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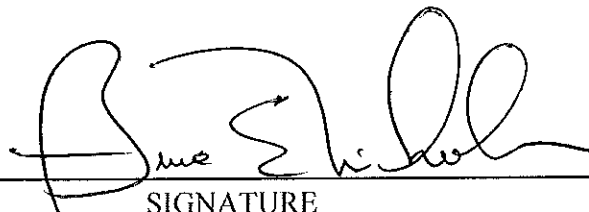
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# Southern California International Airport

## Exploratory Study 2.1

Prepared By:  
CSUSM FEMBA Cohort Class 2014 Entry

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## 1. Executive Summary

Within the next 15 years, demand for air travel in Southern California is predicted to surpass the capacity of its airports. This report is the third in a series of Master's projects focusing on the construction of a new Southern California International Airport (SCIA) that would not only address this supply shortage, but also be a catalyst for sustaining economic growth in the region. The vision is for SCIA to become a mega hub serving as a gateway between Asia and the American continents much like Dubai International and Japan's Narita airports connect their sections of the globe. This year's Master's project expands the research on the proposed SCIA airport by addressing funding methods, exploring the mega hub concept, and assessing the economic impact the airport will have on the region.

According to the 2013 Exploratory Airport Study (EAS), several Southern California airports, including the Los Angeles International Airport (LAX), John Wayne Airport (SNA), and San Diego International Airport (SAN), will be unable to meet capacity demands by 2040. That study evaluated several locations for a new Southern California International Airport (SCIA) and determined the only feasible location is on the southern edge of Camp Pendleton (Farberov, Hyatt, Rangel, & Rendina, 2013).

The 2014 Exploratory Airport Study (EAS 2.0) evaluated the regional impacts of a new airport at the proposed location. Those findings framed the airport as a Tri-County airport that would service San Diego, Orange and Riverside counties. EAS 2.0 defined the geographic scope of the region and the demographic profile of its population. It went on to demonstrate how existing airports do not sufficiently serve their needs. From there, it benchmarked the Tri-County region against other metropolitan areas and determined that most are served by at least one major international airport in addition to a large airport handling primarily domestic flights. *It should be noted that EAS 2.0 in no way suggests SCIA replace San Diego International, but instead work in conjunction with it to meet the expanded demand.* With this increase in traffic, the study also analyzed public and private transportation needs as well as the potential economic impact of the proposed airport on the region. While the undertaking of such a large project will require cooperation from many entities both public and private, most stakeholders agree that a new international airport would provide tremendous value to the Tri-County region.

This 2015 Exploratory Airport Study (EAS 2.1) continues to assess the viability of SCIA. The first chapter (Section 2) benchmarks funding methodologies of national and overseas airport construction in the 21<sup>st</sup> century. The last new major airport built in the United States was Denver International Airport (DEN) in 1995 at the end of the 20<sup>th</sup> century. Benchmarking international airport development will give context to more recent construction projects. The chapter explores capital programs and bond funding as well as operational revenue from passenger fees, gate leases and other non-aeronautical revenue such as car rental facilities. It goes on to assess the potential operational efficiency of SCIA by analyzing cost per enplanement (CPE) along with



non-passenger revenue sources and airport cost metrics of five benchmark airports in the United States. The chapter closes by analyzing the relationship between CPE and other financial parameters such as long-term debt, non-passenger airline revenues, and earnings.

The second chapter, (Section 3), investigates the potential benefits of making SCIA a hub airport for at least one international carrier. Besides Southwest Airlines, a domestic point-to-point carrier, no other major airline considers San Diego home. Most of the largest airports in the U.S. house a hub for at least one major international airline. Building upon the funding models described in the previous chapter, it explores the potential funding role and economic impact of building a hub for a major carrier for SCIA. Questions focus on the types of incentives needed to attract a hub airline, and the role hub airlines can and should play in funding, developing, and designing airports.

The final chapter (Section 4), builds upon the economic impact study of EAS 2.0 that focused primarily upon the economic impact of airport from on-site operations. This year's study goes further by analyzing the economic impact an airline hub might have on the broader Tri-County region, including the potential impact of travelers from Asia on local housing, retail, and hospitality sectors.

EAS 2.1 reinforces the previous studies' findings of a clear need for additional capacity in the Southern California region driven by strong growth in international travel. The economic impact to the region will be significant, not only from the initial construction that would last for several years, but beyond from the ongoing revenue generated by related and supporting industries. The analysis in this report shows that a mega hub international airport that provides a gateway directly connecting the Tri-County region to emerging economies in Asia and Latin America will benefit local residents and the industries that employ them, as well as international visitors and the industry sectors that serve them.

The report suggests that attracting one or more hub airlines to the airport will be key to making SCIA a major international transit point. SCIA has a unique opportunity to partner with potential hub airlines early in the planning and construction processes. Doing so can ensure that this 21<sup>st</sup> century airport will be designed to meet the needs of international travelers and the carriers that serve them. Financial analysis further suggests that strong airport-carrier partnerships should result in increased efficiencies. The analysis points to opportunities for increasing non-aeronautical revenue from areas such as concessions, retail and rental car facilities. Public-private partnerships should also be considered in the area of terminal management. SCIA has the unique opportunity to set the new standard for airport development and operations in North America. Success depends on vision, openness to innovative partnerships, new funding models and calculated risks. The global marketplace is becoming ever more connected and it is time to prepare the Southern California region for the future of international air travel.



## Funding Benchmarking

## 2. Funding Benchmarking

### 2.1. Introduction

The most recent major airport constructed in the United States was the Denver International Airport (DEN) in 1995 and the quality of airport infrastructure in the United States has fallen behind many developed and emerging countries. According to the World Airport Awards (also known as the Passengers Choice Awards), the top 10 rated airports in customer satisfaction do not include a single United States (U.S.) airport. Additionally, according to a report by CNN, the main culprit is the nation's lack of dedicated aviation infrastructure investment.

This chapter analyzes funding trends for airport construction and expansion projects over the past 15 years in order to support the development of the proposed Southern California International Airport (SCIA), which aims to accommodate increasing and unmet demand for air travel to and from the region. The chapter includes international airport development and expansion projects to provide additional context on airport infrastructure development and funding methodologies.

The following airport projects will be included in this analysis:

1. San Diego International Airport (SAN)
2. San Francisco International Airport (SFO)
3. Seattle Tacoma International Airport (SEA)
4. Los Angeles International Airport (LAX)
5. Denver International Airport (DEN)

#### 2.1.1. Research Questions

1. How many new airports have been built in the past 15 years, are being built, or are in the planning process?
2. How are airports funded in the 21<sup>st</sup> Century?
3. What are the revenue drivers of an airport, both aeronautical and non-aeronautical?
4. What is the operational viability of SCIA? A statistical analysis of key metrics.

#### 2.1.2. Scope and Limitations

The focus of this study will be to benchmark airports with projected enplanements greater than 10 million per year for US airports. Measurements for international airports will be stated in terms of the total number of passengers per year rather than enplanements as this is the standard international metric. Passengers equate to roughly double the number of enplanements.

#### 2.1.3. Methodology

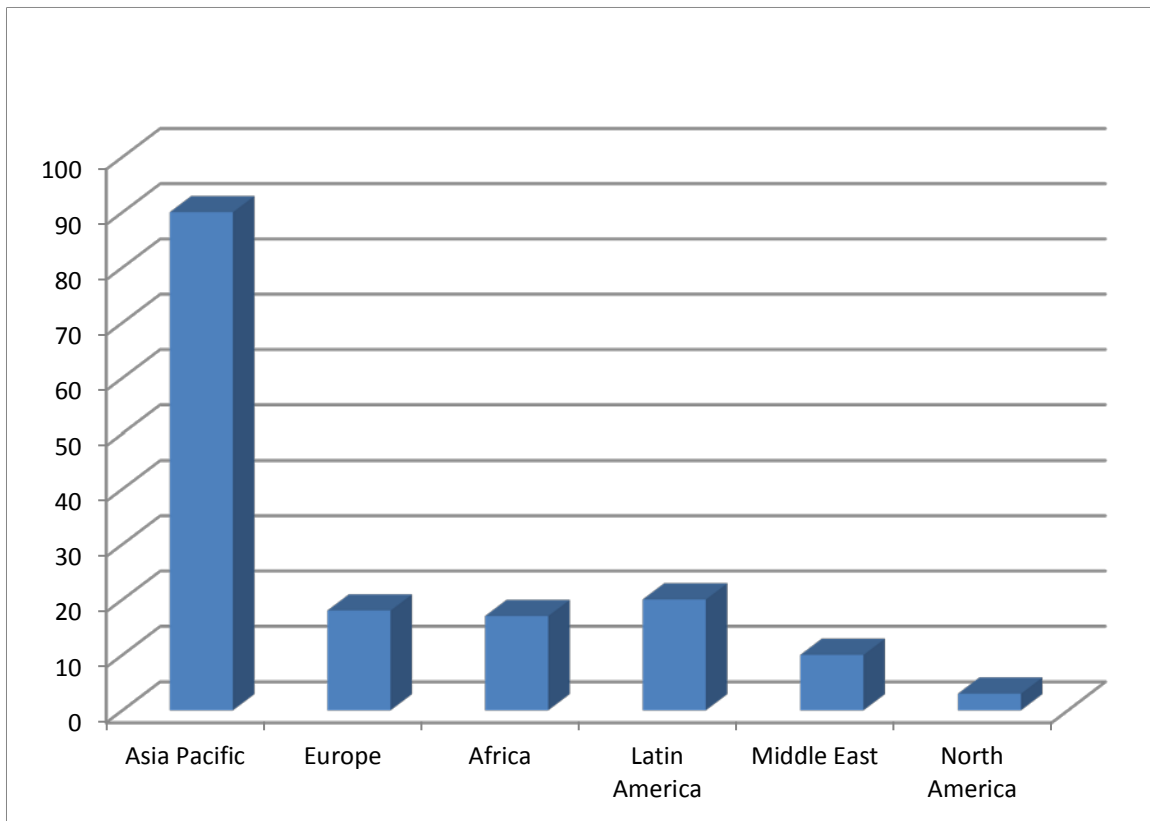
Using secondary data, this section benchmarks new airports and large infrastructure improvements to better understand capital as well as operational funding sources and challenges.

This chapter also investigates how airports in the U.S. finance capital improvements and developments through research in past capital improvement and greenfield construction projects. U.S. public infrastructure projects and associated funding strategies are compared and contrasted with those in other nations. Lastly, operational viability of the proposed SCIA is explored through statistical and regression analysis of all large-hub airports in the U.S.

## 2.2. New Airports and Large Infrastructure Improvement

In the past century, the commercial airline industry evolved from rickety 75-horsepower seaplanes to an “industry that today provides a kind of global connectivity that was “unbelievable” a century ago,” (Johnson, 2014). According to statistics by the International Air Transport Association (IATA), “3.1 billion people flew in 2013, surpassing the 3 billion mark for the first time ever. That figure is expected to grow to 3.3 billion by 2014 and represents about 44 percent of the world’s population,” (Johnson, 2014). Over the past century, mature economic hubs for trade have invested heavily in airport infrastructure and emerging markets are currently investing heavily in airport projects. The graph shown in Figure 1 reveals the significant amount of investments the Asia Pacific region, specifically China and India, are directing towards new airport construction projects.

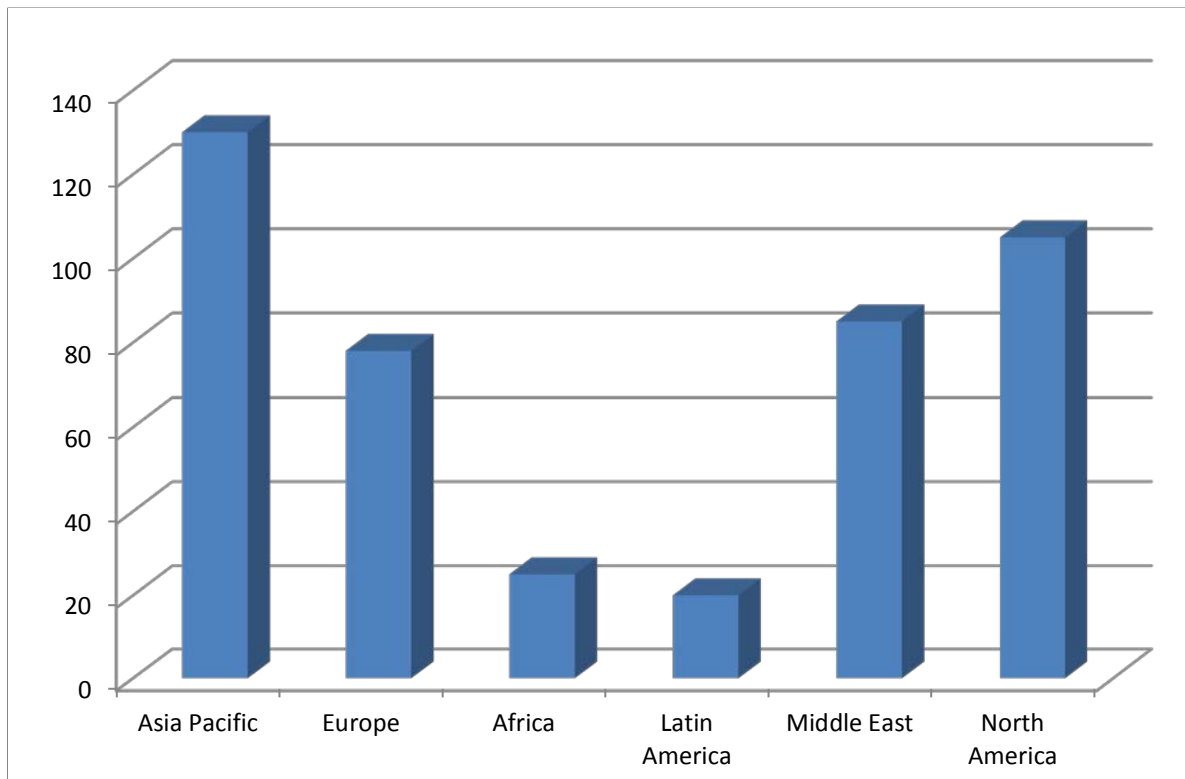
Figure 1: Number of new airport projects by region (investment, USD), July-2015



Source: Centre for Aviation

The majority of investment dollars spent on new airport construction is concentrated within the Asia Pacific region. At first glance, it appears as though the transportation superiority of countries in this region will rapidly surpass North American economies that are not investing as heavily in new projects. If investment in infrastructure is used to predict future economic growth, such an imbalance in investment may indicate that China and India are poised to catch up to North America and if North America does not invest in keeping its infrastructure on par with China and India, it may fall behind. That being said, North American cities already have large-scale transportation hubs and rather than developing new airport projects, these cities are concentrating their investment dollars on airport revitalization and expansion projects. Figure 2 reveals that the North American region is only lagging slightly behind the Asia Pacific region in total investments on airport projects that include new construction, revitalization and expansion (Centre for Aviation, 2015).

Figure 2: All airport project investment by all types, activity by region in USD as of Jun-2015



Source: Centre for Aviation

This chapter focuses on international airport development and expansion projects to provide international context on airport infrastructure development and funding methodologies. The section will provide statistics on regional hub airport development projects in the following regions: North America, South America, Europe, Asia Pacific, Africa and the Middle East.

### 2.2.1. Projects in North America

The largest North American airport development project is the Mexico City International Airport (Centre for Aviation (CAPA), 2015). This new airport is expected to begin phase one of its operations in 2020, will ultimately accommodate 120 million passengers annually, and cost a total of \$11.3 billion. This airport will also replace the existing Benito Juarez International Airport, and is expected to have one large terminal of 560,000 m<sup>2</sup> and six runways, two that will be each 4.5 km long and four that will be each 4 km long (Martin, 2015). It will be developed on federally owned land in the Zona Federal del Lago de Texcoco, between Ecatepec and Atenco in the State of Mexico, which is about 10 km northeast of the existing Benito Juarez International Airport.

The airport design, which appears in Figure 3 below, was created by Foster + Partners in collaboration with Fernando Romero Enterprise (FR-EE) and Netherlands Airport Consultants (NACO). According to Foster + Partners, the new airport will be the "world's most sustainable airport" as it will be the only certified LEED Platinum airport in the world, and will feature rainwater collection, daylight direction, and "comfortable temperatures that will be maintained internally for much of the year, and almost entirely using air drawn from outside, with little additional heating or cooling required" (Projects / List / Mexico City International Airport Mexico City, Mexico 2014, 2015).

Figure 3: Architectural Rendering of Mexico City International Airport



Source: (Projects / List / Mexico City International Airport Mexico City, Mexico 2014, 2015)

Funding for this airport, as well as ongoing operations, will be managed by The Grupo Aeroportuario de la Ciudad de México (Airport Group of Mexico City), a state-owned operator that also owns the existing Benito Juarez International Airport. According to Airport Group of Mexico City CEO Federico Patino, a \$3 billion revolving credit line will serve as the airport's



initial source of funding, which will be replaced by long-term bonds. The airport's loan program will be divided between bonds (up to \$6 billion) and federal government funds. To date, JP Morgan Chase & Co., Citigroup, HSBC, Banco Santander SA, and Banco Bilbao Vizcaya Argentaria SA are managing the sale of the bonds. JP Morgan Chase & Co., Citigroup, and HSBC are also coordinating the completion of the credit line. "As we use the credit line, we'll refinance it in capital markets," Patino said. "We are very advanced with ratings agencies with the idea of having the best rating possible" (Cattan & Cota, 2015).

According to the Centre for Aviation (CAPA) Airport Construction 2015 Mid-year Review, the Los Angeles International Airport (LAX) is currently undergoing several improvement projects, with the largest being the new Tom Bradley International Terminal (TBIT) project. The first phase of the new TBIT was completed in 2013 and the second phase is scheduled for completion this year. Improvements include doubling the capacity of the terminal to 1.2 million square feet with 18 new gates, nine of which will accommodate larger aircrafts, such as the Airbus 380 super jumbo jet, Boeing 747-8 Intercontinental, and Boeing 787 Dreamliner, premier dining and shopping, and expanded federal customs and immigration screening areas. The total cost for the new TBIT is \$1.9 billion, up from \$1.5 billion, which is due to the addition of several individual projects that have been added to the TBIT project. According to the project website, the new TBIT is being funded by LAX operating revenues, capital improvement program funds, fees from airlines, passenger facilities charges, and airport revenue bond proceeds (Los Angeles World Airports, 2015).

### 2.2.2. Projects in South America

The majority of current airport development and expansion projects in South America are located in Brazil. The largest airport development project, announced in 2013, is the New Airport São Paulo (NASP), which will be located 40km north of São Paulo city and will cost \$2.2 billion. According to CAPA, this airport will feature a 340,000sqm passenger terminal with capacity for 48 million passengers annually, as well as a 70,000sqm cargo terminal and two 3500m runways (Centre for Aviation, 2015).

This new airport will serve as the third international airport in the São Paulo region, in addition to Sao Paulo Guarulhos International Airport (GRU) and Campinas Viracopos Airport (VCP), both of which are majority privately owned. The State operator Infraero retained 49 percent of the overall equity. This new airport is also expected to be privately owned and is targeted for completion in 2024. As of October 2015, the CCR Group, an infrastructure concession group, announced it, "now holds the purchase option for the airport's area in the São Paulo Metropolitan Region." CCR also reported that it is no longer required to reimburse its shareholders for land purchase costs or any other spending deriving from the project's studies stage (Filho, 2015). According to Investe São Paulo, a private company of public interest from the Government of the State of São Paulo that is associated with the Department of Economic

Development, Science, Technology and Innovation (SDECTI) via cooperation, the airport project currently faces opposition from the GRU and VCP concessionaires as they contend they were not made aware of the proposed new airport at the time of placing their bids and argue that a new airport terminal would hurt their business (Investe Sao Paulo, 2015).

Brazil began privatizing airports in 2012 in response to increases in air travel (approximately 6.4 percent during the last decade) as well as anticipated air travel increases due to the FIFA World Cup in 2014 and the Olympic Games in the summer of 2016. Privatization required that each consortium upgrade gateways and infrastructure in advance of the 2014 World cup and 2016 Olympics. In addition, each consortium was required to make annual payments, in accordance with the concession period of each airport, to the Fund for National Civil Aviation (FNAC), which was intended to improve the quality of existing airports and enhance the development and integration of Brazil (CAPA, 2015).

### 2.2.3. Projects in Europe

The Berlin Brandenburg Airport (BBI) in Germany is one of the largest airport development projects in Europe, and once operational, will be the largest airport in Germany with an initial annual capacity of 27 million passengers and future annual capacity of 45 million passengers. Although initially slated to open in 2011, ongoing construction delays has caused the opening date to be postponed four times. The airport is currently scheduled to become operational in the second half of 2017 and will ultimately replace all three airports in Berlin, Tempelhof (THF), Tegel (TXL) and Schönefeld (SXF) (Centre for Aviation (CAPA), 2015).

Before construction began in 2006, the costs were estimated at 2.5 billion euros, however, delays have more than doubled costs. According to Airport World, funding for this airport project was secured from a consortium of seven German banks that was headed by the European Investment Bank (EIB), which contributed 1 billion euros to the project (Airport World, 2009). Initial funding was expected to secure all further construction phases, however, in response to construction delays, additional funding of 30 million euros was pledged by the European Union (EU) in 2009 to help with the completion of the project, with the last portion paid in 2013.

The London Heathrow airport announced a five-year (2014-2019) infrastructure project in 2013 and has more recently received support from the Airports Commission for a proposal to build a new 3,500m runway, which, if approved, will reportedly be one of the largest infrastructure projects in the world with estimated costs of 17.6 billion pounds (\$28 billion) (Smith, 2015).

The initial five-year infrastructure project included the completion of Terminal 2 (demolition and subsequent rebuilding), a new integrated baggage system and new taxiways and stand that will allow the airport to accommodate more modern aircrafts, such as the Airbus A380. Funding for this project represented one of the largest private-sector investments in UK



infrastructure. The plan also included a tariff increase of retail price index (RPI) (RPI is similar to the consumer price index measure of inflation) of 5.9 percent and an average maximum allowable charge per passenger of 24.56 pounds over the five year period.

According to BBC News, funding for the proposed runway will come from private sources. However, taxpayers may be required to invest up to 5.7 billion pounds for additional infrastructure (BBC News, 2015). Prime Minister David Cameron is expected to announce his approval of the proposed runway by the end of this year.

#### 2.2.4. Projects in Asia Pacific

According to Centre for Aviation (CAPA), the Asia Pacific Region leads the world in investment dollars spent on airport new construction and airport improvements projects (Centre for Aviation (CAPA), 2015). As emerging markets in the Asia Pacific region mature, demand for air travel is increasing due to growth in disposable income and increased business travel (BMI Research, 2010). This section focuses on recent large airport development and redevelopment projects in China, India and Southeast Asia and how these projects are being funded.

During the past decade China has invested heavily in infrastructure with 54 new airport construction projects in the planning and construction phases (Centre for Aviation, 2015). According to the Civil Aviation Administration of China (CAAC), the 2008 Beijing Olympic Games and the Expo 2010 Shanghai prompted major airport construction in China and between 2006 and 2010 China built 45 new airports (BMI Research, 2010). The outlook for airport development projects will not be as substantial as the previous 15 years; however, the expansion drive, especially in regional airport construction, is not over for China, with several projects still in the pipeline, albeit of a smaller scale. Currently two of the largest projects in progress are the Kuming Airport US \$900 million and the Wuhan Tianhe Airport Expansion Project Phase III US \$2.15 billion (BMI Research, 2010). The government funds airport projects in China. According to the CAAC, the government announced in November 2008 that as part of the stimulus plan, US\$58.5 billion would be spent on airport infrastructure in 2009 and 2010, for the construction of 50 new airports and the upgrading of 90 others, (BMI Research, 2010).

India's population is growing wealthier with an expected gross domestic product per capita growth of 14 percent per annum between 2010 and 2020 (Business Monitor Online, 2010). This will fuel demand for air travel in India, which is fueling a large amount of development in airport infrastructure. The Business Monitor Online article titled *Bigger Opportunities in Airport Infrastructure as India Trails China* explains how airport development projects in India have become public private partnerships in funding and construction:

"The government has earmarked US\$8.6bn for airport infrastructure investments, having perpetrated an equal amount in investments over the past 10 years. The private sector has shown a great interest recently in building and operating airports in India, with major

local, but also international players announcing stepping up their presence in India's airport sector. The involvement of the Indian conglomerates is altering the competitive landscape in India's airport sector, creating a buoyant market as competition between Reliance, HCC, GMR Infrastructure and GVK Power and Infrastructure heats up."

Conglomerates have realized high profitability in airport operations and are increasingly willing to invest in airport projects in order to obtain operator rights and India has leveraged the increasing conglomerate competition to help fund their ambitious number of airport projects (BMI Research, 2013) (BMI Research, 2010).

In addition to the impressive number of airport projects in China and India, Southeast Asia is also investing heavily in airport infrastructure. Indonesia, Myanmar, and Vietnam are at various stages of large-scale multi-billion dollar airport development projects seeking to become the next regional hub (BMI Research, 2011) (BMI Research, 2013). According to the Business Monitor Online, within this region there is a strong reliance on public-private partnership (PPP) frameworks (BMI Research, 2013). "Recent developments in Vietnam's airport sector indicate that government efforts to increase private sector participation are taking off. Not only will this provide the government with funds for additional airport projects, but will help create a more competitive business environment that will spur business efficiency and raise service standards," (BMI Research, 2013).

#### **2.2.5. Projects in Africa**

According to CAPA, the number of airport projects and investments taking place on the African continent nearly matches the investments being made in European infrastructure. Countries like Zambia, Kenya and Egypt are all making substantial investments. However, none of the projects are large enough to meet the 10 million enplanement minimum research standard established in this project. Funding methods used to finance airports in Africa are slightly different than more economically stable regions. Airport project funding methods most commonly utilized are: government funds, World Bank Loans and PPP (BMI Research, 2010) (BMI Research, 2014).

#### **2.2.6. Projects in the Middle East**

There are numerous projects underway in the Middle East seeking to capitalize on the region's strategic geographic location as a hub between Asia, Europe and Africa. The United Arab Emirates (UAE) leads the way in airport development projects striving to become the world's top airport for international travelers.

According to a press release by the Airport Show 2016, Dubai World Central Airport (DWC) will overtake London Heathrow as the world's top airport for international passengers in 2015, (Airport Show 2016, 2014). Dubai is executing a US \$34 billion (DWC) project which involves construction of five runways and capacity to handle 160 million passengers a year and

is expected to invest over US\$8.1 billion in new infrastructure to host Expo 2020 (Airport Show 2016, 2014).

In addition to the massive airport development project in Dubai, the UAE is also constructing a brand new Midfield Terminal Complex (MTC) at the Abu Dhabi International Airport. The MTC is designed to be “the largest, virtually pleasing and architecturally magnificent structure in the Emirate of Abu Dhabi,” as shown by the graphic rendering in Figure 4 (Airport Technology, 2015). Airport development projects in UAE are funded through a combination of government funds and bank loans. The MTC project is being funded through a loan of US \$1.08 billion from a consortium of banks including Al Hilal Bank, Mashreq Bank, Union National Bank, First Gulf Bank and Arab Bank (Airport Technology, 2015). The project is an integral part of the Plan Abu Dhabi 2030, “which is an Emirate-wide scheme planned to ensure the growth of Abu Dhabi as a business and tourism centre,” (Airport Technology, 2015).

Figure 4: Abu Dhabi International Airport Midfield Terminal Complex



Source: (Airport Show 2016, 2014)

### 2.3. Capital Funding

Airports today are funded from a variety of sources. In contrast with other countries, airports in the United States have not historically utilized private/public partnerships. However, in recent developments San Diego International Airport is considering all funding sources including a private/public partnership to finance their \$2.2 billion overhaul of Terminal 1 (Showley, 2015).

Conventionally, most agencies design capital programs to project ongoing revenues and debt service available from terminal rents, concessions, landing fees and tenant leases. Major

improvement funding comes from a combination of FAA grants, Passenger Facility Charges (PFC's), Customer Facility Charges (CFC's) and Airport Revenue Bonds. This section defines and describes these funding methods. It then provides examples of funding models used for airport development projects in San Diego, Salt Lake City, Denver, San Francisco, Seattle Tacoma, and Los Angeles.

### 2.3.1. Bond Funding and Capital Programs

Airports frequently turn to capital markets to finance long-term construction projects. Bond proceeds are the largest sources of funds for airport capital needs, accounting for approximately 54 percent of the total funds historically (municipal\_bond\_market\_fact\_sheet., 2016).

Bonds are long-term debt contracts issued by the federal government, agencies or organizations to raise money to fund projects (Pawar, 2010). The credit rating of the issuing agency and the duration of bonds are two key factors that determine the rate of interest paid to investors and thereby the cost of capital for issuers. There are several types of bonds the agency can choose to issue.

General obligation bonds (GO's) are supported by the overall tax base of the issuing agency and were historically used when airports were in their infancy and were not able to generate reliable revenue. GO's have largely been replaced by General Airport Revenue Bonds (GARB) that are supported by the airport's ability to generate ongoing revenue as represented by the bond issuer. Revenue bonds are generally preferred because they do not contribute to total indebtedness (subject to state requirements) and voter approval is usually not required (Bates, 1982).

Passenger Facility Charge Bonds (PFC) are based on the fee charged per boarding passenger. Lastly, Specialty Bonds and Private Activity Bonds (PAB) are also available. PAB's are subject to the alternative minimum tax which increases the investor's required return on investment and in turn increases the financing cost for the airport (Airports Council International).

An important model used in bond funding and designing a capital structure is the Cost Recovery Model. This model calculates the expected revenue from both aeronautical and other airport income and divides that by the debt service of the airport, less the fees they are able to charge:

$$\frac{\textit{Aeronautical Net Income} + \textit{Other Airpot Income}}{\textit{Airport Debt Service} - (\textit{Passenger Facility Charges} + \textit{Customer Facility Charges})}$$

If the amount from this calculation is greater than the debt service requirement (125 percent for example) then the airport should increase its aeronautical charges to ensure proper debt coverage (Morrison, 2014).

