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R E S E A R C H R E P O R T

Update of a Web-Based Economic Impact Calculator  
for Small- and Medium-Sized Airports and a  
Study of the Economic Impact of Minnesota Airports

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# **Update of a Web-Based Economic Impact Calculator for Small- and Medium-Sized Airports and a Study of the Economic Impact of Minnesota Airports**

## **Final Report**

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This study is the result of collaboration between the University of Minnesota and Mn/DOT Aeronautics. The study authors include William C. Gartner, professor in the Department of Applied Economics, Brigid A. Tuck, analyst/writer in the Extension Center for Community Vitality, and Daniel L. Erkkila, head of the North Central Research and Outreach Center and adjunct professor in the Department of Forest Resources.

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## Executive Summary

This report details the process of updating the Web-based airport economic impact calculator and the calculation of the statewide economic impact of Minnesota public airports. The end products of these efforts are: 1) an economic impact calculator that more adequately reflects current economic conditions with added flexibility to handle large, unique airport operations 2) and an estimate of the total economic impact of Minnesota airports in 2009.

Minnesota airports vary widely in their function, size, runway length and type, and the services offered. Most Minnesotans probably would easily identify the large airports in Minnesota that offer commercial air service, including Minneapolis-St. Paul International, Duluth International, and Rochester International. They may also be able to identify some of the smaller non-hub airports that provide commercial air service like Bemidji and Brainerd Lakes Regional.

However, many cities and counties in Minnesota have a small airport that caters to general aviation aircraft. Most airports have at least one paved runway, though a few have only grass landing strips or seaplane-bases. Many airports in larger rural communities house the corporate flight division of a major employer. For example, Schwan's maintains aircraft and pilots at the airport in Marshall and Hormel Foods has a flight department at the Austin airport. Most airports are home to a fixed based operator (FBO). An FBO provides services to general aviation aircraft at the airport, such as fuel sales, hangar rentals, and aircraft maintenance. In many cases, the FBO also serves as the airport manager. Airport managers are responsible for day-to-day oversight at the airport. For small airports, the FBO is often hired or compensated by the municipality to do these duties. Some municipalities wrap the airport manager job into other functions of a city or county employee. Other larger airports have a full-time airport manager supported by the municipality or by airport fees.

All of these airport activities contribute to the economy of their host municipality. The airport economic impact calculator prompts users to enter data on nine main types of economic activity to calculate the impact of their local airport. These include: public airport operations and capital investments, FBOs, commercial scheduled air service, retail businesses, general aviation, freight operators, private corporations with flight departments, non-profit and government entities and other activities. The newly updated economic impact calculator allows for greater variability in the size and scale of these airport operations and contains new economic impact coefficients that reflect changes in the economy since the calculator was first developed.

These nine activities also contribute to the economy of Minnesota. To calculate the economic impact of the airport system in Minnesota primary data were collected from airport managers, FBOs, corporate flight departments and governmental units. Secondary data were obtained from Minneapolis-St. Paul International, Rochester International, and Duluth International airports to provide a comprehensive economic impact analysis for the state.

In total, Minnesota airports generate \$12.2 billion in economic activity in Minnesota. This impact includes the creation of 164,900 jobs in the state as well as \$6.5 billion in labor income. The majority of this impact is generated by the three largest airports in Minnesota (Minneapolis-St. Paul International, Rochester International, and Duluth International). However, small and

medium size airports create a significant economic impact of their own. In 2009, these airports contributed \$434 million in economic output to the state including 3,758 jobs and \$184 million in labor income. These figures represent that total economic impact of airports including the direct effect, the indirect effect, and the induced effect (see the methodology section for a definition of terms).

## **Chapter 1. Introduction**

In 2004, the Minnesota Department of Transportation (Mn/DOT) contracted with the University of Minnesota to develop a Web-based economic impact calculator for small and medium sized airports. In early 2005, the University completed this work and unveiled the airport economic impact calculator. Airport managers, local officials, and interested citizens can enter information specific to their airport, such as the operating budget for the airport, the number of commercial scheduled flights, and the size of the local fixed based operator (FBO), and the calculator will estimate the total economic impact of their airport.

Extensive research went into the development of the calculator. University researchers, including an author of this report, visited 51 airports across the state. Airport managers, FBO owners, and other personnel were interviewed to provide technical assistance and data for the calculator. The Principal Investigators attended the Minnesota Council of Airports annual symposium to collect background information. A Technical Advisory Panel (TAP) was created to provide guidance to the project. The calculator has proven to be popular. Despite this extensive research, the calculator returned errors when large, unique airport activities with numerous employees were entered. In addition, since 2005, the economy has changed. For these reasons, Mn/DOT Aeronautics determined the calculator needed to be revised and updated.

As part of the calculator update, a study of the total economic impact of Minnesota airports was also commissioned. The project called for primary data collection to determine the economic impact of small to medium sized airports. Secondary data from previous research studies could be incorporated for the three large airports not included in the calculator. These two data sources could then be combined to determine the total economic impact of Minnesota airports.

## **Chapter 2. Update of the Economic Impact Calculator**

The first goal of this research project was to update the airport economic impact calculator that was launched in 2005. The original airport economic impact calculator, while an excellent tool for the majority of Minnesota airports, had some minor flaws. In particular, large, unique airport operations such as the Air National Guard rendered the calculator inoperable. Further, economic conditions have changed since 2005 and some of the underlying coefficients needed to be updated. As part of this project, those issues were addressed and updated. This section of the report will detail how the corrections and updates were implemented.

The process of updating the calculator had three main steps: 1) gather new data from airport managers and on-airport aviation businesses to improve the underlying equation 2) update the economic impact coefficients and 3) test the current airport economic impact calculator Web site for functionality.

