance both at the points of origin and destination, and finally completing the final delivery as seen in the figure above (Manson 2005).

Freight Forwarder is a company or a person that organizes shipments to get large orders from the manufacturer. An integrator is a company that takes care of everything from getting the commodity from the shipper’s location to the customer. This will include any and all mode of transportation; examples of integrators are FedEx, UPS, and DHL. The following excerpt is from O’Connell’s *The Role of Air Cargo in California’s Agricultural Export Trade* report from May 2005.

“A generation of aggressive out-sourcing of logistical functions has evidently left many companies indifferent to the need to maintain and expand the state’s transportation infrastructure. That infrastructure projects are typically expensive, socially unsettling and environmentally sensitive make political leaders reluctant to tackle them. Undertaking

massive infrastructure projects implies a major role for government, which makes the process ideologically offensive to some. Still, if California is to continue to enjoy the kind of transportation infrastructure essential for full participation in a global economy, a stronger constituency will have to be mobilized in support of an expanded and more diversified air transport system.” (O’Connell 2005)

This report will discuss in overview of California’s agricultural air freight transportation. This is will done by looking at the California’s Current and Future role and later discussing the international and California’s freight system. Miscellaneous sections about airports in California will be discussed to aid in explaining the issues the state might face in the future due to the increase in air freight. Finally a set of recommendations will be laid out for potential improvements for the state.

2.0 Current Role of Air Freight in California

The amount of agricultural exports from California in 2004 was \$10.4 Billion worth. California extensively exports to Japan, China, South Korea, Taiwan, and Hong Kong, and exports a moderate amount to Europe and Latin America. Very little is exported via air freight to Canada and Mexico, due to the current modern trucking and rail operations. Figure 2-1 below shows the Air Cargo’s share of California’s Agricultural Exports. In 2004, airborne shipments were amounted to only 6.3 percent of the \$10.4 billion of all agricultural products exported from California. This came to \$659 million worth of airborne agricultural exports in 2004 from California. As seen in Figure 2-1, the total has increased 60 percent since 2000 with about \$414 million.

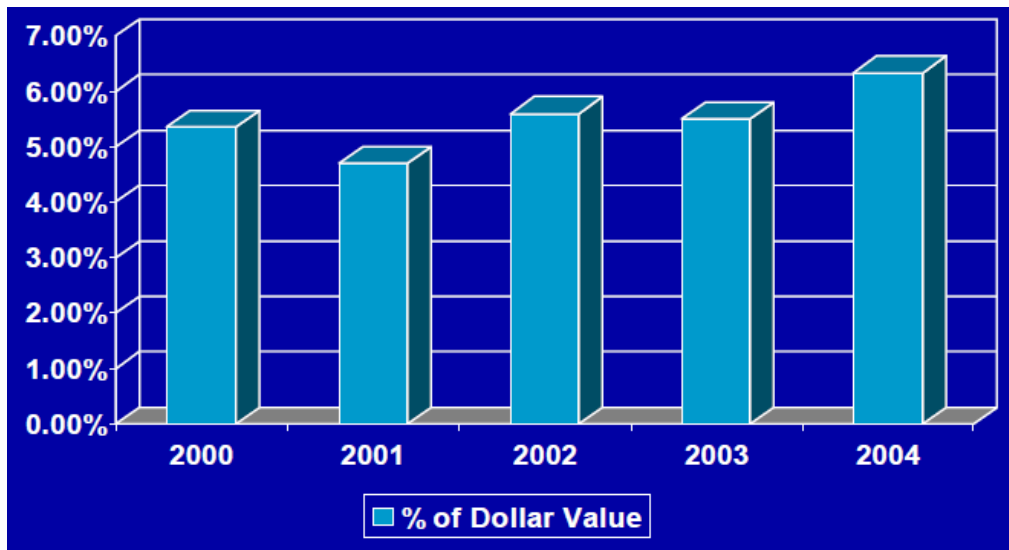


Figure 2-1: Air Cargo’s Share of California Agricultural Exports

Even though 6.3% is a small number, it still represents a substantial volume of business. But it is important to note that agricultural exports have increased by a large amount of 60% since 2000 and an increase should be expected going forward.

Figure 2-2 below shows the leading regional destinations of California's airborne agricultural exports (in millions of dollars). California's airborne agricultural exports primarily go to markets in Northern Asia. Japan has been the main destination for California's air freight exports. The most surprising has been the big flow in agricultural air freight shipments to China in from 2002 to 2004. This is due to China joining the World Trade Organization in 2001. Over the next three years, California's agricultural exports to China tripled, then it quadrupled, and then it doubled again. From \$3.1 million in 2001, it increased to \$94.4 million in 2004.