### 2.3.1.1. San Diego International Airport (SAN)

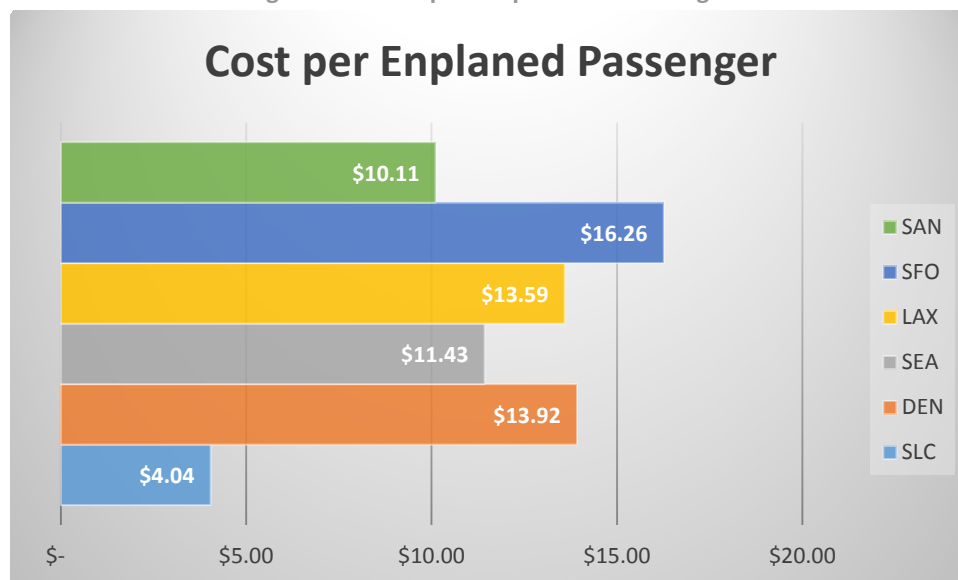
“We don’t make a profit we make a better airport.” That is the slogan of San Diego International Airport. They have been making their airport better with the “Green Build” design of their Terminal 2. The Airport Authority secured a low all-in borrowing cost of 3.92 percent for the Senior Airport Revenue Bonds, which is a lower long-term rate than any other airport in the nation in the same rating class (View News, 2015). The timing of the market and the favorable credit rating of the agency both contribute to that low cost bond issuance.

SAN has recently approved a plan to replace Terminal 1. The replacement plan will cost \$2.2 billion with the first phase estimated at \$1 billion. Currently the airport covers operations and improvements with a \$4.50 per person, federally-controlled facility fee, which raised \$39 million this year. It also collected \$100 million in airline charges and raises other funds from parking, concessions and federal grants. In addition to bond financing, the airport may invite airlines to finance all or part of the expansion or enter into a public-private partnership with a company that would build, maintain and operate the new terminal (Showley, 2015).

### 2.3.1.2. Salt Lake City International Airport (SLC)

Salt Lake City International Airport is embarking on their Terminal Redevelopment Project. It is one of the few airport projects in North America focused on building an entirely new airport. It is more effective for them to replace their terminals rather than retrofit them. Aging, constrained facilities are driving the project with a total estimated cost of \$1.8 billion. As illustrated below, SLC boasts a much lower Cost per Enplaned Passenger (CPE) than comparable airports:

Figure 5: Cost per Enplaned Passenger



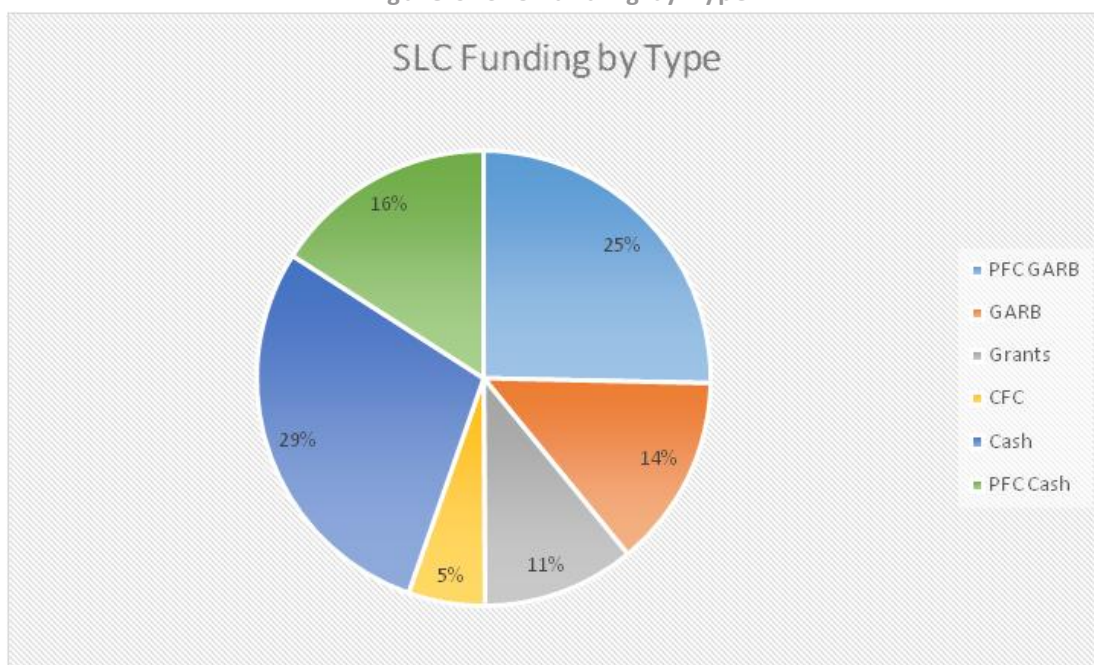
SLC operates as an enterprise fund and has a self-sustaining budget. It holds no debt and carries more than \$250 million in cash reserves that it will put toward the redevelopment project. A contributing factor of their low CPE may be the age of the facility, they have not completed



any major renovations unlike other airports such as Denver International (DEN) or Seattle (SEA). “The new terminal is also structured to support the thousands of people who come to pick up visiting relatives or returning missionaries for The Church of Jesus Christ of Latter-day Saints with a designated area for passenger greetings and farewells” (Collette, 2015).

Below is a graph of SLC’s capital structure. This illustrates the percentage of each type of capital used to fund the project. In this case, cash is the largest contributor, followed by General Airport Revenue Bonds (PFC GARB’s) backed by Passenger Facility Charges (Features, 2015).

Figure 6: SLC Funding by Type



### 2.3.1.3. Denver International Airport (DEN)

Denver International Airport is the 5<sup>th</sup> busiest airport in the United States and the 15<sup>th</sup> busiest in the world. Built in 1995, it is the most recently built new airport in the United States. A series of improvements are planned and funded by a Capital Program (covering years 2013-2018), which is estimated to cost approximately \$1.4 billion. Approximately \$608.1 million is expected to be financed with proceeds from the sale of 2013 bonds and approximately \$135.8 million in costs will be financed by net proceeds of Future Planned Bonds under the General Bond Offering.

Looking at DEN’s cost of capital, Moody’s Investors Service, Inc., Standard & Poor’s Ratings Service, Inc. and Fitch, Inc. have published ratings of “A2” (negative outlook), “A” (stable outlook) and “A” (stable outlook), respectively, with respect to the Series 2013A-B Subordinate Bonds. 2013 Class A shares are at an interest rate of 4.8 percent maturity date 2043. 2013 Class B shares 4.3 percent, maturity date 2043 (Association, 2013).

#### **2.3.1.4. Seattle Tacoma International Airport (SEA)**

Seattle Tacoma International Airport has positioned itself as an international gateway. To further enhance their offerings and increase their capacity for enplanements SeaTac has developed a 5-year Capital Program (covering years 2014-2018) estimated to cost approximately \$1.898 billion. Below are some of the key projects they are financing (costs are in millions):

- \$285 North Star Terminal Improvements
- \$304 International Arrival Facility Expansion
- \$239 Baggage Handling Improvements
- \$103 Runway Improvements

55 percent of funds will come from Future Bond Offering proceeds, 1.7 percent from Revenue Bond Proceeds. This will require a bond debt service coverage of 125 percent (see formula in section 2.3.1) and nine months of Operation and Maintenance coverage (Morrison, 2014).

#### **2.3.1.5. Los Angeles International Airport (LAX)**

International traffic is projected to increase at a higher rate than domestic traffic. Their Capital Structure will support needed improvements for the increased number of enplanements and enable the terminals to conform to modern aeronautical standards. 64 percent of the \$8.5 billion in expenditures will be spent on terminal projects and 31 percent is allocated for airfield and apron projects.

Funding will come from a variety of sources, 24 percent will be from prior bond proceeds, 26 percent will be from future senior bonds and 4 percent from senior bonds. Bond debt service coverage is projected to remain strong at over 200 percent (RyanYakubik, 2015).

#### **2.3.1.6. San Francisco International Airport (SFO)**

In fiscal year 2013/14, much of the traffic growth can be attributed to international traffic 5.3 percent compared to 2.7 percent on the domestic side. San Francisco International has a five-year Capital Plan with expected expenditures of \$2.5 billion. 60 percent of this will be spent on terminal improvements. Funding sources include 95 percent from bonds and commercial paper. Four percent will come from grants.

#### **2.3.2. Cost Overruns**

Capital programs are effective planning tools for airports to allocate their resources. In considering the large amounts airports spend on construction and development it is worth considering how accurate those budgeted amounts are.

Looking at overall construction costs there is a term coined “Survival of the unfittest”. On large projects, contractors with the lowest bid usually win the award, not the one that best represents the true cost of construction (Keading, 2015).

For example, Denver International Airport had to testify before the subcommittee on Aviation at the House of Representatives on the cost overruns during DEN’s original construction. The project was estimated at \$1.7 billion and had a final cost of \$4.8 billion. This was more than double the original budget. Much of the costs can be attributed to changes in the project’s scope. However some construction defects such as faulty concrete in the runway panels made up the difference.

Below are some examples of large transportation projects and their cost overruns. It should be taken into consideration when developing the capital program and cost recovery model for SCIA that costs will likely exceed estimates.

**Table 1: Cost Overruns**

Transportation Projects	Cost Estimate	Date of Estimate
	Original	Recent or Final
<b>Boston Big Dig</b>	\$2.6b (1985)	\$14.6b (2005)
<b>New York City East Side Access</b>	\$4.3b (1999)	\$10.8b (2014)
<b>San Francisco-Oakland Bay Bridge</b>	\$1.4b (1996)	\$6.3b (2013)
<b>Denver International Airport</b>	\$1.7b (1989)	\$4.8b (1995)
<b>New York City WTC Rail Station</b>	\$2.0b (2004)	\$4.0b (2015)
<b>Denver West Light Rail</b>	\$250m (1997)	\$707m (2013)
<b>Virginia Springfield Interchange</b>	\$241m (1994)	\$676m (2003)
<b>Note: m=million, b=billion</b>		

Some lessons learned from DEN are to:

1. Get airlines involved early on in the design to help minimize changes.
2. Provide for alternative or back-up systems when implementing un-tested technology.
3. Provide for vigorous quality control and quality assurance programs (Institute, 2015).

While making all efforts to maintain construction costs, plan for flexibility within the capital program and allow for inevitable changes.

## 2.4. Operating Revenues

Large airports are profitable and generate more than enough revenue to fund operations. Smaller airports have a greater challenge. Revenue for airports is separated into two categories: aeronautical and non-aeronautical. Aeronautical revenues are directly related to the flights and/or enplanements. Non-aeronautical revenues are indirect revenues that are related to airport



activities, but not directly to flights or enplanements. Operating revenues from aeronautical activities come in the form of fees and use leases. The majority of non-aeronautical revenues come in the form of lease agreements from vendors and services that operate within the jurisdiction of the airport. The type of vendors ranges from food and beverage, retail and duty free, rental cars, and parking and ground transportation services. Large airports, in general, have been able to stay profitable and even grow during down times in the economy. From the point of the latest downturn in the US economy, large airports have survived and even thrived.

#### 2.4.1. Aeronautical Revenue

Revenues generated from aeronautical activities are broken down into two main categories, passenger airline aeronautical revenue and non-passenger aeronautical revenue. The aeronautical revenues help fund ongoing operations of the airport. In addition, they serve as backing for bond flotation, which in turn, assist with new construction for an airport as well as expansion activities. This section will explain in detail the most common aeronautical related sources of revenue.

##### 2.4.1.1. Passenger Airline Aeronautical Revenues

These revenues are from fees directly related to passenger airlines and are specific to passenger operations.

- **Passenger Airport Landing Fees:** Passenger airport landing fees, also known as runway fees, are charged to passenger airliners for use of runways, aprons, and taxiways during the arrival process. The fees will vary per aircraft based on the congestion of the airport. Less congested airports may charge less per aircraft than a more congested airport would (Airport Charges). Different airports provide different services as part of the landing fee. Higher fees may include the use of a gate and offloading equipment. Other airports may charge a lesser fee, but charge fees for the extra services, such as use of the gate and offloading equipment. Airline landing fees do not seem to be regulated, as many airlines complain the fees charged by airports are too high (Hilkevitch, 2010). Airlines are at the mercy of the airports they choose to operate in. Many large airports can raise fees wherever they see fit. Airlines wishing to operate out of such airports must pay these additional fees. Most often, the excessive fees are placed back in the lap of the passenger in the form of higher ticket prices. It is hard to compare passenger airline landing fees from airport to airport, as many different factors go in to them. On average, airline landing fees account for about 32.5 percent of aeronautical revenues.
- **Terminal Arrival Fees: Rents & Utilities:** Terminal arrival fees are the fees charged to airlines for the use of the terminal in which they operate. These fees are usually based on the amount of space used inside of a terminal by an airline (Airports Council International). Terminal arrival fees are a major source of aeronautical revenues, on

average, making up approximately 46 percent of airport aeronautical revenues. Terminal arrival fees do not appear to be regulated in any manner. Thus, airlines are at the mercy of the airport when it comes to these fees. Many airports will create a use and lease agreement with specific airlines that spell out clearly what the charges will be for the airlines for not only terminal arrival fees, but passenger airline landing fees as well (Airports Council International).

- **Terminal Area Apron Charges/Tie downs:** Aprons, also known as tarmacs, are viewed and charged the same as metered public parking on the street, but without specific time limits. Fees are charged for the parking of the aircraft during the loading, unloading, and refueling of the aircraft. These fees may be in addition to terminal arrival fees, or they may be waived according to whatever the terms of a use and lease agreement between the airline and airport may be. These fees do not seem to be regulated, but are negotiable when a use and lease agreement is in place.
- **Federal Inspection Fees:** Federal inspection fees are charged to the airlines for security personnel in the airport (Airport Charges). Security checks have proven to be a necessity in this day and age. The federal government oversees the Transportation Security Administration (TSA). The cost of TSA operations in the airport are passed on to the airlines, which in turn, get passed on to the passengers in the form of higher ticket prices.

#### 2.4.1.2. Non-Passenger Aeronautical Revenues

These revenues are from fees directly related to the activities of non-passenger airline companies or government agencies.

- **Landing Fees from Cargo:** Landing fees from cargo are charged to cargo airliners for use of runways, aprons, and taxiways during the arrival process. The fees will vary per aircraft based on the congestion of the airport, and typically may be based on the weight of the aircraft. Less congested airports may charge less per aircraft than a more congested airport would (Airport Charges). Airlines are subject to the discretion of the airports they choose to operate in.
- **Landing Fees from GA and Military:** Landing fees from general aviation and military, are charged to military aircraft and all other aircraft that are not covered by passenger airlines or cargo airlines, for use of runways, aprons, and taxiways during the arrival process. The fees will vary per aircraft based on the congestion of the airport, and typically may be based on the weight of the aircraft. Less congested airports may charge less per aircraft than a more congested airport would (Airport Charges).
- **FBO Revenue: Contract or Sponsor-Operated:** A fixed-base operator is a commercial business that has been given the right to conduct business and provide services on public use airports. The relevance of FBO's to the SCIA study is minimal.

- **Cargo and Hangar Rentals:** Cargo and hangar rentals provide revenue for an airport for the housing of cargo or aircraft. The revenue generated is difficult to pinpoint as there are many factors that go in to it. Some of those factors are the capacity or availability of rentals.
- **Aviation Fuel Tax Retained for Airport Use:** Local taxes placed on the sale of aviation fuel are to be used for airport use, and are treated as revenue (Randall S. Fiertz, 2014).

#### 2.4.2. Non-Aeronautical Revenue

Revenues generated from non-aeronautical activities are broken down into six main categories. Similar to aeronautical revenues, the non-aeronautical revenues also help fund ongoing operations of the airport. They also serve as backing for bond flotation for expansion activities. This section will explain in detail all of the most common non-aeronautical sources of revenue.

- **Land and Non-Terminal Facility Leases and Revenues:** In 2012, land and non-terminal facility leases accounted for nearly \$600 million in revenues for airports nationwide (Airports Council International). These revenues are directly related to any business granted a lease to operate on airport grounds, but outside of the terminal. Land and non-terminal facility leases can contribute a large non-aeronautical revenue stream for an airport. A rental car facility is an example of a business that benefits from such lease agreements.
- **Terminal Food & Beverage:** Terminal food and beverage concessions are typically contracted out to large companies that specialize in airport services. In 2012, terminal food and beverage concessions contracts accounted for over \$500 million in airport revenues (Airports Council International). Some examples of large airport concessions companies include Hudson Group, Delaware North, Airport Concessions Inc., and Concourse Concessions Inc. Food and beverage concession are becoming more and more important for airports looking to increase revenues and are seen as a major source of non-aeronautical revenues. As terminals are updated and/or expanded, the strategy has been to maximize the amount of food and beverage locations.
- **Terminal Retail & Duty Free:** Similar to food and beverage concessions, retail and duty free shops are contracted out to large airport concession companies. In 2013, revenues from retail and duty free contracts totaled close to \$630 million. Retail and duty free contracts are a very important non-aeronautical source of revenue, and more focus is being placed on maximizing the retail space to increase the potential revenue. One of the more innovative ideas has been to place automated retail machines in areas of the airport where a full retail shop may not fit. These machines carry last minute items passengers may be missing and allow airports to capitalize on renting out areas of the airport that would not otherwise generate revenue.

- **Rental Cars:** Contracts from rental car companies that operate on airport grounds are a major source of revenue for an airport. The contracts have been worth about \$1.5 billion in annual airport revenues nationwide. The rental car industry as a whole generates about \$36.4 billion annually. The majority of those revenues come through airport rentals. The partnership between airports and rental car companies is interdependent and highly successful for both partners.
- **Parking & Ground Transportation:** In 2012, revenues from parking and ground transportation totaled approximately \$3.1 billion nationwide for airports (Airports Council International). Long-term parking has become a major, and almost necessary source of revenue that enables an airport to operate profitably. In addition, contracts to ground transportation companies such as shuttles, taxis, limo services, Uber, and Lyft contribute a great deal of non-aeronautical operating revenue to an airport. Hotel revenue from hotels that operate on airport grounds was just over \$100 million nationwide in 2012 (Airports Council International). This is not seen as a major source of revenue for airports in general. Most likely this is due to space constraints. A hotel takes up a large area, and other more lucrative uses of the land are available.

Below is summary of the various sources of revenue:

Table 2: Classifications of Operating Revenues

Aeronautical		Non-Aeronautical
Passenger	Non-Passenger	
Passenger Airport Landing Fees	Landing Fees from Cargo	Land and Non-Terminal Leases
Terminal Arrival Fees	Landing Fees from GA and Military	Terminal Food & Beverage
Terminal Apron Charges	FBO Revenue	Terminal Retail & Duty Free
Federal Inspection Fees	Cargo and Hangar Rentals	Rental Cars
		Parking & Ground Transportation

## 2.5. Operational Viability

Operational viability of the proposed SCIA is explored by evaluating passenger airline Cost per Enplanement (CPE) along with non-passenger revenues and other airport cost metrics. The five benchmark airports are evaluated with respect to the statistical population of large airports in the United States using regression analysis. The purpose of this analysis is to create a predictive model that can be used to identify potential CPE cost drivers such as long-term debt, non-passenger airline revenues, and earnings before interest, taxes, depreciation, and amortization (EBITDA).

### 2.5.1. Analysis and Approach

In the United States passenger aviation industry, CPE is used as a standard metric by passenger airlines for measuring and comparing airport costs. From the airline’s perspective, CPE represents a normalized cost for doing business at a particular airport. From the airports’ perspective, however, CPE represents revenue and is equivalent to passenger airline revenue per enplanement calculated as follows:

**Table 3: CPE Revenue versus Cost Perspective**

<b>Airport Perspective</b>	<i>Passenger Airline CPE= Airport Passenger Revenue per Enplanement</i>
<b>Airline Perspective</b>	<i>Passenger Airline CPE= Passenger Airline Aeronautical Revenue / Enplanement</i>

EAS 2.0 estimates the annual operating capacity of the SCIA to be 30 million passengers in 2040 (CSUSM FEMBA Class of 2015, 2015). The total number of airport passengers equates to the sum of enplaned and deplaned passengers; therefore, the number of enplanements is approximately half the total number of passengers. Using this relationship, the estimated 30 million annual passengers for SCIA becomes 15 million enplanements. This places SCIA in the “Large Hub” category, defined by the FAA as an airport having 1 percent or greater of the total national passenger enplanements. (Federal Aviation Administration, 2015). Based on fiscal year 2014 financial information reported to the FAA, there are currently 29 airports in the United States classified as Large Hubs, including all five benchmark airports. All of the 29 Large Hub airports will be used as a statistical population for the operational viability analysis in the following sections.

In order to identify and better understand factors that affect CPE and as a result, operational viability, the population considered for the statistical analysis encompasses all large hub airports. In addition to CPE, the following metrics are considered:

- Non-passenger aeronautical revenue per enplanement
- Non-aeronautical revenue per enplanement
- Total revenue per enplanement
- Total debt per enplanement
- Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) per enplanement
- Hub concentration factor

### 2.5.2. Data Set

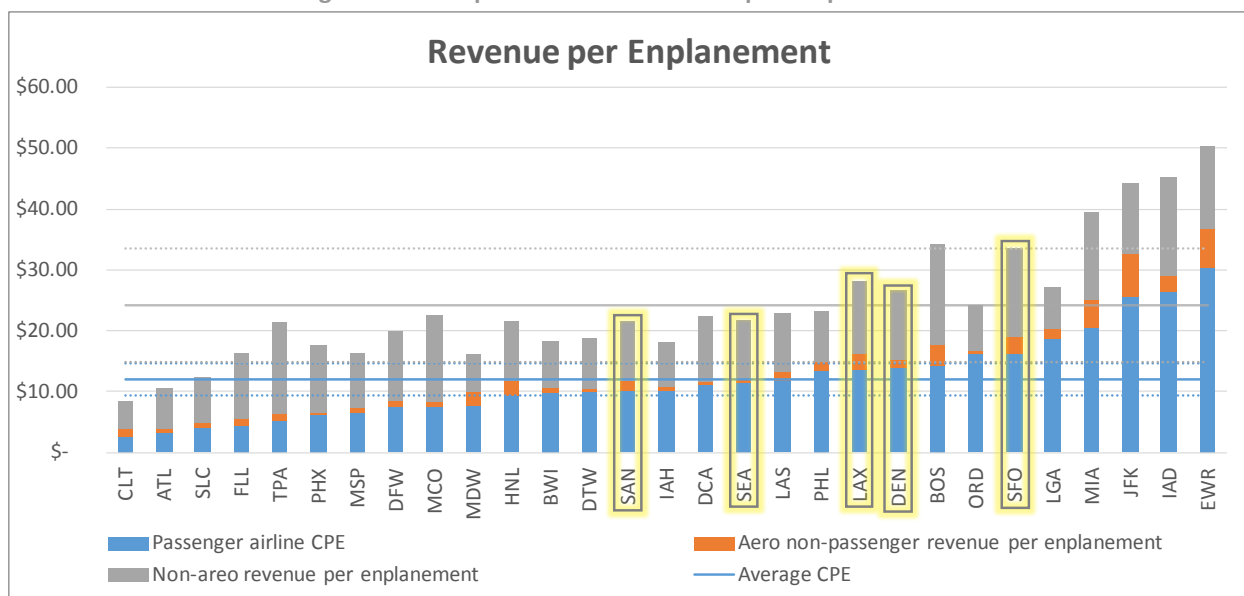
The FAA's Airport Compliance Program requires all commercial airports in the United States to annually report specific financial information through an online database. These reports are then

aggregated and made available to the public through the FAA’s Certification Activity Tracking System (CATS). CATS provides a common, reliable source for reported financial results and also provides summary performance metrics for all airports in the United States (Federal Aviation Administration).

### 2.5.3. Assessment of Benchmark Airports

The initial analysis evaluates normalized revenues for the population of large hub airports and assess where the five benchmark airports fall relative to the mean and associated 95 percent confidence intervals. Figure 7 shows revenues for the five benchmark airports in comparison with the rest of the population and means for CPE and total revenue per enplanement. The data is sorted by increasing CPE and the dotted lines in the chart represent the 95 percent confidence intervals for the respective means.

Figure 7: Comparison of Revenues per Enplanement



Results of the initial statistical analysis show the 95 percent confidence interval for mean CPE is  $\$12.03 \pm \$2.66$  and the mean total revenue per enplanement is  $\$24.22 \pm \$3.90$ . All of the benchmark airports except for SFO fall within mean CPE 95 percent confidence interval. SFO is slightly higher than the mean in CPE and greatly exceeds the mean for total revenue per enplanement. This is a result of higher than average non-passenger aeronautical revenue from sources such as cargo and private aviation.

### 2.5.4. Regression Analysis

The purpose of regression analysis is to identify correlations between CPE (dependent variable) and several independent variables and then create a predictive model that can be used to forecast the CPE of the proposed SCIA using multiple linear regression techniques. The first step is to identify metrics that correlate with CPE and then test for statistical significance. A high

correlation coefficient between the dependent variable and an independent variable indicates a strong correlation exists between the pair of variables. Using Microsoft Excel's data analysis tools, only the following independent variables were shown to have significant correlation with CPE:

- Total revenue per enplanement
- Percent of non-passenger revenue
- Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) per enplanement

Further analysis reveals a high degree of cross-correlation between the total revenue per enplanement and EBITDA per enplanement indicating that only one must be used in the regression analysis. Since EBITDA per enplanement exhibits lower cross-correlation with percent non-passenger revenue, it is more suitable for use in the regression analysis. Refer to Appendix A: SCIA Affordability Statistical Data for the complete list of variables tested for correlation.

The final step in the regression analysis is to perform a multiple linear regression using the two significant independent variables. Results of this regression analysis are provided in the following section.

#### 2.5.5. Results Summary

Regression results reveal a strong negative correlation between the percentage of passenger revenue and CPE indicating airports generating higher portions of revenue from non-passenger aviation sources are associated with lower CPE. The other significant result is that airports with higher EBITDA have higher CPE. The linear model of the relationship between this set of variables is as follows:

$$CPE = 20.80 - \$21.24(\% \text{ non-passenger revenue}) + 0.83(\text{EBITDA per enplanement})$$

Based on the linear regression results, 91 percent of the variation in CPE is accounted for by this model. Detailed results of the linear regression are included in Appendix A: SCIA Affordability Statistical Data.

The model predicts that the most viable financial structure of SCIA is one that maximizes non-passenger revenue and limits profit taking. The following table uses the linear regression model to predict CPE of the proposed SCIA based on the average, minimum, maximum percent of non-passenger revenue exhibited in the data set given a minimum \$3.17 EBITDA per enplanement.



Table 4: Predicted SCIA Cost per Enplanement

	% non passenger revenue	Predicted SCIA CPE
Benchmark Airport Average	50.3%	\$7.73
Population Average	52.9%	\$6.92
Minimum (LGA)	31.1%	\$13.73
Maximum (TPA)	75.5%	-\$0.16

Using the average percent of non-passenger revenue from the five benchmark airports coupled with a minimum EBITDA, the predicted SCIA cost per enplanement is predicted to be significantly below the population mean at \$7.73. The model also illustrates that CPE can be dramatically reduced by increasing the percentage of non-passenger revenue.

### 2.5.6. Limitations

The regression model does not account for variance in CPE due to external factors such as the following:

- Cost of living
- Collective bargaining agreements
- Other factors
- Mix of domestic vs. international passenger traffic

## 2.6. Discussion

One surprising result of the analysis is that total debt per enplanement did not correlate with CPE. Reasons for this apparent anomaly may be due to reporting irregularities in the FAA data set associated with the three large hub airports operated by the Port Authority of New York and New Jersey, LaGuardia Airport (LGA), Newark Liberty International Airport (EWR) and John F. Kennedy International Airport (JFK). Although the port authority reports \$666 million in interest expense on \$19.9 billion of total long-term debt covering aviation, public transportation, bridges and tunnels and the World Trade Center (Port Authority of NY & NJ, 2015). Further investigation and analysis is required in order to identify and allocate debt and interest expense to each of the three airports.

Despite this anomaly, this data set can still be used to assess effects of debt on CPE viability. Marginal effects of varying debt load on CPE can be estimated using the premise that large airports employ cost recovery and sharing policies as described in Section 2.3.1.

EAS 2.0 estimated construction costs for SCIA to be \$7.4B in 2013 dollars and \$22.5B in 2040 dollars (CSUSM FEMBA Class of 2015, 2015). Adjusted for 2014 dollars to be consistent with the data set, total estimated construction costs for SCIA considered in this analysis are \$7.9 billion. Given all of this debt is financed, the total estimated debt equates to an interest expense per enplanement of \$18.16 which is \$13.38 above the average for the population and \$12.00



above the average for the five benchmark airports. Applying this marginal cost to the predicted CPE of \$7.73 results in increasing the predicted CPE to \$19.73 putting it well above the average for the benchmark airports and raises viability concerns.

These viability concerns can be addressed by raising capital through alternate means such as public-private partnerships and by increasing the portion of non-passenger revenues.

### **2.6.1. Alternate Sources of Capital**

Internationally, the private sector is playing an increasing role in funding and operating new airport development as well as major airport expansions. Examples previously discussed include India, Brazil and China. The San Diego Airport is also considering private capital in their future Terminal 1 renovation and redesign. When applied properly, private sector funding would be effective at reducing the amount of bond funding needed for the proposed SCIA development project. They are also considering outsourcing the construction, management, and operations of the terminal. The argument for private sector partnership is that a private entity may be more efficient at managing and operations.

One caveat is that in international public/private partnerships, the government plays a much different role in infrastructure development than the US government plays. Many international private companies have close ties to the state government. Further research would be required to determine to what extent a public/private partnership would be viable for SCIA.

### **2.6.2. Maximizing Non-Passenger Revenue**

Operational viability concerns resulting high debt loads can also be mitigated by exploiting the relationships identified in the regression model. The marginal increase resulting from increased interest expense can be offset by increasing non-passenger revenues. For example, increasing the percent of non-passenger revenue to 75 percent (e.g. Tampa International Airport (TPA)) will result in a much lower predicted CPE of \$11.84, bringing the metric back in line with the average for the benchmark airports.

Although the estimated per-passenger debt load for SCIA will be will above average, negative effects on operational viability can be mitigated by maximizing revenues from non-passenger sources such as cargo, general aviation, and non-aviation activity. Having higher non-passenger revenue means that passenger airlines bear less of the debt burden, making the proposed airport more viable and attractive to the passenger airline industry. It is also critical that the SCIA airport authority implement cost sharing policies and limit EBITDA until the debt load is more in-line with the other large-hub airports.