The economic impact of airports is driven by expenditures. Each of the nine airport-based activities make expenditures to operate. These are the direct effects of airports. As these expenditures are made, they create additional expenditures in the local economy. For instance, if the airport has hangar rentals, some of the money paid for rent will go to maintenance of the structure. As the airport manager buys wood for repairs from the local lumberyard, the lumberyard must increase its spending for its inputs, therefore generating even more spending. Likewise, if the airport manager hires a local handyman to perform the repairs, he or she has more money to spend at the local grocery store, and the grocery store has to increase its spending. These are the indirect and induced effects. The direct effects plus the indirect and induced effects sum to the total effect. From these effects, a generic multiplier can be derived that quantifies the impact of \$1 of expenditures.

The airport economic impact calculator contains two critical equations that assist in determining the total economic impact of airports. In many cases, total expenditures for privately-owned operations (example, FBOs) is unknown by the calculator user, but basic information like the number of planes operated or number of employees is known. The calculator has an underlying equation that can estimate expenditures for an operation based on the number of planes and/or the number of employees. The equation was based on data collected in the initial creation of the calculator. It was this equation that did not perform adequately when large, unique operations were entered into the model. Once total expenditures are determined, the calculator then applies the appropriate multiplier to determine the total economic impact. These multipliers are subject to variation based on economic conditions and these were in need of updating to reflect the current economy.

### **Updating the Underlying Equation for Determining Expenditures**

FBOs, corporate aviation organizations, and government operations were surveyed on the number of planes they operate, the number of full-time and part-time employees at their operation, and their total expenditures for the year. This information was then used to update the underlying equation that allows users to estimate expenditures based on the number of

employees and/or the number of planes. The update was successful and the new equation can more effectively estimate the impact of a large, unique operation.

On November 6, 2009, an email invitation was sent to a list of 90 FBOs and flight schools. Seven of those were returned for bad email addresses. Thus, 83 invitations were delivered. There were 40 responses yielding a 47 percent response rate. In December 2009 and January 2010, six corporate/commercial operations were contacted by phone and asked to participate in an online survey. Of those six, four responded for a rate of 67 percent. Finally, the Air National Guard was contacted and asked to participate, which they did.

In order to calculate the total economic impact of Minnesota's small and medium sized airports it was necessary to update the expenditure estimating equation contained in the original calculator. It was determined how much each FBO or corporate on site entity is spending each year through primary data received from both groups (see Appendix A, survey instruments). Once expenditure information, the number of employees (full time annual, part time annual, part time seasonal) and the number of planes the FBO or corporate entity maintained were known the data were subjected to a regression analysis. The dependent variable was Expenditures and the Independent variables were the three types of employee categories noted above and number of planes maintained. This was the same analysis used to derive the equation for the first version of the calculator. As expected, the higher response rate to the survey improved the predictive power of the new equation.

The new equation is:  $Y(\text{Expenditures}) = \exp(11.078 + 1.131 \ln(\text{number of full time annual employees}) + .416 \ln(\text{number of full time seasonal employees}) - .274 \ln(\text{number of part time employees}) - .005(\text{number of planes maintained}))$  where:

exp = exponent, and

ln = natural log

This applies to both on site FBO's and corporate entities. The r square value is .701 which is considered high for an equation with so few variables. The higher response rate achieved in the updated version of the calculator greatly increases the predictive power of the model and extends its stability to larger entities. The previous equation began to lose its predictive power if an FBO or corporate entity had more than 40 employees. This new equation, run in logarithmic form, is capable of correctly estimating FBO or corporate entities expenditure regardless of the number of employees they have.

One thing the reader might notice is that the contribution to the dependent variable (expenditures) is negative (slightly) when an FBO or corporate entity maintains its own planes and also when then number of part time employees increases. The reason for this is that we begin with an expected level of expenditures before any contribution from the dependent variables is added/subtracted from this number. The original estimation is the intercept term which is 11.078 in this equation. When the rest of the variables are considered the intercept term will either show a gain or loss depending on the magnitude of each variables contribution. Note that the amount of planes maintained or owned only affects the intercept term by a very small

number even if large numbers of planes are considered. The equation has, for the most part, factored in plane ownership/maintenance into the intercept term. Therefore what is added or lost as a result of adding more or less planes is already determined and based on the primary data collected. The new equation with its new co-efficients is simply providing estimated expenditures based on a previously calculated company (FBO, corporate entity) profile.

### **Updating the Economic Impact Coefficients**

The economic impact coefficients are based on multipliers. For the airport economic impact calculator, multipliers were derived using IMPLAN (IMpact Analysis for PLANning, Minnesota IMPLAN Group) software and data. The newest data package (2008) was purchased. The necessary calculations were then performed and the new economic impact coefficients were derived. These new coefficients more accurately reflect current economic conditions.

Each airport activity has a unique economic impact coefficient based on the county in which the airport is located. The appropriate economic impact coefficient is applied to the activity to determine the total economic impact of that activity. For example, when expenditures for public ownership are entered into the model, the economic impact coefficient for the air transportation sector is applied to calculate the total economic impact of public ownership. Likewise, when expenditures for retail establishments are entered, the economic impact coefficient for retail establishments is applied.

### **Evaluating the Airport Economic Impact Calculator Web site**

The economic impact calculator was created with feedback and with information from airport managers, FBOs, and other aviation personnel that were interviewed as part of the initial development of the calculator itself. Since updates were being made to the calculator, Mn/DOT determined it was an appropriate time to test the usability and functionality of the calculator as well.

Therefore, on September 28, 2009, University of Minnesota project staff attended the AirTAP (Airport Technical Assistance Program) conference held in Mankato, Minnesota. At the conference, volunteers were requested for a focus group to evaluate the current airport calculator. Four individuals representing airports in Minnesota volunteered to participate in the focus group. The participating airports were Aitkin, Chisholm, St. Cloud and South St. Paul. The focus group represented a cross-section of airports by size, location, and type of activity. Focus group participants were asked to use the calculator to estimate the impact of their airport. During this process, they were asked to consider the ease of use and understanding of each of the calculator screens and the ease of data collection for that screen.