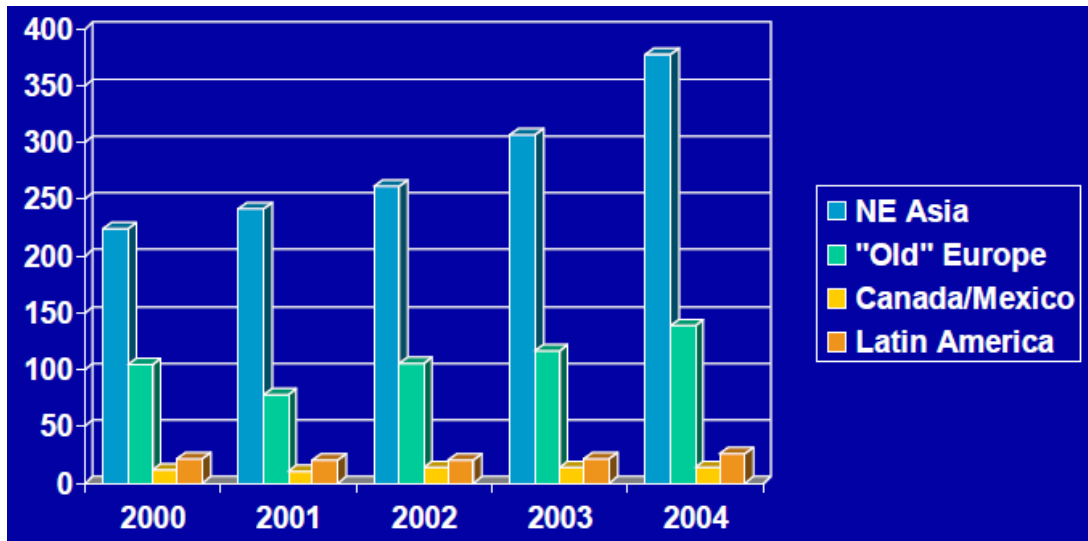


Figure 2.2: Leading Regional Destinations of California's Airborne Agricultural Exports

It is seen that California's overall farm export trade with China has grown greatly during the three year period after China joined the World Trade Organization in 2001. The export amount has increased from \$186.3 million to 2001 to \$663.6 million in 2004. It is interesting to note that the quick increase in airborne shipments to China did not come at the expense of California's airborne agricultural export trade with Hong Kong, which saw a robust 41% increase from \$11.1 million in 2001 to \$15.7 million in 2004 (O'Connell, 2005).

3.0 Airports in California

Approximately one-half of all air cargo is shipped in the bellies of passenger aircraft. In California, there are two main gateway airports: Los Angeles International Airport (LAX) and San Francisco International Airport (SFO). In 2004, LAX and SFO handled about 98.8% of all airborne imports and handled about 93.2% of all airborne exports. Below, Figure 3-1 shows all the airports in California where the Red are International airports and the black are regular, domestic airports.



Figure 3-1: International and Domestic Airports in California¹

As shown in Figure 3-1, there are several international airports in close proximity to LAX and SFO where given the right amount of space for freight, could take one more of LAX and SFO's air freight shipments. The number of airports in California has increased over the past several years. There are currently over 50 domestic airports and 11 international airports in California.

¹ Source: <http://www.mapsofworld.com/usa/states/california/california-airports.html>

Figures 3-2 and 3-3 below show the current runway of the two main airports, LAX and SFO respectively. Section 8 will discuss the current issues with these two airports with regards to air freight.