An exceptional example of how to generate high levels of non-aviation revenue can be found in the Dubai International airport. Going beyond being a mega hub concept, the United Arab Emirates successfully created what is arguably the first “destination airport”. The Dubai International airport has become a popular destination for conventions, business meetings,

shopping, and recreation, generating significant non-passenger aviation revenues for the airport and economic prosperity for the region. Hub airports and associated regional economic impact are explored in more detail in the following two sections of this report.

# Hub Airport



### 3. Airline Hub

#### 3.1. Introduction

In the 21<sup>st</sup> century, travel is global. The United States (U.S.) pioneered the aviation industry in the 20<sup>th</sup> century and built all of the major international gateways located in Los Angeles, Chicago, Atlanta, and New York. While transatlantic travel dominated the last century, today, more and more international travel is transpacific. With the exception of Los Angeles, and to a lesser extent San Francisco and Seattle, most of America's largest hub cities are located on the Atlantic coast. Indeed, the greater New York metropolitan area is home to two major international hub airlines – JFK and Newark.

Most of the largest airports in the U.S. house a hub of at least one major international airline. As mentioned earlier, currently no major international airline considers San Diego home besides Southwest, which is a domestic point-to-point carrier. EAS 2.0 demonstrated that due to space constraints, SAN cannot physically expand its capacity to accommodate the international traffic of a hub airline. For this reason, previous studies recommend building a new Southern California International Airport (SCIA). If SCIA is to function as a gateway international airport, then it must attract at least one hub carrier.

This chapter explores the potential benefits of making the proposed SCIA a hub airport for at least one such international carrier. It provides insight to the economic and other benefits of hosting hub airlines, what SCIA needs to do to attract airline hubs, and what roles these airlines might play in the planning and funding of the airport project.

##### 3.1.1. Research Questions

1. What are hubs, how do they work, and why are they important?
2. How can SCIA attract hub airlines? What role do they play in the development and funding of airports?
3. Why travel trends necessitate a hub at SCIA?
4. What are the benefits and challenges a hub will provide?

##### 3.1.2. Methodology

This chapter is based upon the most recently available, free online information about airport hubs and international airline traffic. The large variety of sources includes journal articles, industry reports, government sources, and news publications. The goal was to synthesize the information from multiple sources, identify effective ways to attract airlines to the proposed airport, and explore the role major carriers might play in the planning, development, and financing of the airport project.

Additionally, industry and government sources were used to analyze the traffic patterns of international passengers through hub city airports in the US and destinations around the globe.

The international regions studied include Asia, Australia, Europe, North America and South America.

### **3.2. What is an Airline Hub?**

Ideally, an airport the size of the proposed SCIA should be able to host multiple hubs. However, for the purposes of this analysis, discussion is limited to examining the opportunities, advantages and challenges of making SCIA a hub airport for at least one international carrier.

Airports establish mutually beneficial relationships with airlines. Airlines transport cargo and passengers through airports; airports provide infrastructure services to the airlines. An airline hub can be vital to the success of an airport, especially an international airport. Furthermore, hub airports are very important in terms of global transport infrastructure because they serve as gateways to a country or region.

Hub airports attract more than just passengers. Non-aviation related activities and services are required to successfully support an airline hub. Airports are a business with the goal to grow and increase passenger activity. An airline hub will contribute towards the growth and increase the likelihood of SCIA becoming a successful international airport.

Boeing forecasts passenger traffic to grow by 4.9 percent with a need of more than 38,000 airplanes over the next 20 years (Boeing, 2015). According to Boeing, aviation is becoming more diverse, with approximately 40 percent of all new airplanes delivered to airlines based in the Asia Pacific region (Boeing, 2015). Therefore, it is imperative that SCIA house a major international airline and become the gateway to the United States for Asia. While hubs have played an important role in international air travel for decades, there are a variety of ways of classifying hubs as well as a variety of ways in which airports and airlines have operated them. The following sections discuss these points.

#### **3.2.1. Types of Airport Hubs**

There is no universal definition for a hub (Elledge, 2014), but in general an airport hub is considered to be a large number of direct flights by one or more carriers. Based on the U.S. Federal (FAA), hub categories as defined in title 49 U.S.C., § 40102 (U.S. Department of Transportation Federal Aviation Administration, 2014), categorizes hub size based on a percentage of the airport's share of traffic over the total passenger enplanements in the U.S.

##### **3.2.1.1. Large Airport Hubs**

The FAA defines large hubs as airports with 1 percent or more of the total U.S. passenger enplanements (U.S. Department of Transportation Federal Aviation Administration, 2014). According to FAA, the benchmark airports SAN, SFO, SEA, LAX and DEN are defined as large hub airports (see Table 5 below).

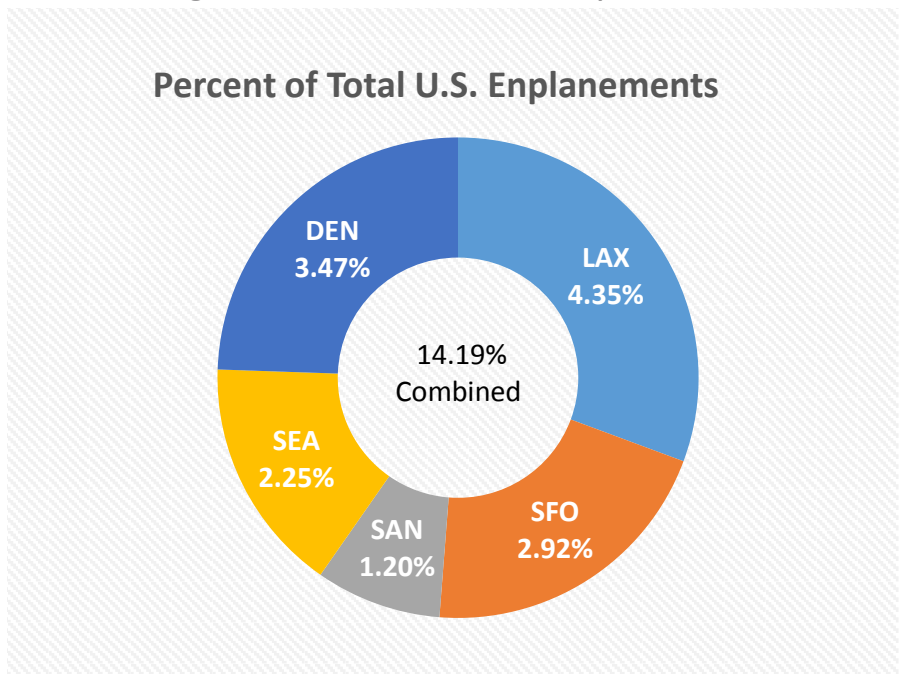
Table 5: Percent of Total U.S. Enplanements

Airport	Airport Codes	2013 Percent
Los Angeles International Airport	LAX	4.35%
Denver International Airport	DEN	3.47%
San Francisco International Airport	SFO	2.92%
Seattle Tacoma International Airport	SEA	2.25%
San Diego International Airport	SAN	1.20%

Note: Adapted from *Terminal Area Forecast Summary Fiscal Years 2014-2040* by Federal Aviation Administration. (2014). Retrieved from [http://www.faa.gov/data\\_research/aviation/taf/media/taf\\_summary\\_fy2014-2040.pdf](http://www.faa.gov/data_research/aviation/taf/media/taf_summary_fy2014-2040.pdf)

Collectively in 2013, the benchmark airports SAN, SFO, SEA, LAX and DEN comprise 14.19 percent of the total U.S. passenger enplanements. LAX has the highest percent of enplanements as seen in Figure 8.

Figure 8: Percent of Total U.S. Enplanements



Source: (OAG Aviation Worldwide Limited, 2015)

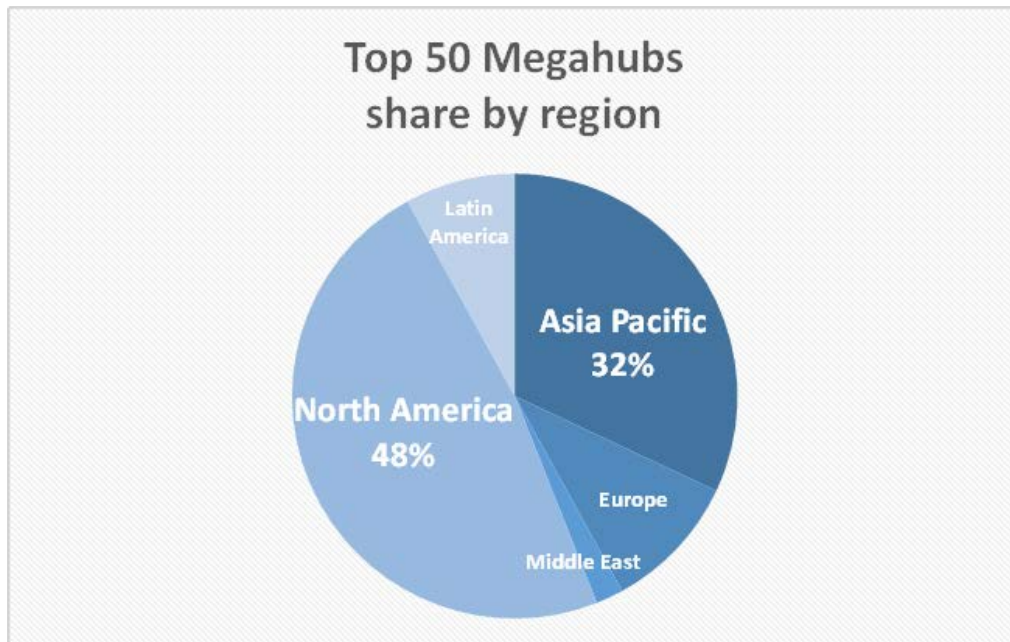
Air traffic delays typically occur at large hub airports. One main cause for delays is inclement weather condition. Another cause is reduced runway capacity below the level necessary to accommodate traffic levels (U.S. Department of Transportation Federal Aviation Administration, 2014). The 2014 Exploratory Airport Study (EAS 2.0) examined the capacity rates for current operations at core airports, concluding that Southern California region will be unable to meet demand for air travel by 2040. A new international airport in the Southern

California region with larger facilities and multiple runways will accommodate expected capacity and help alleviate delays within the existing hub network system.

### 3.2.1.2. Mega Hubs

OAG, an air-travel intelligence company, defines mega hubs as the top airports in the world with the highest ratio of possible scheduled connections to the number of destinations served by that airport (OAG Aviation Worldwide Limited, 2015). OAG uses only single connections to and from the respective airport in an eight-hour window based on scheduled seats in 2014. As seen in Figure 9, North America dominates the globe with nearly half of the top 50 mega hubs. The Asia Pacific region has 32 percent of the world's mega hubs. Together, the North America and Asia Pacific regions contain 80 percent of the world's busiest hubs:

Figure 9: Top 50 Mega Hubs, Share by Region



Source: (OAG Aviation Worldwide Limited, 2015)

The U.S. contains 22 of the top 50 mega hub airports (OAG Aviation Worldwide Limited, 2015) and of the benchmark airports, all but SAN are on the top 50 list of mega hubs.



Table 6: West Region Benchmark Airports Mega Hub Top 50 Ranking

Airports	Airport Codes	Mega Hub Top 50 Ranking
Denver International Airport	DEN	8
San Francisco International Airport	SFO	11
Seattle Tacoma International Airport	SEA	12
Los Angeles International Airport	LAX	27
San Diego International Airport	SAN	-

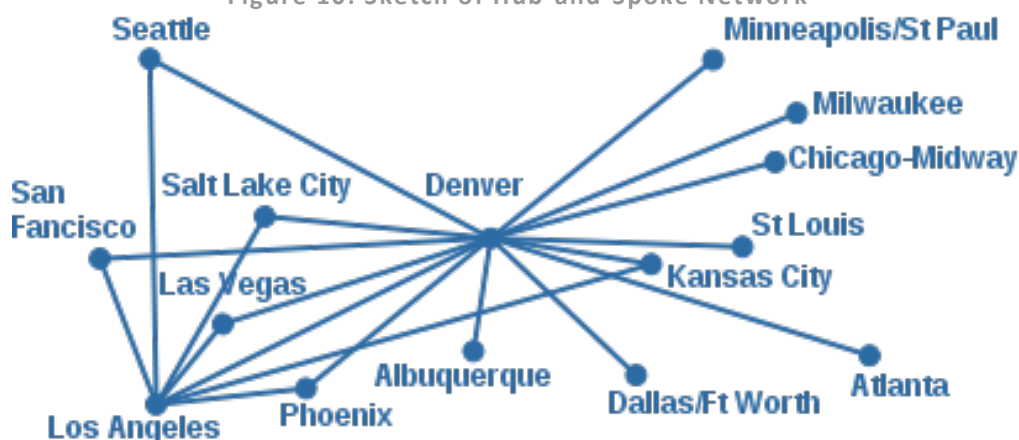
Adapted from *OAG Mega Hubs Index: The World's Most Connected Airports* by OAG 2015.

Retrieved from <http://www.oag.com/Insight/Free-Reports/megahubs-index-201>.

### 3.2.2. Hub-and-Spoke Network

The most common network is the hub-and-spoke network. The spokes are the routes of the airplanes departing from a central hub airport such as Atlanta, as depicted in Figure 10. The hub-and-spoke system requires flyers to connect through hub airports on their way to most destinations (Gulliver Business Travel, 2015). For the airlines, a hub-and-spoke network lowers operating costs by sharing resources, equipment and capabilities at the hub location. With a hub operating as a major connection between flights, airlines increase their ability to fill seats on a flight, in turn, also providing passengers move efficient routes to their destinations.

Figure 10: Sketch of Hub-and-Spoke Network



Source: (Zacks)

An airline can design the network around their target customer’s needs. For example, overseas passengers most likely use a major airline that is part of a hub (Bosner, 2015). In contrast, a businessperson travelling between small cities wants to avoid a layover at a major airline hub. To meet this specific need, Southwest Airlines utilizes a direct-route system rather than moving passengers through major airline hubs. Customers have different needs, resulting in numerous types of airlines and networks. Currently, SAN is a major link in Southwest’s point-to-point flight network because it is not a major international hub.



One drawback is that hub-and-spoke networks lend to pricing inefficiencies and airline booking ploys. As carriers aim to fill their planes to cover the fixed costs of operating a flight, airlines try to match the lowest fares, partaking in aggressive price competition (Gulliver Business Travel, 2015). Major carriers typically dominate the market at their respective hubs, giving them pricing power. Because of price competition, high-demand elasticity of airfares and carriers with dominating hubs, passengers pay 20 to 30 percent higher airfares to or from airports dominated by a single carrier (Silver, 2011 ). As a result, airfare may be lower if booked with a layover through one of those carrier-dominated cities such as Atlanta or Cincinnati and the final destination at a smaller hub. Travelers trying to lower their travel costs use the hidden city ticketing ploy to book a cheaper flight with an extra leg, disembarking at the layover airport as their final destination and failing to show up for the second half of the trip.

The shortcoming of a hub-and-spoke network is the susceptibility to weather. A major hub network that is vulnerable to inclement weather such as heavy snow, winds or fog may halt air traffic, causing a ripple effect throughout the network. Additionally, delays may last long after the weather has improved, indirectly affecting traffic in cities by inclement weather. Further exploration is necessary regarding inclement weather, such as fog, which may adversely affect SCIA.

### **3.2.3. Hub Cities**

Four major airlines fly 80 percent of the U.S. passenger traffic (Jones, 2015). The mergers of major carriers such as United Airlines and Continental, American Airlines and US Airways, and Delta Airlines and Northwest have contributed to the growth of mega hubs in U.S. cities. Delta Airlines, American Airlines and United Airlines identify six to eight major hub cities:

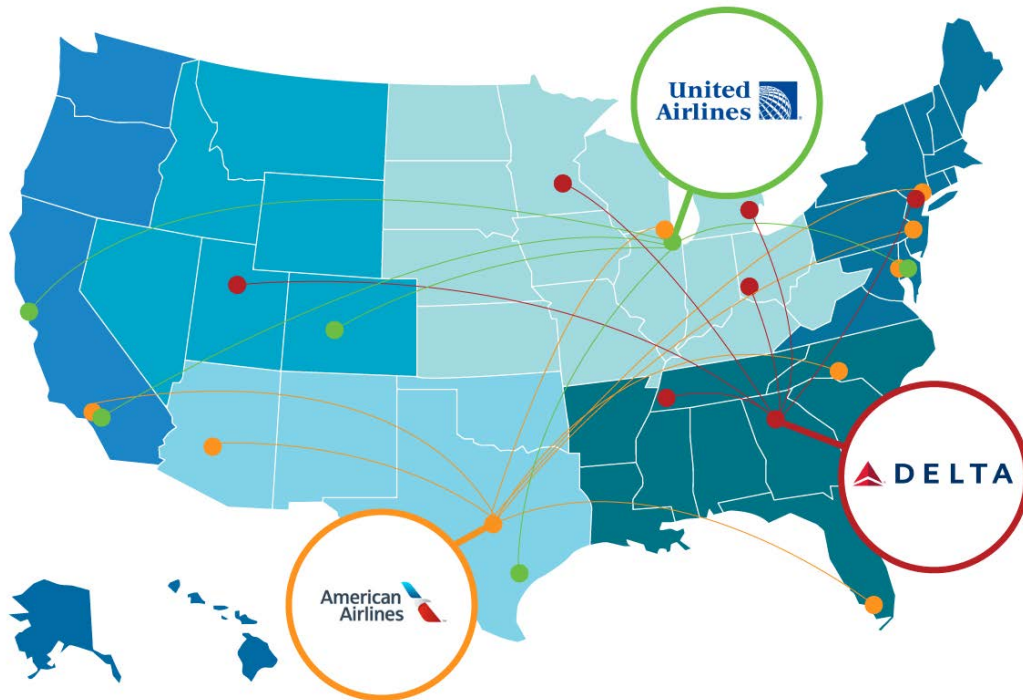
Table 7: Major Hub Cities

Airline	Major Hub Cities
Delta Airlines	<b>Atlanta (Headquarters)</b>
	Cincinnati
	Detroit
	Memphis
	Minneapolis/St. Paul
	New York
	Salt Lake City
American Airlines	<b>Dallas/Forth Worth (Headquarters)</b>
	Charlotte
	Chicago
	Los Angeles
	Miami
	Philadelphia
	Phoenix
	New York
	Washington, DC (Dulles)
United Airlines	<b>Chicago (Headquarters)</b>
	Denver
	Houston
	Los Angeles
	San Francisco

Adapted from airline flight maps, see Appendix B: Hub Cities and Flight Maps for United Airlines, American Airlines and Delta Airlines

On the West Coast, SFO and LAX are primary hubs for United’s domestic and international flights. LAX is also a primary hub for American Airlines. Delta does not utilize any of the benchmark airports SAN, SFO, SEA, LAX or DEN as a primary hub airport, making Salt Lake City Delta's nearest primary hub city to the Western region (see Figure 11).

Figure 11: Map of Hub Cities



### 3.3. Attracting a Hub Airline and the Role It Plays

#### 3.3.1. Air Service Incentive Programs

In order to attract airlines looking to establish a hub on the West Coast dedicated for international flights, well balanced and aggressive air service incentive programs are essential. Air service incentive programs are key in airports looking for new or expanded services (Wilson, 2015). SCIA must develop such incentive programs if it is to successfully position itself as an attractive hub location for commercial and cargo carriers.

SCIA has two primary options in providing funds and support to carriers – subsidies and incentives. Subsidies are the direct payment of airport revenue, and in addition to that, the airport can levy local taxes to support airlines. Any subsidies received by the airline are revenue neutral. Revenue neutrality includes rebates and fee waivers associated with the use of airport facilities and services. Incentive money will come from airport funds, but will become “revenue neutral” to other airlines (Wilson, 2015).

Incentives involve fee reductions that favor airlines and their operation endeavors. In effect, airlines committing to establishing a hub in the SCIA will position themselves to gain favorable status and treatment. Not only will they pay lower fees associated with the use of the facilities, but they will also gain the opportunity to monopolize over non-qualifying airlines. In designing its incentive programs, SCIA should benchmark against existing hub airports to offer comparably attractive incentive programs.

The funding sources can originate from local, state, and federal entities, as well as other organizations including state tourism organizations, convention centers and visitors' bureaus located within the Tri-County region, and partnerships with the airlines. Available funding from numerous source entities create a balanced mix of subsidiaries and incentive programs.

### **3.3.1.1. Facility Use**

The Western region's aging 20<sup>th</sup> century airports are quickly reaching aircraft capacity, and tarmacs are over scheduled and congested with aircraft serving domestic and international flights. Trends in the airline industry need to be considered throughout the design and development process of Southern California's first 21<sup>st</sup> century airport (Airbus, 2015). With the projected growth in demand for international travel, SCIA's infrastructure needs to be able to handle the expanded traffic. It also needs to meet the expectations of international travelers who have grown accustomed to the amenities offered by newer airports throughout the world.

SCIA has the opportunity to leverage the proposed new-state-of-the-art facilities among airlines looking for ownership in airport facilities. The new generation of airport services has expanded from primarily catering to airlines and their service needs, to now accommodating the rising expectations of travelers. SCIA can incentivize airlines by offering shareholder opportunities, or access to controlling specific areas of the airport facilities, especially for those that have an interest of establishing a hub for both domestic and international flights (Futterman, 2005).

Currently, terminal space with the ever-growing number of flights is the main concern at existing airports. The increase of airplanes has added to the congestion on the tarmac, making it difficult for larger aircrafts to operate to their fullest potential and efficiency. SCIA has a unique opportunity to design facilities to meet modern airline and traveler needs from the ground up, rather than retrofitting outdated facilities. Thus, working with the needs of potential hub-airline partners in mind, SCIA can design terminals to accommodate their modern fleets.

The opportunity to build terminals and hangars to aircraft specifications benefit airline carriers with enormous aircrafts such as the A380 airbus used for long-haul international flights. As of now, most airports do not have enough space to maneuver an A380 (Grabianowski, 2015). An airbus fits 800 people, has two entryways, and therefore needs two gangways extending from the same terminal (Grabianowski, 2015). SCIA is the ideal location to design dual entry terminals in order to increase the efficiency of this type of aircraft. This should be particularly appealing to airline carriers considering adding larger aircrafts to their fleet.

Not many airlines have the luxury of designing an entire airport around their brand, but airlines have options in designing a seamless ground experience for their passengers nonetheless (Garcia, 2015). The needs of passengers and airlines, constant change in safety regulations, and advancements in technology are important to consider.

Planning a new airport provides an opportunity to bring airline partners in on the ground floor where they can provide valuable input into customizing terminals and hanger spaces to meet their needs. The incentive, beyond financial, is the opportunity to build an airport around an airline, rather than other way around. Frontloading the specific configurations, facility services, and tarmac requirements during original construction will save time and money.

SCIA will be a brand new airport with state-of-the-art facilities acting as the perfect opportunity to leverage specific construction and design elements as one of the most valuable incentives airlines can benefit from. In addition to complying with airline requirements, the enhanced experience of travelers is highly valued in the airline industry (Team, 2014). Examples of incentives tied to enhancing the traveler experience include customized configurations, new facilities, power recharging stations, expanded ticket counters, expedited customs and security, as well as state-of-the-art lobbies and duty-free shops. Airports have many opportunities to create incentives tied to facilities and services that are part of an airline's operational costs of new international routes.

#### **3.3.1.2. Fee Waivers**

Operations and maintenance are costly and airlines are responsible for part of those costs including repairs, reconditioning service areas, airport security, terminal development, tarmac use, and other air service related expenses. Offering to lower or waive fees for a limited time helps reduce the cost of a new international route, allowing airlines to become much more competitive in growing markets such as the Asia-Pacific market (Wilson, 2015).

The fee waiver or rebate initiatives should focus on reducing costs associated with landing fees, gate fees, rental fees, or fuel flowage fees and should be offered for a specific length of time. The SCIA has an opportunity to negotiate such fee waivers with airlines as a way of gaining long-term commitments from major carriers.

#### **3.3.1.3. Airport Cooperative Marketing Arrangements (ACMA)**

Southern California's attractions expand far beyond the Los Angeles metropolitan area. Many attractions are located within the Tri-County Region. Currently, this region is underserved due to its distance from a major international airport. SCIA has an opportunity to attract the increasing numbers of travelers to and from Asia and other countries and the major airlines that carry them by forging marketing partnerships among airlines, the airport, and regional attractions.

In an industry where airports compete for any airlines' business, the way an airport markets the destination can be a strong deciding factor for the airline (Maslen, 2014). SCIA can partner with the California Travel & Tourism Commission to promote Southern California as an ideal travel destination. SCIA should not have any difficulty promoting its location as a prime destination with beautiful coastlines, sunny weather, dynamic cities such as San Diego and Los

Angeles, and world-renown attractions such as Disneyland, Universal Studios, LEGOLAND, and Sea World. Most airlines have well-established and successful brands, but because the travel industry is so competitive, additional joint marketing efforts are seen as an opportunity to reach travelers in new route markets.

A wide range of marketing programs is available, but the popular options are initiatives that provide monetary support for marketing efforts. A proposed airline cooperative marketing program (ACMA) is aimed to promote destinations out of the SCIA by introducing new entrants and incumbent airlines offering international routes, therefore increasing passenger activity. Based on existing similar programs, cooperative marketing agreements match up to 50 percent of qualifying airlines' marketing campaign proposals (Wong, 2014). Airlines will benefit by marketing new international routes and destinations to their customers.

The cooperative marketing program will benefit the SCIA as well since it provides an opportunity to jointly market its attractive Southern California location as a destination. The program needs to include broadcast, print media, promotional activities and material, all which are required to promote the airport via the use of the SCIA logo and or the mention of the airport. Once the airline's marketing campaigns are approved by SCIA officials, the airline can be enrolled in the program for 12 months, thereafter, has the opportunity to reapply for a second year if funds are still available, all at the discretion of SCIA.

Any variation of marketing and promotional activity mix offered by airline companies can include:

- Multimedia advertising – TV, radio, online, and social media
- Print advertising, collateral materials, direct mail and other forms of print marketing
- Promotional events

#### **3.3.1.4. Recommendations for Air Service Incentive Programs**

SCIA will need to establish a variety of incentives and subsidiary programs to entice airlines to establish international hubs at the airport. The proposed air service incentive programs should be designed to offset airlines operational costs through subsidies, fee waivers, rebates, and marketing support to bring attention to international travel services.

The specific types of incentives need to be negotiated as part of partnership deals between the airport and major international carriers. The goal should be to establish long-term partnerships SCIA and airlines, creating synergy and enhancing the experience of both the airlines and travelers.

#### **3.3.2. Role of an Airline Hub in Developing and Funding Airports**

Terminal facilities and services for international traffic are relatively more costly for domestic traffic (International Civil Aviation Organization, 2013). Hub-and-spoke structures have been

instrumental in reducing the overall cost of U.S. air travel and increasing the travel options that are available (Button & Lall, 1999). The major U.S. network carriers that deploy hub-and-spoke operations do so for both costs and revenue reasons (Button & Lall, 1999).

### 3.3.2.1. Use and Lease Agreements

Airport use and lease agreements specify the share of risks and responsibilities of running the airport and are the foundation for financing airport facilities (Charles Richardson, 2014). The three types of agreements are residual, compensatory, and hybrid. Each agreement has its own method to calculate airline charges and presents a different level of financial risk to the airport.

**Residual agreements** consider aeronautical and non-aeronautical revenues when setting fees. This requires airlines to guarantee an airport's solvency by agreeing to pay any deficit not covered by non-aeronautical revenues. Airlines assume a greater risk in residual relationships; airlines have a greater stake in an airport's success. This is particularly important given that when building a new airport, hub partners can get in on the ground floor and have a sense of ownership of the facility – financial, and otherwise.

In a **compensatory agreement**, airports have all the aeronautical and non-aeronautical revenues, as well as the financial risk and cost associated with the airport's operations such as airport security and facility maintenance. The airline carriers incur the cost of facilities and services they use.

The **hybrid agreement** is a combination of residual and compensatory agreements that split the risk and reward between the airline and airport. Hybrid agreements typically combine residual principles to airside facilities such as runways and compensatory elements to landside services such as car parks (Charles Richardson, 2014).

### 3.3.2.2. Bargaining Capabilities

An important consideration is a hub airport's bargaining capabilities in an airport-airline relationship. Hub airline carriers typically dominate large airports. These airports need their customers as much as the customers need the airports (Polk & Bilotkach, *The Assessment of Market Power of Airports*, 2013). A large airport can lose a significant share of its traffic if the hub carrier decides to leave or is forced into bankruptcy. Airlines with dominant position at airports will charge higher airfares that increase the potential surplus between the airlines and the airport (Polk & Bilotkach, *The Assessment of Market Power of Airports*, 2013). An airline carrier with several hub airports in its network can utilize a single-hub network to demolish one of the smaller hubs. We can conclude the largest carriers such as Delta Airlines, American Airlines and United Airlines are in the best position in the airport-airline bargaining relationships.



### **3.4. How Travel Trends Necessitate a Hub Airline at SCIA**

Capacity is constrained and congested at many airports along the West Coast of North America. This congestion is expected to worsen as the traffic from Asia to the West Coast grows, as described later in this report. Constraints are associated with slot availability, runway capacity, terminal capacity, as well as noise restrictions (Polk & Bilotkach, The assessment of market power of hub airports, 2013). These constraints are particularly tight at SAN. Due to some of these constraints, SAN is unable to significantly expand services by incumbent airlines or accommodate a major international airline. SAN's growth limitations, coupled with increasing need for travel between southern California and Asia makes SCIA an ideal location for domiciling an international carrier.

Housing an international airline hub provides numerous advantages not only to the airport and passengers but also to the local and regional economy. Additionally, an airline hub is able to increase non-aeronautical revenues related to retail and office space at the airport due to more passenger volume. Commercial airports are often economic engines that drive the local, state, and national economies and contribute to the growth of jobs and economic output across the country (CDM Smith, 2014). A major airline can significantly contribute towards the economic output of the region.

This section begins by discussing the potential benefits a hub airline would provide to Tri-County residents by increasing air travel access. Next is an analysis of the travel patterns of passengers that might be more likely to visit the region if a major airline hub were established here. This is followed by a discussion of the potential benefits SCIA will reap through successfully partnering with a hub carrier. The section concludes with a brief discussion of the effects on the local economy in terms of providing on-site airport employment.

#### **3.4.1. Benefits to Local Passengers**

The primary advantage to passengers is that hub airports offer additional direct and connecting flights to and from more places, both domestic and international (Elledge, 2014). Hub airports offer non-stop flights to nearly twice the number of cities as non-hub cities (Button & Lall, 1999). The airport and hub airline offers passengers choice, convenience and quality (Partners, 2013). Currently, there is only one daily flight to Japan and one to the UK from SAN. Travelers to and from San Diego must either connect to larger hub cities, or depart from LAX or Tijuana International Airport for direct international flights.