Overall, the calculator received a very favorable reaction from the focus group. Both groups were able to move fairly quickly through the screens and arrive at the economic impact of their airport.

Based on the results of this focus group, the University of Minnesota project team made the following recommendations for the upgrade of the Web-interface to Mn/DOT Aeronautics.

1. Provide definitions for the terms used in the calculator. It is possible to add a scroll over function that would pop-up the definition of the word and/or term.
2. Add a screen that summarizes the data entered before calculating.
3. Carry the number of businesses entered from the initial screen over into the corresponding follow-up screen. For example, if in the initial screen, the operator enters 2 businesses that ship freight, when they get to the freight screen, a large number 2 would appear on the page.

## **Chapter 3. Economic Impact of Minnesota Airports**

The second major goal of this research project was to determine the total economic impact of Minnesota airports. This analysis was last completed in 1999 by Wilbur Smith Associates and was in need of updating. The primary organization and methodology of this study builds on the research completed in 2005 that created the economic impact calculator. Essentially, the economic impact calculator research identified nine primary airport activities that generate economic output. These are: operations of the airport itself, fixed based operators (FBOs), commercially scheduled flight service, general aviation, retail businesses, freight transport operations, corporate flight departments, government operations, and other activities. In this section of the report, the economic impact of eight of those activities will be quantified and explained.

### **Methodology**

There are several methods for determining the economic impact of airports. Previous studies (Wilbur Smith Associates 1999) done in Minnesota studied a select sampling of airports and then applied the results to all airports in Minnesota.

This study will follow the methodology established in the development of the airport economic impact calculator (Gartner, Erkkila, and Hyunkuk 2005). In that study, the researchers identified nine airport-based activities that create economic activity. They are: public airport operations and capital investments, FBOs, commercial scheduled air service, retail businesses, general aviation, freight operators, private corporations with flight departments, non-profit and government entities, and other activities. This report examines each of those activities and uses primary data to determine the economic impact of eight of the individual activities for small and medium sized airports. The economic impact of each activity will then be summed to get the total economic impact of small and medium sized airports in Minnesota. The economic impact of large airports in Minnesota will be collected from secondary data sources.

### *Data Sources*

Data for this report was collected from a variety of sources, depending on the airport-based activity. Data regarding expenditures for airport operations were obtained from state agencies that collect that information. Data on day-to-day local operating expenditures were gathered from the Minnesota State Auditor. Data on capital expenditures and expenses for maintenance and operation activities that received federal or state funding was provided by Minnesota Department of Transportation, Aeronautics.

Data needed to determine the economic impact of FBOs was collected in a survey of FBO operators. On November 6, 2009, an email invitation was sent to a list of 90 FBOs and flight schools. The list was provided to the University of Minnesota by the Minnesota Department of Transportation. Seven of those email invitations were returned due to bad email addresses. Thus, 83 invitations were delivered. There were 40 responses yielding a 47 percent response rate.

Airport managers were surveyed to gather information on commercial scheduled air service, retail businesses, general aviation, freight operators, and other activities. On October 2, 2009, an email invitation was sent to all 135 airport managers asking them to participate in the online airport managers' survey. Personal invitations were also issued at the AirTAP annual conference held September 28th and 29th, 2009 in Mankato, Minnesota. Computer kiosks were set-up at the conference for airport managers to participate. Of the 135 invitations, five were returned for bad email addresses. Therefore, 130 email invitations were officially distributed. The survey had 88 responses. Of those, some were duplications. Therefore, the survey had a roughly 60 percent response rate.

Finally, to collect information on private corporations with flight departments and on government operations, a survey was distributed to six corporate flight departments along with the Air National Guard located in St. Paul and in St. Cloud. Four corporate flight departments and the Air National Guard completed the survey.

### *Input-Output Models*

Special economic models, called input-output models, have been developed to conduct economic impact analysis. There are several input-output models available. One particular input-output model is called IMPLAN (IMPact Analysis for PLANning, Minnesota IMPLAN Group). IMPLAN is widely used by economists for economic impact analysis because it: can measure output and employment impacts; is available on a county-by-county basis; and it is flexible for the user. Due to these reasons, the IMPLAN model was used for this analysis. IMPLAN has some limitations and qualifications, but it is one of the best tools available to economists for input-output modeling. Understanding the IMPLAN tool, its definitions, and its limitations will help ensure the best results from the model.

There are a few definitions that are essential to understand in order to properly read the results of an IMPLAN analysis. The terms and their definitions are provided below.

### Output

Output is measured in dollars and is equivalent to total sales. The output measure can include significant double counting. For example, think of corn. The value of the corn is counted when it is sold to the mill, again when it is sold to the dairy farmer, again as part of the price of fluid milk, and then yet again when it is sold as cheese. The value of the corn is built into the price of each of these items and then the sales of each of these items are added up to get total sales (or output).

### Employment

Employment includes full- and part-time workers and is measured in annual average jobs. Total wage and salaried employees as well as the self-employed are included in employment estimates in IMPLAN. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric.

### Labor Income

Labor income measures the value that is added to the product by the labor component. For example, in the corn example, when the corn is sold, a certain percentage of the sale goes to the

farmer for his/her labor. Then when the mill sells the corn as feed to the dairy farmer it includes in the price some markup for its labor costs. When the dairy farmer sells the milk to the cheese manufacturer, he/she includes a value for his/her labor. These individual value increments for labor can be measured. This is labor income. Labor income does not include double counting.

#### Direct Impact

The direct impact is equivalent to the initial activity in the economy. In this study, it will be spending by the economic activities that occur on airports.

#### Indirect Impact

The indirect impact is the summation of changes in the local economy that occur due to **spending for inputs** (goods and services) by the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, this implies a corresponding increase in output by the plant. As the plant increases output, it must also purchase more of its inputs, such as electricity, steel, and equipment. As it increases its purchase of these items, its suppliers must also increase its production, and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts.

