KING COUNTY INTERNATIONAL AIRPORT ECONOMIC IMPACT STUDY 2013

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Executive Summary

King County International Airport (KCIA)—"Boeing Field"-- is the subject of this economic impact study. It is located in south Seattle west of Interstate 5 and east of the Duwamish River. KCIA is the location of final production activity by the Boeing Company on model 737 airplanes, and also serves as the location for logistics related to the delivery of these airplanes to airline customers. Boeing also operates the military AWACS program at KCIA. The airport is also a major general aviation center, and in 2013 was the 25th largest cargo center in the nation. KCIA serves a wide variety of clients, ranging from small private aircraft, large corporate flight departments and businesses supporting corporate air, retailers, training services, and a major museum. This study includes all of the tenants at KCIA, plus the Museum of Flight.

The economic impact of KCIA in 2013 was $3.5 billion in local business sales, supporting 16,336 jobs and $1.08 billion in labor income, as measured by a version of the Washington State input-output model benchmarked against King County. In addition $78 million in sales and business and occupation taxes were generated in the state of Washington and in the local area. There were 5,209 people employed at the airport in 2013, earning $495 million in labor income. Direct sales by businesses at the airport were $2.2 billion in 2013, of which $1.8 billion was accounted for by aerospace activity. Most business activity at KCIA is exported from this region, contributing significantly to the economic base of the region. Most of this business activity—referred to as "new money"-- would not be present in King County without KCIA. New money or export sales were $1.9 billion in 2013, or 90% of total business activity at KCIA. This export-related business generated $3 billion in sales by King County businesses, generated 13,205 jobs and $872 million in labor income in King County.

Businesses related to corporate air, air cargo, and flight school activity were optimistic about growth in th eir business activity in the next few years, while those serving general aviation expected declines in this business activity. Tenants (excluding Boeing and small private and corporate air) reported roughly equal shares of increases, decreases, and no change in their business activity since the height of the Great Recession in 2008. In contrast, two-thirds of these respondents expected their sales to increase in the next several years, and most of the rest of these businesses expected their sales to be unchanged. Most tenants had concerns related to their business activity at KCIA, and half of them thought that King County could help them deal with these issues. Examples of types of help that King County could provide include helping finding new sites for businesses at KCIA, help in reducing costs, and help in getting public transportation on the east side of KCIA.

This is the fourth study of this type undertaken regarding KCIA. Economic impacts of KCIA are larger in this study for two reasons—overall direct business activity is larger and the economic impact model includes some activity not measured (but present) in the previous studies. Aerospace employment has risen since the last study (benchmarked against 2008), while FBO/Corporate air employment has been stable, while airlines, air cargo and "other" activities have had employment reductions. Government employment located at the airport has changed, with the departure of some King County government offices and the relocation of an Army National Guard unit to KCIA. Each of these KCIA economic impact studies has used a slightly different input-output model, but the multipliers in these models have been similar in their magnitude

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Several people were extremely helpful in the conduct of this study. Mr. Jesse Uman, Manager, State and Local Government Operations for The Boeing Company provided crucial information on company operations at KCIA. Peter G. Anderson of Galvin Flying Service/Landmark provided excellent background information about corporate and FBO air operations at KCIA. Information was also provided by the following tenants in relation to their business activity at KCIA: Aeroflight, Airlift Northwest, Airpac Airlines, Ameriflight, Ashton Corporation, Aviation Partners, Aviation Training Center, Aviators Store, Cavu Café, Clay Lacy Aviation, Costco, DB Schenker, DHL Express, Federal Aviation Administration, GRE Airport LLC, Jones Payne Group, Kenmore Air, King County International Airport administration, King County Jet Center, National Aviation Supply, Nordstrom, Starbucks, United Parcel Service, Hanger Holdings (Vulcan), Army National Guard, Opportunity Skyway, Skagit Transportation, Erin Air, The Flight Academy, Greenpoint Technologies, Reliable Aircraft Detailing, Hertz, CB Air, Washington Audiology Services Inc., Pacific Coast Feather, South Seattle Community College, Duncan Aviation, Classic Helicopters & Seattle Helicopter Tours, Helicopters Northwest, Evergreen Trucking School, TBS Couriers (Unity Courier Service), U.S. Customs and Border Protection, American Avionics, Cascade Airframe Repair, American Limo, and Mente LLC. In addition, The Museum of Flight, while not a KCIA tenant, provided valuable information about their business activity.

The author of this study thanks all of these tenants and businesses at KCIA, and accepts responsibility for any errors made in the use of the information that they supplied in the course of this study.

I. Introduction

This report is the fourth economic impact study of King County International Airport (KCIA) (Beyers & McMullin 2000; Beyers & Hyde 2002; Beyers & Babb 2009). Each of these studies has taken a similar approach and has used similar methodology. Data on business activity at KCIA were sought from all tenants through a survey (See Appendix A for a copy of the survey form). King County provided the author with a list of tenants, and most of these tenants provided data through a personal interview. Several tenants provided information about their businesses in telephone interviews or by e-mail. The survey obtained information on sales or revenues, employment and employee compensation, recent changes in business activity, expected changes in business activity, and comments on issues facing businesses located at KCIA. These comments should be useful to King County in managing KCIA. The data on business activity at KCIA were then used with a version of the Washington State input-output model to estimate economic impacts of KCIA on the King County economy (Beyers & Lin 2012).

This report is organized as follows. The next section presents a description of the various tenant categories found at KCIA. This is followed by a description of the direct economic impacts of business activity at KCIA, and results of the economic impact analysis are presented. Next, results of interviews regarding changes in business activity and issues facing businesses located at KCIA are presented. The final section of this report compares results of this study with those reported in the first three KCIA economic impact studies. Appendix A contains the questionnaire used with tenants, while Appendix B contains the names of the tenants and other businesses included in this study. Appendix C contains estimates of economic impacts of current private-sector capital projects at KCIA. Appendix D is a technical appendix describing aspects of the input-output modelling process.

Overview of Tenant Categories

Seven broad categories of tenants are located at KCIA. They are (1) aerospace manufacturing businesses, (2) fixed base operators (FBOs) and corporate air businesses, (3) air passenger and air cargo businesses, (4) retailers, (5) government establishments, (6) service industry and other tenants, and (7) general aviation. A brief description of each of these categories of tenants is now provided.

(1) Aerospace Manufacturing and Delivery

This category is dominated by the Boeing Company, which has major facilities located on the west side of KCIA primarily associated with the delivery of the 737 product line. Boeing flies these aircraft to KCIA and completes painting and some aspects of final assembly there. Boeing's clients and engine suppliers also have a major presence at KCIA. The sale process separates engine sales from the sale of the rest of the aircraft, so engine manufacturers are also present in relation to final sales. Airlines that are making purchases of these aircraft also have personnel located at KCIA who are involved with the inspections and other documentation related to the transfers of title and sale of these aircraft. Some military/defense activities of the company are also conducted at KCIA, but in interviews with the Boeing Company the nature of these activities were not specifically identified. In addition, Boeing Business Jets has a presence at the airport; this division is involved in selling Boeing jet aircraft to non-airline customers.

While the Boeing Company is by far the largest employer within this category, on the east side of the field there are also several companies engaged in the manufacture of parts or components sold to the aerospace trade, including custom aircraft interiors.

(2) FBOs and Corporate Air and Training

Along the east side of the field there are a number of establishments serving largely business markets for private and corporate aircraft. This industry segment at the airport is complex; each establishment has a somewhat different market focus. Some establishments primarily service jet aircraft either owned locally by wealthy individuals or businesses that they control, while others cater to a diversified set of clients who fly in and out of KCIA. These establishments provide a variety of services to their clients. They service aircraft that are permanently based or temporarily located at their site. They provide support services such as limousine services, taxis, or car rental and hotel accommodations for people who fly into KCIA and are attending meetings or attending other business functions in the local area. They arrange food services for on-the-ground or in-flight needs. They refuel aircraft. They provide service on aircraft visiting and housed at KCIA. They also provide training to people learning to become pilots. Businesses only providing training are included with the services sector in this study. There are a number of businesses that also sell aircraft. In some cases, these are establishments servicing a particular corporate client or they are engaged in the myriad of activities just described.

(3) Passenger Transportation and Air Cargo

KCIA is also the site for a portion of the scheduled and unscheduled passenger air transportation industry in the Central Puget Sound region. Some of the unscheduled air transportation establishments are also engaged in flight training activity. More important than passenger airline activity at KCIA is air cargo. United Parcel Service is the largest supplier of these services. KCIA is also the focal point for consolidators that connect shipments between regional locations to air cargo carriers. The air carriers move these shipments from local to international markets. KCIA is also the base air emergency medical care. This service transports individuals within the region and statewide to hospitals and treatment facilities located in metropolitian Seattle. In some cases, this movement from KCIA to local hospitals is undertaken by helicopter.

(4) Retailers

KCIA has several businesses that are engaged in retail activity. One establishment specializes in the sale of books and maps related to aviation, another sells and services avionics equipment, while another has a more general line of retail goods related to aviation activity.

(5) Government

There is a public sector presence at KCIA, related to a variety of functions performed by Federal agencies and King County. The federal presence at the airport is related to the FAA which operates the control tower, while NOAA maintains an unmanned instrumentation station for weather. The Department of Homeland Security, including Immigration and Customs Enforcement serves international passenger movements at KCIA. The State of Washington leases space, for $1.00/year, at the north end of the airport for an Army National Guard unit.

King County has employees at KCIA related to the management and maintenance of the airport facilities.

(6) Services and Other Activity

KCIA is also the location of a number of other business activities located a various establishments around the field. They are extremely diverse in their nature. These businesses include the Museum of Flight at the southwest corner of the field. Although the Museum of Flight is not an airport tenant, KCIA staff and the museum consider themselves part of the airport "family," and today it does use some space on airport property. One establishment serves food to passengers using the terminal building for scheduled flights and to airport employees, while there are several other food service establishments associated with corporate air activity. Several producer service businesses with no relationship to the airport simply rent office space through KCIA tenants. There are also firms providing training services to people interested in becoming pilots, as well as several public educational institutions. Several firms providing repair service work for the aircraft industry are located at KCIA. There are several trucking businesses at KCIA, the largest of which provides hauling services for solid waste removed from King County wastewater treatment facilities. This is a heterogeneous collection of tenants, most are tightly tied to the airport for their business activity, but there are some "outliers" who are airport tenants largely due to low cost of space for their business activity.