Residents living in the Tri-County region will enjoy the range of destinations from SCIA available to them that exceeds those offered in comparable regions without a hub (Button & Lall, 1999). Hub airports often contain executive lounges, separate ticketing and check-in facilities as well as other attributes enhancing the local traveler's experience (Button & Lall, 1999). The

increase in flight volume to international destinations will attract more passengers from the Tri-County Region to SCIA.

### **3.4.2. Benefits to International Travelers**

Located on the West Coast, SCIA is ideally positioned to attract international passengers from Asia. Overseas arrivals to California increased 9.5 percent annually from 2010 to 2014 (Dean Runyan Associates, Inc., 2015). In 2013, half of California's top ten overseas visitor market countries were from Asia (CIC Research, 2013).

Simply put, most growth in airport construction is occurring in Asia. The continuous increase in air traffic is a result of numerous international airport development and expansion projects in the past 15 years, especially China's heavy investment in infrastructure and airport construction projects. According to the Economic Research Organization at the University of Hawaii, "By 2010, China ranked third in international tourism expenditures after Germany and the United States. China is now Asia's largest source of international outbound tourists." (Arita, La Croix, & Mak, 2012). On January 19, 2012 in a White House statement, US President Barack Obama signed an executive order on visa reform, expediting the visa process for many countries such as China, Brazil and India (Embassy of the United States: London, UK, 2012). The expedited visa process will save time and money, encouraging applicants to choose the United States as their tourism destination (Embassy of the United States: London, UK, 2012). In 2007, the United States became an approved destination for Chinese tourists, another factor contributing to ranking China as number one on the Overseas Visitors to California List in 2013 (CIC Research, 2013).

The Chinese air travel market is very attractive. The growing demand of the Chinese air travel market will drive the increase of direct flights between China and U.S. SCIA needs to attract international hub airlines to accommodate the increasing demand (Airline Network News Analysis, 2015). The shortest path from Asia to North America is transpacific, not transatlantic. Airports on the West Coast of the U.S. are approaching capacity making travel more difficult for Asian passengers, most of whom enter California through LAX or SFO. In order to meet the travel demands of Asian passengers, a new hub gateway is needed along the California coast.

As a new airport hub of international travel, SCIA is a gateway to many international destinations capitalizing on this growing market, bringing positive economic impact to the Tri-County Region, California and U.S. If the Tri-County Region is to benefit from the economic growth these travelers bring, then SCIA must offer the benefits of an international airline hub.

**Table 8: Overseas Visitors to California in 2012 and 2013**

Rank	Country	2012	2013	Percentage Change
1	China (excluding Hong Kong)	671,000	818,000	21.9%
2	United Kingdom	635,000	652,000	2.7%
3	Australia	522,000	553,000	5.9%
4	Japan	558,000	536,000	-3.9%
5	Germany	399,000	421,000	5.5%
6	France	373,000	389,000	4.3%
7	South Korea	388,000	389,000	0.3%
8	India	190,000	240,000	26.3%
9	Brazil	183,000	206,000	12.6%
10	Taiwan	138,000	186,000	34.8%

Note: Reproduced from *Overseas and Mexican Visitors to California* by Visit California and California Business. Retrieved from [http://industry.visitcalifornia.com/media/uploads/files/editor/CA%20Intl%20Report%202013%2010-16-2014\(1\).pdf](http://industry.visitcalifornia.com/media/uploads/files/editor/CA%20Intl%20Report%202013%2010-16-2014(1).pdf)

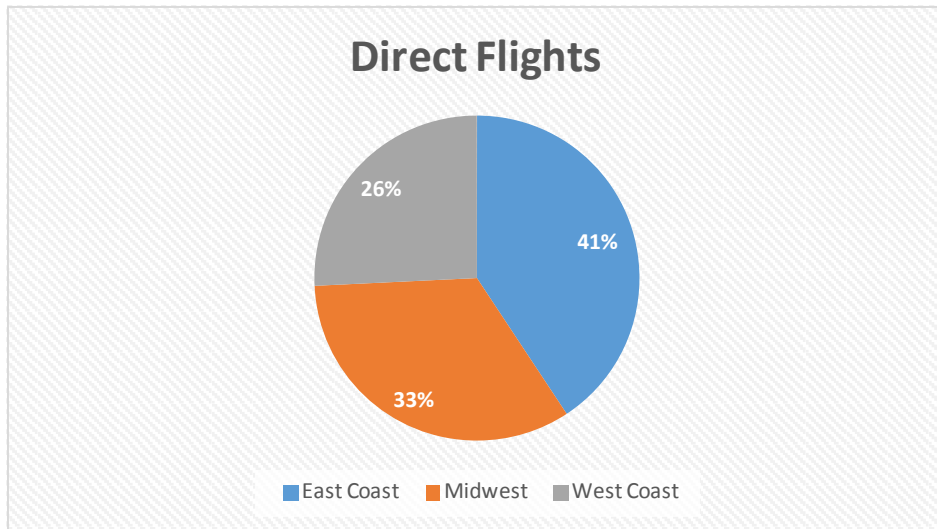
### 3.4.3. Flight Patterns

This section studies and analyzes historical data of direct departure flights flying out from the U.S. major international airports in the West Coast, Midwest and East Coast to multiple international destinations. The international regions include Asia, Australia, Europe, North America and South America.

According to the data from [travelmath.com](http://travelmath.com), there are a total of 1,398 direct departure international flights with 569 from the East Coast, 469 from the Midwest and 360 from the West Coast. The East Coast has the most direct departure flights with 41 percent compared to only 26 percent in the West Coast and 33 percent in the Midwest.

This indicates there are a lot more air travel activities on the East Coast flying outside of the United States. This may be attributable to the fact that many East Coast airports house international hub airlines. For instance, with four runways serving more than 50 million passengers per year, JFK houses several major international airlines including American Airlines and Delta Airlines, giving passengers better routes to multiple destinations. As previously mentioned, overseas travelers most likely use a major airline that is part of a hub (Bosner, 2015).

Figure 12: Direct Departure International Flights



Of the total number of international direct flights departing the U.S., 548 flights are to Europe and 226 flights are to Asia, which represents 39 percent and 16 percent respectively, of the total direct flights (Figure 13). Over 50 percent of the international direct departures from the United States are flying to Asia and Europe. For the air travel industry, these current flight patterns indicate that the major potential markets are in Asia and Europe (Airline Network News Analysis, 2015).

Figure 13: Total International Direct Flights to Regions

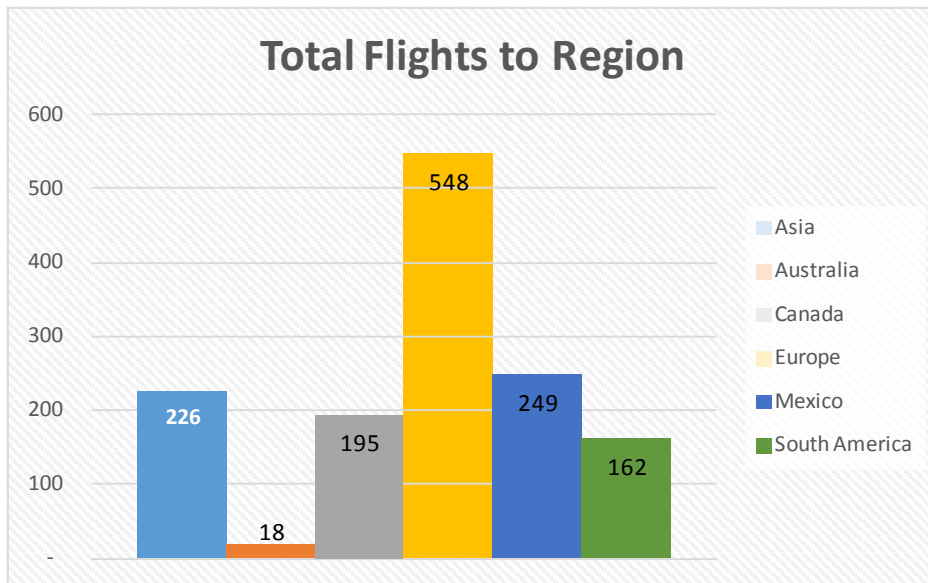
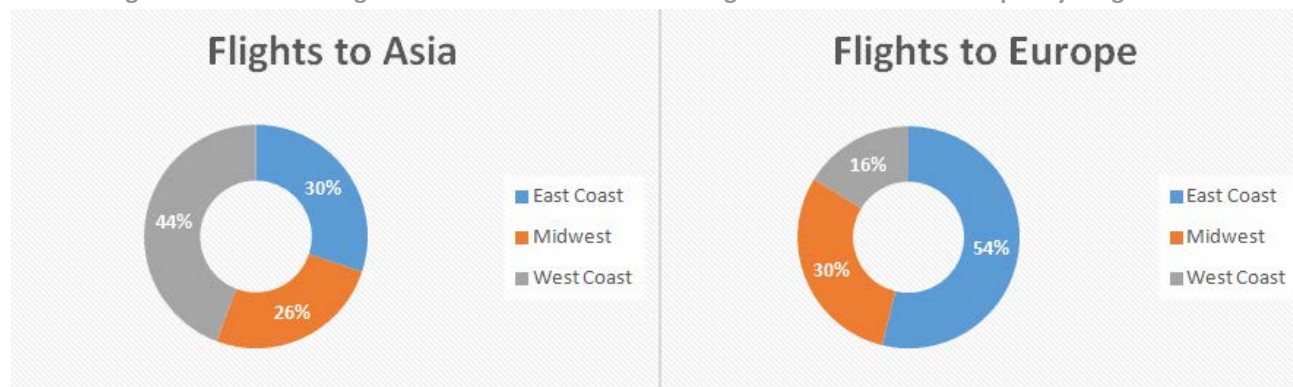


Table 9: Number of International Direct Flights by Region

Airport Regions	Flights to Asia	Flights to Australia	Flights to Canada	Flights to Europe	Flights to Mexico	Flights to South America
West Coast	100	16	66	89	81	8
East Coast	68	0	55	295	35	116
Mid-West	58	2	74	164	133	38
<b>Total</b>	<b>226</b>	<b>18</b>	<b>195</b>	<b>548</b>	<b>249</b>	<b>162</b>

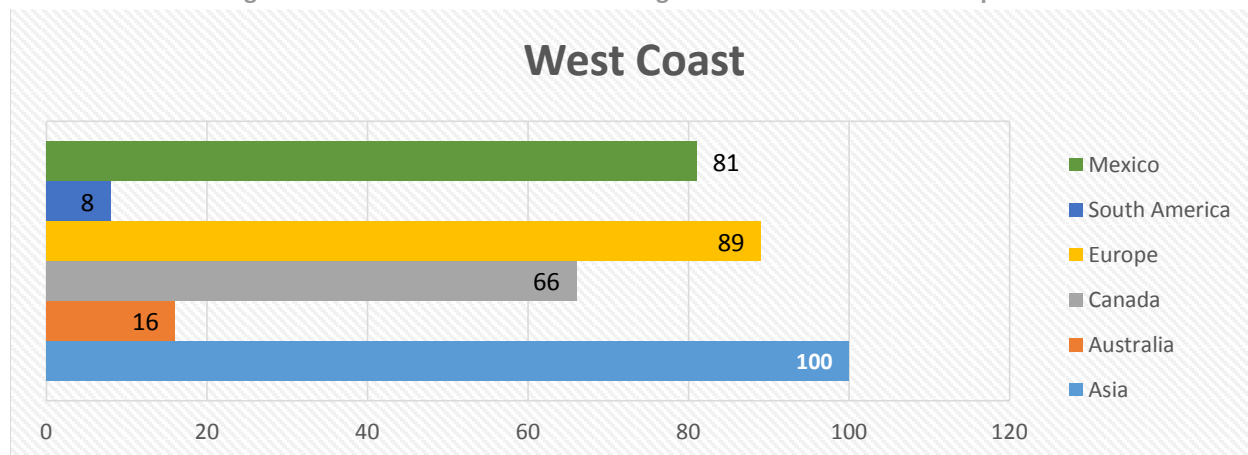
After further analysis of the direct flight data, the results indicate most of the U.S. international direct departure flights to Asia originate from West Coast airports (see Table 9). Most of the departure flights from the Midwest and East Coast regions are to Europe. The flight data makes sense given that the flight distance from the West Coast is closer to Asia and the East Coast is closer to Europe with 44 percent West Coast flights to Asia and more than half of the East Coast flights fly to Europe:

Figure 14: Percentage of International Direct Flights to Asia and Europe by Region



Narrowing the research and analysis down to benchmarking West Coast airports, Asia is the largest market share target for SCIA:

Figure 15: International Direct Flights from West Coast Airports



SAN, the busiest single-runway commercial airport in the U.S., is the nearest international airport in proximity to SCIA. Japan Airlines (JAL) is the only international airline

flying from SAN to Asia, scheduled to fly only once per day. No other major international airports consider San Diego home. With 44 percent of the flights to Asia originating from West Coast airports, but only one daily flight to Asia from the nearest international airport, SCIA could gain significant market share by attracting international airlines connecting San Diego and the Tri-County region to Asia.

The international flight patterns are a major reason the West Coast needs a new international gateway airport that is home to a hub for at least one major carrier. SAN will not be able to accommodate increasing demands for international air travel with only one runway, no room to expand and limited capacity at West Coast airports in general.

Analyzing and comparing the average number of departing and arriving passengers per runway year-to-year illustrates how West Coast airports currently serve the increasing demand of air travelers. The average number of passengers per runway has been increasing and is expected to continue increasing. Examining the trend of passenger per runway helps to forecast the number of runways needed for the infrastructure design and development of the SCIA as an international hub to accommodate the expected number of passengers.

**Table 10: Passengers per Runway**

Airport	Runways	2012	2013	2014
LAX	4	15,650,967	16,222,742	17,149,322
SAN	1	17,362,420	17,747,682	18,649,694
DEN	6	8,602,012	8,503,811	8,668,742
SEA	3	10,737,931	11,112,938	11,916,713
SFO	4	10,665,131	10,874,999	11,413,386

“Total passengers to/from the U.S. (U.S. and foreign flag carriers) are projected to increase 4.7percent in 2015 (calendar year). The average annual rate of growth between 2015 and 2035 is 4.0percent, with passengers increasing from 204.9M to 452.9M. The fastest growing region is Latin America at 4.4 percent per year, followed by Asia/Pacific (4.3percent per year), Atlantic (3.9percent per year) and Canadian Trans border (3.3 percent per year).”

Based on the five West Coast benchmarked airports, the lowest number of passengers per runway is DEN at 8.5 million with six runways in 2013 and the highest is SAN at 18.6 million with one runway in 2014. As the newest airport built within the past 20 years, DEN opened in 1995 with five runways and a capacity of 32 million passengers. As shown in Table 10, DEN currently has six runways with 8.7 million passengers per runway or a total of 52 million per year.

Adjusting the number of runways to five in order to reasonably compare the increase in passenger capacity between 1995 and 2014, the estimate of 2014 passenger volume at DEN

would approximate 43.3 million. Based on this estimate, DEN opened at about 75 percent of its 2014 capacity. Therefore, we estimate that SCIA will open at about 75-80 percent of the expected capacity of 30 million passengers as stated by EAS 2.0.

At the 75-80 percent of the expected capacity, the high-end of the expected range for SCIA is estimated at 12 million passengers per runway, see Table 11. Given DEN has the lowest number of passenger per runway, the low-end of the expected range would approximate 8.5 million passengers per runway. In order to accommodate this expected range of passenger volume, the assumption is that SCIA must be larger than SAN with at least two runways.

**Table 11: Expected Range for Passengers per Runway**

Expected Range	Enplaned Passengers
Low	8,500,000
Med	10,000,000
High	12,000,000

### 3.5. Benefits and Challenges of a Hub Airline at SCIA

Beyond benefits to the passengers, hosting a hub airport provides benefits to airports. Airports are multi-product companies that offer many aeronautical and non-aeronautical services to passengers and airlines. The most important services include the infrastructure for takeoff and landing of airplanes, ground-handling services, a central infrastructure for airlines, rental space, supply of parking and shopping facilities for end-customers at the airport (Polk & Bilotkach, The assessment of market power of hub airports, 2013).

The primary advantage to the airport is that a hub airline tenant will make a significant contribution towards the operating revenue of the airport. An airline hub will substantially contribute towards the operating and maintenance cost of a new airport (Haider, 2015). Airline hub carriers can contribute significantly to the success of an airport through increased passenger volume and traffic. The increased traffic means more passenger facility charges are collected to fund projects that enhance safety, security, capacity, noise reduction, or increase air carrier competition (FAA, 2015).

The airport and hub airline provide, pay for, or collect fees related to aeronautical and non-aeronautical services. The airport charges airline carriers for aeronautical services related to terminal rents and landing fees to pay for operational expenses related to supporting the airlines (Airports Council International, 2014). The airport collects a leasing fee for non-aeronautical services including concessions, parking and airport access, rental car operations, and advertising (Airports Council International, 2013). By maximizing passenger volume and traffic, the airport can increase aeronautical revenue and negotiate higher rates with third-party vendors providing non-aeronautical services.



SCIA will greatly benefit from entering into **residual agreements** with airlines given that residual agreements place more of the risk with the carriers expected to make up any deficits in revenues. Thus, the airlines guarantee that the airport remains solvent and operational. This type of arrangement is most beneficial to SCIA given it will be a new airport and the uncertainty in consumer taste. In return, airports compensate the carriers with a share and control of some of the airport's non-aeronautical revenue. Developing this type of arrangement will further increase the likelihood of SCIA becoming a successful hub airport.

### 3.5.1. Retail Space

Airports are magnets for business and trade (Cyrus Freidheim, 1999). SCIA will be a prime location to attract retail space, space and an international airline hub will route millions of passengers through SCIA for business and leisure. The development of high-quality retail space at the airport and surrounding areas will lead to increased passenger spending in the region, which include the integration of entertainment and leisure outlets and duty-free shopping, generating significant non-aeronautical revenues (Powell, New airport openings and upgrades for 2015, 2015). The increased passenger volume generated by the airline hub will have a direct effect on concessions. Concessions such as gift shops, restaurants, and newsstands directly benefit from the increased passenger volume (Airports Council International, 2013). In turn, the airport benefits from the rents charged from concessions and could negotiate higher rates based on passenger volume.

Extensive and frequent air services are critical to attracting conventions and trade shows (Cyrus Freidheim, 1999). An international airline will play a key role in attracting passengers who use and need these services. Such services play a major role in the location of corporate and regional headquarters, service companies, research and development facilities and manufacturing sites (Cyrus Freidheim, 1999). More passenger traffic will increase the likelihood of increased retail sales at SCIA.

### 3.5.2. Regional Economy

In the United States, the airline economy is primarily domestic. The future depends on airports developing into international hubs because the economic growth potential is in international service (Cyrus Freidheim, 1999). With overall growth forecasted for all air traffic, SCIA will not competing for LAX's or SAN's market share. Rather, SCIA will need to gain market share in international business from Asia, Australia, and South America. The new airport and airline hub will directly and indirectly contribute towards economic output benefits to the Tri-County Region. (CDM Smith, 2014). Even the national economy will benefit due to increased trade, inward investment, and tax revenues (Partners, 2013). SCIA and the airline hub will drive and support economic activity through direct business activities at the airport and business activities throughout the local and regional economy.

### 3.5.3. Employment

Airports and airlines require large numbers of people to ensure proper operation facility and airline operations. Airports and airlines need people for airport security, maintenance, and administration. The airline carriers need people to operate the check-in desks, handle baggage, and perform administrative duties.

SCIA and a hub airline will attract companies to move near the airport thereby creating new jobs (Cyrus Freidheim, 1999). Companies hire people from the surrounding area and region, paying wages and benefits that circulate throughout the local and regional economy (Cooper, Poghosyan, & Sedgwick M., 2012). Local economies of hub cities have seen upturns due to increased employment, more visitors spending more money locally and a heightened attractiveness to new businesses that consider convenient, frequent and cost-effective air travel when deciding where to locate (Cyrus Freidheim, 1999). These activities will also generate jobs in the regional transportation, tourism, and hospitality industries.

Airlines and airports account for 26 percent of direct jobs generated by air transport in North America (Air Transport Action Group, 2012). EAS 2.0 determined that SCIA has the potential to create between 100,000 and 200,000 new jobs in related and supporting industries within surrounding area. In 2012 the number of jobs directly generated by the air transport industry in North America was estimated to be 2.7 million of which 25 percent or 675,000 were in jobs for airlines or handling agents such as flight crew, check-in staff, maintenance crew, reservations and head office staff (Air Transport Action Group, 2012). Increased employment as a result of SCIA will greatly contribute to the local economy and region. The next chapter presents a discussion of economic benefits to the region through activities beyond the airport site.

### 3.6. Discussion

SCIA has much to gain by partnering with a hub airline. However, such partnerships do not come without challenges. One such challenge is that having one hub might confer monopoly power on the major carrier at SCIA (Button & Lall, 1999). Even though the airport is the only provider of infrastructure the airline requires to operate its hub, the airline can potentially wield countervailing power which can have a negative operational affect for SCIA (Polk & Bilotkach, The Assessment of Market Power of Airports, 2013). This means the airline will be able to charge high fares to captive passengers which could have a negative effect on passenger travel.

Unintentional competition for international and domestic passengers may arise due to the close vicinity of LAX and SAN to SCIA. Even though SCIA may not intentionally compete with LAX and SAN, SCIA has no control over consumers' airport choice. The local consumers may choose the older more conveniently located airport, leaving the new distant airport unused (Cyrus Freidheim, 1999). To overcome this concern, SCIA's objective is to complement SAN

by facilitating international travel at SCIA and supplementing domestic travel as a result of SAN's capacity constraint. Major economic dislocations can result from building SCIA. Hotels, convention centers and businesses near the old airport could become obsolete as volume at SAN decreases drastically (Cyrus Freidheim, 1999). Housing, lease rates and values for properties located near SAN may also be negatively affected if consumers decide to use SCIA instead of SAN. This can be a challenge for the region as economic development around SCIA could be relatively slow.

Multi-airport systems with two primary airports tend to not be as successful as cities that have one primary hub and a secondary airport focused on point-to-point traffic to and from the city (Cyrus Freidheim, 1999). Whereas in multi-airport cities, the local traffic base is large enough to support both airports. The primary hub is much larger than the secondary airport, and the secondary airport is focused on a different customer segment. In other words, the secondary airport does not become an overflow hub. EAS 2.0 determined there are enough passengers in the Tri-County region to support SCIA without having to compete for passengers with SAN. Thus, it is critical that the SCIA and SAN maintain their respective roles ensuring that SCIA becomes and remains the primary international hub airport while SAN continues to handle the domestic travel to and from the region.



# Economic Impact

## 4. Economic Impact

### 4.1. Introduction

The Tri-County region stands to reap substantial economic benefits if the new SCIA attracts a hub airline. Previous chapters have outlined the pros and cons of attracting a hub airline to the SCIA. However, that data is focused on the economic impact of activities occurring on airport property (i.e., airport employees, airport construction contractors, airport lobby retail). This chapter analyzes the economic impact to the surrounding Tri-County region and its residents should SCIA be successful in attracting a hub airline.

EAS 2.0 provided economic impact estimates based upon projected capacity of SCIA to be 30 million passengers each year. While that study focused on the demographics of the region, it did not consider the demographics of the inbound traveler to the Tri-County region (CSUSM FEMBA Class of 2015, 2015).

This chapter focuses on the region of origin of international travelers to the West Coast and their potential impact on the local economy. Specific attention is paid to local housing, retail, and hospitality industries. It also considers the potential economic impact of their impact on the economic lives of civilian and military populations that call the region home.

#### 4.1.1. Research Questions

This chapter analyzes and discusses the following research questions:

1. What would be the economic impact to the Tri-County region of opening an international hub airport with primary routes to Asia and South/Latin America?
2. Specifically, what would be the economic impact on:
  - a. Retail
  - b. Hospitality
  - c. Real Estate (positive and negative impacts)
3. What new industries will be attracted to the Tri-County region and what will the economic impact be?
4. How will local military and civilian residents be affected?

#### 4.1.2. Methodology

Using secondary data, this chapter benchmarks the proposed SCIA project against the following five major airports in the western U.S., SFO, DEN, LAX, SEA and SAN. It analyzes the countries of origin of passengers traveling to each airport to develop a profile of expected Tri-County visitors. It then compares the potential impacts on the hospitality, retail, and real estate industries by examining the effects of recent influxes of Chinese visitors to Los Angeles that are currently served by LAX, the West Coast's largest international hub and the one closest to the proposed new airport.

## 4.2. Benchmarking

### 4.2.1. Benchmark Airport Passenger Data

Table 12 through Table 15 illustrate historical information gathered from 2011 to 2014 for each of the four benchmark international airports including total enplaned passengers, total international enplaned passengers, and a breakdown of international enplaned passengers from Asia, Australia, and Latin/South America (Office of Airline Information, Bureau of Transportation Statistics, Research and Innovative Technology Administration, 2015). For comparison, Table 16 includes similar information for San Diego International Airport at Lindberg field.

**Table 12: Seattle-Tacoma International Airport Enplaned Passenger Data**

	Enplaned Passengers	2014	2013	2012	2011
	Total International	1,895,977	1,726,673	1,573,333	1,459,641
	From Asia	610,942	590,669	50,6768	471,845
	From South/Latin America	104,513	100,482	104,238	96,304
	From Australia	0	0	0	0

**Table 13: San Francisco International Airport Enplaned Passenger Data**

	Enplaned Passengers	2014	2013	2012	2011
	Total International	5,070,124	4,798,047	4,613,270	4,360,583
	From Asia	2,073,419	1,999,873	1,920,478	1,814,816
	From South/Latin America	544,006	506,006	520,356	396,882
	From Australia	199,791	214,673	195,473	204,550

**Table 14: Los Angeles International Airport Enplaned Passenger Data**

	Enplaned Passengers	2014	2013	2012	2011
	Total International	9,151,356	8,567,715	8,230,152	8,054,748
	From Asia	2,848,865	2,833,629	2,787,742	2,568,293
	From South/Latin America	2,223,200	1,958,172	1,786,781	1,800,500
	From Australia	1,034,797	1,005,210	986,559	1,030,292

**Table 15: Denver International Airport Enplaned Passenger Data**

	Enplaned Passengers	2014	2013	2012	2011
DEN	Total International and Domestic	25,999,659	25,496,051	25,798,113	25,666,527
	Total International	1,079,057	972,154	864,412	886,108
	From Asia	62,302	35,262	2,908	15,007
	From South/Latin America	328,682	275,861	225,046	237,545
	From Australia	0	0	0	0

**Table 16: San Diego International Airport Enplaned Passenger Data**

	Enplaned Passengers	2014	2013	2012	2011
SAN	Total International and Domestic	9,331,936	8,873,785	8,684,277	8,461,733
	Total International	344,281	322,003	268,040	215,446
	From Asia	56,634	40,141	2,811	2,149
	From South/Latin America	122,436	130,416	92,603	76,691
	From Australia	0	0	0	0

The number of enplaned passengers from Asia and South/Latin America is consistently trending in an upward direction for all benchmarked airports. Table 17 shows the marked percentage increase each year in enplaned passengers originating from Asia with significant increases at both SAN and DEN.

**Table 17: Percent Change from year to year of Enplaned Passengers Originating from Asia**

Benchmarked Airport	SFO	SEA	LAX	SAN	DEN
2014	4%	3%	1%	41%	77%
2013	4%	17%	2%	1328%	1113%
2012	6%	7%	9%	31%	-81%

In addition, to the large growth in passengers from Asia, growth is also apparent in enplaned passengers originating from South and Latin America. Table 18 shows a significant percentage increase each year, specifically at LAX, SAN, and DEN.

**Table 18: Percent Change from year to year of Enplaned Passengers Originating from South and Latin America**

Benchmarked Airport	SFO	SEA	LAX	SAN	DEN
2014	8%	4%	14%	-6%	19%
2013	-3%	-4%	10%	41%	23%
2012	31%	8%	-1%	21%	-5%

As SCIA attracts a hub airline with flights from Asia and/or South/Latin America, the Tri-County region has the opportunity to absorb some of this growth.



#### 4.2.2. Benchmark Airport Spending Trends

Table 19 provides data on individual per trip spending of international travelers from each of the benchmarked airports. This data includes the average amount of money spent on personal trips and business trips at each airport (Economic Development Research Group, Inc., 2013) (Martin Associates, 2014) (Stanford, 2013) (San Diego Tourism Authority, 2013) (Longwoods International, 2015).

**Table 19: Individual, Per Trip Average Spending for Personal and Business Travel at Each Benchmarked Airport**

Benchmarked Airport					
International Personal Trip Spending	\$1,128.00	\$1,341.90	\$1,234.95	\$657.00	\$413.00
International Business Trip Spending	\$1,818.00	\$2,283.10	\$2,050.55	\$1,133.92	\$426.00

The variation in personal versus business per trip per passenger spending is high with slight differences across benchmarked airports. Specifically, business trip spending is nearly double personal trip spending at most of the airports. Each type of trip to each airport was further analyzed to determine the breakdown of the percentage of funds that were spent on transportation, hospitality, restaurants, entertainment, and retail for each benchmarked airport as shown in Table 20 (Stanford, 2013) (San Diego Tourism Authority, 2013) (Economic Development Research Group, Inc., 2013) (Longwoods International, 2015) (Martin Associates, 2014).

**Table 20: Spending Trends in Each Benchmarked Airport**

Benchmarked Airport	SFO	SEA	LAX	SAN	DEN
Transportation	10%	2%	17%	13%	23%
Hospitality	44%	39%	27%	34%	27%
Restaurants	24%	35%	22%	26%	21%
Entertainment	6%	8%	11%	10%	15%
Retail	16%	15%	17%	15%	14%

Analysis of the percentages in Table 20 reveals higher transportation spending trends at suburban airports where there is less mass transit, specifically at DEN and LAX. Reducing transportation costs to and from the airports may leave more possibilities for increased spending in hospitality, restaurants, entertainment and retail.

#### 4.2.3. Projected Spending Impacts

The previous chapter provides low, medium, and high values for the number of anticipated enplaned passengers for the SCIA. These ranges were calculated using the passengers per runway of each of the five benchmarked airports. Using the provided ranges, we then calculated the anticipated number of international passengers originating from Asia, South or Latin America and Australia as a percentage of international enplaned passengers. Using the weighted

average percentage of the total number of international passengers and the anticipated total number of passengers low, medium and high ranges, the breakdown of international passengers by origin was calculated. The anticipated number of international passengers arriving from Asia, South or Latin America and Australia was derived using weighted averages from the benchmarked airports with the results in Table 21.