#### Induced Impact

The induced impact is the summation of changes in the local economy that occur due to **spending by labor** by the employees in the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, the new employees will have more money to spend to purchase housing, buy groceries, and go out to dinner. As they spend their new income, more activity occurs in the local economy. This can be quantified and is called the induced impact.

#### Total Impact

The total impact is the summation of the direct, indirect and induced impacts.

### **Economic Impact of Small and Medium Sized Airports**

Minnesota airports vary widely in their function, size, runway length and type, and the services offered. Most Minnesotans probably would easily identify the large airports in Minnesota that offer commercial air service, including Minneapolis-St. Paul International, Duluth International and Rochester International. They may also be able to identify some of the smaller non-hub airports that provide commercial air service like Bemidji and Brainerd Lakes Regional.

However, many cities and counties in Minnesota have a small airport that caters to general aviation aircraft. They may or may not have runways of required length that allow larger aircraft to land. Most airports have paved runways, though a few have grass strips or have seaplane-bases. Many airports in larger rural communities house the corporate flight division of a major employer. For example, Schwan's maintains aircraft and pilots at the airport in Marshall and Hormel Foods has a flight department at the Austin airport. Most airports are home to a FBO. An FBO provides services to general aviation aircraft at the airport, such as fuel sales, hangar rentals and aircraft maintenance. In many cases, the FBO also serves as the airport manager.

Airport managers are responsible for the day-to-day oversight at the airport. For small airports, the FBO is often hired or compensated by the municipality to do these duties. Some municipalities wrap the airport manager job into other functions of a city or county employee. Other, larger airports have a full-time airport manager supported by the municipality or by airport fees.

This study is primarily focused on the economic impact of these general aviation airports. Minneapolis-St. Paul International, along with Duluth International and Rochester International, were not directly included in the primary data collection primarily due to their size. Including the three largest airport systems in Minnesota in the airport calculator would have rendered the calculator virtually inoperable for the small and medium-sized airports. In addition, all three have recently independently contracted to have an economic impact study completed. The results of these independent studies were included in the final analysis to provide a picture of the economic impact of the state's airport system.

## **Public Expenditures**

The majority of airports in Minnesota are publically owned and operated.<sup>1</sup> The local municipality (city, county, or special jurisdiction) that owns the airport makes expenditures to operate the airport. There are two major types of public expenditures on airports. There are expenditures for the day-to-day operation of the airport. These often include costs for an airport manager, as well as daily maintenance such as mowing in the summer and runway plowing in the winter. Oftentimes, these expenditures are covered to some extent by activities at the airport. For example, a surcharge may be placed on fuel charges or the municipality may charge rental fees for hangars on the property. These expenditures are primarily the responsibility of the local authority that owns the airport. There are also expenditures for upgrades and investments in the airport, such as runway repaving, installation of navigation guides, and the purchase of large maintenance equipment. These expenditures are often partially funded from federal and/or state grants and loans.

### *Operating Expenditures*

The municipality that operates the airport reports expenditures to the Minnesota State Auditor. This information is publically available. University of Minnesota researchers made a request to the State Auditor for this information. The State Auditor provided the researchers with 2007 public airport expenditures. These expenditures were entered into the IMPLAN model as a final demand change in the Scenic and Sightseeing Transportation and Support Activities for Transportation. Despite its misleading name, this category includes "Airports, civil, operation and maintenance", as well as many activities that occur on airports in Minnesota, such as hangar rentals, aircraft maintenance, and runway maintenance.

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<sup>1</sup> Privately owned landing strips do exist. A very small number of these are open to general aviation and are included in this study. Most privately-owned strips are exclusively for the owner's use and therefore are not included in this study.

According to the State Auditor data, in 2007, municipalities spent \$20,826,588 to operate their airports.<sup>2</sup> This is the direct output impact of operating airports. In order to generate these expenditures, IMPLAN estimates that 228 individuals were employed at a cost of \$14.9 million in labor income. These figures are shown at the direct impacts in Table 1.

**Table 1: Economic Impact of Airport Operations in Minnesota: 2007**

Direct		Indirect	Induced	Total
Output	\$20,826,588	\$2,083,860	\$14,951,169	\$37,861,617
Employment	228	18	116	362
Labor Income	\$14,940,831	\$890,046	\$4,793,168	\$20,624,044
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

As a result of expenditures to operate airports, another \$17,035,029 of output is created, primarily through the spending of employees. Airport daily operations are more highly labor intensive and require more in terms of employee time than they do in capital. Thus, the total economic impact of operating airports is \$37.9 million. The spending also increases employment. Total employment generated in the state due to operating the airports is 362. These 362 individuals received \$20.6 million in labor income.

#### *Construction and Investment Expenditures*

Many of the dollars used for airport construction and improvement projects come from the federal and state government. This money is dispersed by the Minnesota Department of Transportation which keeps records. The University of Minnesota made a request to the Department of Transportation for these records. Data on federal and state expenditures for construction in 2008 were provided to the University, along with data on state and federal contributions to the maintenance and operation of public airports. This information was then entered into the appropriate IMPLAN categories to determine the total economic impact of airport construction and investment activity in Minnesota.

As shown in Table 2, the state and federal government contributed nearly \$45 million to airport construction and investment activities in Minnesota in 2008. As these projects were completed, ripples were created in the economy as construction materials were purchased and workers spent their paychecks. The total economic impact of airport-related construction projects was \$85 million. To complete these projects, 295 people were employed. As a result of the ripple effect, a total of 577 jobs were created in the Minnesota economy as a result of airport construction and improvement projects. These employees were paid nearly \$30 million in labor income.

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<sup>2</sup> This does not include expenditures for Minneapolis-St. Paul International, Duluth International, or Rochester International.