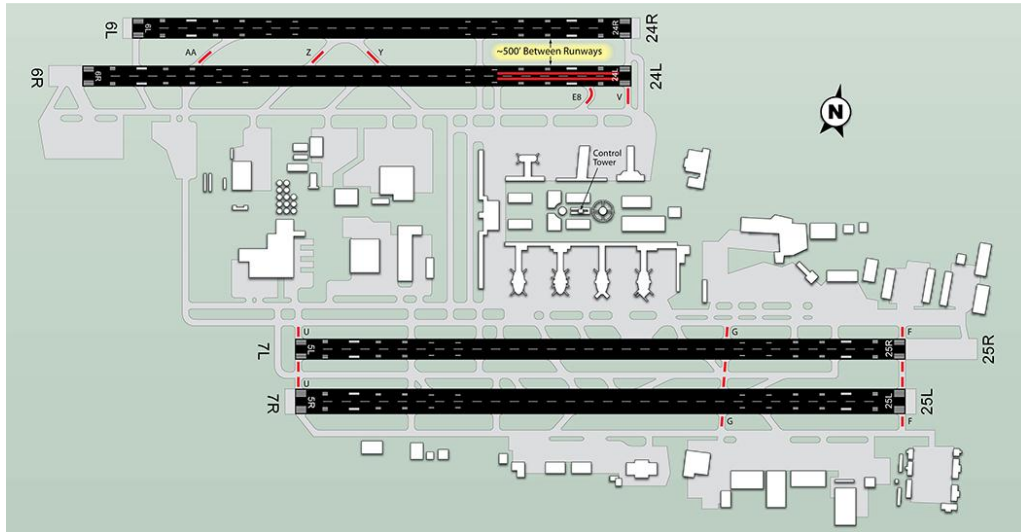


Figure 3-2: Los Angeles International Airport Runways Map

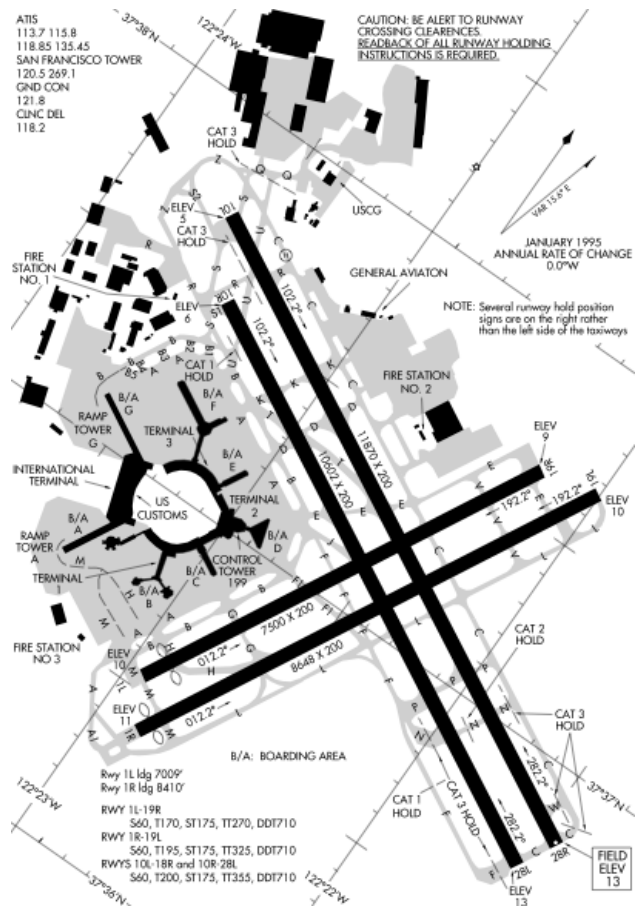


Figure 3-3: San Francisco International Airport Runways Map

In O'Connell et al report, they state a hypothetical situation in which an airport would be dedicated specifically for air freight. The question "If one were to establish one or more airports specifically designated to handle agricultural exports, where in California should that facility be sited?" is asked. It is further explored by analysis of the area. The San Joaquin Valley contains almost half the state's farmland, nearly 70 percent of its cropland, and 75 percent of its irrigated land. Six counties account for about half of California's total value of agricultural production. "But the Central Coast leads in the production of artichokes, asparagus, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, garlic, herbs, lettuce, mushrooms, peppers, and spinach, plus a number of more minor vegetables. Growing regions in Southern California likewise produce a wide range of similar horticultural products." They continue the argument by noting that even if demand for air cargo services from California's agricultural shippers continues to surge, the level of demand will not, contrary to some hopes and expectations, appreciable alter the current air cargo system. There is no reason to assume, for example, that air carriers will initiate regular cargo service into a San Joaquin Valley airport merely to serve agriculture's shipping needs (O'Connell 2005). Such potential solutions can aid in the forecasted increase in air cargo in California and this was stated as a mere example as this report is an overview of the air freight transport in California.

4.0 Future Role of Air Freight in California

There are many reasons to expect a high increase in agricultural air cargo in the future for California. Reasons such as:

- Maritime Shipping
- Expansion of worldwide demand of high-quality products
- Multinational food companies showing interest
- Agriculture's increasing shift toward higher value added crops
- Efforts to liberalize
- Trade in Agricultural Products
- International Air transport regulations

Maritime shipping is becoming an increasingly problematic partner for exporters of high value-added perishable farm products. The congestion of the Port of Los Angeles and Port of Long Beach has been talked about for a few years and is well documented through the media as well. With regards to the expansion of worldwide demand on high-quality products, "there has been a dramatic expansion of the worldwide market for high quality and typically high value-added food products grown and processed under conditions conducive to wholesomeness and food safety" (O'Connell 2005). A lot of prosperity has been increasingly spreading to several populations in most of the world's countries, specifically to those that usually classified as Newly-Industrialized Countries (NICs). The increase in prosperity comes with demand of food products that are considered nutritious, wholesome, and safe consume. The June 2004 report from the Economic Research Service (ERS) of the U.S. Department of Agriculture observed:

"High income-growth rates in developing countries portend higher rates of fruit and vegetable consumption and trade in the future. In the

meantime, developed countries will dominate global consumption and trade of fruits and vegetables, not only because of their high income levels but also because of consumers' increasing concerns about healthy eating, which tend to increase fruit and vegetable intake in their diets. The United States is well placed to take advantage of the potential for greater horticultural trade."²

Exports are a vital part for California's fruit, nut and vegetable growers. Almonds, wine, table grapes and raisins are four of the United States' top 10 specialty crop exports which are grown principally in California. In 2002, over 90 percent of all table grapes, lemons, processed tomatoes, and garlic that were exported to other countries were grown and processed in California. Over \$1 billion worth makes up over 80 percent of California almond crop is exported. Fresh lettuce and strawberries, two other commodities grown primarily in California, have increased their exports by 85 percent and 76 percent respectively since 1999. And exports to the traditional markets also continue to develop and grow. In O'Connell's report, it is stated that given the growing importance of product differentiation in which California agricultural exporters may find it useful to emphasize the issue of food safety, air shipments of fresh produce minimize the risks associated with improperly shipped edible products.

The multinational businesses that feed much of the world's population are becoming more and more concentrated and globalized. The trend toward greater consolidation in the wholesale, retail and food processing segments of the food industry is continuing in North America, Western Europe, and throughout the world. In the past several years, there has been a sharp trend in the world's food and beverage industries toward larger and fewer enterprises in production, processing, and distribution. Factors that have been urging this trend forward are: ongoing progress toward economic integration in Europe, the continued consolidation of North American food processors, wholesalers and retailers through mergers and acquisitions, and the imperative facing major North American and European corporations to expand beyond their respective domestic markets, which especially in Europe's case, have limited growth potential (O'Connell 2005). Increase in such trends can be seen as a positive increase in the economic growth of the country. Seeing that several world countries are involved in multinational businesses, one can predict a high increase in air freight in the near future to keep up with such businesses.

Efforts, in general to liberalize both trade in agricultural products and international air transport regulations should open new markets and expand existing markets in California.

² Global Trade Patterns in Fruits and Vegetables by Sophia Wu Huang et al. Agriculture and Trade Report No. (WRS0406) 88 pp, June 2004 (Washington, D.C. USDA, Economic Research Service), p. iv. The report further notes that: "Demand-side factors, which include rising incomes and the creation of a middle class that demands quality produce in all seasons and is willing to pay, have had major consequences for trade."

5.0 Data Sources

There are three main types of data sources that are mainly predominant in agricultural freight data. These are: WISER, UC Davis Farm Export Data, and USDA ERS Export Data. Below are details of each type of data source.

“The “state-of-origin” export data used in this chapter as well as elsewhere in this report were obtained from the World Institute for Strategic Economic Research (WISER). 109 WISER was established in 2004 to continue the international trade data work of its predecessor, the Massachusetts Institute for Social and Economic Research (MISER). From 1988 through 2004, MISER had been one of the U.S. Census Bureau’s Business and Industry Data Centers. Its special focus had been on foreign trade statistics developed by the Census Bureau’s Foreign Trade Division from Shippers Export Declarations (SED) filed in conjunction with most export shipments from the U.S.

During the late 1970s and into the 1980s, California Department of Food and Agriculture statisticians sought to devise a more refined methodology that relied more extensively on information provided by the state’s growers and shippers and especially the various government-sanctioned organizations responsible for administering marketing orders. In 1997, CDFA entered into an agreement with the Agricultural Issues Center (AIC) at the University of California at Davis to measure the value of the state’s agricultural export trade.

That rough-edged methodology works well for those crops like almonds, walnuts, pistachios, raisons, figs and olives where California effectively accounts for the entire national output. For most other crops, though, there are fairly obvious drawbacks associated with this method of counting California’s farm exports. Still, it is a methodology that remains in use by the USDA’s Economic Research Service (ERS).

Not collected by the US Census, but Instead, ERS estimates state shares of agricultural exports using Custom District-level export data compiled by the U.S. Census Bureau and state-level agricultural production data supplied by USDA's National Agricultural Statistics Service (NASS). These approximations are adjusted for exports of agricultural products for which NASS does not collect state-level production data. Using these approximations, a state that is the largest producer of an agricultural commodity will also account for the largest share of U.S. exports of that

commodity. Countries of destination for each state's exports cannot be determined using this data series.”³

Figure 5-1 below shows the different perspectives the three data sources can have (on billions of dollars).