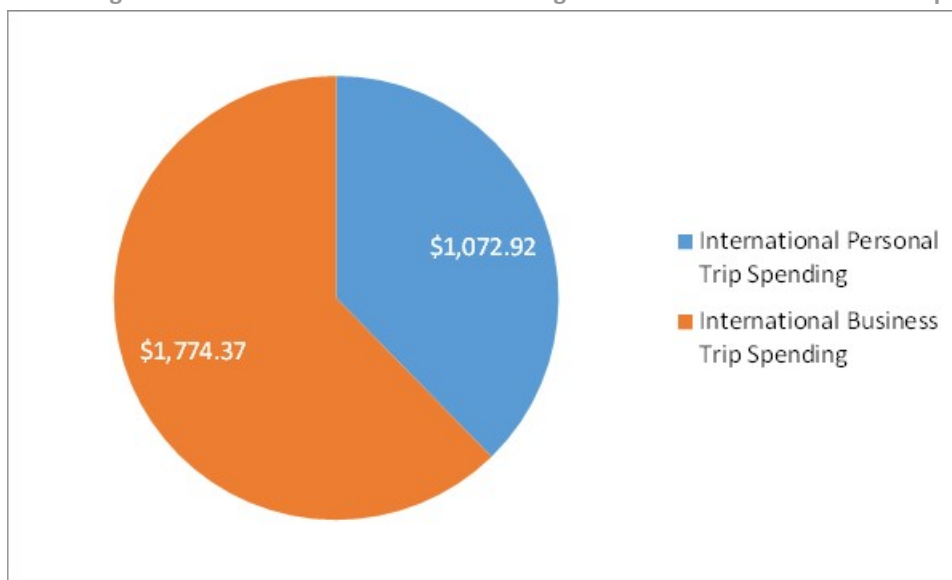
**Table 21: Anticipated Percentages and Totals of International Passengers by Origin\***

	Enplaned Passengers	Percentage	Low	Medium	High
SCIA	Total International and Domestic	100%	17,000,000	20000000	24000000
	Total International	14%	2,330,761	2,742,071	3,290,486
	From Asia	33%	758,346	892,171	1,070,605
	From South/Latin America	27%	629,542	740,637	888,765
	From Australia	8%	177,285	208,571	250,285

\*Percentages and total numbers from Asia, South or Latin America and Australia are calculated using the total number of international passengers anticipated at SCIA.

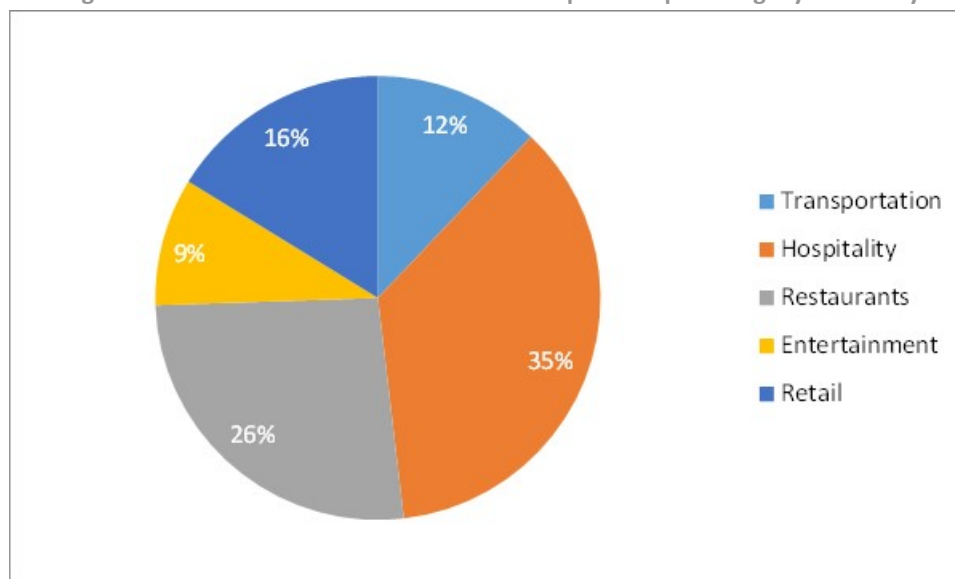
Again using weighted averages from the five benchmarked airports, the projected per trip spending by international travelers on both personal and business trips was calculated and is shown in Figure 16.

**Figure 16: Average Individual International Passenger Personal and Business Trip Spending**



The economic impact to the Tri-County region resulting from transportation, hospitality, restaurant, entertainment and retail spending is calculated using weighted averages from the five benchmarked airports and summarized in Figure 17.

Figure 17: International Traveler Anticipated Spending by Industry



Further analysis of anticipated passenger and expected international trip spending data allows for projecting the economic impact of SCIA on the Tri-County region. The data in Figure 16 and Table 21 are combined in Table 22 and Table 23 to get a high and low range of projected economic impact for the Tri-County region.

Table 22: Low Anticipated Economic Impact Gained from International Travelers to the Tri-County Region

Personal Traveler Spending	Low Range Anticipated Passengers	Low Anticipated Yield
\$ 1,072.92	2,330,761	\$ 2,500,720,092.12

Table 23: High Anticipated Economic Impact Gained from International Travelers to the Tri-County Region

Business Traveler Spending	High Range Anticipated Passengers	High Anticipated Yield
\$ 1,774.34	3,290,486	\$ 5,838,440,929.24

The Tri-County region can expect between \$2.5 and \$5.8 billion in spending by international travelers yielding an impressive economic impact. In the next several sections of this chapter, the economic impact specific to retail, housing and hospitality will be examined more closely.

### 4.3. Impact on Retail

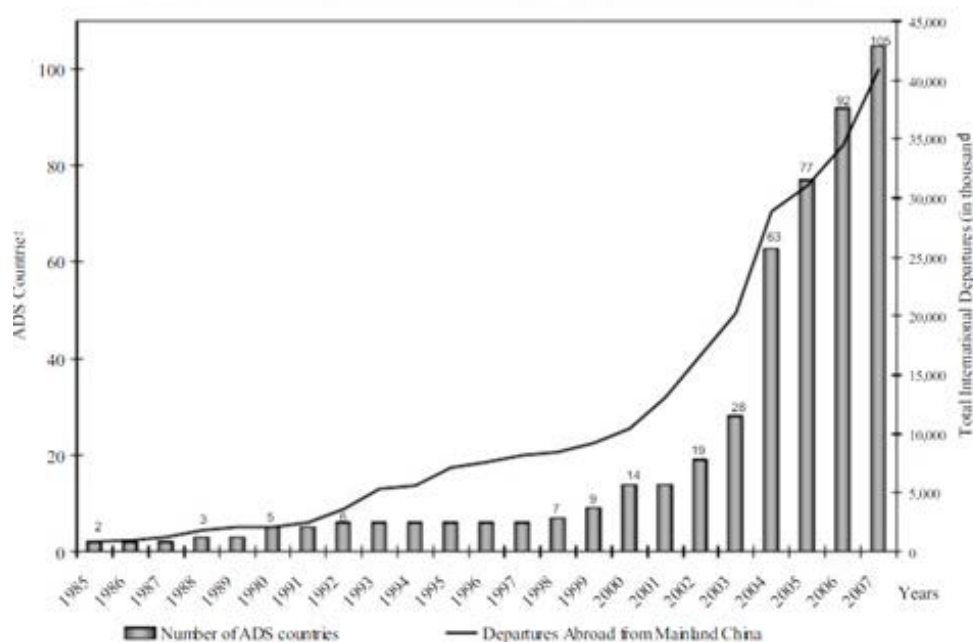
The United Nations World Tourism Organization (UNWTO) reported in May 2014 that as of 2013, China was the leading country in expenditures in International Tourism (UNWTO, 2014). The UNWTO also reported that a new trend has emerged globally where travelers are in some cases traveling solely to do retail shopping. The following section will outline the factors

impacting an increase in Chinese travelers to the United States, the types of purchases these travelers will make, and the economic impact this will have on the Tri-County region.

#### 4.3.1. Factors Impacting Increase

The site Asia Matters for America reported in August 2013 that “Chinese tourist visitor spending in the United States alone increased 47 percent to \$7.7 billion in one year from 2010-2011” (Yousuf, 2013). This drastic increase was impacted by multiple factors including the relaxation of requirements to obtain a visa to travel from China to the United States. This new executive order will “simplify and speed up the non-immigrant visa process” for some making it easier for the Chinese to travel to the United States (The White House Office of the Press Secretary, 2012). In 2007, China made the United States an approved destination by giving it Approved Destination Status (ADS). ADS allows for a bilateral agreement between China and another country granting special group ADS visas for touring groups, as well as increased travel advertising in China. Also, in an effort to increase China’s amount of soft power, they have encouraged Chinese citizens to travel more and use paid sick leave days that have been stockpiled (Yousuf, 2013). The chart below outlines how outbound Chinese travel increases as the number of countries given ADS status increases (Shawn Arita, 2009).

Figure 18: Number of ADS Countries and International Departures from China



Additionally, Yousuf reports that a China’s rising middle class with increasing disposable incomes has also positively impacted the number of Chinese tourists traveling to the United States. Euromonitor International reports that per capita income in China doubled between 2008 and 2013. This makes it the country with the fastest growing spending power among the BRICS (Brazil, Russia, India, China, and South Africa) countries (Euromonitor International, 2013).

While Chinese consumers have an average savings ratio of 39 percent of disposable income, the Chinese government lowered their high savings rates hoping to induce spending.

#### **4.3.2. Changes in Purchasing Behavior of Chinese Consumers**

According to Dr. Yong Chen of Hong Kong Polytechnic University who specializes in Chinese outbound tourism, unlike other global travelers, Chinese tourists focus mainly on shopping. In recent years the purchasing behavior of Chinese tourists has shifted from simple souvenirs to high-priced luxury goods like handbags and watches. In addition, according to Dr. Chen, Chinese travelers are “unlike other global travelers, Chinese tourists focus mainly on shopping” (Cripps, 2013). The combination of increased globalization, improved technology, and growing social media usage has influenced Chinese citizens growing taste for luxury goods. As stated earlier, Chinese travelers also have the growing expendable income to satisfy their luxury purchasing choices (UNWTO, 2014). As of 2012, China had 562,000 high net worth individuals (worth more than US \$1 million), larger than any other BRICS market (Euromonitor International, 2013). Additionally “you have a growing number of what we call the ‘new Chinese tourist’ who are experienced travelers, often with students abroad, looking to experience the local faire (Cripps, 2013).

#### **4.3.3. The Grey Market**

Grey market goods are “genuinely branded merchandise distinguished only by their sale through channels unauthorized by the trademark owner” (Isobel Doole, 1997). Due to high import taxes that increase local retail prices, it makes more sense to for some Chinese to travel abroad to purchase high ticket items. Wolfgang Georg Arlt, director of the China Outbound Tourism Research Institute, told CNN that “Luxury goods are 20 percent to 30 percent cheaper in other global cities. If you plan to spend \$10,000 on shopping and only spend \$1,000 on airfare, it’s much cheaper for Chinese tourists to fly abroad to shop,” (Sanburn, 2013). The influx of travelers from China will surely be satisfying their shopping needs with luxury goods, and maybe purchasing extra to bring home and sell for a profit.

#### **4.3.4. Projected Impact on Tri-county Region**

Table 21 above projects the number of emplaned passengers from Asia to be 758,346 (low), 892,171 (medium), and 1,070,605 (high). Table 22 projects the amount spent per passenger per personal trip to through SCIA to be \$1,072.92, and 16 percent of this amount are retail expenses. This makes the projected economic impact on retail to range from a low of \$130 million to a high of \$183 million annually. Given the overwhelmingly positive outlook on inbound travel from China to the U.S., there is no reason that a medium to high projection shouldn’t be likely.

#### 4.4. Hospitality

LAX has reported in several studies that they are experiencing an influx of tourists from Asia. Los Angeles Mayor Eric Garcetti attributes the record breaking visitor volume to "... growth in the international marketplace – particularly China," (Airport World Magazine, 2015). This is largely due to the convenience of numerous direct flights from China to LAX. A recent study on Los Angeles tourism explains why Asia and the Los Angeles region remain so tightly connected, "China is considered the number one overseas market for tourists traveling to Los Angeles and has the fastest growth of any market, attracting 36 percent more tourists than in 2011. The reason for this is because of China's strong economy and growing upper middle class, enabling them to spend more money in Los Angeles. More places in Los Angeles are also drawing in more Chinese customers by hiring Mandarin speaking sales clerks and incorporating and understanding the Chinese culture," (Wallace, 2014).

##### 4.4.1. Tourism/Leisure Activity Near LAX

Hospitality encompasses activities that generate revenues based on tourist spending including occupancy and theme park visits. This analysis uses Los Angeles as the best comparison for West Coast tourist and leisure activities.

Since the recession in 2008, Los Angeles has shown steady increases in tourism and hospitality generated revenues. A report published by the Los Angeles Tourism Board in 2011 depicted the upward swing (Los Angeles Tourism and convention Board, 2014):

- Los Angeles tourism volume increased more than 3 percent to 27 million overnight visitors in 2011. These overnight travelers contributed nearly \$14.7 billion in spending to the local economy (Los Angeles Tourism and Convention Board, 2014).
- Travel and tourism generated approximately \$1.1 billion in local and state tax revenue in 2011 (Los Angeles Tourism and Convention Board, 2014).
- Hotel occupancy in LA County averaged 71.7 percent in 2011, a +5.9 percent increase over 2010.
- LA's 2011 hotel occupancy placed 7.7 percent above the Top 25 Markets average and 19.3 percent above the U.S. average (Los Angeles Tourism and Convention Board, 2014).
- The 2011 hotel average daily rate was \$123.15, an increase of +5.6 percent over the previous year (Los Angeles Tourism and Convention Board, 2014).
- The total passengers into LAX increased by +4.7 percent in 2011 compared to the previous year. The International market saw a larger increase of +5.0 percent compared to domestic traffic, which increased by +4.6 percent over previous year (Los Angeles Tourism and Convention Board, 2014).

Cruise ships docking in the Port of Los Angeles welcomed nearly 610,000 passengers in 2011. The cruise activity at the Port of Los Angeles generated over \$225 million in economic benefits to the entire region (Los Angeles Tourism and Convention Board, 2014).

As of 2014, Los Angeles set a record high for passenger volume. Los Angeles International Airport handled an estimated 70.7 million passengers last year, far exceeding the previous record of 67.3 million in 2000. Last year, Los Angeles' hotel sector saw an 80 percent occupancy rate with visitor spending at \$18.4 billion and \$28.3 billion in overall economic benefit (Weikel, 2015). The upswing identifies a growing trend in heightened tourism correlated directly to enhanced spending capabilities.

Compared to Los Angeles, San Diego's North County region is not yet equipped to handle LAX's passenger volume. Despite the lack of currently available infrastructure, there is a silver lining. The time needed to plan and construct the Southern California International Airport allocates sufficient time for long term planning of necessary future infrastructure. The mandatory increase of hotels, dining, and leisure activities will be paramount for the increase of passenger traffic and will stimulate job growth and overall economic benefit to the region.

Currently, the Oceanside area offers activities such as sailing, fishing, surfing, paddle boarding, kayaking, coastal skydiving, and scuba diving. Main attractions to the county include SeaWorld, LEGOLAND, and the San Diego Zoo Safari Park. Oceanside also provides a variety of dining choices including local breweries, several small "mom and pop" diners and cafes as well as chain restaurants shown in Figure 19. The Oceanside region consists of several chain hotels/motels as depicted in Figure 20. A unique opportunity exists in the availability of camping on the beach or renting vacation homes that dot the coastline (Oceanside Conference and Visitors Bureau, 2015).



Figure 19: Dining Near the SCIA Region

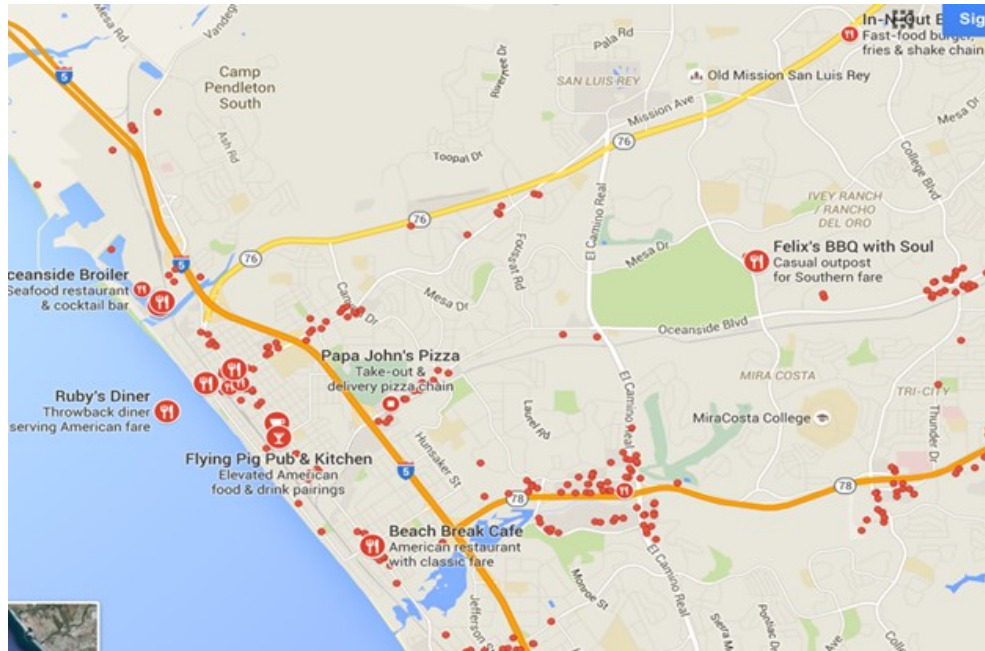
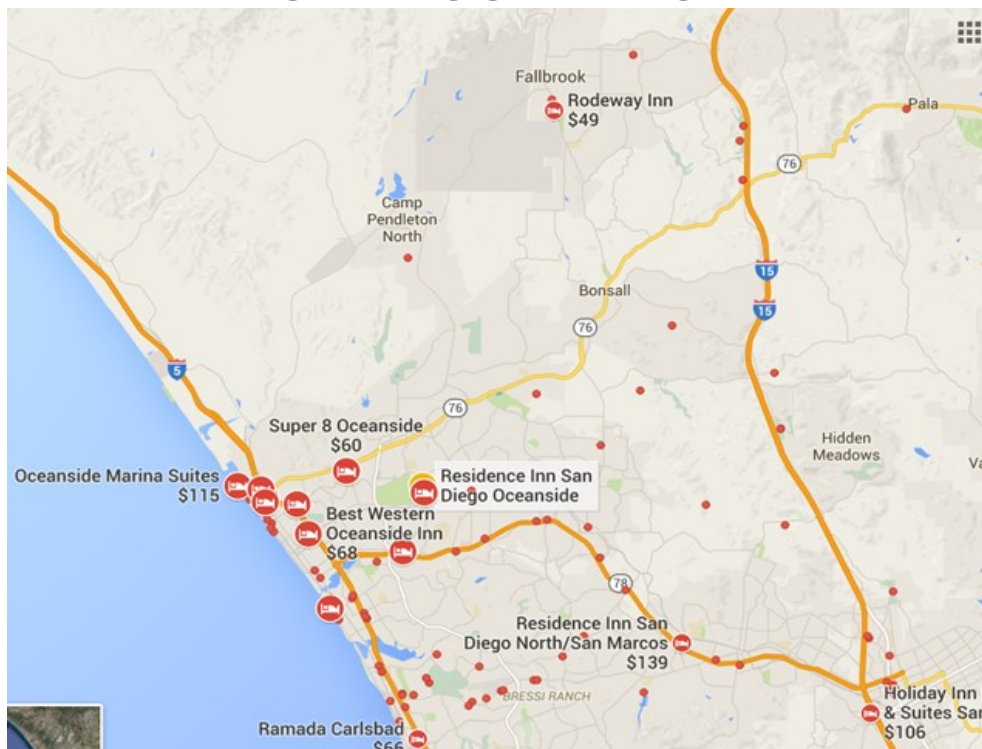


Figure 20: Lodging Near SCIA Region



However, given the broad spectrum of tourists both national and international, creature comforts and wide variety in dining, recreation, and shopping options will be needed. Currently lodging infrastructure will not be adequate to meet anticipated demand. As compared to Los Angeles, the need for dining, shopping, activities, and lodging will need to span the spectrum of

costs from highly affordable to fine or high end experiences. Figure 21 below, depicts the preferences of international visitors traveling to Los Angeles. Therefore, the same will apply to international consumer preferences visiting the Tri-County region through SCIA.

Figure 21: Top 10 Most Popular Activities of Los Angeles' International Visitors



#### 4.4.1.1. Hospitality Tourism in the Tri-County Region

San Diego is becoming a preferred leisure destination according to Hotel News Now. The site explains how San Diego has diversified their market to meet demands of conventions. However, to gain market share it is integral that the region devotes time and money to cater to international tourists, particularly Asian tourists. Without meeting the needs of Asian consumers, SCIA will not optimize profitability (Worgull, 2013). An international hub airline that directly connects Asia to the Tri-County region is needed to make the Tri-County a convenient, accessible market in which Asian tourists can visit and spend their tourism dollars. The current San Diego County tourism data is as follows:

- **Visitors to San Diego County:** There were 33.8 million visitors to San Diego, of which more than 16.9 million were overnight and more than 16.9 million were day visitors (San Diego Tourism Authority, 2015).
- **Visitor Spending:** Visitors to San Diego spent nearly \$9.2 billion at thousands of San Diegan businesses during their stay. Seventy percent of those dollars are spent at businesses other than lodging (San Diego Tourism Authority, 2015).
- **San Diego Hospitality Industry Employment:** The visitor industry employs about 173,100 San Diegans in fields directly related to the hospitality industry, including

lodging, food service, attractions, and transportation (San Diego Tourism Authority, 2015).

- **San Diego Convention Center:** At the San Diego Convention Center, 76 out-of-town conventions and trade shows were held, with an estimated attendance of 527,621 individuals. These events represent approximately \$593 million in direct spending by convention delegates (San Diego Tourism Authority, 2015).
- **Hotel Occupancy:** San Diego County's average hotel occupancy was 74.6 percent and the daily room rate averaged \$140.93 (San Diego Tourism Authority, 2015).
- **Hotel Rooms:** San Diego has approximately 474 hotel and motel properties with 59,691 rooms available to visitors (San Diego Tourism Authority, 2015).
- **Arrivals to San Diego County:** An estimated 9.4 million air passengers arrived at Lindbergh Field, which is served by a total of 19 airline passenger carriers. Amtrak arrivals into San Diego County totaled more than 759,000 people. Southbound and westbound traffic into the County totaled 62 million vehicles (San Diego Tourism Authority, 2015).
- **Tax Revenue:** In San Diego County, nearly \$223 million was collected in Transient Occupancy Tax revenue in fiscal year 2014 (July 2013 -June 2014). Additional sales taxes and property taxes from visitor industry businesses grow the total tax revenues generated by visitors to \$655 million annually (San Diego Tourism Authority, 2015).
- **Population:** The population of San Diego County is estimated to be 3.2 million. San Diego ranks nation's fifth largest county (San Diego Tourism Authority, 2015).

International airports in the United States should anticipate seeing an influx of Asian tourists given the new 10 year Visa agreement between the U.S. and China signed in 2014. With the U.S. Department of Commerce projecting a 4 percent annual growth rate of international travel, travel destinations will be competing for over 80 million new visitors. Again, Table 11 outlines an average spending per trip per Chinese traveler of \$1,072.92 but there are also reports citing that the average daily spending of Chinese tourists is more than \$1,000 per day. These projections are taking into consideration the changing tastes of Chinese consumers towards luxury goods, and their traveling to the U.S. for grey market advantages. With 80 million new visitors at over \$1,000 per day, excluding accommodations, international destination points are potentially competing for close to \$80 billion in revenues from Asian tourism alone (Rauch, 2014). If SCIA welcomes a high-end estimate of one million Asian passengers a year, the region may enjoy an extra \$1 billion in additional spending in the region.

#### **4.4.1.2. Forecast/Trends**

To accommodate the anticipated growth from international travel, major U.S. airlines at LAX have invested more than \$1 billion to renovate their terminals and more than \$7 billion in the

LAX Modernization Program (Airport World Magazine, 2015). The Los Angeles Tourism and Convention Board has revamped Los Angeles’ website and added a second China tourism office in Shanghai. The board also runs an office in Beijing. This strategy comes from the goal of reaching 50 million visitors by 2020, which officials say they are well on their way (City News Service, 2014).

If Los Angeles reaches its 2020 goal, accommodations in the county will be tight. The lodging forecasts as seen in Figure 22 and Figure 23, depict the anticipated passenger volume increase and associated hotel occupancy increase through 2019 (White, 2015)

Figure 22: Forecast Passenger Volume

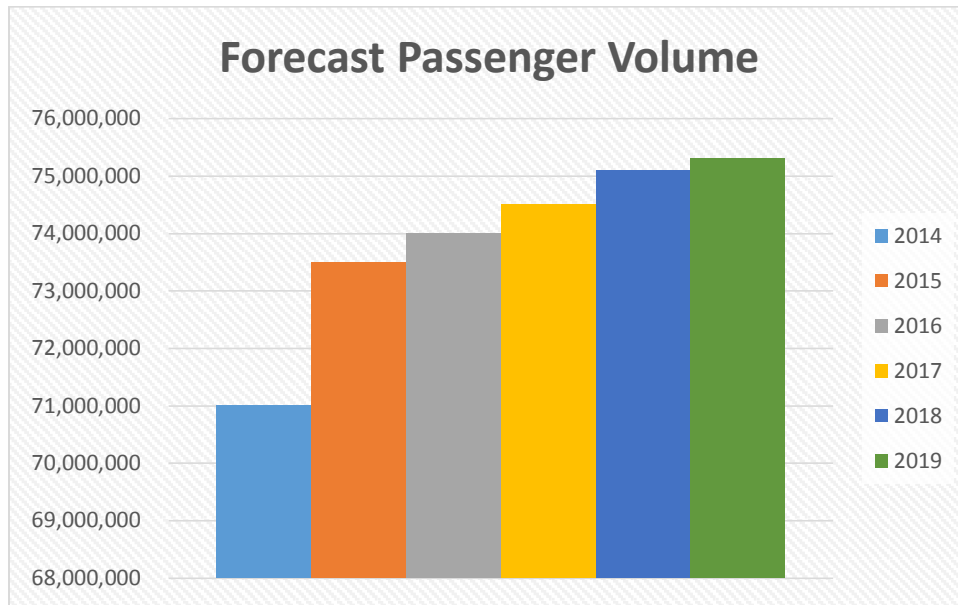
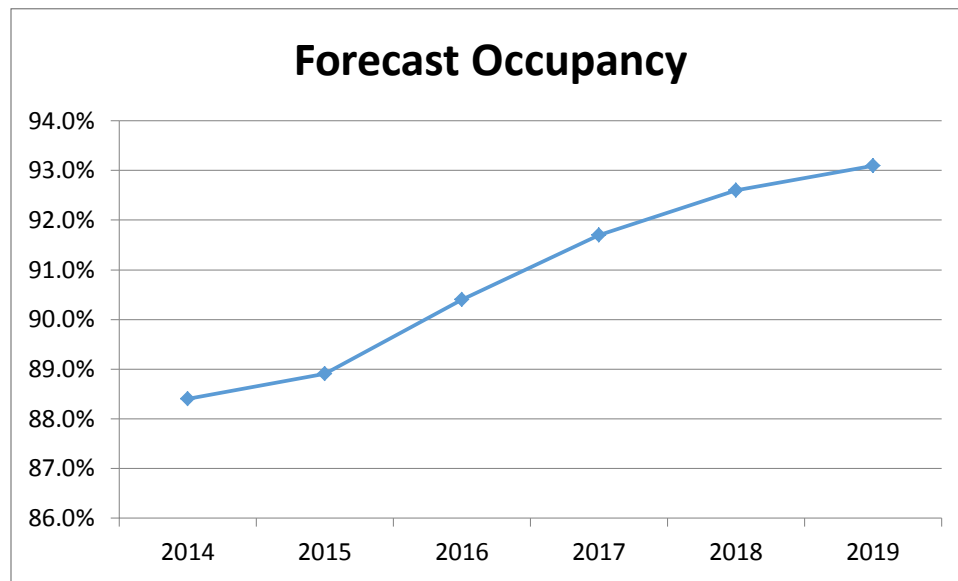


Figure 23: Forecast Occupancy – LAX



The San Diego County hospitality board has forecasted growth in visitor rates, hotel occupancy rates, and expenditure forecasts. Tourism Economics developed the following tables depicting anticipated forecasts through 2020.