**Table 2: Economic Impact of Airport Construction and Investment in Minnesota: 2008**

Direct		Indirect	Induced	Total
Output	\$44,746,618	\$18,983,025	\$21,716,654	\$85,446,297
Employment	295	114	168	577
Labor Income	\$16,336,877	\$6,686,032	\$6,963,583	\$29,986,492
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

**Fixed Based Operators**

Most airports in Minnesota are home to at least one FBO. FBOs provide basic services to general aviation aircraft. This may be as simple as fuel service, but it can include activities like aircraft maintenance, hangar rentals, tie down service, and navigation equipment sales and maintenance. FBOs also often provide flight lessons and pilot training.

FBOs clearly provide an economic impact that is directly tied to the airport itself. Since their services are focused on airplanes, the lack of an airport would mean the end of the business. In order to measure the economic impact of FBOs a survey of all registered FBOs and flight schools was conducted. On November 6, 2009, an email invitation was sent to a list of 90 FBOs and flight schools. The list was provided to the University of Minnesota by the Minnesota Department of Transportation Aeronautics. Seven of those email invitations were returned due to bad email addresses. Thus, 83 invitations were delivered. There were 40 useable responses; therefore the response rate was 47 percent.

On average, a Minnesota FBO operates 3 aircraft and employs 6 people (4 full-time and 2 part-time). The average FBO reported spending \$465,963 to operate in 2009. According to Mn/DOT records, there are 118 FBOs in Minnesota. Therefore, it is estimated that Minnesota FBOs spent \$54,983,634 in 2009.

These expenditures of \$54,983,634 were entered into IMPLAN as a final demand change in the Scenic and Sightseeing Transportation and Support Activities for Transportation industry. At an average of 6 employees per FBO, total employment for the 118 FBOs is estimated at 708.

**Table 3: Economic Impact of Flight Based Operators in Minnesota 2009**

Direct		Indirect	Induced	Total
Output \$54,983,634		\$5,411,600	\$38,826,868	\$99,222,102
Employment 708		48	300	1,056
Labor Income	\$38,800,028	\$2,311,370	\$12,447,439	\$53,558,837
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

Due to spending by FBOs, total output in the Minnesota economy was increased by \$99 million in 2009. A total of 1,055 jobs were created in the workforce and these employees were paid a total of nearly \$54 million in labor income.

## Commercial Scheduled Air Service

Commercial scheduled air service is available at nine airports in Minnesota. Those airports are: Minneapolis-St. Paul International, Duluth International, Rochester International, St. Cloud Regional, Brainerd Lakes International, Bemidji Regional, Range Regional (Chisholm/Hibbing), Falls International, and Thief River Falls Regional.<sup>3</sup> This part of the study focuses on small and medium sized airports, so Minneapolis-St. Paul International, Duluth International, and Rochester International are not included in the following discussion.

To determine the economic impact of commercial air service, airport managers from each of the covered airports were surveyed. The managers were asked to report how many people on average arrived at the airport via commercial carriers. They were then asked to estimate how many of these people were local versus visitors. Using data from previous tourism research (Davidson-Peterson Associates 2008) conducted by the University of Minnesota, an average expenditure per person was calculated. Those who traveled to airports in Northeastern Minnesota were estimated to spend \$261 per day during their visit while those who traveled to airports in Northwestern or Central Minnesota were estimated to spend \$280 per day during their visit. These expenditures were broken into categories: lodging, transportation, food, shopping, and recreation. These spending profiles were applied to the number of visitors per airport.

The six covered airports reported 2,260 visitors during the year. The number of visitors per airport was multiplied by the average length of visit, also obtained from previous tourism research, to determine the number of person days. Total person days for the six airports equaled 9,229. In sum, these visitors spent \$2.5 million in the state while visiting.

Of this \$2.5 million, a significant portion was spent on retail items and on gasoline purchases. Retail and gas purchases must be margined in the impact analysis. The process of margining involves assigning a dollar value to all the individual components of a retail sale. When a person makes a retail purchase, they pay a price that includes the raw cost of the item, along with a mark-up for the retailer and a cost for transportation and storage of the product. Typically, the item is not produced locally, so the only portion of the spending that benefits the local economy is the mark-up to the retailer and perhaps a portion of the transportation and storage expenditure. The input-output modeling software used for this analysis has an average breakdown for each of these components and thereby performs margining calculations.

After margining, visitors arriving on commercial scheduled flights spent \$1.7 million on local goods and services in 2009. This created \$3.3 million in economic activity in the state, 36 jobs and \$1.1 million in labor income. These figures are highlighted in Table 4.

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<sup>3</sup> In 2009, commercial air service to St. Cloud was terminated. Since air service was provided for most of the year, St. Cloud Regional will be included in the analysis.

**Table 4: Economic Impact of Visitors Using Commercial Scheduled Air: 2009**

Direct		Indirect	Induced	Total
Output	\$1,710,829	\$784,717	\$830,024	\$3,325,570
Employment	25	5	6	36
Labor Income	\$627,091	\$254,576	\$266,238	\$1,147,905
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

Commercial scheduled air service also has an economic impact on the state via the Transportation Security Administration (TSA) employees who work at each airport that has scheduled air service. These employees earn salaries that they then spend in the local economy, generating an economic impact. The Transportation Security Administration provided University of Minnesota researchers with the number of full-time equivalent employees at each of the five airports with commercial scheduled air service. There are a total of 29 full-time equivalent TSA employees at those five airports. The average weekly wage for northern Minnesota was \$700 in 2009. Adding a benefit package worth 30 percent of the wage, it is estimated the average TSA employee makes \$47,320 a year. Thus, the total earnings for TSA employees at these airports in 2009 is estimated to be \$1,372,280.

**Table 5: Economic Impact of Spending of Labor Income of Transportation Security Administration Employees: 2009**

Direct		Indirect	Induced	Total
Output	\$1,372,280	\$0	\$1,553,747	\$2,926,027
Employment	29	0	12	41
Labor Income	\$343,070	\$0	\$498,783	\$841,853
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

These earnings are the direct output effect in Table 5. Since the direct impact was in terms of income, the impact of TSA spending was run as a change in household income, therefore, there are no indirect effects. Spending of salaries by TSA employees results in an increase in output of \$2.9 million, 41 jobs, and \$841,853 in labor income.