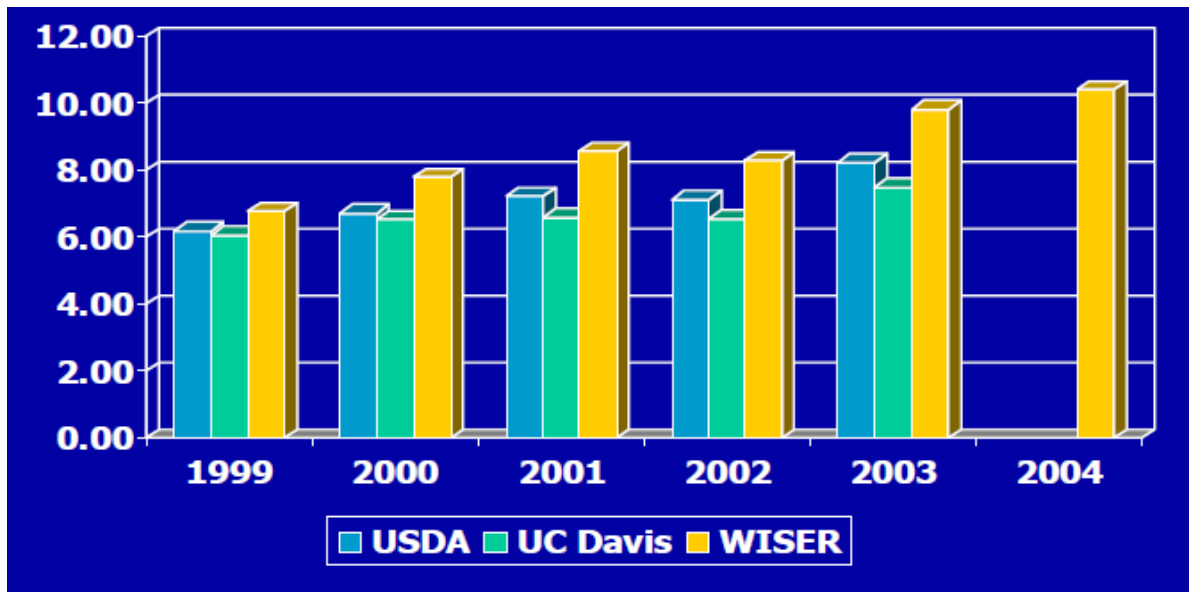


Figure 5-1: Differing Perspectives on California's Agricultural Export Trade

There are significant methodological issues noted and are involved in explaining California's agricultural export trade. "WISER/MISER readily concedes that gateway states like California are credited for unknown volumes of agricultural commodities actually produced in other states but shipped abroad via a California seaport, airport or border crossing" (Mason 2005). It is common that the contents of the freight containers have to be broken down and repacked into new containers suited to the space available on specific aircrafts. When this situation arises, there is a very high likelihood of the clerk filling out the Shippers Export Declaration indicating that the contents started its journey into international trade from the spot at which the repackaging occurred – usually an air cargo terminal on or near an international airport. As a result of this, agricultural products that are shipped from the Pacific Northwest to the overseas destinations via SFO or LAX are usually formally identified as exports of California. This is one of the few reasons that cause the difference within the three types of data sources. The problem is likely not getting resolved until efficient technologies are present for tracking individual shipments. These technologies do exist, but are currently not sophisticated enough and are too expensive. These gadgets will need to permit tracking of agricultural shipments from the point-of-production or the packing house to the final destination abroad.

³ O'Connell, Mason, Hagen. (May 2005). *The Role of Air Cargo in California's Agricultural Export Trade*. Center for Agricultural Business & California State University, Fresno, pp 66-73.

6.0 International Air Cargo System

In any international air cargo shipment, the process typically begins with the shipper contacting a freight forwarder when the shipment is ready for delivery. Before it goes to the freight forwarder, there is a time frame in which the freight forwarder can agree or disagree to arrange for delivery. Once the freight-forwarder agrees to arrange the shipment for the shipper, the freight forwarder then evaluates the flight connections offered by those air carriers serving the desired route and determines which carrier offers the best overall deal for the shipper. The freight-forwarder then books space for the cargo. Once an air carrier has confirmed the booking, the freight forwarder often but no always arranges for the cargo to be picked up from the shipper and brought to the airport. After the required documentation is completed, the cargo is checked-in at the airport terminal. Terminal operators or ground handlers are responsible for loading cargo into the air carrier (airplane) for transport. When the air carrier arrives at the destination airport, the cargo is unloaded and taken to the terminal, where the freight forwarder receives it from the ground handlers. The cargo is then sorted and delivered to the consumer. Figure 6-1 shows this in a flow chart format