(7) General Aviation

KCIA is the home base for more than 300 small aircraft, some of which rent space from King County, while others rent space from FBOs or other establishments serving the corporate air community. The owners of these small aircraft were not surveyed in this research project. However, the expenditures that they make in relation to operating their planes from KCIA, such as fuel and maintenance, would be included in the revenues of the FBOs and others providing services to aircraft at the field. A part of the revenue stream to King County comes from these tenants and the County has some costs associated with servicing these general aviation tenants. The expenses incurred by the County in relation to these general aviation tenants is included with the overall operating costs estimated for the King County Airport Administration establishment. It is recognized that general aviation is an important activity at KCIA and the author believes that our survey has captured on-site expenditures made by those owning these aircraft.

II. Direct Impacts

Economic impacts are calculated by relating direct economic impacts to the input-output model. Given the formulation used in this study, estimates were developed of sales, employment, labor income, other value added, and regional purchases by all of the establishments covered in this study. These estimates were made as follows.

Through the survey of tenants (see Appendix A for a copy of the questionnaire used, and Appendix B for a tenant list), information was collected on sales, wages & salaries, and employment. In many cases, these data were obtained, but in a number of cases tenants could only provide estimates of the number of employees that they had. A number of interviews also provided estimates of labor costs for employees. In cases where tenants could only provide employment estimates, the 2007 Washington State Input-Output model was used to develop ratios of employment, output, and labor income by industry. Prices in this model were benchmarked against the year 2013, so estimates of these relationships were pertinent to the year of this impact estimate. Appendix C contains technical information on the input-output model. All of the tenants listed in Appendix B provided employment information used in this study.

By far the largest data developed in this process were related to Boeing activity at KCIA. Boeing provided an estimate of the number of their employees working at KCIA, as well as an estimate of the number of airline and engine manufacturer representatives located at KCIA. Boeing was unable to separate the value of their KCIA activity from their overall Puget Sound area business activity and could not estimate the effective sales per person employed by the airlines and engine manufacturers. Therefore, an average value of revenue per employee in aerospace was used to estimate sales by manufacturers in this sector (there were several other aerospace manufacturers besides Boeing included with this sector). Airline representatives were classified with business services in the impact analysis, as these entities were not engaged in manufacturing, and were providing services related to the delivery of aircraft.

Table 1 reports results of the estimation of sales and labor income, as well as the estimated employment at KCIA and the labor income per employee by industry group. Over 5,200 people worked at KCIA in 2013, earning an estimated $495 million in labor income. Sales of $2.2 billion occurred, the bulk of which originated in the aerospace sector. There is a considerable variation in labor income per worker across the different industries included in this table. In general, labor income of people working at KCIA is well above the Washington State average of $51,966 in wage and salary income (approximately $61,839 in labor income) in the year 2012 (ESD 2013). The difference between wage and salary income, and labor income, is supplements to wages and salaries (employer contributions for employee pension and social insurance programs, plus employer contributions to government social insurance programs). The employment level reported in Table 1 is a headcount, including full-time and part-time employment. Most employment at KCIA is full-time employment.

Table 1 Sales, Employment and Labor Income

	Sales ($ millions)	Employment	Labor Income ($ millions)	Labor Income per Employee
Aerospace	$1,793.2	3,493	$409.6	$117,264
FBO/Corporate Air	155.8	417	28.2	67,594
Airlines & Air Cargo	103.9	472	21.4	45,426
Retail & Wholesale	6.2	30	1.4	46,547
Government	37.7	407	16.2	39,804
Other	81.7	390	18.3	46,900
Total	$2,178.6	5,209	$495.1	$95,051

The formulation of the input-output model used in this study required the estimation of direct purchases of all KCIA tenants. These are the purchases that they make in King County in the process of producing their goods and services. The direct requirements of businesses located at KCIA were estimated as follows. We used the direct requirements coefficients in the input-output model for the appropriate sectors to estimate direct purchases, or utilized the estimates of labor income that came from the survey of tenants rather than the input-output coefficients. This procedure was used to estimate purchases of each of the groups of tenants identified in Table 1, and then a composite purchases vector was derived, as shown in Table 2. This table indicates purchases of $224 million in King County related to the output of $2.179 billion reported in Table 1.

Table 2 Direct Requirements ($ millions)

	Output (mils. $2013)
1. Crop Production	$0.000
2. Animal Production	0.001
3. Forestry and Logging	0.000
4. Fishing, Hunting, and Trapping	0.144
5. Mining	0.001
6. Electric Utilities	2.004
7. Gas Utilities	1.246
8. Other Utilities	0.518
9. Highway, Street, and Bridge Construction	0.229
10. Other Construction	26.140
11. Food, Beverage and Tobacco Manufacturing	0.412
12. Textiles and Apparel Mills	0.084
13. Wood Product Manufacturing	0.028
14. Paper Manufacturing	0.127
15. Printing and Related Activities	0.839

16. Petroleum and Coal Products Manufacturing	1.950
17. Chemical Manufacturing	0.209
18. Nonmetallic Mineral Products Manufacturing	0.075
19. Primary Metal Manufacturing	0.445
20. Fabricated Metals Manufacturing	2.686
21. Machinery Manufacturing	0.661
22. Computer and Electronic Product Manufacturing	2.413
23. Electrical Equipment Manufacturing	0.079
24. Aircraft and Parts Manufacturing	34.286
25. Ship and Boat Building	0.012
26. Other Transportation Equipment Manufacturing	0.106
27. Furniture Product Manufacturing	0.021
28. Other Manufacturing	0.959
29. Wholesale	9.590
30. Non-Store Retail	0.070
31 Other Retail	2.593
32. Air Transportation	1.123
33. Water Transportation	0.256
34. Truck Transportation	1.785
35. Other Transportation/Postal Offices	5.549
36. Support Activities for Storage, Transportation and Warehousing	22.267
37. Software Publishers & Data Processing & related services	8.747
38. Telecommunications	0.689
39. Other Information	0.942
40. Credit Intermediation and Related Activities	4.234
41. Other Finance and Insurance	4.264
42. Real Estate and Rental and Leasing	10.120
43. Legal /Accounting and Bookkeeping /Management Services	11.524
44. Architectural, Engineering, and Computing Services	14.285
45. Educational Services	5.450
46. Ambulatory Health Care Services	0.350
47. Hospitals	0.000
48. Nursing and Residential Care Facilities, Social Assistance	19.443
49. Arts, Recreation, and Accommodation	2.443
50. Food Services and Drinking Places	2.795
51. Administrative/Employment Support Services	9.270
52. Waste Management/Other, and Agriculture Services	10.512
Total	$223.979

III. Direct, Indirect and Induced Impacts

The input-output model calculates estimates of indirect and induced effects, which are added to the direct impacts to obtain estimates of total impacts, as presented in Table 3. The $226 million in direct purchases made from industries in King County and the $495 million in labor income stimulate the regional economy, producing levels of output, employment, and labor income well above direct impacts reported in Tables 1 and 2. Table 3 indicates that total sales in King County related to activity at KCIA were more than $3.5 billion in 2013 and that more than 16,300 people were employed due to the airport, and $1.08 billion in labor income was earned as a result of activity at KCIA. The strongest impacts are felt in various service industries. A comparison of the direct impacts reported in Table 2 with the total impacts reported in Table 3 illustrates strong impacts within transportation services; retail trade; finance, insurance, and real estate; business services; health services; and other services. Impacts within the aerospace sector are very small, reflecting the relatively weak intra-industry linkage within this sector in the regional economy.

Table 3 Direct, Indirect, and Induced Impacts

	Output (Mils. $2013)	Employment	Labor Income (Mils. $2013)
1. Crop Production	$0.102	1	$0.032
2. Animal Production	0.062	0	0.019
3. Forestry and Logging	0.037	0	0.007
4. Fishing, Hunting, and Trapping	2.264	6	0.657
5. Mining	2.596	11	0.525
6. Electric Utilities	32.673	47	10.517
7. Gas Utilities	8.240	5	0.620
8. Other Utilities	6.649	24	1.813
9. Highway, Street, and Bridge Construction	16.903	48	4.001
10. Other Construction	99.619	362	23.381
11. Food, Beverage and Tobacco Manufacturing	18.982	29	1.593
12. Textiles and Apparel Mills	1.779	8	0.347
13. Wood Product Manufacturing	0.474	1	0.077
14. Paper Manufacturing	1.362	2	0.174
15. Printing and Related Activities	4.642	26	1.426
16. Petroleum and Coal Products Manufacturing	7.212	0	0.089
17. Chemical Manufacturing	0.714	1	0.141
18. Nonmetallic Mineral Products Manufacturing	4.147	10	0.640
19. Primary Metal Manufacturing	0.541	1	0.078
20. Fabricated Metals Manufacturing	4.666	17	0.990