### General Aviation

General aviation air traffic makes up a significant percentage of the air traffic at small and medium sized airports in Minnesota. Many airplane enthusiasts own planes and store them in hangars on the airport property. A nice warm, sunny spring day can bring the skies alive with the sounds of pilots enjoying the open skies. These pilots generate economic activity as they travel to different parts of the state and stay to spend their tourism dollars. As part of the airport managers' survey, managers were asked to estimate how many general aviation planes land at their airport in an average week and what percent of these visitors are non-local or visitors to the region.

On average, airport managers estimate that 40 planes land per week at their airports.<sup>4</sup> Thus, a total of 276,640 general aviation landings occur in an average year in Minnesota. Of these, forty-five percent are non-local pilots and passengers. Using previously generated tourism statistics (Davidson-Peterson Associates 2008), it is estimated that 17 percent of those visitors stay overnight and for an average of 3.4 nights. The remaining 83 percent are day visitors only. According to that same research, the average person staying overnight spends \$310 per day and the average day visitor spends \$267. These averages were applied to a tourism spending profile and entered into the IMPLAN model as the direct expenditure by tourism.

After margining for retail sales, direct expenditures by general aviation tourism was estimated to be \$32.4 million in 2009. Businesses making sales directly to general aviation visitors employed 587 individuals to provide these sales. As a result of this spending circulating through the economy, general aviation tourism had a total economic impact of \$66 million, created 824 jobs and \$25.9 million in labor income in 2009.

**Table 6: Economic Impact of General Aviation Tourism: 2009**

Direct		Indirect	Induced	Total
Output	\$32,377,399	\$14,961,760	\$18,705,177	\$66,044,336
Employment	587	92	144	823
Labor Income	\$15,034,946	\$4,834,232	\$5,999,882	\$25,869,060
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

This analysis focuses on spending by general aviation pilots and passengers on travel and tourism. It does not include an accounting for spending by general aviation enthusiasts on the upkeep and maintenance of their planes. To the extent that the supplies these plane owners use are purchased from an FBO or other on-airport businesses, then the economic impact of that spending is included in this study. However, purchases for items on-line or through catalogs are not included.

### Government Operations

There are several kinds of governmental operations that utilize small and medium sized airports in Minnesota. The largest and most visible is the Air National Guard which has personnel and aircraft at both Holman Field in downtown St. Paul and at St. Cloud. There are other operations however. For example, many government agencies (e.g. US Forest Service) use an airport as a base for work (e.g. fire fighting). Some state agencies use airplanes for expedited transportation around the state.

In measuring the economic impact of government operations, two procedures were used. First, data from the airport managers' survey indicated the percentage of general aviation airports that host government operations. The average spending profile of an FBO was applied to the total estimated number of government operations to derive total spending by those operations. Second, the Air National Guard was asked to participate in the survey. Survey results from them

<sup>4</sup> This represents a significant range – some airports reported as few as 3 planes per week while others reported as high as 1,100 per week.

were used to estimate their total economic impact. These two estimates were then summed to get total spending by governmental entities with aviation-related operations.

Government operations at small and medium sized airports in Minnesota expended almost \$17 million in 2009. They employed 230 employees to create this output. As a result, total economic output in Minnesota increased by \$32.7 million, employment by 327 jobs, and labor income by \$15.9 million.<sup>5</sup>

**Table 7: Economic Impact of Government Operations: 2009**

Direct		Indirect	Induced	Total
Output	\$16,952,537	\$1,898,845	\$13,845,124	\$32,696,506
Employment	230	12	85	327
Labor Income	\$11,706,150	\$635,869	\$3,527,384	\$15,869,403
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

### Retail Businesses

A few of Minnesota small and medium airports host retail businesses at the airport. In many cases, the businesses are aviation-related, such as car rental outlets, travel agencies, or avionic retailers, but in a few cases the retail businesses serve the general public (restaurants, etc).

The measure of the economic impact of retail businesses at Minnesota airports is based on the survey of airport managers. Airport managers were asked to report if they had retail businesses that do not directly service airplanes located at their airport. If they responded yes, they were further asked how many people these businesses employed. A quarter of all responding airports indicated they had a retail business located on the airport property. There are 133 small and medium sized airports in Minnesota; therefore, 33 airports are home to retail businesses. Based on survey results, there are 2 employees per business, for a total of 66 retail employees at airports in Minnesota. This is the basis for the direct impact of retail businesses shown in Table 8.

**Table 8: Economic Impact of Retail Businesses at Airports: 2009**

Direct		Indirect	Induced	Total
Output	\$3,866,596	\$1,401,595	\$2,034,360	\$7,302,551
Employment	66	9	16	91
Labor Income	\$1,701,955	\$462,535	\$652,721	\$2,817,211
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

Spending by airport-based retail businesses created a total of \$7.3 million in economic impact in 2009. In addition, 91 jobs were created that paid a total of \$2.8 million in labor income.

<sup>5</sup> Employment here is in full-time equivalents. The Air National Guard has a significant number of part-time employees.

## Freight Transport

A few local companies use airports to transport light and valuable products to market. These businesses use the nearest airport because it is convenient and easy to access. To measure the economic impact of freight transport in Minnesota, this study examines the economic impact of the next best alternative for these companies. In other words, if the closest airport closes, where is the next closest airport of similar size and service that the business could access? It is assumed that service to these businesses is provided by an FBO or other private company, so the economic impact of these operations is equivalent to the savings companies achieve by using freight transport.

Total savings accumulated by companies using freight transport was calculated using results of the airport managers' survey. Airport managers were asked if their airport hosted freight transportation, how many freight flights went out per week, and the distance to the nearest airport of a similar size and service. Based on these responses, and using a cost savings of \$0.50 per mile (based on federal reimbursement rates), it is estimated that freight operations save \$374,400 per year by using the closest airport. This is the direct impact shown in Table 9 below.