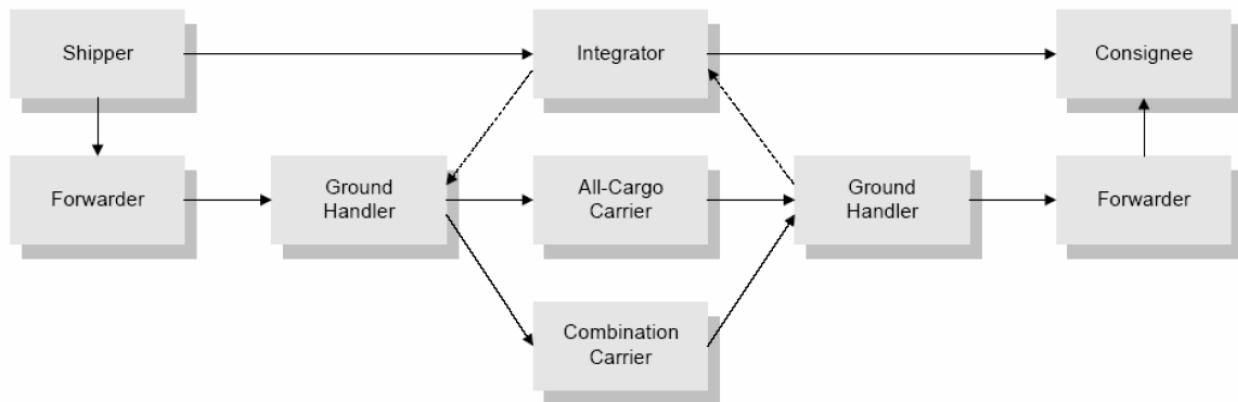


Figure 6-1: International Air Cargo System ⁴

⁴ O'Connell, Mason, Hagen. (May 2005). *The Role of Air Cargo in California's Agricultural Export Trade*. Center for Agricultural Business & California State University, Fresno.

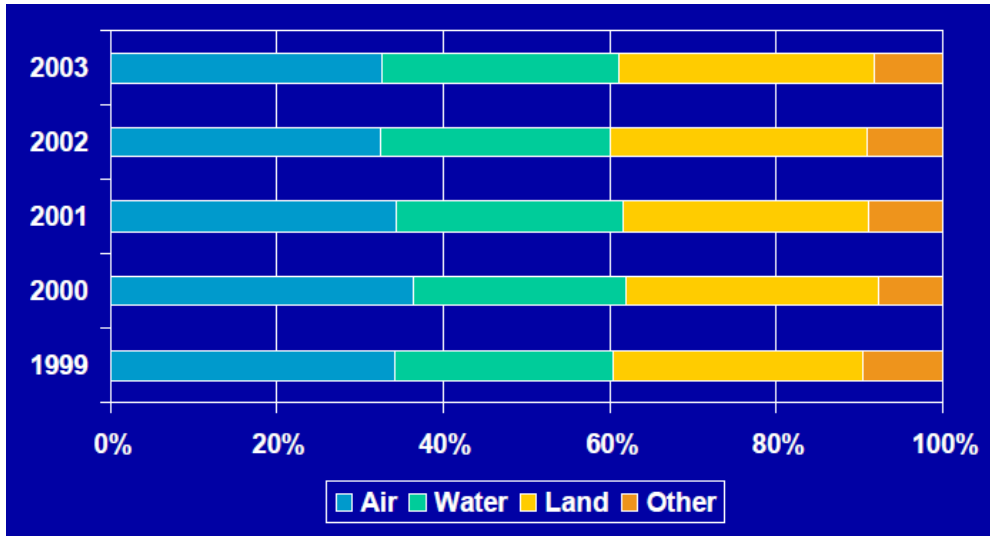


Figure 6-2: Air Cargo and U.S. Exports Share by Dollar Value⁵

One common misconception made by the general public and many public policymakers is that international trade is largely confined to the nation's seaports and to border crossings with Canada and Mexico. It is true that the heavy lifting when it comes to moving America's exports is done by ships, trucks and trains (as seen in Figure 6-3). But as Figure 6-2 indicates, when the nation's export trade is calibrated in dollar terms, the picture changes drastically (O'Connell 2005).