21. Machinery Manufacturing	2.617	5	0.396
22. Computer and Electronic Product Manufacturing	3.505	10	1.036
23. Electrical Equipment Manufacturing	0.399	1	0.063
24. Aircraft and Parts Manufacturing	1742.558	3,101	372.223
25. Ship and Boat Building	0.180	1	0.052
26. Other Transportation Equipment Manufacturing	0.942	2	0.109
27. Furniture Product Manufacturing	0.664	4	0.175
28. Other Manufacturing	3.105	11	0.588
29. Wholesale	74.031	321	25.606
30. Non-Store Retail	3.422	26	0.896
31 Other Retail	129.116	1,330	50.964
32. Air Transportation	118.179	496	23.476
33. Water Transportation	5.463	12	1.150
34. Truck Transportation	18.147	106	5.781
35. Other Transportation/Postal Offices	17.436	97	6.978
36. Support Activities for Storage, Transportation and Warehousing	229.253	607	42.245
37. Software Publishers & Data Processing & related services	21.790	42	7.530
38. Telecommunications	55.210	99	9.125
39. Other Information	20.740	99	9.188
40. Credit Intermediation and Related Activities	94.752	173	17.343
41. Other Finance and Insurance	72.221	349	23.101
42. Real Estate and Rental and Leasing	48.277	464	9.654
43. Legal /Accounting and Bookkeeping /Management Services	160.658	1,210	89.917
44. Architectural, Engineering, and Computing Services	36.716	232	19.578
45. Educational Services	29.881	323	10.081
46. Ambulatory Health Care Services	73.318	532	37.903
47. Hospitals	53.558	262	19.951
48. Nursing and Residential Care Facilities, Social Assistance	54.339	809	24.772
49. Arts, Recreation, and Accommodation	50.336	580	18.626
50. Food Services and Drinking Places	68.862	915	21.025
51. Administrative/Employment Support Services	34.075	624	23.699
52. Waste Management/Other, and Agriculture Services	95.974	748	31.141
State & Local Government		2,145	128.621
Total	$3533.389	16,336	$1080.122

Table 3 reports 2,145 jobs in state and local government supported by economic activity at KCIA. State and local government is not a sector endogenous to the input-output transactions matrix. However, state and local government is included in the input-output model, explicitly in final demand, and implicitly in "other value added." In the formulation of the input-output multiplier system used in all four KCIA economic impact studies state and local government has been endogenous to the direct, indirect, and induced matrix of output multipliers (See Appendix C). In the current version of this model coefficients relating employment and labor income were included with the model, resulting in the state and local government estimates contained in Table 3. The previous versions of the model used in the KCIA economic impact studies did not include these state and local government employment and labor income coefficients, although they could have been included. Total economic impacts without the inclusion of state and local government would be 14,191 jobs. Government jobs reported in Table 1 are not included in the state and local government statistic in Table 3. Consistent with prior KCIA economic impact studies these direct government jobs were classified in business services, and economic impacts are modelled as if they were a part of the business services sector.

The input-output model has a different multiplier for each sector. It is possible to develop summary or aggregate multipliers for the three measures of impact reported in this study. Table 4 reports these aggregate multipliers. They were calculated by dividing the total impacts for each category of impact by the direct impact measures. For example, the 5,209 people directly employed at KCIA support a total of 16,336 jobs in the regional economy, or 3.14 jobs for each direct job at KCIA. The same computational process was used to derive the output and labor income multipliers contained in Table 4. Table 4 reports two sets of multipliers for employment and labor income—values that include and exclude indirect and induced state and local government.

Table 4 Aggregate Multipliers

	Total	Excluding Indirect & Induced State & Local Govt.
Output	1.62	1.62
Employment	3.14	2.73
Labor Income	2.19	1.92

A more compact version of Table 3 is reported in Table 5. This table distinguishes between manufacturing and non-manufacturing impacts, and also separates non-manufacturing into two service industry components and a non-services grouping. Impacts of KCIA are distributed broadly across each of these aggregate groupings of sectors in the input-output model, except for the small impacts in natural resources and utilities.

Table 5 Summary of Direct, Indirect and Induced Impacts

	Output ($ Millions)	Employment	Labor Income ($ Millions)
Natural Resources and Utilities	$52.624	94	$14.192
Construction and Manufacturing	$1,915.012	3,639	$407.579
Retail and Wholesale Trade	$206.569	1,678	$77.466
Producer and Transport Services	$932.916	4,610	$288.765
Consumer Services & S&L Govt.	$426.268	6,315	$292.120
Total	$3,533.389	16,336	$1,080.122

Puplic Sector Revenues

Business activity in King County related to KCIA leads to collections of state B&O taxes, while the spending of labor income yields sales tax revenues to the State of Washington and local governments. It also produces fuel tax revenues to the Federal Government, and a Fuel Flowage Fee to King County. Table 6 presents estimates of these public sector revenues for the year 2013. The B&O tax revenues were calculated by multiplying the sales of each sector by estimated collections per dollar of output and summed across the sectors to yield the total reported in Table 6. State and local sales tax impacts were estimated as a function of labor income and personal income, as well as a percentage of retail and food services sales at KCIA. Other tax revenues accrue to state and local governments because of business activity at KCIA, but data were not available to calculate these tax impacts. These additional taxes include property taxes, auto rental taxes, and hotel-motel taxes related to spending of visitors served by FBO's at KCIA.

Table 6 Select Public Sector Revenues ($ millions)

State Sales Tax as a share of Labor Income	$32.255
Local Sales Tax as a share of Labor income	$14.887
State B&O Tax	$19.453
Local B&O Tax	$10.548
State Sales Tax on Retail and Food Services	$ 0.436
Local Sales Tax on Retail and Food Service	$ 0.201
otal State and Local Taxes	$77.780
FAA Jet Fuel Tax	$4.796
King County Fuel Flowage Fee	$1.720

New Money Impacts

A second measure of economic impact is referred to as "new money." The previous section presented estimates of economic impacts for all spending taking place at KCIA in 2013. Some of this was spending made by local residents or businesses for goods and services that could be produced someplace else in King County if the airport were not sited here. However, a significant proportion of the activity at the airport involves non-local demand and is production taking place locally that would not occur in the region if the airport were not located here. Table 7 presents estimates of the new money or export share of activity by major industry category at KCIA. The share of markets of KCIA tenants that were made in King County was ascertained in the survey of tenants; this survey is the basis for estimating the level of new money activity taking place at the airport. Clearly, in the aggregate new money accounts for the bulk of revenues and jobs at KCIA. Direct government employment at KCIA is divided between federal agencies such as Homeland Security and the Army National Guard. It was presumed that the revenue to these federal agencies was directly from the federal government, even though some of them are performing services for tenants at the airport (such as the flight control tower services provided by the FAA).

Table 7 New Money Estimates of Sales and Employment

	Sales ($ Millions)	% New Money Sales	Employment
Aerospace	$1790.699	99.9%	3,488
FBO & Corporate Air	54.344	34.9%	97
Airlines & Air Cargo	64.833	62.4%	294
Retail	1.752	28.2%	8
Government	22.725	60.3%	246
Other	14.452	17.7%	132
Total	$1948.806	89.5%	4,266

Through the use of the same methodology as described above for total sales, estimates were made of the economic impact of new money demands and direct requirements. Table 8 presents summary impacts from these new money estimates, which are proportionally similar to the impacts reported in Tables 3 and 5. However, these impacts are not exactly proportional due to the variation in the share of sales of the different sectors included in this study that are new money and the varying distributions of direct requirements across the sectors included in this study. New money output impacts are approximately 85% of the total output impacts, while for employment and labor income the comparable percentages are 81% and 81% respectively. This analysis indicates that King County's economy has 13,205 jobs supported by new money; most of the direct jobs reported in Table 7 would not be created in King County without KCIA.. The employment impacts would be 11,377 if indirect & induced state and local government were excluded, while labor income would be $762.251 million if this government activity were excluded.

Table 8 New Money Summary Impacts

	Output ($ Millions)	Employment	Labor Income ($ Millions)
Natural Resources and Utilities	$40.779	74	$11.061
Construction and Manufacturing	$1,873.476	3,512	$354.378
Retail and Wholesale Trade	$163.801	1,340	$61.908
Producer and Transport Services	$609.258	3,174	$207.057
Consumer Services & S&L Govt.	$333.019	5,105	$237.421
Total	$3,020.333	13,205	$871.826

The new money impacts are similar in their distribution to the overall impacts of KCIA. The domination of aerospace in the new money impact scenario is even greater than in the baseline impact estimate. However, the indirect and induced impacts of both scenarios are largely felt in the services related to the consumption-related effects associated with the spending of labor income.

A final perspective on new money is given in Table 9, which contains sales and B&O tax revenue impacts associated with the new money scenario. This table indicates that tax revenue impacts are approximately 80% of the values reported in Table 6. Data were not available to estimate the share of FAA fuel tax revenues and King County Fuel Flowage Fee

Table 9 New Money Sales and B&O Tax Impacts ($ millions)

State sales as a share of labor income	$26.035
Local Sales as a share of labor income	$12.016
State B&O Tax	$15.675
Local B&O Tax	$8.555
State Sales on Retail & Food Services	$0.143
Local Sales on Retail & Food Serevices	$0.066
Total	$62.490

In summary, KCIA created over 16,000 jobs in King County in 2013, and over 13,000 of these are "new money" jobs that would not be here if business at KCIA were not present. It generated $3.5 billion in sales, $1.1 billion in labor income, and $77 million in tax revenues to state and local governments that represented net gains to the regional economy due to the presence of the airport.

It should be noted that these economic impact estimates are limited to businesses located in King County. Spending by users of the airport also lead to production located elsewhere in the state economy. This results in other economic impacts in Washington State that are not captured in this study. For example, fuel sold at the airport is not refined in King County, but much of it is refined at petroleum refineries located in north Puget Sound. It was not possible in this study to document the larger economic impacts of KCIA on the Central Puget Sound region

or Washington State economies. If measures of spending related to production elsewhere in the state economy had been measured, the economic impacts would be higher than documented in this report.

IV. Markets and Changes in Business Activity

Table 10 reports the market composition of different types of tenants at KCIA. These data are based on the survey of tenants. The dominant aerospace sector is estimated to have almost entirely industry clients, although there may be some military activity that would have federal government revenue. Data used for this project could not isolate these possible military markets for the aerospace sector. Given the dominance of the aerospace sector, overall (total) market orientation is largely to industry, with small aggregate household and government markets. Revenue in the government sector is dominated by the employment at federal establishments, followed by employment in the KCIA office. The "other" category includes organizations such as the Museum of Flight, and activities such as flight training and instrument repair services; estimates in Table 10 are weighted by total values of sales. The markets of air cargo carriers are difficult to estimate, as carriers such as UPS do not have detailed accounting information on the split between household and industry markets for the parcels they are moving through KCIA.