Figure 24: San Diego Visitor Forecast (millions)

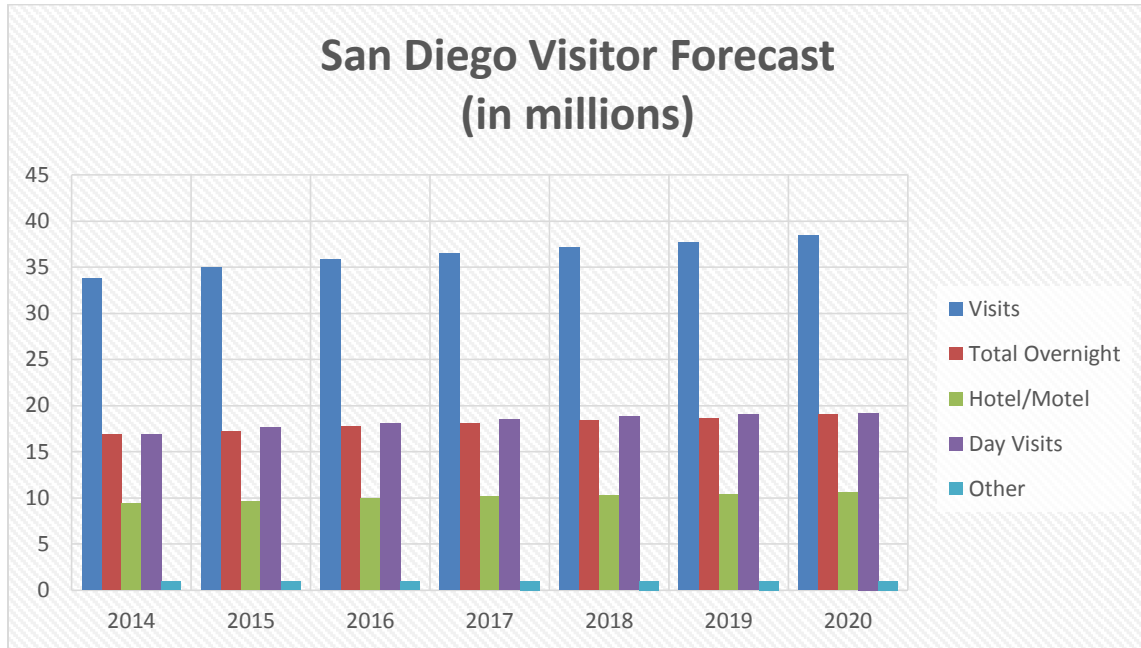
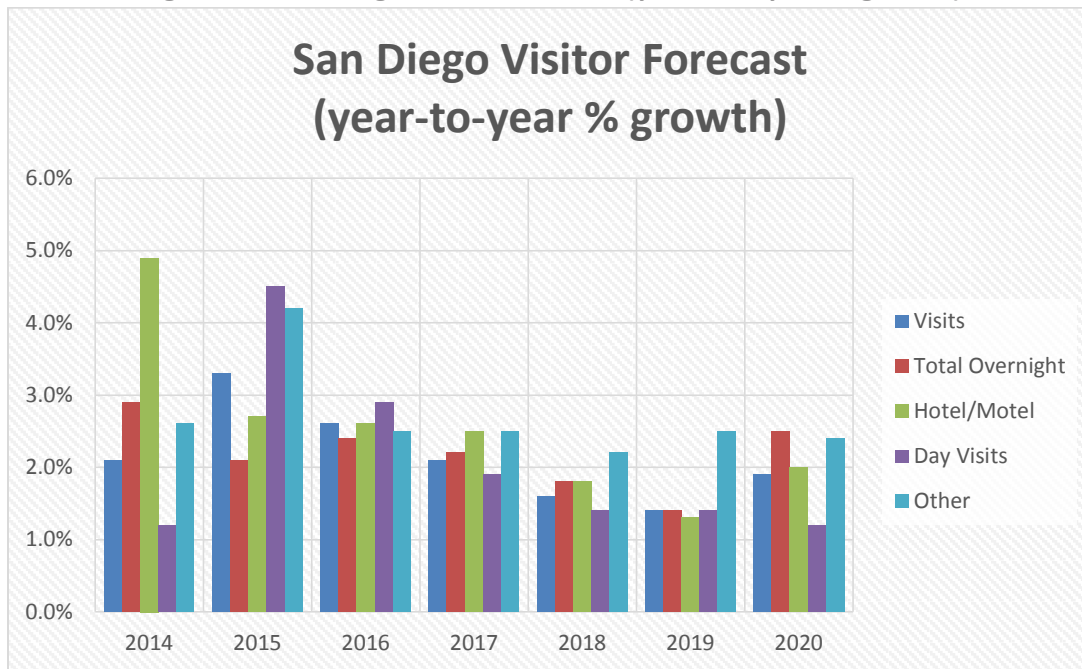


Figure 25: San Diego Visitor Forecast (year over year % growth)

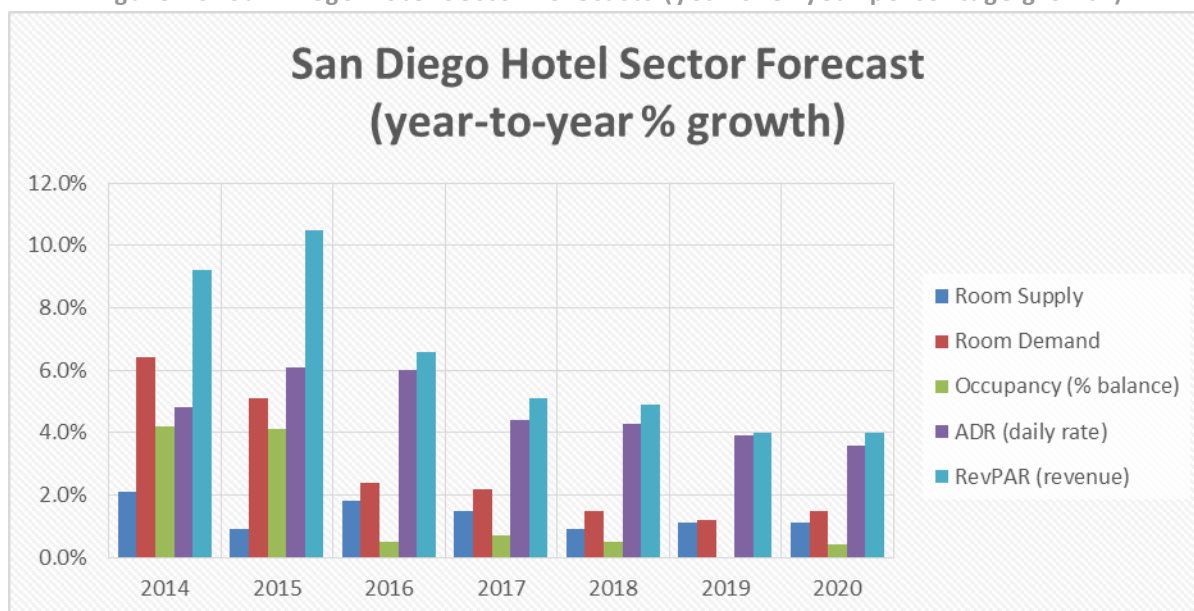


Tourist Economy also developed a forecast for San Diego hotels. The anticipated results show year over year growth in supply and demand for room availability as well as occupancy percentages.

Table 24: San Diego Hotel Sector Forecasts (in millions)

San Diego Hotel Sector Forecasts							
Forecasts	2014	2015	2016	2017	2018	2019	2020
Rooms (room nights)							
Room Supply	21.8	22.0	22.5	22.8	23.0	23.3	23.5
Room Demand	16.3	17.1	17.5	17.9	18.2	18.4	18.7
Occupancy (% balance)	74.6%	77.7%	78.1%	78.6%	79.0%	79.1%	79.4%
ADR	\$141	\$150	\$159	\$166	\$173	\$180	\$186
RevPAR	\$105	\$116	\$124	\$130	\$137	\$142	\$148

Figure 26: San Diego Hotel Sector Forecasts (year over year percentage growth)



San Diego County has a favorable tourism outlook. Given the year over year growth through 2020 hospitality sectors including dining, lodging, activities and attractions will see increases in consumer demand and revenue. Outlined in Table 24 are overnight stays in the county and their continued increase. The majority of these stays are international. This indicates a need for SCIA to ensure initial strategy to capture the international, particularly Asian, market. As stated earlier in the report, Los Angeles is accommodating and attracting Asian tourism through cultural sensitivity. Hiring fluent mandarin speakers and developing lodging, dining, and shopping that cater to the demands of this growing market. San Diego County can maximize and potentially enhance the current trends and forecasts if the growing Asian tourism market can be satisfied (Oxford Economics, 2015).



Table 25: San Diego Tourism Summary Outlook

San Diego Tourism Summary Outlook							
(annual % growth)							
Forecasts	2014	2015	2016	2017	2018	2019	2020
Visits	2.1%	3.3%	2.6%	2.1%	1.6%	1.4%	1.9%
Day	1.2%	4.5%	2.9%	1.9%	1.4%	1.4%	1.2%
Overnight	2.9%	2.1%	2.4%	2.2%	1.8%	1.4%	2.5%
Expenditure	9.7%	9.5%	6.9%	5.4%	4.6%	4.2%	4.8%
Day	4.0%	8.1%	5.4%	4.8%	4.2%	4.4%	4.1%
Overnight	10.4%	9.7%	7.1%	5.5%	4.6%	4.2%	4.9%
Hotel Sector							
Room Supply	2.1%	0.9%	1.8%	1.5%	0.9%	1.1%	1.1%
Room Demand	6.4%	5.1%	2.4%	2.2%	1.5%	1.2%	1.5%
Occupancy (%)	74.6%	77.7%	78.1%	78.6%	79.0%	79.1%	79.4%
ADR (\$)	\$141.38	\$150.03	\$159.09	\$166.05	\$173.25	\$180.05	\$186.45

#### 4.5. Potential Industries Attracted

This section of the report examines the potential industries that would be attracted to the Tri-County region through the provision of an international airport hub. This section will focus on inbound Chinese travelers whose interests are in the fashion, restaurant, and higher education sectors.

##### 4.5.1. Apparel Industry

The fashion industry in the Los Angeles area is dominated by Chinese customers. According to the Los Angeles Fashion Industry Profile - 2014, local operators earn at least \$18 billion in revenue from within the L.A. region's apparel wholesale, textile, and apparel manufacturing businesses. Additionally, their workers earn over \$3.6 billion in direct, indirect, and induced income (Los Angeles Fashion Industry Profile -2014, 2014). Using these data, the proposed SCIA location has great potential in developing a LA type fashion district close to the area. With a major shopping mall located several miles from the location, the development of a fashion district can attract enplaned passengers from the Asia region, specifically China. With an estimated impact on retail of up to \$183,787,762.66 there is a huge potential for the region to capture a portion of these apparel revenues, and this does not include the estimated indirect earnings from this business. Table 26 below shows estimated direct and indirect earnings totaled \$6.4 billion in the five-county Los Angeles metro area in 2011. These earnings can be benchmarked against the fashion/apparel industry in San Diego County.



Table 26: Direct & Indirect Apparel/Textiles Earnings in 5-County SoCal Area, 2011\*

Industry	Direct	Indirect	Estimated Total
Apparel Manufacturing	\$1,101,746,000	\$1,258,084,000	\$2.4 billion
Apparel, Piece Goods, and Wholesalers	\$2,127,641,000	\$1,487,647,000	\$3.6 billion
Textile Mills	\$213,404,000	\$204,078,000	\$0.42 billion
Total of these three industries	\$3,442,791,000	\$2,949,809,000	\$6.4 billion

\*Earnings multipliers include the original earnings. Overall wholesale multiplier used as substitute for apparel wholesaling

Apparel wholesale jobs alone have created 8,700 jobs in eight years in the five-county area (LA, Riverside, San Bernardino, Orange County, and Ventura) with 1100 jobs in a year in that region (Los Angeles Fashion Industry Profile -2014, 2014). Figure 27 below shows apparel wholesaling is more profitable than apparel manufacturing and has been growing.

Figure 27: Los Angeles County and San Bernardino County Have Been Growing Their Share of Apparel Wholesaling Jobs



This indicates that wholesaling is another option for the apparel industry to invest in. Average weekly wages are also higher in apparel wholesaling where it peaks at \$1000/week in 2010.

Figure 28: L.A. County Average Weekly Waged: Apparel Wholesaling Pays Much Better

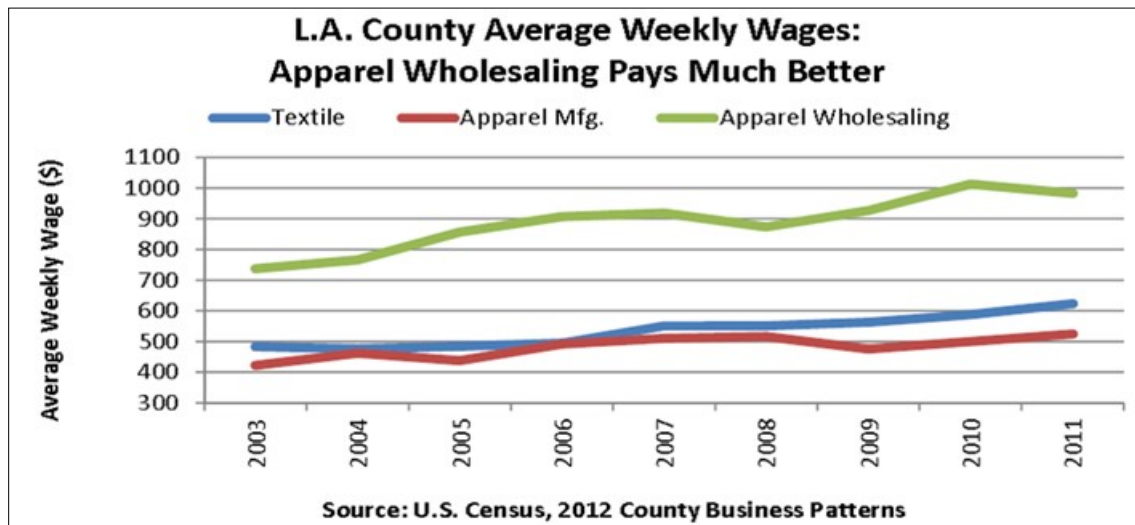
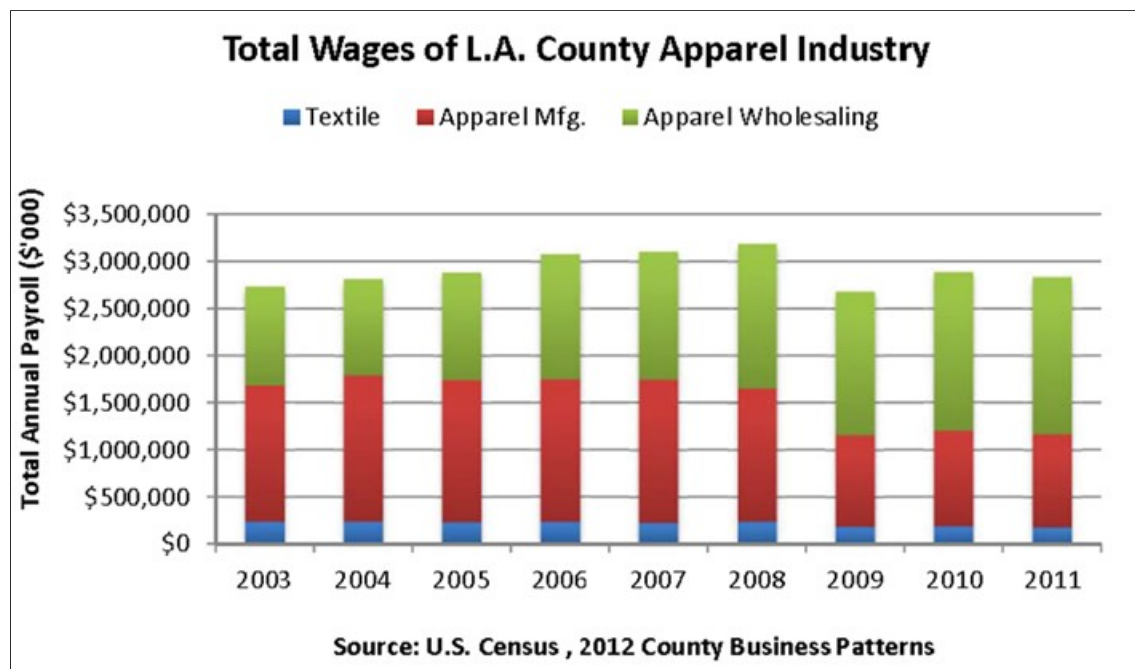


Figure 29: Total Wages of L.A. County Apparel Industry



**4.5.1.1. Investigating Socio-economic Factors on Chinese Female Consumers**

An interesting study on influence of socio-economic factors on Chinese female consumers focuses on their search behavior when shopping for apparel products (Yoo, Jae, & Ye, 2014). This study was used to test the significant differences between female shoppers from different socio-economic status. There were three information search behaviors done for this study: education, household income, and self-reported social class. The study shows Chinese female consumers with household income under \$13,400 USD and consumers with higher education place importance on using brand image, price, and store image. Higher education also places

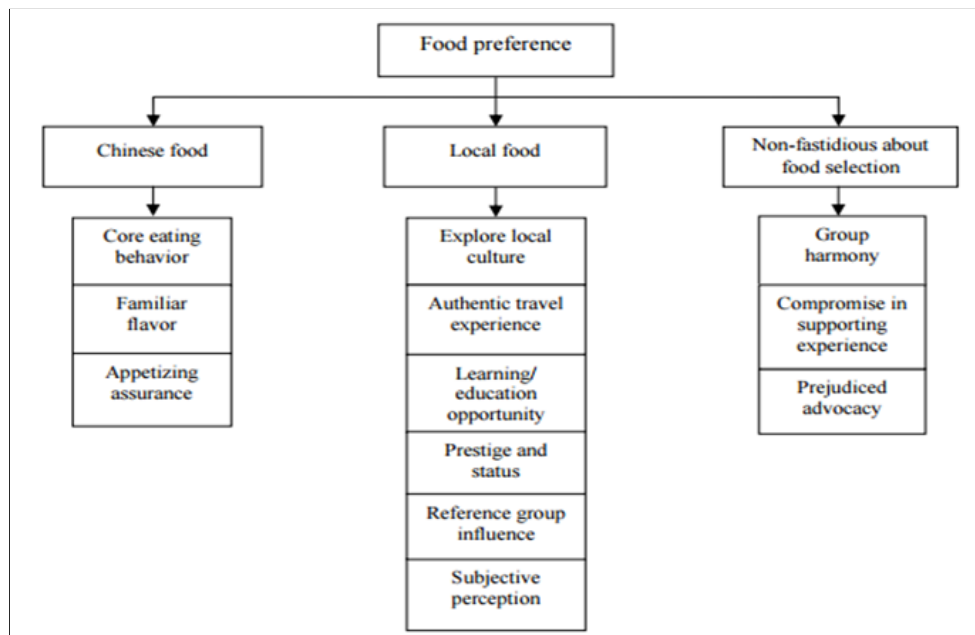
importance on interaction with sales person. They are more influenced by sales personnel; therefore it is important to have sales personnel trained to attract this group of consumers coming from China. More interestingly, the study explains China being highly collectivist culturally; they tend to rely on friends and family for advice in making decisions on purchases. This suggests that word of mouth marketing is important in attracting Chinese customers. Window and store display also play an important role in attracting Chinese consumers. They like to shop for clothing in the U.S. and are influenced by salespeople who understand their needs.

#### 4.5.2. Restaurants

##### 4.5.2.1. Food Preferences for Chinese Tourists

In defining food preferences for Chinese tourists, cultural influences can be a major determinant. Although Chinese tourists like to experiment with local food, they will want to get back to eating Chinese food (Chang, Kivela, & Mak, 2010). According to the article, motivational factors identified as core eating behavior, appetizing assurance and familiar flavor. Hence, Chinese tourist may want to visit Chinese restaurants instead of local restaurants. Figure 30 below shows food preferences for Chinese tourists.

Figure 30: A Model of Chinese Tourists Food Preferences



Chinese tourists like to relate to local food experience when they travel. Since social status is important in the Chinese culture, they want to ensure that they have travelled and experienced local food (Chang, Kivela, & Mak, 2010). In addition, they don't necessarily just want to experiment with local food, but want to have authentic travel experiences where they can experience local tastes (Chang, Kivela, & Mak, 2010). This gives them the opportunity to learn

other cultures and thus enrich their travelling experience. Moreover, learning is considered as motivation for tourists to visit other countries.

#### **4.5.2.2. Food Consumption Expenditure**

Food consumption expenditures can account for up to one-third of the total tourist expenditure per trip. The economic benefits of food expenses can significantly affect the economic viability and sustainable competitiveness of a destination and the restaurant businesses operating in the locality (Mak, 2010). With anticipated international travelers spending 26 percent in restaurants, the region can expect to receive between \$650 million and \$1.5 billion. This is based on anticipated international travelers into SCIA.

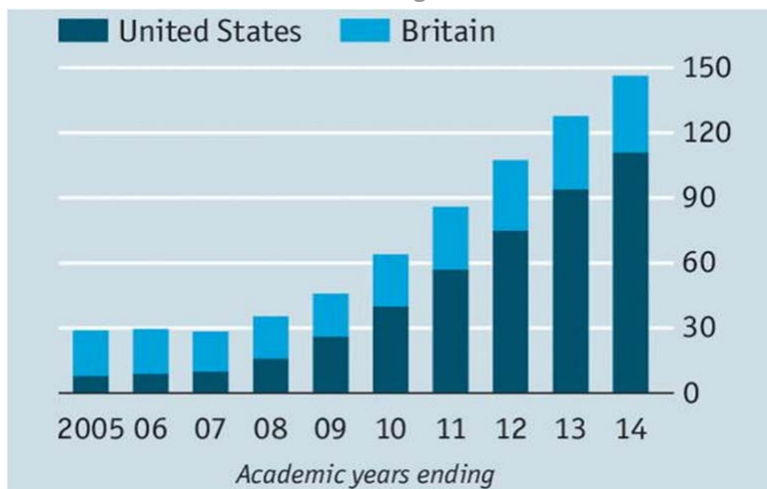
#### **4.5.3. Chinese and Higher Education in U.S.**

In the academic year 2009-2010, there were more than 127,628 Chinese students studying in the United States alone (Bodycott & Lai, 2012). The motivations for Chinese students seeking education abroad include a belief that it will open opportunities for increased wealth and migration (Bodycott & Lai, 2012). Additionally, Chinese parents are tired of Chinese schools focusing on academic scores and would like their children to be exposed to broader educational experiences. Asia remains the largest sending region, accounting for 59 percent of total US international enrollments. China remained in second place, with 67,723 students and the Republic of Korea in third place, with 62,392 students (Chow & Marcus, 2007).

In 2013, about 32,000 Chinese received visas for study at secondary schools in America, up from just 639 in 2005. The growth has occurred despite a steep decline since 2010 in the number of Chinese aged between 18 and 22, from 121m to 89m in 2015 (The Economist, 2015). Several factors that contribute to the rising number of Chinese students coming to the US are quality of education, Chinese parents' preference for well- rated universities in the US, and affordability. In addition, visas are easier to obtain than they were before. Ninety percent of China's mega-rich want their children to study in the US. They feel if their children don't attend universities in the US, then they are not getting an outstanding education (Niall, Fuxman, Ibrahim, & Chao, 2014).

Figure 31 below shows an increase in the number of Chinese undergraduate students in the U.S.

Figure 31: Total Number of Chinese Undergraduate Students in the United States



The growth in higher education attendance, particularly with Chinese students, continues to rise in the U.S. San Diego County has the opportunity to attract Chinese students to its higher learning institutions. Opening SCIA will make it more convenient for Chinese parents to come to the region to visit their children at the universities. While visiting, they will spend their money on shopping, hotel, entertainment, and possibly purchasing real estate properties as an investment and for their children while attending higher education here.

#### 4.5.4. Discussion

Apparel, restaurant, and higher learning industries will create jobs and revenue based on international travelers' spending. It is clear from the analysis on Chinese consumers' spending habits that there is a strong demand for shopping and the need for an LA-type shopping district in the area. In order to meet the demands of this new and growing consumer base, focus will need to be made on infrastructure in the region.

Analysis on food preference in Chinese tourists determines the types of restaurants that need to open in the area to accommodate their taste and preferences. Chinese tourists not only prefer Chinese food but also local food. This gives the opportunity to expand more Chinese restaurants and local types of restaurants in the region. With international travelers spending a projected 26 percent at restaurants, the region can expect to receive between \$650 million and \$1.5 billion in revenues. Finally, Chinese students attending local universities in the region will allow for visiting Chinese parents spend their money on shopping, hotel, entertainment and real estate.

#### 4.6. Impact on Real Estate

A major project, like a new international airport will undoubtedly affect the region and its people in a variety of ways. Positive economic development must be balanced against potential negative impacts region and its residents. One main concern is that a large international airport

is likely to negatively affect real estate prices. While the proposed airport is located close to Oceanside and Fallbrook, home to large civilian and off-base military populations, one of the many reasons why this location is ideal is that it abuts a large military base, not privately owned real estate. The following sections address the potential effects – both positive and negative – on the local real estate market.

#### 4.6.1. Historical Background

In the mid-1990s, a study was conducted on price impact to housing in close proximity to airports. The focus centered around LAX and the effects the airport had on nearby residences. There were several conclusions drawn from this study that are relevant to the SCIA project (Randall Bell, 1997). At that time, it was shown that national and international airports were depressing property values located nearby. Second, property values remained significantly lower for properties closer to the airports than for those further away. Property sales around LAX ranged from 15.1 percent to 42.6 percent lower and averaged 27.4 percent lower to comparable properties (Randall Bell, 1997). Finally, rental rates for office locations were 19 percent to 43 percent lower. This, coupled with vacancy rates as high as 38 percent suggest a negative correlation between airport traffic and real estate prices (Randall Bell, 1997).

Another study was performed at SeaTac International Airport. In 1993, assessed home values were forecasted to decrease resulting from expansion plans to include a third runway. Five towns within close proximity to future flight operations displayed lower residential value as seen in Table 27 below (Helmuth, 1997).

Table 27: Home Values

Town	Actual Assessed value of housing	Estimated Assessed Value Without Airport	Difference
Burien	\$129,000	\$143,900	(\$13,100)
Des Moines	\$136,100	\$149,800	(\$13,700)
Federal Way	\$142,900	\$157,300	(\$14,400)
Normandy Park	\$173,600	\$191,100	(\$17,500)
Tukwila	\$122,400	\$134,800	(\$12,400)

There is an accelerated deterioration in home values scheduled to occur throughout a 20 year time period. To combat these potential drops as a result of noise pollution from the expansion, SeaTac has implemented one of the most comprehensive noise reduction programs in the nation (Helmuth, 1997).

Table 28: Total Change in Home Values Over Time

Town	1993	2000	2020	Difference
Burien	(\$13,100)	(\$29,831)	(\$56,187)	(\$26,356)
Des Moines	(\$13,700)	(\$31,227)	(\$58,835)	(\$27,609)
Federal Way	(\$14,400)	(\$32,804)	(\$61,795)	(\$28,891)
Normandy Park	(\$17,500)	(\$39,859)	(\$75,079)	(\$35,221)
Tukwila	(\$12,400)	(\$28,172)	(\$53,016)	(\$24,844)

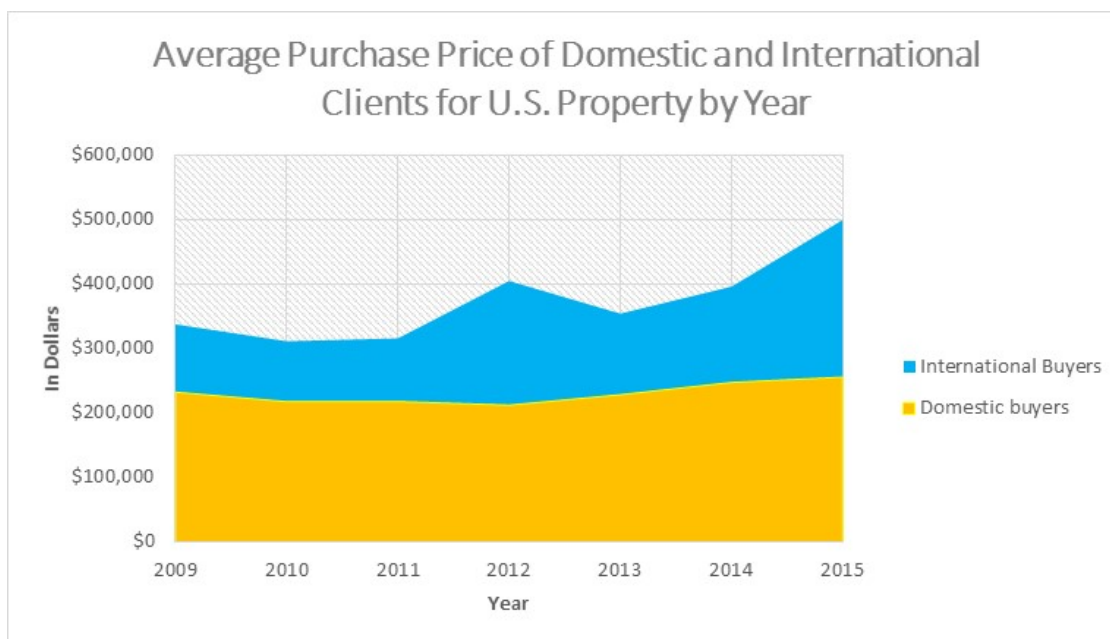
#### 4.6.2. Buyers

##### 4.6.2.1. Domestic

The last several years have seen steady increases in property price appreciation. Domestic buyers have returned to seek home ownership, however, price does factor in to the decision making process. Buyers are spending their dollars outside of California, then moving to more affordable areas.

The average purchase price that domestic buyers are willing to spend for property is modestly higher in 2015 than can be seen several years prior. Conversely, foreign buyers continue to bid for more expensive and attractive alternatives. The momentum of international buyers is noticeable when compared together in Figure 32 (Realtors, 2015).

Figure 32: Average Purchase Price of Domestic and International Clients for U.S. Property by Year



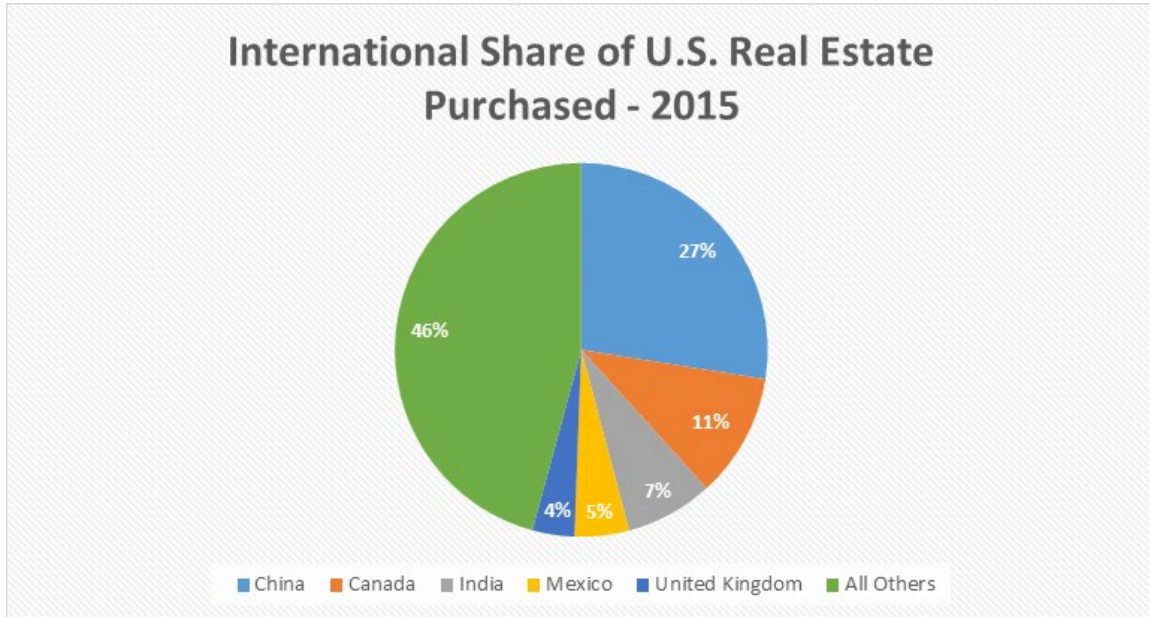
Land values in Southern California may appeal more to the international buyer. Creating connectivity with Asia by way of SCIA may strengthen real estate markets local to the Tri-County region.