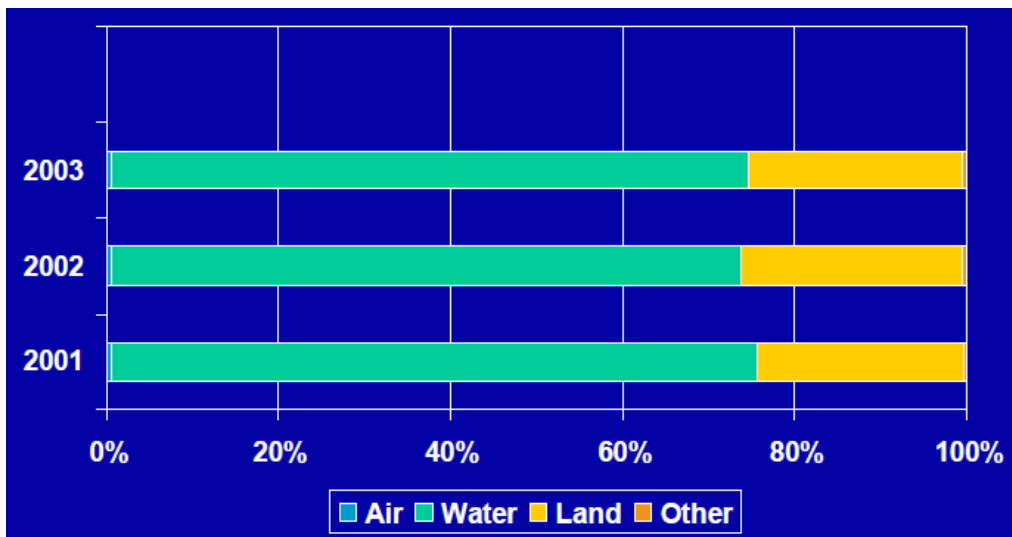


Figure 6-3: Air Cargo and U.S. Exports Share by Weight⁶

⁵ Source: U.S. Bureau of Transportation Studies

⁶ Source: U.S. Bureau of Transportation Studies

7.0 Air Cargo System in California

As for freight exported out of California, measuring in dollar value shows that there are more of California's commodity exports transported by air than by sea or land combined. As seen in Figure 7-2 (data seen in millions of dollars), 54.7 percent of the total exports trade from California traveled by air. Only 25.9 percent was transported over land to Mexico and Canada and seaborne shipments only accounted for 19.4 percent of the total value of California's export trade in 2004.

	Total Exports	By Air	%	By Sea	%	By Land	%
1997	\$99,161	\$61,266	61.8%	\$17,899	18.1%	\$19,996	20.2%
1998	\$95,768	\$57,533	60.1%	\$16,032	16.7%	\$22,203	23.2%
1999	\$97,920	\$61,522	62.8%	\$14,217	14.5%	\$22,181	22.7%
2000	\$119,640	\$77,859	65.1%	\$16,810	14.1%	\$24,971	20.9%
2001	\$106,777	\$64,879	60.8%	\$19,350	18.1%	\$22,548	21.1%
2002	\$92,214	\$52,726	57.2%	\$17,234	18.7%	\$22,254	24.1%
2003	\$93,955	\$50,375	53.6%	\$19,878	21.1%	\$23,742	25.3%
2004	\$109,968	\$60,171	54.7%	\$21,319	19.4%	\$28,477	25.9%

Figure 7-1: California Merchandise Exports by Mode of Transportation 1997-2004 ⁷

By one University of California estimate, air cargo is, on average, at least 37 times as valuable as goods transported by truck. The timely delivery of such cargos has become an increasingly critical requirement for many of California's most competitive industries. Indeed, according to a study by the Institute of Transportation Studies at UC Berkeley, the ability to move goods via air cargo is more important to California than to the nation as a whole.⁸

8.0 Current Issues

The primary question seems to be if California's current air transportation can cope with the future given that it is expected to double or triple by 2025. A few issues with the two main gateways in California are stated. LAX Airport has very little space for expansion due to the location being near cities. LAX also faces much political opposition from neighboring communities. The noise level of airports is very high and causes disruption among cities. Being an international airport, it is a difficult to maintain all departures and arrivals during the day time. It is important to remember that half of the freight that is airborne is placed in passenger flights. Many cities and neighborhoods are beginning to oppose dramatically to airport noise. An example of this kind of opposition is seen below for Mather Airport. SFO Airport usually has issues with weather and diversions due to the constant San Francisco fog that occurs. Also, given the past history, SFO also has been very slow in upgrading their cargo handling capabilities. Both Airports have heavily congested highways that lead to the airport. This can cause severe delays of the shipment making it to the airport on time. If it is delayed, the flight will have to leave without a full load or the flight could get delayed if there is a heavy traffic issues. In the case of agricultural products, this can cause a major loss of business

⁷ Source: WISER

⁸ O'Connell, Mason, Hagen. (May 2005). *The Role of Air Cargo in California's Agricultural Export Trade*. Center for Agricultural Business & California State University, Fresno.

and the commercial life of the product could also expire before the product gets to the consumer. Below is a summary of issues with both the California gateway airports:

Issues with Los Angeles International Airport:

- Little Space for Expansion
- Faces Strict political opposition from neighboring communities in case of increase in flight operations
- Highway access congested

Issues with San Francisco International Airport:

- Flight delays due to weather & diversions
- Slow to upgrade cargo handling capabilities
- Highway access congested

Below is an example of a political opposition to an increase in flights at an airport (Mather – Near Sacramento, CA). A document called “Ten Good Reasons Making Mather Field a Cargo Hub is a Bad Idea”. Given below are the 10 reasons the community has come up with to stop the increase in cargo flights to an airport. This is shown here to insist on the importance and major issue of these political oppositions.⁹

1. Expanding Mather will condemn our area to a future of noise and air pollution, and reduced home values for generations. The Sacramento area has more airports (Sac International, McClellan, Executive and Mather) than any other city in the world.
A toxic dump is more welcome than another major airport.
2. All major cities the world gets their freight without freight hubs. That's because freight comes in at the wee hours when passenger traffic is over. Additionally, 50% of all air freight is transported in the belly of commercial airlines. Sacramento International can handle all the freight this region will need for the foreseeable future.
3. In order to be near Sacramento International airport, UPS and Fed Ex are headquartered in West Sacramento. Locating another connection point 15 miles away at Mather is a logistical waste and an additional traffic burden for Hwy 50.
4. The \$100 million dollar 'special interest' plan for a runway extension so UPS can land jumbo jets side by side at 3 AM is a waste of tax dollars, and will cause a billion dollar loss in real estate values throughout the region.
5. The Board's own business model for Mather (due to inflation, now outdated) shows a 3% return on this investment. That's just another gold plated government looser.
6. The FAA's 1991 study said cargo only airports have little benefit for local economies.
7. Freight is a low wage, mechanized business. Loading and unloading of any kind requires very little skill - bar codes and powered conveyors do most of the work. There is very little spin-off to the freight business. It does not generate any local ancillary enterprises. Freight terminals are business "islands".

⁹ <http://www.keepthepeace.org/10%20Reasons%2012-22-07.pdf>

8. Allowing foreign jumbo jets use our community as a convenient refueling station while on their way to another country adds nothing to our well-being. Just the opposite, it degrades our property values and demoralizes our citizens.
9. There has never been a request from the public for this operation. Every community on the west coast has been against an air cargo hub in their area. When Mather closed in 1993, there was a collective sigh of relief for Sacramento homeowners and realtors.
10. The Sacramento area is rated amongst the worst air quality regions in the nation. Encouraging transient jumbo jets to rain down exhaust and noise on established residential neighborhoods 24 hours a day is just plain criminal.

WE NEED PUBLIC OFFICIALS WHO ENHANCE OUR LIVES NOT DEVASTATE THEM. ⁹



Figure 8-1: Airport Noise Political Poster example

Posters such as the one in Figure 8-1 have also been created locally to add an emotional aspect to the issue of airport noise.

Given all these issues, it is important to keep in mind the main goal. It is to increase and make better the air freight transportation in California.

9.0 Recommendations

General recommendations are made for each part of California and listed here. These recommendations have been suggested by several other studies and summarized below.

Southern California

- LAX to shift activity to Ontario
- Migration to Ontario Airport and march GlobalPort
- San Diego to resolve issues regarding space for more freight flights

Northern California

- Oakland International to gain shares of SFO cargo traffic

Central Valley

- Sacramento International and Mather Field taking on a bigger role for freight

General

- FedEx or UPS to secure a larger share of the international air freight market to other airports
- Establishment of international air cargo service at airports nearer to where high value-added specialty crops are grown

References

Aviation in California: Benefits to Our Economy and Way of Life, California Department of Transportation, Department of Aeronautics (June 2003)

Brian Clancy and David Hobbin. "After The Storm: The MergeGlobal 2004-2008 World Air

Bureau of Transportation Statistics, U.S. Department of Transportation, "Pocket Guide to Transportation 2004".

David E. Wirsing, "San Francisco is a too-familiar example of airports that neglect the needs of air cargo." *Air Cargo World*, September 2004

Freight Forecast," *Air Cargo World*, May 2004

Jon D. Haveman and David Hummels, California's Global Gateways: Trends and Issues

"LAX Traffic Crunch," *Los Angeles Daily News*, November 20, 2004

O'Connel, Mason, Hagen. (May 2005). *The Role of Air Cargo in California's Agricultural Export Trade*. Center for Agricultural Business & California State University, Fresno

San Francisco: Public Policy Institute of California, April 2004

SCAG, Draft Regional Transportation Plan: Task Forces – Aviation (February 2001)