Table 10 Current Market Composition

	Industry	Households	S&L Govt.	Fed. Govt.	Total
Aerospace	99.9%	0.1%	0.0%	0.0%	100.0%
FBO/Corporate Air	95.1%	2.0%	0.6%	2.3%	100.0%
Airlines/Air Cargo	55.2%	19.4%	12.9%	12.5%	100.0%
Retail & Wholesale	64.3%	25.9%	9.8%	0.0%	100.0%
Government	39.5%	0.2%	0.0%	60.3%	100.0%
Other	60.4%	25.2%	9.6%	4.8%	100.0%
Total	94.8%	2.2%	1.0%	2.0%	100.0%

The survey also documented the share of markets of each type of tenant that were located in King County. Table 11 reports these market shares. In the aggregate, it is estimated that 10.5% of total sales are made to clients located in King County. Aerospace has almost no current account sales in King County, while most of the revenue to FBO/corporate air and retail and establishments come from local sources. Airlines/air cargo carriers, government, and "other" businesses have split markets, with about 40% of their revenue from local sources, and 60% from outside King County.

Table 11 Share of Markets in King County

	% King County
Aerospace	0.1%
FBO/Corporate Air	65.1%
Airlines/Air Cargo	37.6%
Retail & Wholesale	71.8%
Government	39.7%
Other	48.7%
Total	10.5%

Market Trends

Several questions were included in the interviews that were aimed at better understanding changes in business activity at KCIA during the last several years. These data provide a perspective on where tenants thought that their businesses were headed in the next several years.

Expected Changes in Market Composition and King County Business Activity

Respondents to the survey were asked to estimate the share of their markets by category five years from now, and to also estimate the share of their business that would be located in King County. Tables 12 and 13 present results of these questions. Many respondents did not think that their market composition would change; the data in Table 12 are quite similar to those reported in Table 10. It should be noted that some establishments that reported current sales were unable to estimate their market composition five years from now, so the differences between Table 10 and Table 12 may not reflect a trend, but instead differences related to the sample.

Table 12 Expected Composition of Markets Five Years from Now

	Industry	Households	State & Local Govt.	Federal Govt.	Total
Aerospace	99.9%	0.1%	0.0%	0.0%	100.0%
FBO/Corporate Air	95.8%	0.8%	0.6%	2.8%	100.0%
Airlines/Air Cargo	55.2%	15.3%	17.0%	12.5%	100.0%
Retail & Wholesale	64.6%	26.2%	9.1%	0.0%	100.0%
Government	39.5%	0.2%	0.0%	60.3%	100.0%
Other	60.4%	25.2%	9.6%	4.8%	100.0%
Total	94.8%	1.9%	1.2%	2.0%	100.0%

The expected share of markets in King County in five years is reported in Table 13. The last column of this table reports the current estimated King County market share. The overall estimated King County market share remains low, only 10.5% of total sales. Expressed alternatively, the strong export market orientation of establishments at KCIA is expected to

continue. This strong export orientation is clearly the byproduct of the computational process, in which aerospace dominates the overall average.

Table 13 Expected King County Markets in Five Years (% of total sales/revenue)

	Industry	Households	State & Local Govt.	Federal Govt.	Total King	Current King
Aerospace	0.0%	0.1%	0.0%	0.0%	0.1%	0.10%
FBO/Corporate Air	81.3%	0.6%	0.5%	0.0%	82.4%	65.10%
Airlines/Air Cargo	28.2%	8.8%	0.4%	0.2%	37.6%	37.60%
Retail & Wholesale	47.2%	18.2%	6.6%	0.0%	72.0%	71.80%
Government	39.5%	0.2%	0.0%	0.0%	39.7%	39.70%
Other	24.7%	15.1%	9.3%	0.0%	49.2%	48.70%
Total	8.9%	1.2%	0.4%	0.0%	10.5%	10.50%

Survey respondents were asked to indicate how they thought their air-related business would change over the next two to five years. Corporate air, general aviation, cargo, flight school and "other" aviation business were the categories used for this question. None of the respondents made any comments about the "other" category, so it is excluded from Figure 1. Many tenants did not reply to this question, as it did not relate to their business. For example, The Museum of Flight does not have any business ties related to these categories of aviation activity. These questions do not apply to Boeing, as their business is not directly related to these categories. This question is most relevant to FBO/Corporate air, and air cargo tenants, and in this study most businesses in these industries did not offer text comments related to their expected change in air transport related business activity. Figure 1 reports the composition of responses received for this question. It is evident in Figure 1 that corporate air, air cargo, and flight school activity was expected to grow by most respondents. In contrast, general aviation was expected to decline by the majority of respondents mentioning this category. Selected quotes are included below by line of business activity.

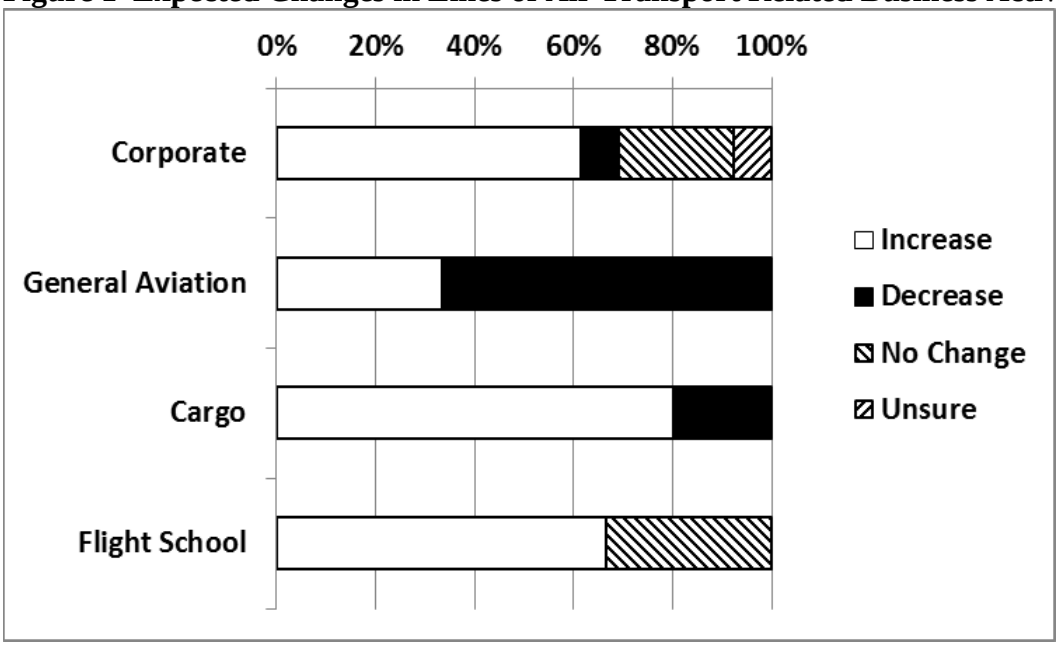
Corporate. "Changes in government tax policy are driving clients to airports out of state." "Washington State Department of Revenue policies are causing clients to shift planes to out of state." "Stable." "Increasing back to pre-2008 levels." "Growth due to international market group." "Possible slight increase." "More travel."

General Aviation No comments were received about this category.

Cargo "Not out to grow, except when they can make a profit." "Slow growth."

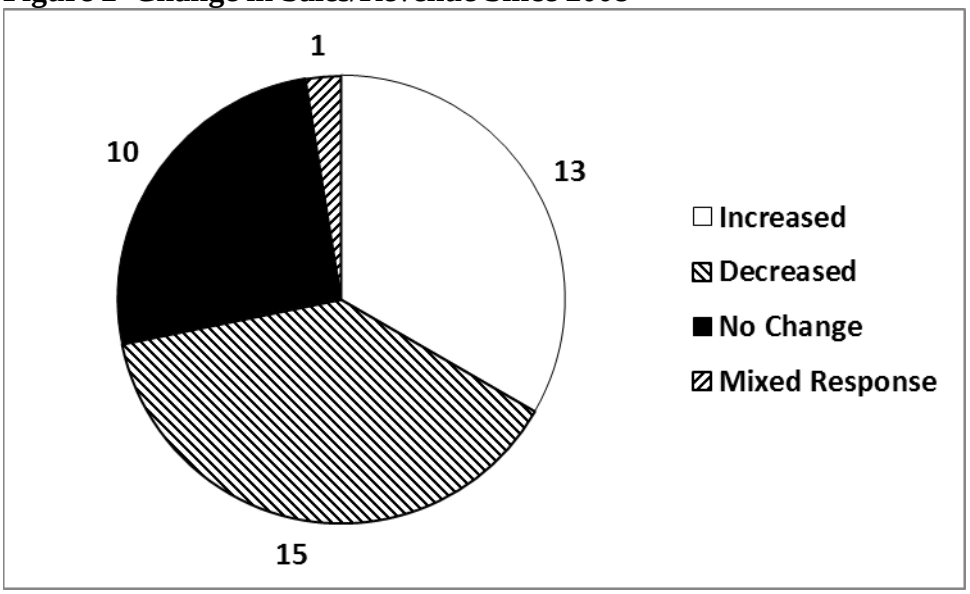
Flight School. "Airlines starting to do more training; people are getting back into it." "Business will increase 25% to 50%."

Figure 1 Expected Changes in Lines of Air Transport Related Business Activity



Respondents to our survey were asked if their business was up or down since the Great Recession began in the national economy in 2008. Figure 2 reports responses to this question, which was answered by about half of the businesses included in this study (most of the non-respondents were small LLC's included in the study housed at FBO's but not surveyed). Boeing was not included in the responses to this question. A mixed picture emerges in Figure 2, with about two-thirds of the respondents having experienced a decrease or no change in their revenues. In contrast, about one-third of the respondents have had an increase in their business activity over the past five years.

Figure 2 Change in Sales/Revenue Since 2008



N=39

Some respondents to the survey provided text about reasons why their business has changed. Some of these responses are reported below. They are not exact quotes, but rather summaries of what these respondents told us. Boeing was not a respondent to this question.

Business Up
"Jet traffic has increased." "General increase in exhibits and attendance." "Up about 25% to 30% due to better marketing and more office organization time." "More travel."