#### 4.6.2.2. International

Foreign investment continues to find its way into U.S. real estate. In 2015, the top five buyers account for roughly 54 percent of the \$104 billion used in international property transactions (Realtors, 2015). The distribution is displayed in Figure 16 (Realtors, 2015).

Figure 33: International Share of U.S. Real Estate Purchased – 2015

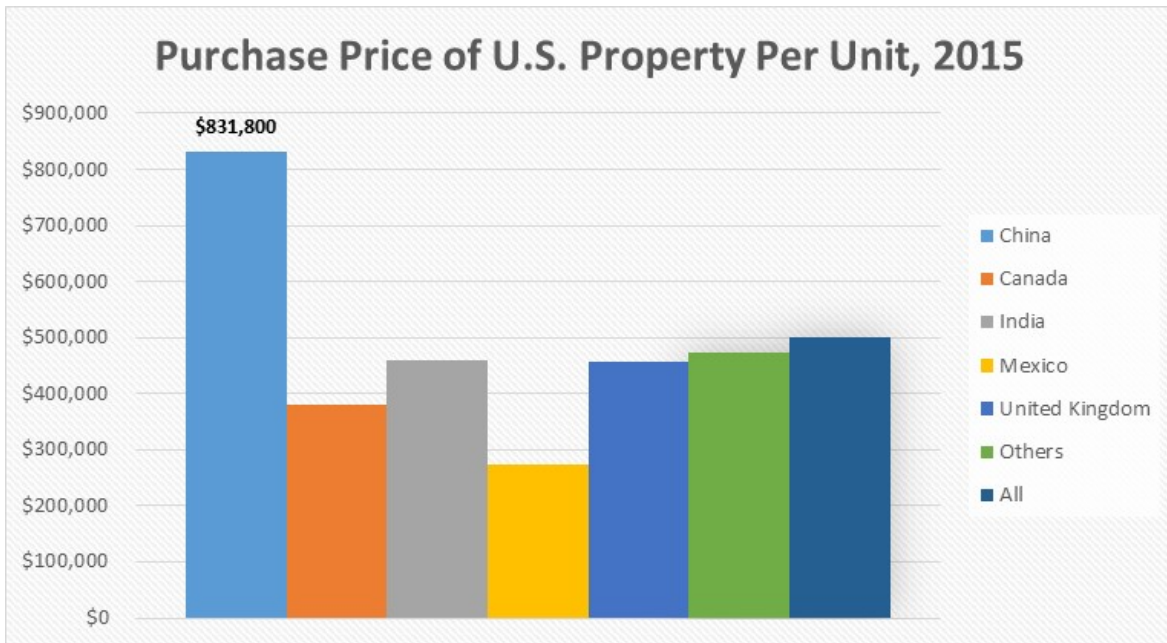


Introducing SCIA to the proposed site may encourage international travelers to consider investment within the Tri-County region.

##### 4.6.2.2.1. China

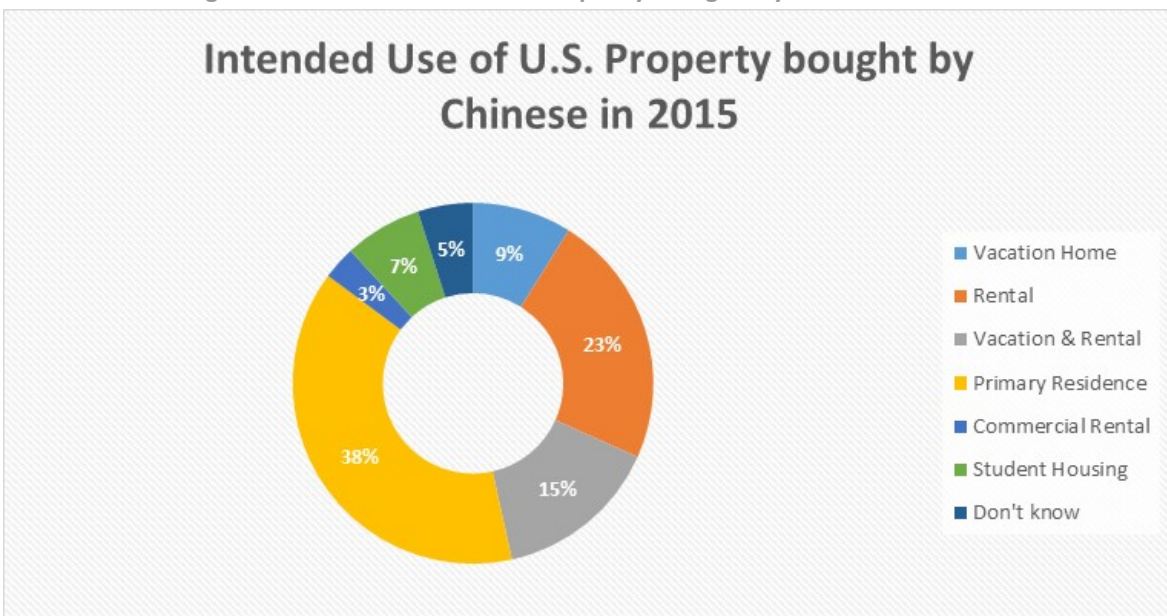
Chinese buyers from abroad are inflating California’s real estate prices (Pollak, 2014). In 2015, Chinese residents account for roughly 29 billion dollars in real estate transactions (Fauth, 2015). Of the top five international buyers of U.S. property, China spends more than \$360,000 more per unit than the 2<sup>nd</sup> largest buyer (Fauth, 2015).

Figure 34: Purchase Price Per Unit



China is buying U.S. real estate, particularly in California, as a means of diversification and to add stability to their portfolios. Real estate is viewed as a stable investment and a way to diversify assets away from China. In addition, Chinese travelers purchase property to set up their children with student housing. Uses of property purchased by Chinese travelers can be seen in Figure 35 (Fauth, 2015).

Figure 35: Intended Use of Property Bought By Chinese in 2015



Nearly 70 percent of real estate transactions involving Chinese buyers are all-cash deals (Fauth, 2015). These deals provide support to price movement as very few fail at closing. The majority

of transactions are for primary residences. Chinese buyers are also active in buying condos, town homes, and commercial rentals (Fauth, 2015; Fauth, 2015).

As connectivity to Asia is extended through the SCIA there is a great likelihood that real estate price appreciation will continue to increase through support of Chinese buyers.

#### 4.6.3. Effects on the Local North County San Diego Market

##### 4.6.3.1. Housing

The two areas most likely to experience immediate impact to real estate as a result of the SCIA are the cities of Oceanside and Fallbrook. Therefore, it is vital to understand the current housing inventory within these two communities. Data from the 2013 U.S. Census Bureau represents housing structures for both and are summarized in Table 29 .

Table 29: 2013 U.S. Census Bureau, Oceanside and Fallbrook Housing Units

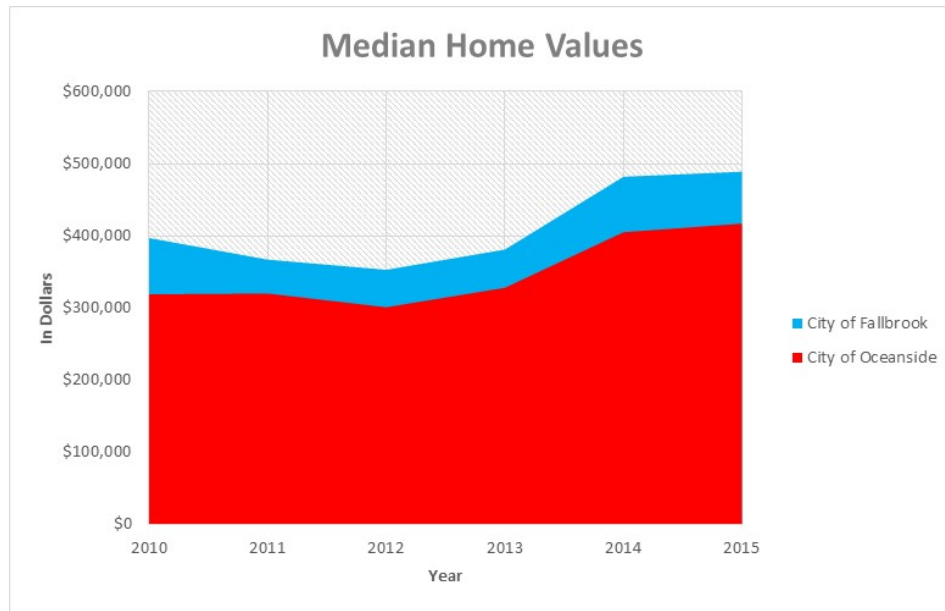
Housing Units	City of Oceanside	City of Fallbrook
Total Housing Units	64,581	10,895
1-Unit, Detached	34,107	7,280
1-Unit, Attached	7,011	125
2 Units	1,875	206
3 or 4 Units	3,983	417
5 to 9 Units	5,874	847
10 to 19 Units	4,159	907
20 or More Units	4,743	782
Mobile Homes	2,805	331
Boat, RV, Van, Etc.	24	0

There is a high probability that these existing structures may lie in the wake of flight paths to the new airport and may cause home prices to be adversely affected.

##### 4.6.3.2. Real Estate Values

The real estate market has seen considerable price appreciation over the last several years. Thanks to a stronger economy, property values have hit levels not reached since the 2008 financial crisis. Homes values in the cities of Fallbrook and Oceanside have also seen this same type of growth. These increases are displayed in Figure 36 (Zillow, 2015).

Figure 36: Median Home Values in Fallbrook and Oceanside

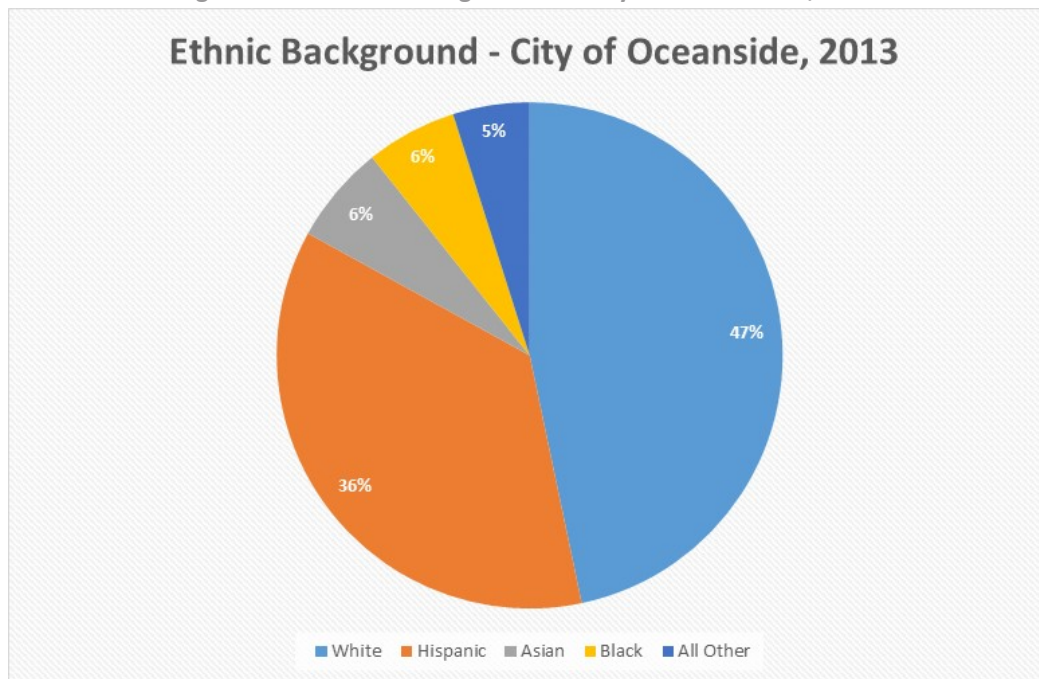


The price movement in home values for each city show strong correlation and track one another.

#### 4.6.3.3. Demographics

Of the approximately 173,000 residents living in Oceanside, more than 87,700 are female (City-data, 2012). Approximately 36,400 residents are foreign-born (13.6 percent Latin America, 3.8 percent Asia) (City-data, 2012). The ethnic diversity of the city of Oceanside is displayed in the following Figure 37 (City-data, 2012).

Figure 37: Ethnic Background – City of Oceanside, 2013



This information is relevant to the SCIA study due to attractiveness for international passengers. Next to Caucasians, Hispanics make up the second largest demographic group in Oceanside. However, this group is prone to use land-based travel as means of transportation to and from Mexico. Unlike Hispanics, the 6 percent of Asian residents may find the SCIA an appealing alternative to LAX and bring increased exposure to the community. Potentially, this usage of SCIA may create a greater need for home purchases and induce healthier real estate markets.

#### **4.6.4. Residential Impact**

The proposed SCIA will be located in the heart of communities that are home to large military and civilian populations. The following sections discuss the ways in which SCIA may affect both segments of the community.

##### **4.6.4.1. Military Personnel**

With over 42,000 active duty personnel at Camp Pendleton, it is important to consider the effect that the SCIA may have on the housing situation for military and their families (Marine Corps Base Camp Pendleton, 2015). The high cost of living in this region, combined with the fact that military members are only allotted a limited monthly housing allowance leads many military families to live on base. There are currently approximately 6,880 housing units on base including single-family homes and multi-family duplex units (Pendleton Housing, 2015). Housing availability on base is determined by rank and family size. The Military Housing Privatization Initiative, established by Congress in 1996, allowed for substantial expansion/remodeling of base housing to improve “Quality of Life” for service members and their families (Military One Source, 2015). Several hundred distressed units on Camp Pendleton qualified for this initiative, and over the last seven years the renovations have made living on-base a desirable option again.

If a military family prefers to live away from the installation they can choose to rent or buy. Typically, service members are only stationed here for a short period of time so it may not make sense for them to purchase property. Again, because of their fixed salaries, and because many families are surviving on one income, home ownership in San Diego is not a priority. With the high costs of living in Southern California, it will be difficult for non-officer ranks with lower incomes to afford to buy homes.

There are many apartment buildings and housing communities’ off-base that are subsidized by the government in order to offset high rental costs for military families. Other complexes may offer military discounts to qualified personnel with their secured government salary. Fortunately, many places will allow rental leases to be broken without penalty, with proof that military orders have immediately changed. This added flexibility is another reason that short-term housing is preferred.



#### **4.6.4.2. Civilians**

Some homeowners in the cities of Oceanside and Fallbrook are exposed to a potential loss in home value due to increased noise and traffic congestion if the SCIA project moves forward. However, the improvements in infrastructure related to the airport project may mitigate such adverse effects, and have a positive impact on the local real estate market.

Directly connecting the region with Asia and the Pacific Rim will increase the numbers of international travelers visiting, investing in, and settling in the Tri-County region. These travelers will spend money and support local businesses which may drive employment, making the Tri-County region more attractive to potential home owners. This might bolster property values. Many immigrants from Asia looking to purchase property may choose the Tri-County region. This may also support home prices. Immigrants on average are willing to spend approximately \$500,000 per unit purchase (Realtors, 2015). However, too great of an influx of foreign cash into the local real estate markets may cause prices to rise to levels beyond the budgets of local residents.

While an intensified housing demand from incoming international travelers will elevate property values, similarly, rental prices will also rise. These higher rates may potentially drive military families back on base and lower-income residents out of the area. Should this be the case, military families could explore the housing options on-base if there was a strong desire to remain close.

Non-military homeowners looking for a way to escape from the airport commotion may consider renting out their homes. Again, with the high demand from the new wave of immigrants, owners have the ability to command higher rents to generate additional income. A four bedroom home in Oceanside can earn more than \$2,500 per month (Rentrage, 2015). Condominiums and townhomes in the area can also charge elevated rates.

#### **4.6.5. Concerns**

##### **4.6.5.1. Noise**

Noise is the number one complaint of those who reside and work by an airport. Noise exposure impairs performance, slows memory, increases aggression, and at high levels, reduces overall quality of life (British Medical Bulletin, 2003). Noise concerns are likely to be a major source of conflict, and a tough battle to fight before the construction of the SCIA is approved.

In order to help combat these issues, some airports have developed specific programs in an effort to help diminish the noise. At SEA, there are two programs in place: the Sound Insulation program, and the Noise Abatement program (Port of Seattle, 2013). The Sound Insulation program works to improve noise pollution by installing insulation in residential properties, as well as schools in order to mitigate interior noise levels. The Noise Abatement program works on initiatives designed to reduce noise produced from aircraft and at the airport

during take-offs, landings, and overhead. Although the FAA has sole control over all flight patterns, the Port of Seattle tracks and reports air traffic activities to make sure they remain in compliance with noise regulations.

#### **4.6.5.2. Pollution**

Pollution and air quality are obvious concerns of residents living around an airport. Breathing in harmful pollutants can cause respiratory ailments, asthma and other damage to the lungs.

Pollution is also devastating our atmosphere, environment and ecosystem. According to a 2012 study, the city of Oceanside scored a 130 in an AQI (air quality index) which ranked significantly worse than the national average (City-data, 2012). Currently, however, emissions are an unavoidable reality. Unless newer methods in modes of transportation are developed, one may deem this as a “necessary evil”.

#### **4.6.5.3. Personal Health**

In general, noise is a stressor that elicits a physiological “fight or flight” mechanism in the brain. Airport noise can take a physical toll on the body and is a contributor to several health issues, including sleep disturbances, anxiety, depression and stress. Research also shows that jet noise significantly contributes to high blood pressure, an increase in hypertension and other cardiovascular disorders (BMJ, 2013). A study done on individuals age 40 and over reported that men who live under flight paths have a 69 percent higher risk of heart disease and stroke, while women fared even worse, with a 93 percent higher risk of cardiovascular issues (Moore, 2009). Jet noise is the harshest of any rail/traffic noise, immediately inducing stress hormones and disrupting cognitive functioning.

#### **4.6.5.4. Traffic**

Many complain about the traffic congestion and clogged highways in Southern California. Regardless of the SCIA installation, traffic has become an ever so prevalent issue. However, transportation systems around airport facilities are known for superior, efficient ways to traverse. In addition, public modes of transportation surrounding the proposed airport site are currently underutilized as much as 70% or more (CSUSM FEMBA Class of 2015, 2015). According to 2013 statistics, the rail system which includes Amtrak, Metrolink, Sprinter and Coaster have room to grow between 23 and 85 percent (CSUSM FEMBA Class of 2015, 2015). Effects of airport traffic may be absorbed in the public transportation system currently not accessed. This would alleviate strain on local thoroughfares in close proximity to SCIA.

#### **4.6.6. Discussion**

There are numerous factors that affect overall real estate prices. First, economic factors such as employment rates, inflation rates, and consumer sentiment can be leading indicators that drive



prices in the housing sector. Second, environmental factors such as air quality, flood zones, and scenery are also influences to real estate. Third, political factors such as elections and agendas can cast uncertainty over consumers pondering home purchases. Finally, legislative factors such as new laws and taxes can restrict home buyers.

Population growth is one of the leading drivers for supply and demand. The migration to a region and desire for home ownership may be the key determinants that drive higher home prices. Conversely, the movement of inhabitants away from a region can produce downward pressures on real estate prices. As of 2015, the population in city of Oceanside is approximately 173,291 (Locator, 2015). In the same year, the population in the city of Fallbrook is approximately 31,305 (Locator, 2015). The growth in housing units is to maintain pace with the growth in population to mitigate influence on real estate prices.

Land is finite, and the ability to build housing units is constrained to availability of land. The planning in residential housing considers additional factors such as commercial, infrastructure, and other project developments. The SCIA proposal, in conjunction with additional factors, leaves open opportunities for investment. It may be difficult to declare SCIA as a primary driver impacting real estate if the proposal passes. A case can also be made that SCIA would initiate growth and prosperity to the cities of Oceanside and Fallbrook. While evidence suggests the SCIA would negatively impact real estate prices, connectivity with Asia and exposure to the Tri-County region may counterbalance that issue.

#### **4.7. Discussion**

EAS 2.0 provided economic impact estimates focused on activities occurring on airport property to include employment, construction, and airport lobby retail (CSUSM FEMBA Class of 2015, 2015). This chapter used benchmarked airports, each with an associated hub airline, to determine the pros and cons of the Tri-County region attracting a hub airline to the SCIA. Section 4.2 of this chapter has highlighted the importance of attracting a hub airline to the SCIA with direct international access to Asia as well as South and Latin America. The average per trip spending and number of anticipated international travelers to the Tri-County region yields an annual economic impact range of \$2.5 billion to \$5.8 billion. In order to draw the maximum possible positive economic impact to the Tri-County region, the local supporting infrastructure will need to reflect the desires of the incoming international travelers regarding retail, hospitality, industry and housing.

Retail is anticipated to attract 16 percent of the total international economic impact to the Tri-County region. This represents possible annual increases ranging from \$400 to \$934 million. To maximize the return on investment, section 4.3 analyzed the types of retail international traveler's desire. With China making travel to the U.S. easier for consumers the region is projected to see steady growth in the number of travelers that arrive. Due to high import taxes that increase local prices in Asia, it now makes more sense to travel to the United States to

purchase high ticket items, which are still cheaper here than in China. The retail market in the Tri-County region will need to provide the opportunities for Chinese visitors to purchase the high-ticket items they desire. Currently a luxury brand outlet mall exists in Carlsbad to support this need, but more infrastructure will be needed in retail services.

Section 4.4 highlights the current growth in the hospitality market in the LAX region and uses that to project the impact SCIA would have on hospitality in the Tri-County region. The LAX region has experienced steady growth in tourism and hospitality revenues since 2008 as well as increased number of travelers visiting the area. Local sporting activities, main attractions, restaurants, breweries, and hotels exist within the Tri-County region, however, the existing accommodations will not meet the future needs of international travelers. Efforts will need to be made in improving infrastructure so the region is ready once SCIA is open for business. With Chinese consumer preferences starting to veer towards luxurious goods, per trip spending has been projected as high as \$1,000.00 a day leaving \$80 billion in revenues available to the Tri-County region.

The increase in travelers to the region will have the greatest impact on the apparel, restaurant, and higher education industries as discussed in section 4.5. By researching Chinese consumer spending habits and apparel industry trends in the similar LA fashion market, it was clear that the Tri-County region has an opportunity to capture some of the revenues coming into the region. Although, there will definitely need to be effort put into building infrastructure to support the increased consumer traffic and spending in this industry. Restaurants are another place that Chinese travelers enjoy spending their money, both on traditional Chinese and traditional local American cuisine. This is another area that will benefit from infrastructure development. With increasing numbers of Chinese students studying abroad and parents coming to visit, this will cause increases in revenues in retail and hospitality as well as impacting the housing market, discussed further in section 4.6.

Some international travelers will be arriving to visit children attending local universities and will invest in real estate. The installation of a large airport in the Tri-County region will certainly have positive and negative impacts on local real estate. This section goes further to assess the buying power of domestic and international real estate buyers and shows the number of international real estate purchasers is growing substantially. Attracting an international airline to hub at SCIA will capitalize on that growing market benefitting the Tri-County region.

The region can expect to enjoy many positive effects from building SCIA, partnering with major hub airlines, and attracting international travelers. However, positive impacts must be weighed against potentially negative consequences. Currently a large portion of the Tri-County region is home to military personnel and their families. As the local housing market increases, many military families may be required to live on the military base vice contributing in the local rental and real estate market. Current residents of the Tri-County region will

experience an impact of noise, traffic, and pollution as well that may not be desirable. The analysis in this chapter suggests that the many positive effects should counterbalance any negative effects. Increased infrastructure, employment, and commerce should strengthen the region making it an even more attractive place to live, to visit, and to conduct business.

## 5. Conclusion

The U.S. pioneered the aviation industry in the 20<sup>th</sup> century. Truly the American Century, the U.S. built state-of-the-art infrastructure that was the envy of the world. At that time, most international travel was transatlantic. Accordingly, much of America's airport infrastructure was built along the eastern seaboard.

Recent decades have shifted the scope of global business and travel toward Asia. In the 21<sup>st</sup> century, growth in trade and travel has become Transpacific. Previous studies, including those conducted by MBA students and California State University, San Marcos (CSUSM) have shown that the aviation infrastructure in the U.S., particularly along the West Coast, will soon be insufficient to keep up with the growing demands for transpacific air travel and trade. California has invested in upgrading its existing aviation infrastructure, most recently through its improvements to San Diego International Airport. However, better quality infrastructure is not enough – more capacity is needed, especially in the growing Tri-County region.

This year's Master's project (EAS 2.1) has shown that, indeed, most of the world's newest airports are being built in East Asia, notably China and India. These new mega-modern airports are hubs to fleets of larger aircraft. The most direct route to North America lands not along the east coast, but on the west coast. Thus, the west coast needs to build new mega hub airports capable of handling the increased traffic.

Most 20<sup>th</sup> century airport projects were funded through bonds and were largely publicly financed. This report has shown that around the world, 21<sup>st</sup> century airports are going beyond strictly public financing and creating opportunities for investors and public-private partnerships. Such alternative models may provide blueprints for SCIA.

Beyond being airport stakeholders, airlines can also be important partners in the design, financing, and operations of successful international airports. To meet the growing demands of more travelers and larger aircraft, a new international airport like the proposed SCIA has a unique opportunity to partner with potential hub airlines (either domestic or international) to create a major gateway along America's West Coast. The new airport must meet the demands of the traveling public as well as the airlines that carry them. Working closely with airlines during the design and planning phases can help ensure that major airline partners will continue to support SCIA well into the future.

EAS 2.1 reinforces the previous studies' findings of a clear need for additional capacity in the Southern California region driven by strong growth in international travel. The economic impact to the region will be significant, not only from the initial construction that would last for several years, but beyond from the ongoing revenue generated by related and supporting industries. The analysis in this report shows that a mega hub international airport that provides a gateway directly connecting the Tri-County region to emerging economies in Asia and Latin

America, will benefit local residents and the industries that employ them, as well as international visitors and the industry sectors that serve them.

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## 7. Appendix A: SCIA Affordability Statistical Data

### 7.1. Data Set

The data set used for the SCIA affordability analysis is provided in Table 30. The data represents financial results from each airport's latest reported fiscal year (typically 2014) and was extracted from the FAA's Certification Activity Tracking System (CATS) and then normalized by the airport's annual passenger enplanement total where necessary (Federal Aviation Administration). The five benchmark airports used throughout this report are highlighted in yellow.

Table 30: Population Dataset

Airport ID	Passenger airline CPE	Aero non-passenger revenue per enplanement	Non-aero revenue per enplanement	Total revenue per enplanement	Estimated cost of capital	Total debt per enplanement	Interest expense per enplanement	% non-passenger revenue	EBITDA per enplanement	Hub concentration factor	Debt to revenue ratio
CLT	\$ 2.65	\$ 1.30	\$ 4.47	\$ 8.41	3.66%	\$ 40.02	\$ (1.46)	68.53%	\$ 3.82	88.00%	4.759
ATL	\$ 3.36	\$ 0.48	\$ 6.65	\$ 10.49	4.51%	\$ 65.56	\$ (2.95)	67.97%	\$ 5.00	79.80%	6.251
SLC	\$ 4.04	\$ 0.90	\$ 7.39	\$ 12.34	0.00%	\$ -	\$ -	67.23%	\$ 3.83	68.00%	0.000
FLL	\$ 4.52	\$ 0.94	\$ 10.71	\$ 16.17	3.65%	\$ 130.48	\$ (4.77)	72.03%	\$ 5.48	20.10%	8.069
TPA	\$ 5.23	\$ 1.17	\$ 15.00	\$ 21.40	4.16%	\$ 68.03	\$ (2.83)	75.54%	\$ 9.37	68.00%	3.179
PHX	\$ 6.10	\$ 0.49	\$ 11.20	\$ 17.79	4.26%	\$ 74.27	\$ (3.16)	65.70%	\$ 5.75	51.30%	4.175
MSP	\$ 6.60	\$ 0.71	\$ 9.06	\$ 16.37	4.88%	\$ 76.88	\$ (3.75)	59.68%	\$ 7.58	75.10%	4.697
DFW	\$ 7.53	\$ 1.05	\$ 11.30	\$ 19.89	3.99%	\$ 201.09	\$ (8.02)	62.12%	\$ 6.02	83.00%	10.111
MCO	\$ 7.53	\$ 0.89	\$ 14.19	\$ 22.61	4.55%	\$ 58.33	\$ (2.66)	66.70%	\$ 10.29	29.50%	2.580
MDW	\$ 7.81	\$ 2.26	\$ 5.97	\$ 16.05	3.99%	\$ 151.60	\$ (6.04)	51.31%	\$ 3.83	95.50%	9.446
HNL	\$ 9.44	\$ 2.30	\$ 9.77	\$ 21.50	1.66%	\$ 135.43	\$ (2.25)	56.12%	\$ 6.21	50.00%	6.298
BWI	\$ 9.82	\$ 0.82	\$ 7.63	\$ 18.28	4.01%	\$ 57.52	\$ (2.31)	46.27%	\$ 3.17	71.20%	3.147
DTW	\$ 10.06	\$ 0.42	\$ 8.26	\$ 18.74	3.52%	\$ 134.46	\$ (4.73)	46.33%	\$ 5.92	75.10%	7.176
SAN	\$ 10.11	\$ 1.60	\$ 9.84	\$ 21.55	4.11%	\$ 151.15	\$ (6.21)	53.08%	\$ 6.48	42.70%	7.013
IAH	\$ 10.18	\$ 0.65	\$ 7.19	\$ 18.02	3.74%	\$ 90.78	\$ (3.40)	43.51%	\$ 6.94	78.10%	5.038
DCA	\$ 11.26	\$ 0.43	\$ 10.59	\$ 22.28	4.14%	\$ 115.83	\$ (4.79)	49.45%	\$ 7.40	51.10%	5.200
SEA	\$ 11.43	\$ 0.61	\$ 9.66	\$ 21.70	4.22%	\$ 125.71	\$ (5.30)	47.32%	\$ 9.37	49.90%	5.794
LAS	\$ 11.90	\$ 1.34	\$ 9.43	\$ 22.67	4.89%	\$ 206.12	\$ (10.08)	47.51%	\$ 11.99	43.20%	9.094
PHL	\$ 13.34	\$ 1.41	\$ 8.43	\$ 23.18	3.16%	\$ 84.61	\$ (2.67)	42.47%	\$ 5.20	75.30%	3.650
LAX	\$ 13.59	\$ 2.64	\$ 11.94	\$ 28.16	3.41%	\$ 114.33	\$ (3.89)	51.76%	\$ 10.39	25.40%	4.060
DEN	\$ 13.92	\$ 1.41	\$ 11.28	\$ 26.61	4.09%	\$ 160.92	\$ (6.59)	47.68%	\$ 11.14	42.60%	6.047
BOS	\$ 14.32	\$ 3.28	\$ 16.56	\$ 34.16	3.91%	\$ 108.44	\$ (4.24)	58.07%	\$ 14.13	21.00%	3.174
ORD	\$ 16.24	\$ 0.52	\$ 7.41	\$ 24.16	3.90%	\$ 220.48	\$ (8.59)	32.80%	\$ 10.00	43.70%	9.125
SFO	\$ 16.26	\$ 2.66	\$ 14.60	\$ 33.51	4.54%	\$ 193.66	\$ (8.78)	51.48%	\$ 16.00	46.00%	5.778
LGA	\$ 18.73	\$ 1.58	\$ 6.87	\$ 27.18	0.00%	\$ 1.63	\$ -	31.07%	\$ 5.89	68.00%	0.060
MIA	\$ 20.54	\$ 4.42	\$ 14.40	\$ 39.36	4.91%	\$ 301.27	\$ (14.80)	47.83%	\$ 19.22	70.70%	7.654
JFK	\$ 25.70	\$ 6.97	\$ 11.52	\$ 44.19	0.00%	\$ 56.41	\$ -	41.85%	\$ 14.52	68.00%	1.276
IAD	\$ 26.44	\$ 2.69	\$ 16.15	\$ 45.28	4.14%	\$ 344.55	\$ (14.27)	41.61%	\$ 23.02	74.60%	7.609
EWB	\$ 30.29	\$ 6.46	\$ 13.56	\$ 50.31	0.00%	\$ -	\$ -	39.80%	\$ 22.11	68.00%	0.000

### 7.2. Summary Statistics

Summary statistics are used to help characterized the data set and provide the mean and associated 95 percent confidence intervals that are used in subsequent analysis. The Descriptive Statistics of Microsoft Excel’s Data Analysis functions were used to generate the following data set summary statistics. Note that Excel calculates the sample variance standard deviation as opposed to the population variance and standard deviation. This introduces minor discrepancies in these variance calculations which deemed to be insignificant for the analysis in this report.