Due to savings by companies shipping freight by air, total economic output in Minnesota increased by \$700,000, 5 additional persons were employed, and \$250,000 in labor income was generated in Minnesota in 2009.

**Table 9: Economic Impact of Freight Transport at Airports: 2009**

Direct		Indirect	Induced	Total
Output	\$374,400	\$144,113	\$184,845	\$703,358
Employment	3	1	1	5
Labor Income	\$143,140	\$52,543	\$59,257	\$254,940
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

These estimates do not include an accounting for the economic output of the manufacturer or business itself, only the value of shipping. A strong argument could be made that certain businesses would not be able to locate where they are if not for the availability of air freight transport. In that case, the output of those companies would be part of the economic impact of airports. However, this question was not researched in this work.

## Corporate Flight Departments

Many Minnesota corporations maintain their own flight departments at Minnesota airports. They typically own 1 to 2 planes, employ a couple of pilots, and have one or two mechanics on staff. The planes are used to transport corporate managers around the state and the nation, typically from corporate headquarters to plants. Schwans, Hormel, Marvin Windows, and 3M are just a few Minnesota corporations with their own flight departments.

In order to determine the economic impact of these flight departments, a survey of corporate flight departments was conducted. The format of this survey was exactly the same as the survey given to the FBOs. Six corporate flight departments were contacted to complete the survey and

four complied. The averages from these surveys were used to determine the direct impact shown in Table 10. The number of corporate flight departments was taken from the survey of airport managers and from a separate interview with airport managers at the Metropolitan Airports Commission (MAC) reliever airports. On average, each non-MAC airport hosts 2 corporate planes and the corporation expends \$155,000 annually to operate the plane. In addition, an estimated 150 corporate planes are located at the MAC reliever airports, also expending \$155,000 to operate a plane.

**Table 10: Economic Impact of Corporate Flight Departments at Airports: 2009**

Direct		Indirect	Induced	Total
Output	\$56,778,312	\$18,099,420	\$23,591,734	\$98,469,466
Employment	167	92	182	441
Labor Income	\$20,417,490	\$4,683,522	\$7,569,375	\$32,670,387
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

In 2009, corporations spent \$56.8 million to operate their planes in Minnesota, hired 167 individuals, and paid them \$20.4 million in labor income. As a result, the total economy of Minnesota increased by \$98.5 million including 441 jobs and \$32.7 million in labor income.

### Other Activities

The previous sections of this report have highlighted eight major activities at Minnesota airports that generate an economic impact in the State of Minnesota. These activities comprise the vast majority of activities at airports, but are not comprehensive. Some airports have unique activities that were not reported or were not included, for various reasons, in this report. For example, the authors acknowledge at least one small to medium sized airport in Minnesota that has a large manufacturer located on the airport grounds. The manufacturer’s main product line is aviation-related.

The economic impact of these “other activities” will not be calculated in this report. Since the number of these unique operations is very small, the economic impact they create will fall within the estimated error of this report. Further, collecting and reporting data on single operations presents a challenge as confidentiality cannot be maintained. Finally, it is believed these unique operations are not pervasive across all airports in Minnesota. Over 50 airports were visited in formatting the calculator and determining the economic impact and few instances of these operations were discovered. However the impact of these “other activities” is calculated in the economic impact calculator for each individual airport that reports it has “other activities”

### Total Economic Impact of Small and Medium Sized Airports

In total, Minnesota small and medium sized airports created \$434 million in output in the state in 2009 including 3,758 jobs and \$184 million in labor income. This impact was created from expenditures by eight airport-based activities including: public airport operations and capital investments, fixed based operators (FBOs), commercial scheduled air service, retail businesses, general aviation, freight operators, private corporations with flight departments, non-profit and

government entities. These airport-based activities spent \$234 million in 2009, employed 2,337 individuals, and paid them \$120 million in labor income.

**Table 11: Economic Impact of Small and Medium Sized Airports in Minnesota: 2009**

Direct		Indirect	Induced	Total
Output	\$233,989,193	\$63,768,965	\$136,239,702	\$433,997,855
Employment	2,337	392	1,029	3,758
Labor Income	\$120,051,578	\$20,810,725	\$42,777,830	\$183,640,129
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

### Economic Impact of Large Airports in Minnesota

Primary data collection for this report focused on small and medium sized airports in Minnesota. Minneapolis-St. Paul International, Rochester International, and Duluth International were not included in the previous analysis. All of these airports have, at different times, conducted their own economic impact studies. Those studies and their results will be highlighted here.

#### *Minneapolis-St. Paul International Airport*

In 2005, John C. Martin Associates LLC published “The Local and Regional Economic Impacts of the Minneapolis-St. Paul International Airport”. Results from this study are shown in Table 12. While input-output methodology was used in this study, it did not follow the same overall outline as this study. In the published study, data for the direct, indirect and induced output effects was not included.

**Table 12: Economic Impact of Minneapolis-St. Paul International Airport: 2005**

Direct		Indirect	Induced	Total
Output	Not Available	Not Available	Not Available	\$10,688,700,000
Employment	89,061	15,837	48,478	153,376
Labor Income	\$2,444,500,000	\$534,300,000	\$2,986,100,000	\$5,964,900,000
Estimates by John C. Martin Associates LLC.				

#### *Duluth International Airport*

In 2007, the Minnesota Department of Employment and Economic Development (DEED) conducted a brief analysis of the economic impact of Duluth International Airport. The study was “limited in scope and is not as detailed as a comprehensive analysis” (Adiarde 2007). The study did not follow as detailed a format for determining the economic impact as this study does. The results of this economic impact are shown in Table 13.