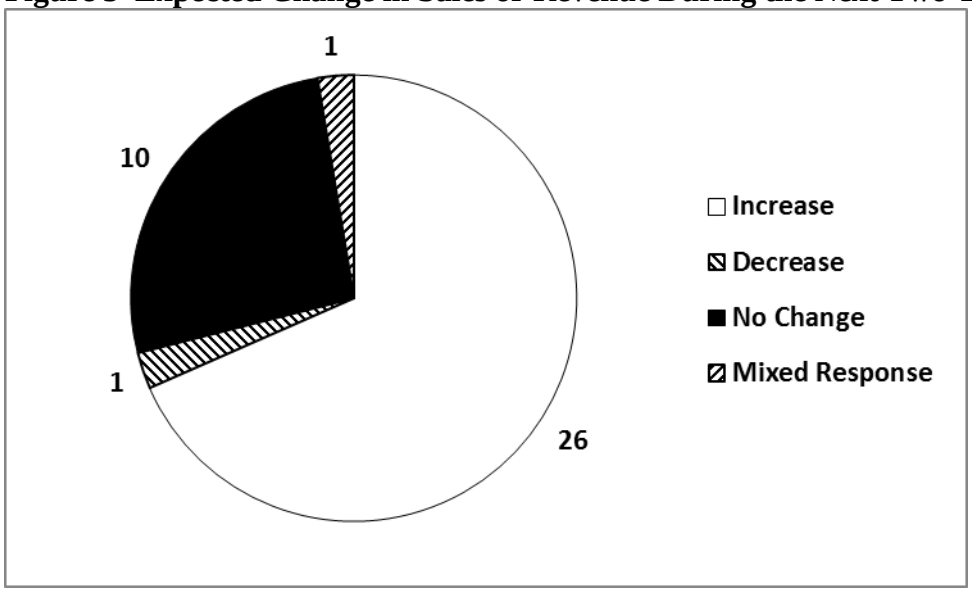
Business Down
"Business still down 5% from 2008." "Due to loss of subcontracting by DHL and FedEx." "Sales down by 40%." "Sales down by about 75%." "Fuel sales clearly down, in relation to taxes on fuel sales." "Was down about 20%, but now back to only down 10%." "Lost 8 clients in the last five years, but have gained them back." "Almost back, business has diversified."

Business Unchanged
"Delivery up 3% but pickup down 13%." "Was down, then up."

Mixed Responses
No comments were made by the one firm classified in this group.

Respondents were also asked how they anticipated their sales to change over the next two years (to 2015), as reported in Figure 3. This figure is a striking contrast to Figure 2, as it clearly shows overwhelming expectations for increases in sales in the next several years. Only one respondent visualized a decrease in revenues, while about one-fourth of respondents anticipated no change in business activity.

Figure 3 Expected Change in Sales or Revenue During the Next Two Years



N=38

Respondents offered more comments about their expected business change than they did about their recent business change. Summaries of these comments are presented below. Some are verbatim quotes, while others are summaries of notes made about conversations with tenants. While many respondents expect their business to increase, as reported in Figure 3, there are more comments anticipating no change or a decline in business.

Increase

"Steady increase." "Slight increase." "Airlines starting to more training, people are getting back into it." "We will add another 3 or 4 people." "5% growth is a conservative estimate." "Hope to be back to prerecession levels." "Back up to pre-2008 levels." Will add 3 or 4 people, due to international market group." "Slow gain of 2% or 3%, not 4% or 5%." "Growth with population, but technology will reduce volume." "Growth by maybe 50%." "A gain of 10% to 20%, adding services and expanding market reach." "Slow growth."

No Change in Business

"Not out to grow." "Stable."

Decrease or Mixed Response

"Due to a movement in financial industries to electronic file transfers." "Uncertainty." "Can't guess." "Hope it will grow, not sure."

Issues Facing Business Activity at KCIA

The survey concluded by asking respondents what the most important issues were facing their business at KCIA, and if there were actions that KCIA could take that would help them with these issues. Table 14 reports text provided by respondents to this question. Responses are grouped into four categories, with text that captures the essence of the comments made but should not be regarded as verbatim statements. Text is first provided by those who said that their business faced some issues at KCIA, and that KCIA could take actions to help them with these issues. This is followed by those who identified issues, but did not think that King County could help them. Then, for the record, there are five respondents who said they faced no issues in their business at KCIA, and did not perceive that KCIA could take actions that could help them. Finally, three respondents said that their business did not face important issues at KCIA, but they did have suggestions of actions that KCIA could take. After these statements are reported, the text after ***KC*** indicates actions that respondents said KCIA could help their businesses. It should be noted that Boeing was not a respondent to this question, and responses are reported here from approximately two-thirds of the businesses included in this study. For some establishments, such as the FAA or Homeland Security, the question was not really applicable. Some establishments included in this study, such as the small LLC's found at FBO's were not interviewed. The author has reported what respondents had to say about these questions, and makes no judgment about their accuracy.

Table 14 Issues Facing Business Activity at KCIA and Actions that KCIA Could Take to Help Deal With These Issues

Issues facing businesses at KCIA and actions tenants said King County could take to help their business
Issues: Changes in government taxation policies - exemption that makes their charges less competitive, especially actions by the Washington State Revenue Dept. ***KC*** - King County could help them with the tax issue.
Issues: Sales tax charged on fuel costs, lease costs very high. Hard to compete with other airports with lower costs. ***KC*** – Could lower these lease costs; fuel sales clearly are impacted, losing business to other airports.
Issue: Sequestration - closing of tower. ***KC*** -- They could help with better winter operations.
Issues: Sequestration; customers & border control, need new hanger, process is cumbersome. ***KC***: Help with Customs & Border control.
Issue: To develop new lines of business to replace their existing services. ***KC***: Glibly said "get rid of competitors"
Issue: How to develop new spaces to provide their service. ***KC***: Could help in the permitting for a new building.
Issues: Availability of land, ramp availability, would like a bigger space. ***KC***: Would like to combine pickup and delivery.
Issues: Lease is up in a year; regulatory environment is a challenge. ***KC***: Provide services to tenants that make them want to be there.

Issues: Costs - health care, wages, safety, fuel. ***KC***: Support the airport more, $, project-wise, and also more $ on transport infrastructure.
Issues: Safety, taxes(revenue dept. data requirements), price of fuel. ***KC***: Be more flexible with landing fees.
Issues: Their business is in limbo due to redevelopment - Galvin is in negotiation for the property. ***KC***: Help in finding a new site.
Issue: People who come in trucks from other locations steal away their business. ***KC***: KC could enforce a requirement that those selling at the airport be a tenant; also a differentiated rental rate structure would help.
Issues: Revenue keeping pace with the cost of business. What will the market accept in rates and charge increases to maintain the current level of facility and customer service is the central question? Airport will need to balance its operation and capital budgets through strict prioritization of needs and FAA requirements. ***KC***: Adopt airport strategic plan and executive and council action on proposed KK Code changes and rate increases.
Issues: They don't need to be located at KCIA, but they do have important local customer relations (Boeing). ***KC:*** Parking is an issue; and the lack of public transit.
Issue: Rent goes up. ***KC***: Lower the rent.
Issues facing businesses at KCIA, who feel King County cannot help them deal with these issues
Issue: Cost of fuel farm inspection. **KC** – No.
Issue: Good access & maintenance. **KC** -No
Issue: Disconnect on land lease rates--slowly pushing people out. Maybe there needs to be more consideration of small operators. ***KC*** - No
Issue: Overall demand in the company, that translates into work at this location. ***KC*** - No, but respondent then offered these comments: Keep up field; some issues over fuel (they do their own fuel and treatment is unfavorable due to regulations.) Also "foreign object damage"-- inconsistent policy on this (King county Police 24/7)-- bother them at least once a month.
Issues: Ground lease - still being negotiated; fire marshal overzealous. Sequestration. ***KC*** - No
Issue: Possibly more competition. ***KC*** No, Not aware of anything KC could do.
Issue: The building is to be demolished, so relocation is an issue. ***KC*** - No. Then said: "The county does not care about them."
Issue: Demand has been problematic due to the costs of operation. ***KC***: Not really much they can do.
Issue*:** Will have to move as Galvin will be redeveloping the property. ***KC – No.
Issue: Space - they will fill up the space in a few years. ***KC*** – No.
Issue: Hanger space. ***KC*** No.
Issue: Lack of parking. ***KC*** No, but it looks like they have moved to Southcenter.

Respondents who said they faced no major issues related to their business at KCIA and who did not think that there was anything KCIA could do to help them.
None really. KC - No
None.
Nothing.
No.
Not applicable.
Respondents who said they faced no major issues related to their business at KCIA and who then offered some comments about actions that KCIA could take that would help them.
None, but then with regard to what ***King County*** could do they said: "Slow in invoicing water bills. Good at Communicating. Wants more speed control on perimeter road by airport way."
None. ***KC***: Better maintenance of vegetation; keep fence lines clear.
No. ***KC***, Said no, but: They need more space.

V. Comparisons with the 1998, 2002, and 2008 KCIA Economic Impact Studies

This study has been conducted through the utilization of methodologies almost identical to those used in the 1998, 2002 and 2008 KCIA Economic Impact Studies. This study purposefully used measurement procedures so that results could be compared results obtained in the current study with the ones benchmarked against the year 1998, 2002 and 2008. Although this was our approach, there are some differences in procedure that have influenced impact analysis outcomes and direct impact measurements. Key inputs common to the 1998, 2002, 2008 and the current studies are:

(1) Data were provided by tenants at the airport about their business activity. Employment, labor income, and sales of tenants and subtenants at the airport, were used as reported by them. It was assumed that they have provided accurate estimates of their business activity. The study was conducted on the best data available.

(2) Models of the regional economy with similar specifications, based on the Washington State input-output model were used to estimate economic impacts. There are differences in the multiplier structure in the current study and in the models used in the 1998, 2002 and 2008 studies. In 2012, a new input-output model for the Washington economy was published and benchmarked against the year 2007. The 1998 study utilized the 1987 Washington input-output study, while the 2002 study used the 1997 Washington input-output study as the basis for the King County models developed for the purpose of those studies. The 2008 study utilized the 2002 Washington input-output model as the basis for the King County economic impact

estimates. This study used the 2012 Washington State input-output model. However, while each study used a different underlying Washington State input-output model, these models are similar in their sectoring plan and in their multiplier structure.