Table 31: Summary Statistics

Descriptive Statistics	Passenger airline CPE	Aero non-passenger revenue	Non-areo revenue per enplanement	Total revenue per enplanement	Estimated cost of capital	Total debt per enplanement	Interest expense per enplanement	% non-passenger revenue	EBITDA per enplanement	Hub factor	Debt to revenue ratio
Mean	\$ 12.03	\$ 1.81	\$ 10.38	\$ 24.22	3.45%	\$ 119.64	\$ (4.78)	52.86%	9.313	59.41%	5.188
Standard Error	\$ 1.30	\$ 0.31	\$ 0.59	\$ 1.90	0.28%	\$ 15.29	\$ 0.71	2.16%	1.000	3.79%	0.525
Median	\$ 10.18	\$ 1.30	\$ 9.84	\$ 21.70	3.99%	\$ 114.33	\$ (3.89)	51.31%	7.399	68.00%	5.200
Mode	\$ 7.53	#N/A	#N/A	#N/A	0.00%	\$ -	\$ -	#N/A	#N/A	68.00%	0.000
Standard Deviation	\$ 6.99	\$ 1.67	\$ 3.20	\$ 10.25	1.53%	\$ 82.35	\$ 3.80	11.64%	5.388	20.43%	2.829
Sample Variance	\$ 48.93	\$ 2.79	\$ 10.21	\$ 105.13	0.02%	\$6,781.84	\$ 14.45	1.36%	29.029	4.17%	8.002
Kurtosis	\$ 0.78	\$ 3.80	\$ (0.71)	\$ 0.76	143.32%	\$ 1.08	\$ 1.31	-69.32%	0.893	-73.00%	-0.559
Skewness	\$ 1.04	\$ 1.98	\$ 0.29	\$ 1.05	-163.80%	\$ 0.91	\$ (1.14)	20.74%	1.238	-38.80%	-0.229
Range	\$ 27.64	\$ 6.55	\$ 12.09	\$ 41.91	4.91%	\$ 344.55	\$ 14.80	44.47%	19.851	75.40%	10.111
Minimum	\$ 2.65	\$ 0.42	\$ 4.47	\$ 8.41	0.00%	\$ -	\$ (14.80)	31.07%	3.166	20.10%	0.000
Maximum	\$ 30.29	\$ 6.97	\$ 16.56	\$ 50.31	4.91%	\$ 344.55	\$ -	75.54%	23.017	95.50%	10.111
Sum	\$ 348.94	\$ 52.41	\$ 301.01	\$ 702.36	99.99%	\$3,469.59	\$ (138.56)	1532.82%	270.066	1722.90%	150.462
Count	29	29	29	29	29	29	29	29	29	29	29
Confidence Level(95.0%)	\$ 2.66	\$ 0.64	\$ 1.22	\$ 3.90	0.58%	\$ 31.32	\$ 1.45	4.43%	2.049	7.77%	1.076

### 7.3. Correlation Matrix

The correlation matrix provides a measurement of how each pair of variables tends to vary together and is used to identify strong dependent relationships between pairs of data. A strong correlation however, does not identify causal relationships. Table 32 provides the correlation matrix generated using Microsoft Excel’s data analysis functions.

Table 32: Correlation Matrix

	Passenger airline CPE	Aero non-passenger revenue per enplanement	Non-areo revenue per enplanement	Total revenue per enplanement	Estimated cost of capital	Total debt per enplanement	Interest expense per enplanement	% non-passenger revenue	EBITDA per enplanement	Hub concentration factor	Debt to revenue ratio
Passenger airline CPE	1.000										
Aero non-passenger revenue per enplanement	0.771	1.000									
Non-areo revenue per enplanement	0.456	0.449	1.000								
Total revenue per enplanement	0.950	0.829	0.696	1.000							
Estimated cost of capital	-0.381	-0.491	0.147	-0.294	1.000						
Total debt per enplanement	0.276	0.031	0.361	0.306	0.536	1.000					
Interest expense per enplanement	-0.245	0.010	-0.369	-0.281	-0.612	-0.968	1.000				
% non-passenger revenue	-0.747	-0.318	0.090	-0.533	0.274	-0.233	0.194	1.000			
EBITDA per enplanement	0.825	0.695	0.758	0.912	-0.038	0.456	-0.478	-0.354	1.000		
Hub concentration factor	-0.022	0.024	-0.448	-0.150	-0.138	-0.088	0.067	-0.102	-0.175	1.000	
Debt to revenue ratio	-0.203	-0.310	-0.084	-0.215	0.658	0.781	-0.741	0.020	-0.053	0.016	1.000

The highlighted entries in the leftmost columns represent the two dependent variables selected for regression analysis.

**7.4. Regression Results**

Excel’s regression analysis tool was used to perform a multiple linear regression using the least squares method to fit a line through the selected data set. Output of the regression analysis is provided in Table 33.

**Table 33: Regression Results**

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.957							
R Square	0.916							
Adjusted R Square	0.910							
Standard Error	2.101							
Observations	29							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	1255.2245	627.6123	142.1962	9.996E-15			
Residual	26	114.7564	4.4137					
Total	28	1369.9809						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	20.803	2.326	8.945	2.05E-09	16.023	25.583	16.023	25.583
% non-passenger revenue	-31.241	3.647	-8.566	4.79E-09	-38.738	-23.745	-38.738	-23.745
EBITDA per enplanement	0.831	0.079	10.551	6.86E-11	0.669	0.993	0.669	0.993

The results show that variation in the two independent variables (percent of non-passenger revenue and EBITDA per enplanement account for 91 percent of the variation in CPE in the data set. The model is statically significant as indicated by the F significance of nearly zero. The intercept and each coefficient are also statically significant as indicated by nearly zero P-values. The line fit residual values also appear to be random when plotted indicating a good line fit.

**7.5. Line Fit Plots**

Figure 38 and Figure 39 show predicted vs. actual data for the regression model and are used to visually confirm the regressions significance and accuracy.

Figure 38: % Non-passenger Revenue Line Fit Plot

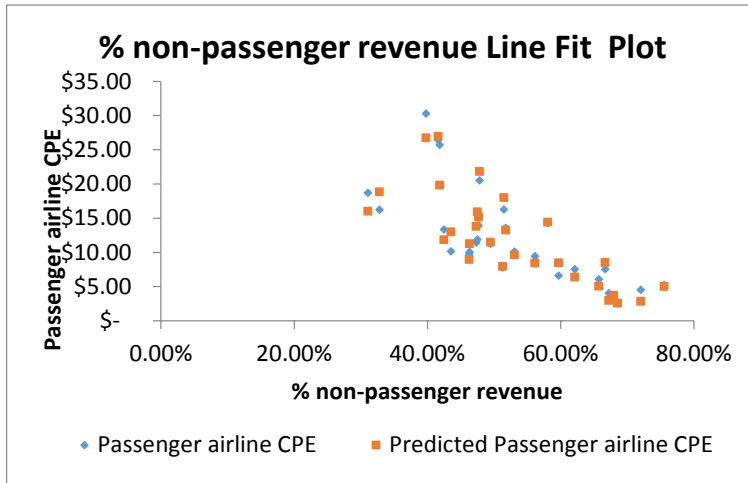
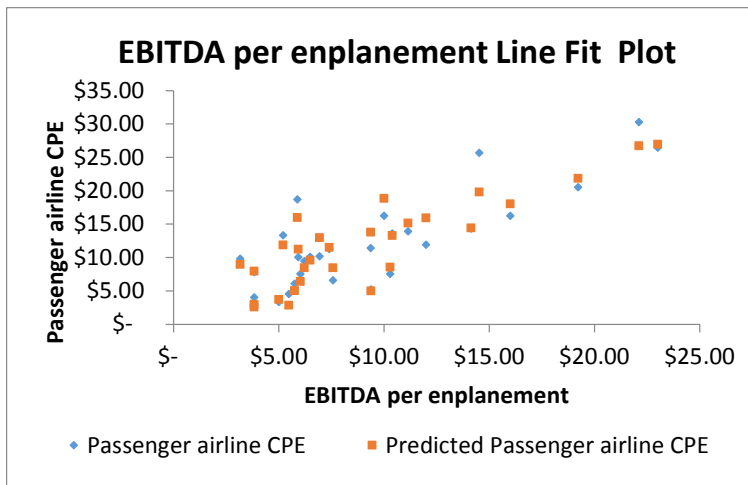


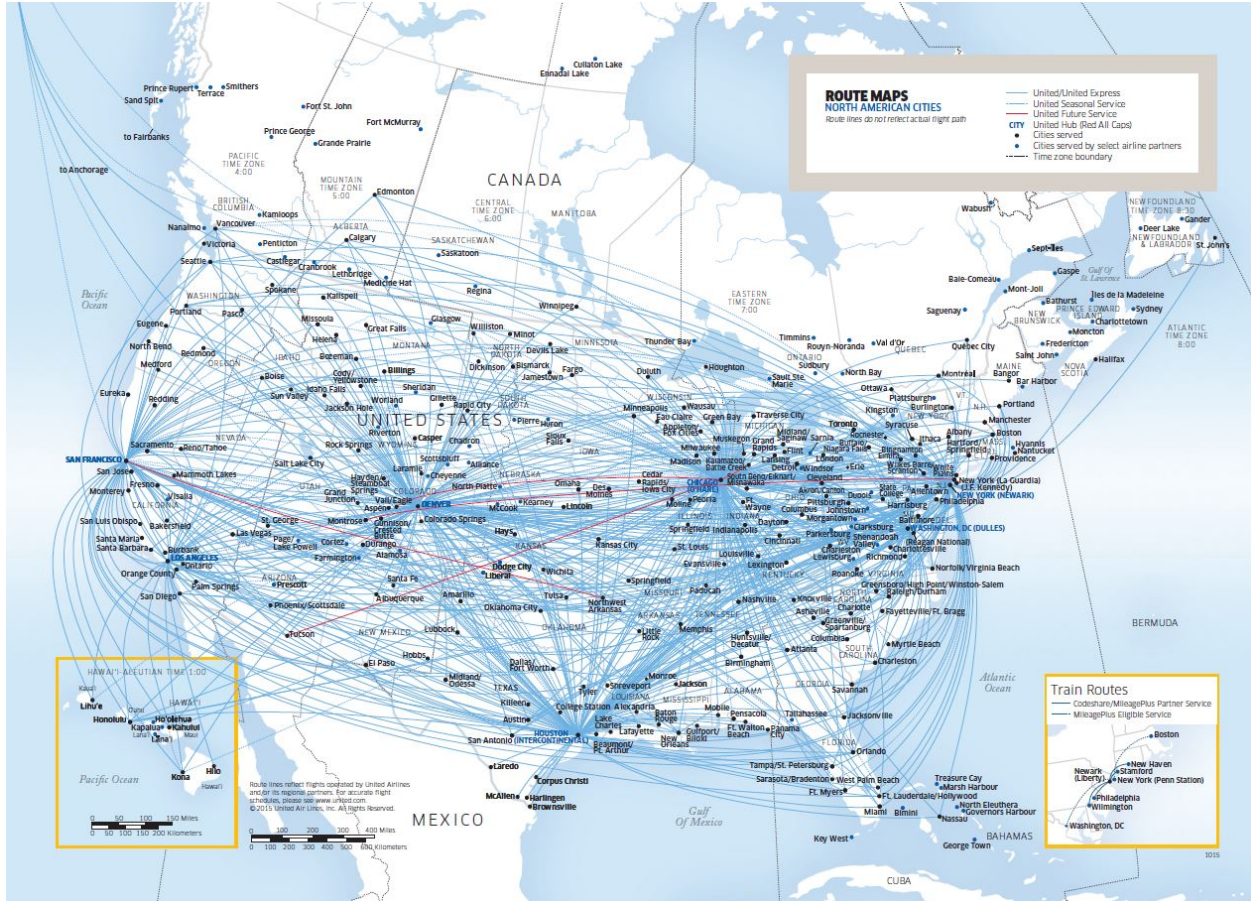
Figure 39: EBITDA per Enplanement Line Fit Plot





## 8. Appendix B: Hub Cities and Flight Maps for United Airlines, American Airlines and Delta Airlines

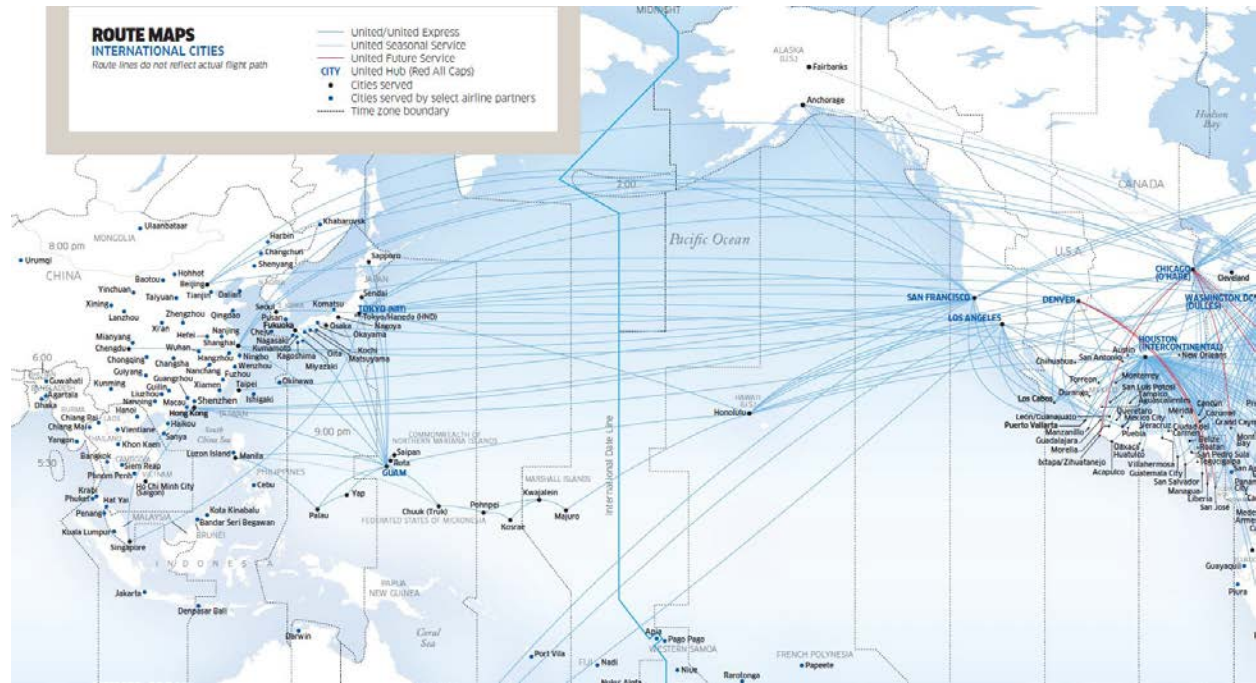
### 8.1. United Airlines U.S. Flight Map



Source: (United Airlines, 2015)

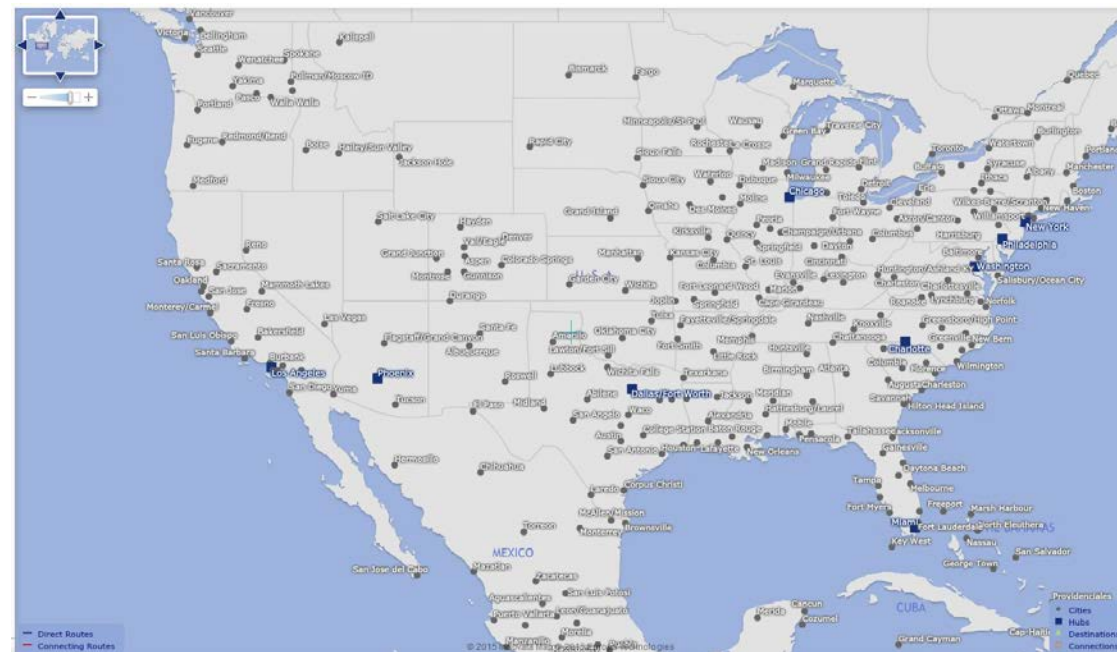


### 8.2. United Airlines International Flight Map



Source: (United Airlines, 2015)

### 8.3. American Airline Hubs and Cities Map



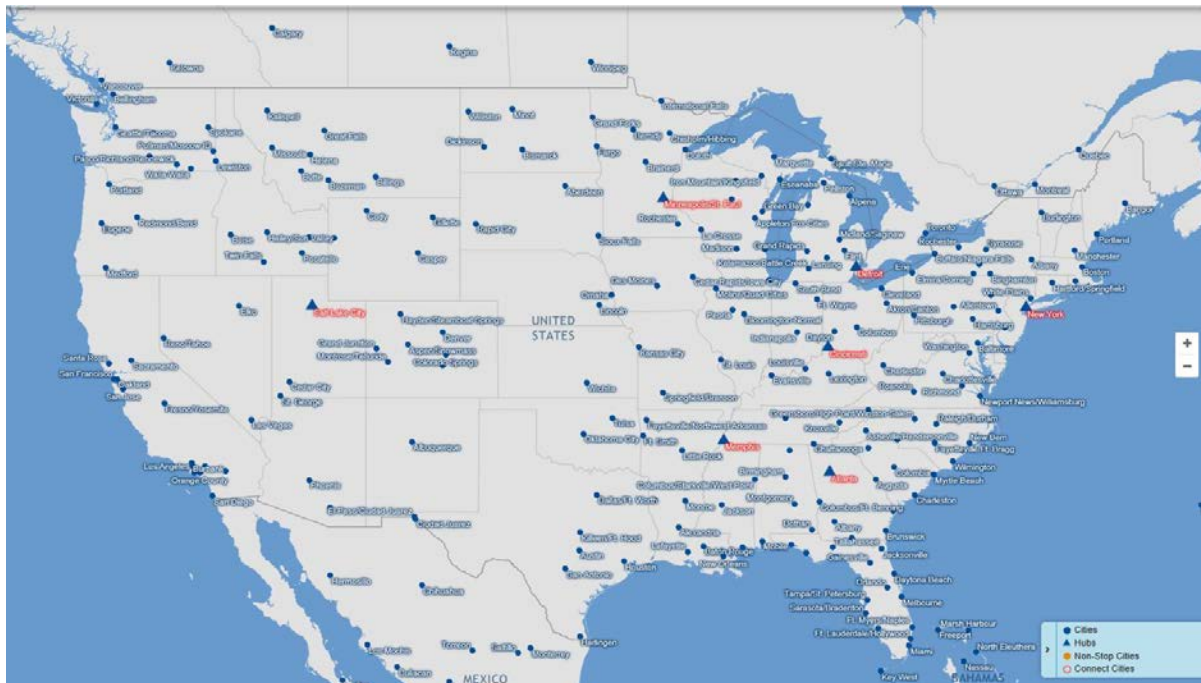
Source: (American Airlines, 2015)

### 8.4. American Airlines International Flight Map



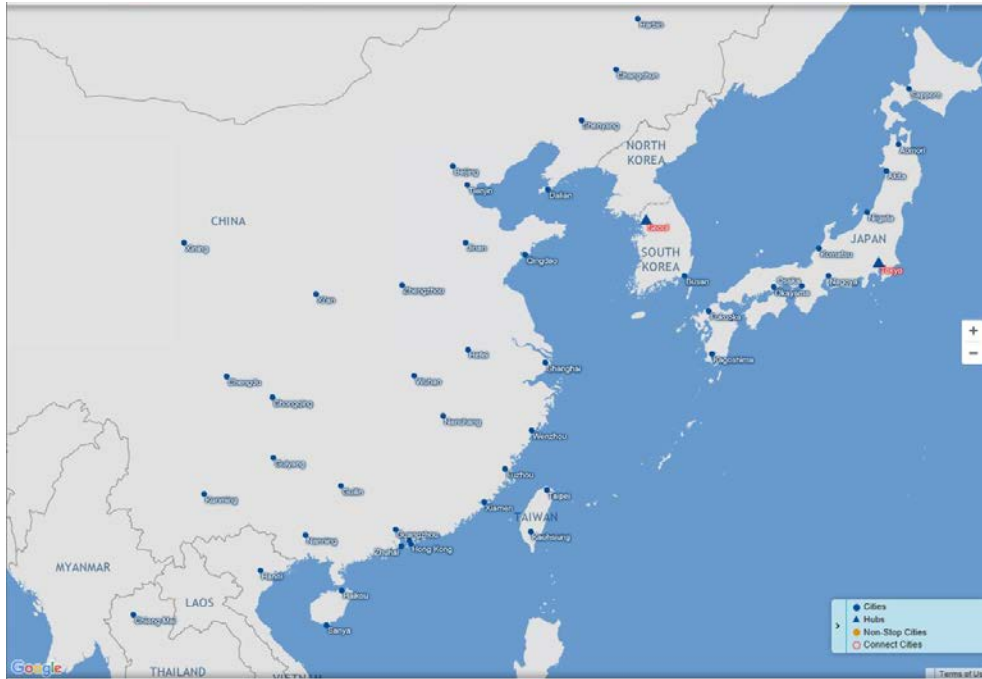
Source: (American Airlines, 2015)

### 8.5. Delta Airlines U.S. Hubs and Cities Map



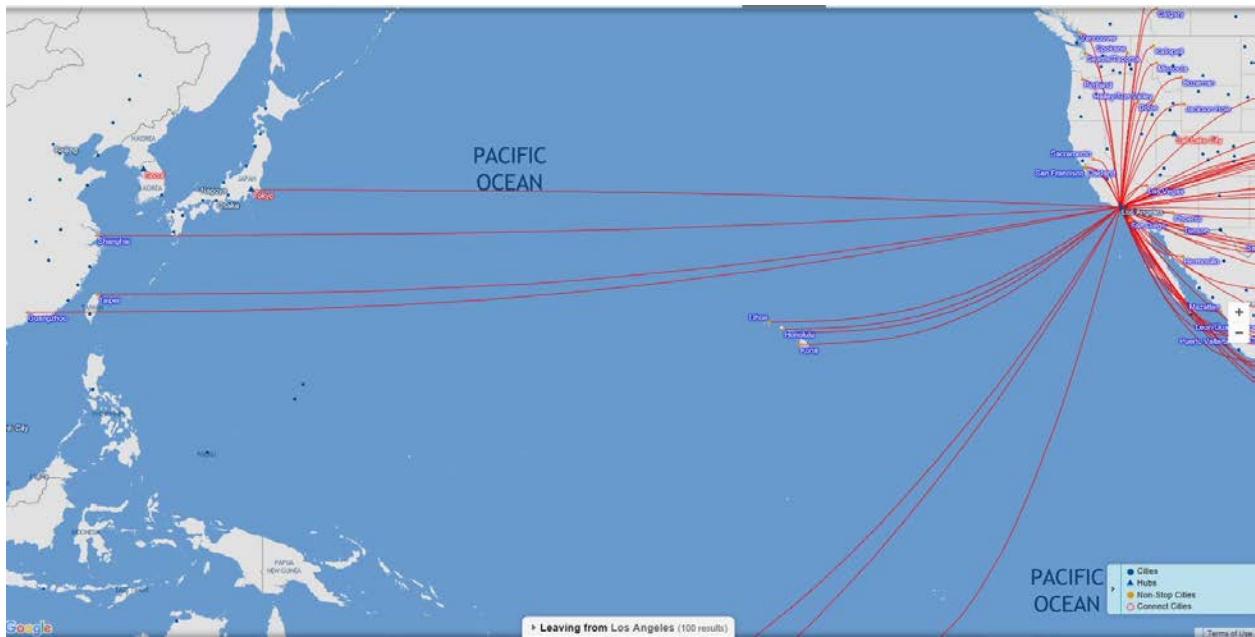
Source: (Delta Airlines, 2015)

### 8.6. Delta Airlines Asia Hubs and Cities Map



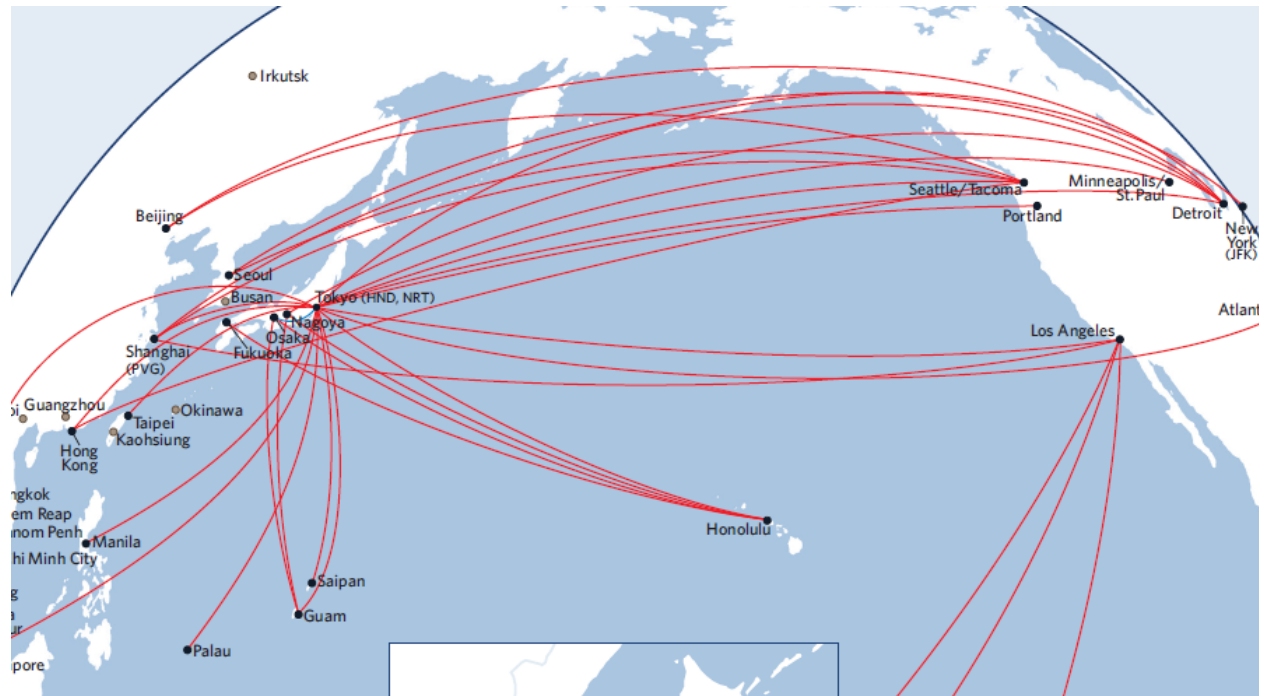
Source: (Delta Airlines, 2015)

### 8.7. Delta Airlines Flight Map LAX to Asia



Source: (Delta Airlines, 2015)

### 8.8. Delta Airlines Flight Map U.S. to Asia



Source: (Delta Airlines, 2015)



## 9. Appendix C: Cohort 2014 - California State University San Marcos

### 9.1. Funding Benchmarking Team



Rosemary Reed



Diana Valle



Chris Gillespie



Mark Schafer



Rajan Brown

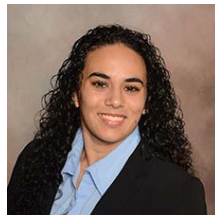
### 9.2. Airport Hub Team



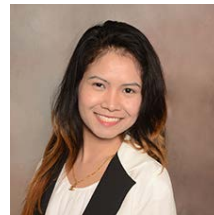
Claudia Encinas



Ava Musnicki



Bianca Robinson



Santhana Saythong



Isai Castaneda

### 9.3. Economic Impact Team



Robin Reschke



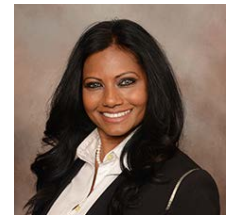
Laura McLin



Rachel Mann



Rachel Kuehn



Sheela Flores



Richard Monaco