Figures 4 and 5 portray the relative importance of broad industry groups for the years 1998, 2002, 2008 and 2013. Direct KCIA employment was estimated to have declined from 4,078 in 1998 to 3,934 in 2002, was estimated to have increased to 4,866 in 2008, and to 5,209 in 2013. Figure 4 indicates that the greatest volatility in direct employment has been in the aerospace sector. FBO/Corporate Air employment has been relatively stable, while air cargo/airline and government employment show decline across the four studies. The increase in government employment is related to the large influx of personnel at the Army National Guard base at the north end of KCIA, many of whom are part-time employees. The change in "other" employment is related to changes in estimates of employment at the Museum of Flight, airline representatives located at KCIA and considered as part of the services sector, and other tenants. In the 2008 study the airline representatives were counted with "other," while in the current study they are classified in aerospace in Figure 4. In the 1998 and 2002 studies these airline representatives were also considered to be part of the aerospace sector.

Figure 4 Employment at KCIA in 1998, 2002, 2008 and 2013

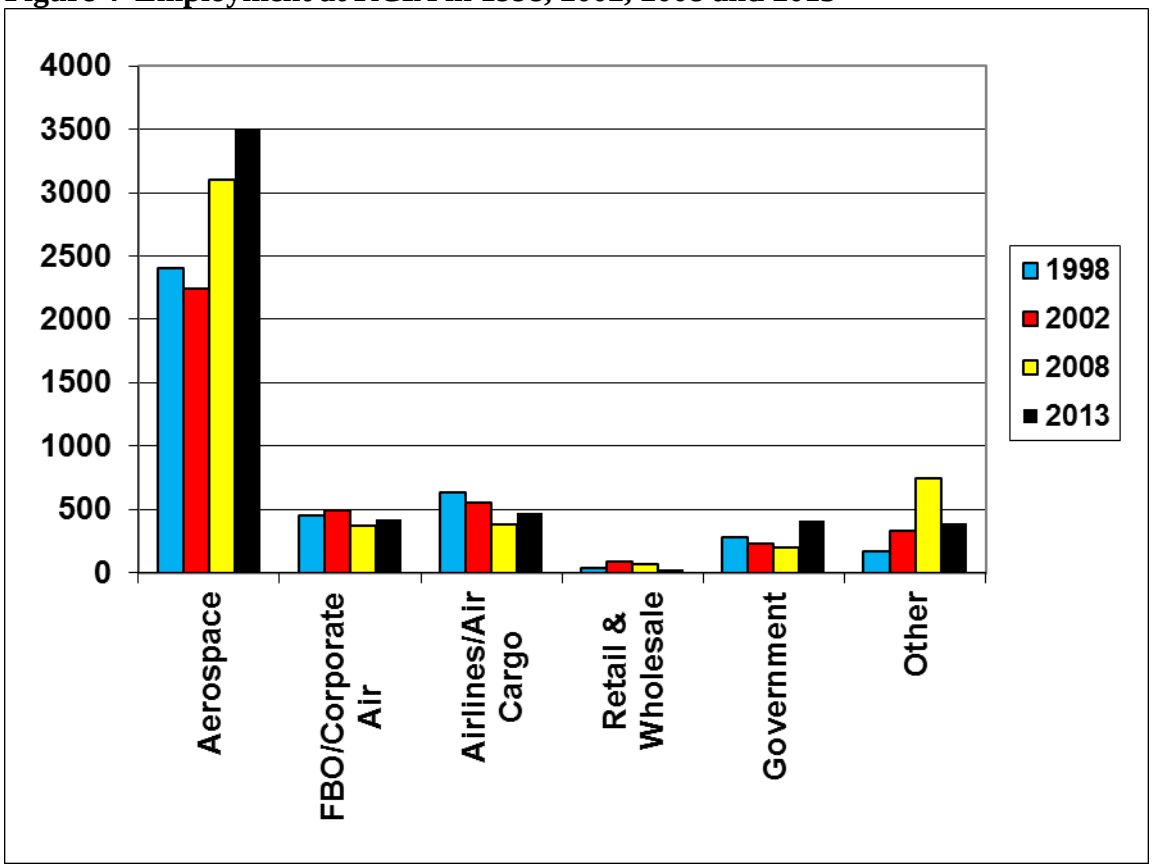
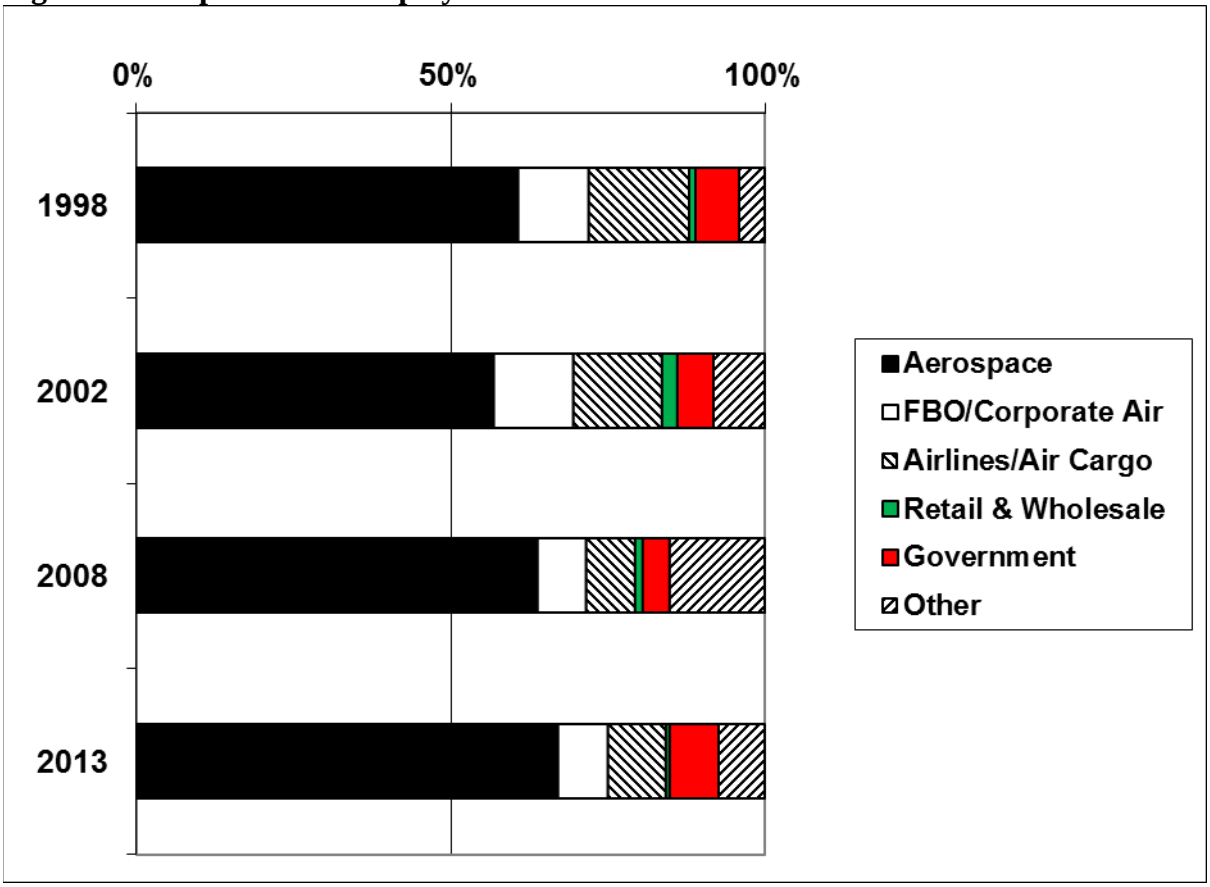


Figure 5 reports the composition of employment at KCIA in 1998, 2002, 2008, and 2013. The data used for this figure are the same as used for Figure 4. In all four studies, the aerospace

sector has accounted for around 65% of total employment at KCIA. The absolute increase in estimated aerospace employment in the 2008 study leads to a corresponding decrease in share of total employment accounted for by other categories of employment at KCIA. The absolute decline of employment in airlines/air cargo and government reported in Figure 4 also are evident in Figure 5.

Figure 5 Composition of Employment at KCIA



Multipliers used in the four studies are similar. Table 15 presents these multiplier estimates. The modest difference in output multipliers in the 1998 and 2008 studies are likely accounted for by small variations in the input-output direct, indirect, and induced requirements matrices used in the two studies and is related to changes in the mix of industries located at KCIA. The current study used the 2007 Washington State input-output model, and output multipliers from this model are similar to those used in the 2002 study, while the labor income and employment multipliers for KCIA appears to be very close to those derived in the 1998 and 2002 studies. The 2008 study appears to have a somewhat lower labor income multiplier than in the other three studies.

Table 15 Multiplier Comparison

	1998 Study	2002 Study	2008 Study	Current Study
Output Multiplier	1.47	1.59	1.43	1.62
Employment Multiplier	2.59	2.59	2.59	2.73
Labor Income Multiplier	1.94	1.93	1.69	1.92

Direct measures of sales are higher in the current study than in the 1998, 2002, and 2008 studies. Differences in prices and productivity are likely contributors to these differences. Table 16 reports sales for the three studies. It should be noted that this table has a slightly different scheme for grouping businesses than used in the 1998 study, and the author has adjusted data in the 1998 database to make them comparable to the industry definitions used in the current study. The 1998 study counted a number of the reservists at the National Guard station as employees in the government sector, while in the 2008 study there was no reported activity at the Army National Guard site.

Table 16 Sales Comparison (Current $)

	1998 Sales $ millions	2002 Sales $ millions	2008 Sales $ millions	Current Study Sales $ millions
Aerospace	$778.29	$680.75	$1,971.97	1793.2
FBO & Corporate Air	67.34	101.645	115.11	155.8
Air Passenger & Air Cargo	81.03	68.025	115.26	103.9
Wholesale and Retail	2.79	40.925	5.8	6.2
Government	26.52	41.212	18.597	37.7
Other	20.06	67.959	30.121	81.7
Total	$976.03	$1,039.21	$2,256.86	2178.6

Labor income per employee is reported in Table 17 for the four studies. No attempt has been made to standardize these estimates due to inflation. In all four studies the earnings of aerospace workers were high. The 2002 study shows earnings for the government sector well above the level found in the current study and in the 1998 study, while in the current study this estimate is depressed by the large number of part-time Army National Guard employees.

Table 17 Labor Income Comparison

	1998 Labor Income Per Job	2002 Labor Income Per Job	2008 Labor Income Per Job	Current Study Labor Income Per Job
Aerospace	$52,623	$77,899	$112,143	$117,264
FBO & Corporate Air	$44,044	$50,445	67,430	$67,594
Air Passenger & Air Cargo	$30,381	$37,949	47,212	$45,426
Wholesale and Retail	$26,944	$39,560	31,500	$46,547
Government	$44,007	$94,053	60,045	$39,804
Other	$45,244	$47,675	39,106	$46,900
Total	(Not estimated)	(Not estimated)	$97,574	$95,051

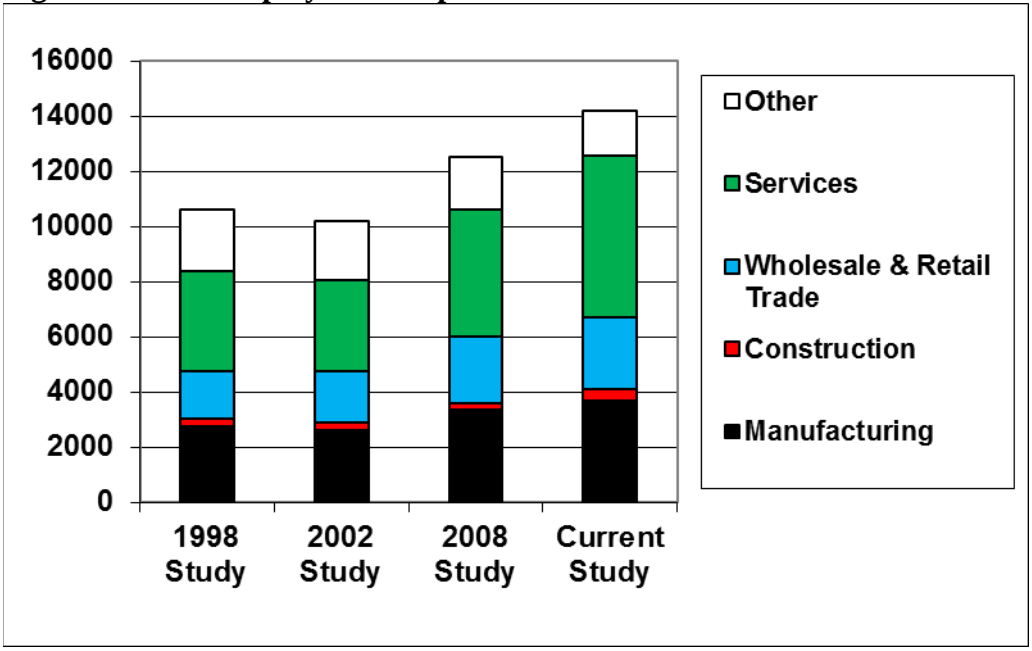
Table 18 presents a comparison of estimates of the share of new money from the four studies. As with the other comparisons in this section, this table is not directly comparable to the percentages of new money shown in the 1998 study, due to slight differences in industry groupings. The overall orientation of businesses at KCIA remains strongly tied to export markets, with a similar aggregate percentage of new money in the two studies. The "other" sector shows a strong increase in export orientation in the 2002 study, as airline representatives were included in this category in the 2002 study, and they are included with aerospace in the current study.

Table 18 New Money Comparison

	1998 Study	2002 Study	2008 Study	Current Study
Aerospace	99.30%	99.80%	100.00%	99.90%
FBO & Corporate Air	27.60%	22.70%	59.40%	34.90%
Air Passenger & Air Cargo	52.40%	57.70%	60.60%	62.40%
Wholesale and Retail	45.80%	34.30%	29.70%	28.20%
Government	29.50%	36.40%	12.80%	60.30%
Other	31.70%	79.70%	23.40%	17.70%
Total	87.00%	81.50%	94.00%	89.50%

A final perspective on the four KCIA economic impact studies comes from a comparison of their regional employment impact estimates. Figures 6 and 7 present these estimates, with Figure 6 illustrating the total employment levels, and Figure 7 the mix of employment by broad category. It should be noted that the first two studies were conducted using the Standard Industrial Classification (SIC), while last two studies utilized the North American Industry Classification System (NAICS). Differences in definitions between these two systems create minor issues related to the aggregation of detailed industry codes as reported in Figures 6 and 7.

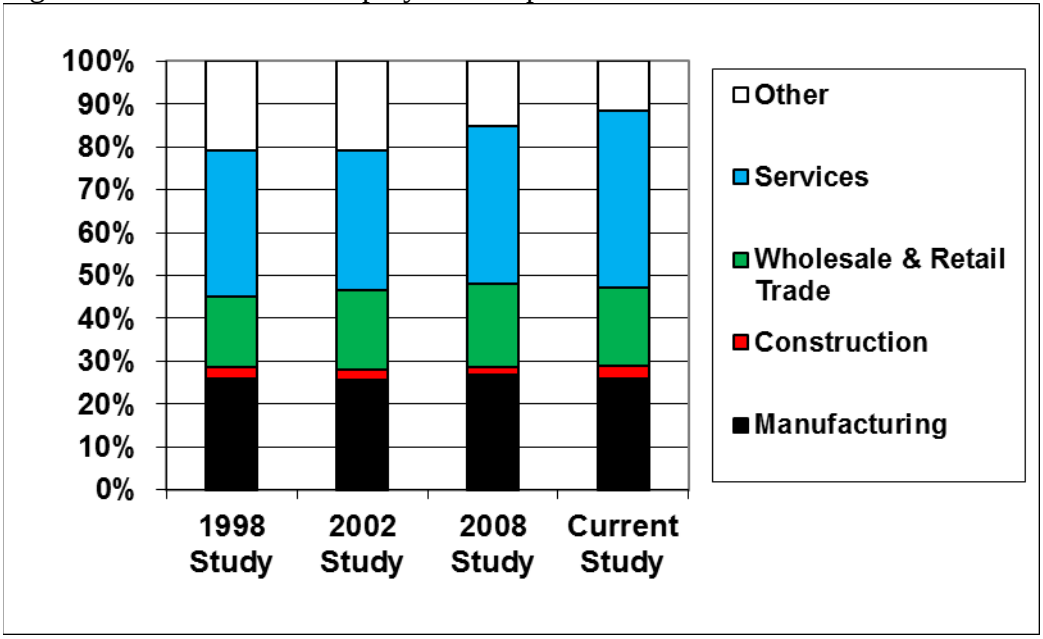
Figure 6 Total Employment Impacts



Each of these studies measured impacts in terms of output (sales), employment, and labor income. Only employment impacts are reported in Figure 7; interested readers can develop comparative measures on other dimensions by accessing each of these studies.

Figure 6 and 7 clearly show that most impacts are felt in the wholesale and retail trade, as well services sectors. Services are defined as business, health, and consumer services. "Other" includes transportation, communications, utilities, and financial services, as well as natural resources. Total job impacts mirror direct job levels, reported in Figure 4. Impacts in manufacturing are mostly the direct jobs created at KCIA in the aerospace sector. The current study indicates about 2,000 more jobs supported in King County when compared to the 2008 study. Figure 7 reports very similar shares of total employment impact across the four studies, a result driven by the relative stability of the mix of direct economic impacts. Differences in these estimates are also related to the different input-output models used for these studies; each study has used a different Washington State model to derive a King County model.

Figure 7 Share of Total Employment Impacts



VI. Concluding Comments

This study has documented the economic impact of KCIA on the King County economy for the year 2013. It was based on a survey of the principal tenants at KCIA and on information that they provided us with regarding their subtenants. We believe that tenants in this study have provided us with reasonably accurate information, and that the impact estimates developed in this study are a good approximation of the economic impact of KCIA for the year 2013. KCIA generated more than 16,000 jobs in King County in 2013, was responsible for sales by King County businesses of $3.5 billion, and supported the earnings of $1.1 billion in labor income. About $76 million in state and local sales and B&O taxes were generated as a result of economic activity at the airport. Directly, 5,200 people worked at the airport in 2013, earning $495 million in labor income.

This research project has measured the diverse economic activity that takes place at KCIA, a busy general aviation airport in the middle of one of the nation's largest metropolitan areas. The airport makes a significant contribution to the economic base of King County. The nature of this contribution has changed somewhat since the conduct of the economic impact studies benchmarked against the years 1998, 2002 and 2008. The Boeing Company is operating at a higher level at KCIA than was the case in the 1998, 2002 and 2008 studies. Retail and air cargo activity at KCIA has declined, while FBO/Corporate air activity appears to be stable. While many tenants experienced a downturn in business due to the recent recession, many of them are optimistic about the development of their business in the near future.

It is inevitable that there is dynamism in the mix of tenants and their level of business activity at an airport like KCIA. Shifts in earnings levels, effects of inflation and productivity change, and other dynamic factors, date studies such as this one. It is common for these studies to be updated periodically, such as KCIA has done..

Appendix A. King County International Airport Economic Impact Study 2013

Responses to this survey will be treated as confidential. Responses from individual businesses will be combined with information from other respondents to preserve confidentiality. No survey data will be given to King County.

Establishment Name _____

Date of Interview _____

Person Interviewed _____

1. Description of products or services: _____

_____

2. Sales or Budget (most recent fiscal year) $_____

3. Market Composition (% of sales or budget):

	% of Total	% from King County sources	Expected % Five years from now	Expected % from King County Sources Five Years from Now
Industry Markets	%	%		
Household Markets	%	%		
Governments – Local or State	%	%		
Government – Federal	%	%		
Total	100.0%		100.0%	

Market Trends – How do you see your lines of business changing over the next 2 to 5 years?

Line of Business	% Increase	% Decrease	Comment
Corporate			
General Aviation			
Cargo			
Flight School			
Other --			

4. How many employees on average do you have that are: _____ Full time _____ Part time

5. What was your total level of employee compensation in your most recent fiscal year?
(E.g. wages & salaries as well as fringe benefits)

$_____

6. How has your sales (budget) changed since the Great Recession began in 2008?
☐ No Change ☐ Has Decreased ☐ Has Increased

a. If their sales (budget) has changed, by what % _____
b. Why has this change occurred?

_____

7. How do you anticipate you sales (budget) will change over the next 2 years (to 2015)?
☐ No Change ☐ Will Decrease ☐ Will Increase

a. If they think their sales will change, by what % _____
b. Why do you expect this change?

_____

_____

8. What are the most important issues facing your business activity at KCIA over the next several years?

---

9. Are there actions that King County could take that would help your business deal with issues identified in question 8? Yes ☐__ No ☐

a. If the answer is yes, please describe these actions

_____

_____

_____

10.. *(Ask this only to those with no recorded subtenants)*. Do you have tenants or subtenants? If yes, who are they, how many people do they employ, what is their business, and how much of it is sold in King County?

_____

Appendix B. List of Tenants Included in this study

NAICS	Tenant or Subtenant
336400	Boeing Company
336400	Boeing - customers & service
336400	Greenpoint Technologies
336400	Reliable Aircraft Detailing
336400	Boeing Business Jets
441228	National Aviation Inc.
443112	American Avionics
451211	Aviator's Store
481111	Kenmore Air
481112	DHL Express
481112	United Parcel Service (UPS)
481200	Airlift NW
481200	Ameriflight
481211	Erin Air
481212	Airpac Airlines
484200	TBS Couriers (Unity Courier Service)
484200	DB Shencker tenant (unnamed)
484230	Skagit Transportation
485320	American Limo Inc
488110	FAA
488119	Costco
488119	GDH-1 "Hangar 89", NW Retailers
488119	GRE Airport LLC (Elite Aviation) (Goodman Real Estate)
488119	Nordstrom
488119	Starbucks
488119	Vulcan (Hangar Holdings)
488119	CB Air
488119	Nordstrom
488119	Mente LLC
488119	King County Jet Center, LLC. KCJC, Georgetown Management
488119	J&J Properties, (Lake Washington Properties manages for)
488119	ASLP (LLC at Galvin)
488119	Lifestream Medical (LLC at Galvin)
488119	Mocha (LLC at Galvin)
488119	AMI (LLC at Ashton)
488119	Ashton Aviation LLC
488119	JCE Design (LLC at Ashton)
488119	OBAir LLC (LLC at Ashton)

488119	Progeny 3 (LLC at Ashton)
488119	TPS LLC (At Ashton)
488119	Unnamed LLC's at Clay Lacy Aviation (20 establishments)
488119	Pacific Coast Feather (LLC at Ashton)
488190	Aeroflight (BFI Holdings)
488190	Clay Lacy Aviation (Gateway Air) / Hangar II LLC
488190	Galvin Flying Service
488190	Air Methods Helicopter Repair (subtenant to Kenmore)
488190	Duncan Aviation
488190	Cascade Airframe Repair
488510	DB Schenker (formerly BAX)
531312	Ashton Corp.
532111	Hertz
541330	Aviation Partners Inc
541620	Jones Payne Group
561320	DB Shencker – temporary help additions (unnamed)
611100	Opportunity Skyway
611100	South Seattle Community College
611500	Aviation Training Center
611500	Classic Helicopters
611500	Evergreen Trucking School
611512	The Flight Academy
611512	Helicopters NW
611512	Wings Aloft
611512	Atomic Helicopters
621340	Washington Audiology
712110	Museum of Flight
722000	catering Clay Lacy
722213	Cavu Café
722213	Wings Café
923100	King County Facilities Management
923100	WA National Guard
923100	Customs & Border Protection

Appendix C. Construction Impacts

In addition to the economic impacts of operations of tenants at KCIA, there are also economic impacts associated with new capital investment at the airport. Current or recent investment includes (1) the Quad 7 site at 7777 Perimeter Rd. E., (2) the UPS site, and (3) Starbucks facility on E. Marginal Way. It is estimated that construction activity at these three sites is or was a total of $64.5 million. Unlike the economic impact estimates presented earlier in this report, which are ongoing from year to year, these are one-time impacts linked to these capital investments. The economic impact model use to analyze operations of businesses at KCIA was used to estimate the economic impacts of this construction activity. Table C-1 presents aggregate impacts from this investment activity. Sales taxes generated by the spending of labor income and B&O taxes on sales volume generated as a result of this construction activity generate $2.84 million in tax revenues for local governments and the state of Washington. Overall tax impacts are larger than this, because a portion of the capital outlays for these projects at KCIA are subject to the sales tax. Unfortunately data were not available to estimate these tax revenues, but they could easily double the tax impacts reported here.

Table C-1 Economic Impacts of Construction Activity at KCIA

	Output ($ Millions)	Employment	Labor Income ($ Millions)
Natural Resources and Utilities	$2.247	4	$0.625
Construction and Manufacturing	$72.321	295	$16.623
Retail and Wholesale Trade	$12.832	109	$4.910
Producer and Transport Services	$20.205	111	$6.697
Consumer Services & S&L Govt	$15.354	194	$8.837
Total	$122.959	713	$37.692

Appendix D. Technical Appendix on the Input-Output Model

The impact estimates developed in this study stem from the utilization of an "input-output model." Models of this type are based on static, cross-sectional measures of trade relationships in regional or national economies. They document how industries procure their inputs and where they sell their outputs. Pioneered by Wassily Leontief, who won the Nobel Prize in Economic Science for his insights into the development of input-output models at the national level, these models have become "workhorses" in regional economic impact analysis in recent decades.

Washington State is fortunate to have a rich legacy of research developing input-output models. Early work was led by Philip J. Bourque and Charles M. Tiebout. Input-output models have now been estimated in Washington State for the years 1963, 1967, 1972, 1982, 1987, 1997, 2002, and 2007. No other state in the U.S. has this rich historical legacy of survey-based or quasi-survey based regional input-output models. The current is based on work completed in 2011 and 2012 by a team of Washington State government staff and William B. Beyers (Beyers and Lin 2012).

Input-output models decompose regional economies into "sectors"–groups of industries with a common industrial structure. The heart of these models are "Leontief production functions," which are distributions of the cost of producing the output of sectors. Leontief augmented the national accounts schema developed by Kuznets (also a Nobel laureate in economics) to take into account the significant levels of intermediate transactions that occur in economic systems in the process of transforming raw materials and services into "finished products" or "final products." Sales distributions among intermediate and final sources of demand are used as the accounting bases for the development of the core innovation of Leontief: that these relationships can be used to link levels of final demand to total industrial output by way of a system of "multipliers" that are linked through the channels of purchase in every industry to the production of output for final demand.

This system of relationships is based on accounting identities for sales and purchases. Mathematically, the system may be represented as follows. For each industry we have two balance equations:

(1) $X_i = x_{i,1} + x_{i,2} + ... + x_{i,n} + Y_i$

(2) $X_j = x_{1,j} + x_{2,j} + ...+ x_{n,j} + V_j + M_j$

where: X_i =total sales in industry i,

X_j = total purchases in industry j

$x_{i,j}$ = intermediate sales from industry i to industry j

Y_i = final sales in industry i

M_j = imports to sector j

V_j = value added in sector j.

For any given sector, there is equality in total sales and total purchases:

(3) $X_i = X_j$ when i=j.

This system of transactions is generalized through the articulation of Leontief production functions, which are constructed around the columns of the regional input-output model. They are defined in the following manner.

Let us define a regional purchase coefficient:

$$r_{i,j} = x_{i,j}/X_j.$$

Rearranging,

$$x_{i,j} = r_{i,j}X_j$$

Substituting this relationship into equation (1) we have:

(4) $$X_i = r_{i,1}X_1 + r_{i,2}X_2 + ... + r_{i,n}X_n + Y_i$$

Each sector in the regional model has this equation structure, and since the values of X_i equal X_j when i=j, it is possible to set this system of equations into matrix notation as:

(5) $$X = RX + Y$$

This system of equations can then be manipulated to derive a relationship between final demand (Y) and total output (X). The resulting formulation is:

(6) $$X = (I-R)^{-1}Y$$

where the $(I-R)^{-1}$ matrix captures the direct and indirect impacts of linkages in the input-output model system. The input-output model utilized in the modeling for this research project was developed by a committee led by Dr. William Beyers and Dr. Ta-Win Lin, and was published in 2012 by the Washington State Office of Financial Management. The model has 52 sectors.

A major issue that surrounds the estimation of the $(I-R)^{-1}$ matrix is the level of "closure" with regard to regional final demand components, which are personal consumption expenditures, state and local government outlays, and capital investment. It is common practice to include the impacts of labor income and the disposition of this income in the form of personal consumption expenditures in the multiplier structure of regional input-output models. The additional leveraging impact of these outlays is referred to as "induced" effects in the literature on models of this type. It is less common to include state and local government expenditures in the induced effects impacts, but it can be argued that demands on state and local governments are proportional to the general level of business activity and related demographics. In contrast, investment is classically argued to be responsive to more exogenous forces, and is not a simple function of local business volume. In the model that developed for this impact study, personal

consumption expenditures and state and local governments have been included as a part of the induced-demand linkages system. We have considered Washington personal consumption expenditures to be a function of labor income, and state and local government to be a function of other value added. The resultant Leontief inverse matrix is available from the Office of Financial Management in either the "simple" or the "complex" impact analysis spreadsheet.

References

William B. Beyers & Shaun McMullin. (2000) King County International Airport Economic Impact Study. Prepared for King County.

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