**Table 13: Economic Impact of Duluth International Airport: 2007**

Direct		Indirect	Induced	Total
Output	\$599,100,000	\$146,800,000	\$114,200,000	\$860,100,000
Employment	2,309	954	1,171	4,434
Labor Income	\$132,600,000	\$40,400,000	\$34,600,000	\$207,600,000
Estimates by Minnesota Department of Employment and Economic Development.				

*Rochester International Airport*

In 2009, RS&H in conjunction with McGhie & Betts, Inc. conducted a study of the economic impact of Rochester International airport. The study focused on the economic impacts from businesses, tenants, and users of the airport. This study did include a measure of the economic impact of spending by visitors that arrive via the airport. The results of this economic impact study are shown in Table 14. In this study, the published results included only the total economic effects and did not include a breakdown of direct, indirect, and induced effects.

**Table 14: Economic Impact of Rochester International Airport: 2007**

Direct		Indirect	Induced	Total
Output	Not Available	Not Available	Not Available	\$161,500,000
Employment	Not Available	Not Available	Not Available	2,911
Labor Income	Not Available	Not Available	Not Available	\$73,300,000
Estimates by RS&H and McGhie & Betts, Inc.				

*Construction Expenditures*

As mentioned earlier, the above referenced airport studies do not follow the same methodology as this study. After careful review, it is clear that the independent studies do not include an accounting of public expenditures for construction projects. Therefore, the economic impact of construction projects at large airports is included here.

In 2008, the federal and state governments expended \$32.5 million on construction projects at large airports in Minnesota (Table 15). The model estimates that to complete this level of construction, 212 individuals were employed and they were paid \$11.6 million in labor income. As a result of this spending, a total of \$62.8 million in economic activity was generated in the state, including 422 jobs and \$21.9 million in labor income.

**Table 15: Economic Impact of Large Airport Construction Expenditures: 2008**

Direct		Indirect	Induced	Total
Output	\$32,467,929	\$14,515,253	\$15,831,408	\$62,814,590
Employment	212	88	122	422
Labor Income	\$11,643,478	\$5,133,147	\$5,076,078	\$21,852,702
Estimates by University of Minnesota Extension Center for Community Vitality. Includes MSP, Rochester and Duluth.				

## Total Economic Impact of Minnesota Airports

Table 16 shows the total economic impact of Minnesota small- and medium-sized airports in 2009. As a result of direct spending by the eight measured airport-based activities, small and medium sized airports created \$434 million in output including 3,758 jobs and \$184 million in labor income in 2009. This information is the summary of a University of Minnesota research project that collected primary data from airport managers, FBOs, corporate flight departments, and government operations.

**Table 16: Economic Impact of Medium and Small Airports in Minnesota: 2009**

Direct		Indirect	Induced	Total
Output	\$233,989,193	\$63,768,965	\$136,239,702	\$433,997,855
Employment	2,337	392	1,029	3,758
Labor Income	\$120,051,578	\$20,810,725	\$42,777,830	\$183,640,129
Estimates by University of Minnesota Extension Center for Community Vitality. Does not include MSP, Rochester or Duluth.				

Table 17 summarizes the total economic impacts of Minnesota largest three airports: Minneapolis-St. Paul International, Rochester International, and Duluth International. These results are drawn from previous research conducted on behalf of the airports and from our analysis of construction expenditures at those airports. As a result of direct spending by airport-based activities, large airports in Minnesota created \$11.8 billion in economic output, including 161,142 jobs, and \$6.3 billion in labor income.

**Table 17: Economic Impact of Large Airports in Minnesota: 2009**

Direct		Indirect	Induced	Total
Output	N/A	N/A	N/A	\$11,773,114,590
Employment	N/A	N/A	N/A	161,142
Labor Income	N/A	N/A	N/A	\$6,267,652,702
Estimates by Minnesota Department of Employment and Economic Development , RS&H, McGhie & Betts, Inc. and John C. Martin Associates LLC				

Finally, Table 18 highlights the total economic impact of airports in Minnesota. These values are the summation of the medium and small sized airport economic impact (as calculated by the University of Minnesota) and the large airport economic impact (as calculated by other researchers).

In 2009, Minnesota airports contributed \$12.2 billion to the state's economy, including 164,900 jobs and \$6.5 billion in labor income.

**Table 18: Economic Impact of Airports in Minnesota: 2009**

Direct		Indirect	Induced	Total
Output	N/A	N/A	N/A	\$12,207,112,445
Employment	N/A	N/A	N/A	164,900
Labor Income	N/A	N/A	N/A	\$ 6,451,292,831
Estimates by University of Minnesota Extension Center for Community Vitality, Minnesota Department of Employment and Economic Development , RS&H, McGhie & Betts, Inc. and John C. Martin Associates LLC				

## **Chapter 4. Conclusions and Discussion**

Airports contribute significantly to Minnesota's economy. In 2009, airport activities added \$12.2 billion to the state's total output, contributed 164,900 jobs, and paid \$6.5 billion in labor income. The three largest airports, Minneapolis-St. Paul International, Duluth International, and Rochester International, clearly account for a large portion of that economic output and employment. However, small and medium sized airports have a significant economic impact of their own in out-state Minnesota. Small and medium sized airports generated \$434 million in output, 3,758 jobs, and paid \$184 million in labor income.

These are the highlights of a statewide study of the economic impact of airports. For individual airport managers and other interested parties, an updated airport economic impact calculator now exists that allows the user to enter data and information specific to an airport. The calculator will then return the economic impact of that airport. The calculator is now better suited to handle large, unique airport activities and uses newer, more accurate economic impact data.

The above paragraphs highlight the results of a nearly one-year effort to update the Web-based airport economic impact calculator and to measure the total economic impact of Minnesota airports. The process involved visits to airports, attendance at aviation-related conferences, surveying of FBOs, airport managers, corporate flight departments, and the Air National Guard. Data and information were collected on eight airport activities including: operations of the airport itself, FBOs, commercially scheduled flight service, general aviation, retail businesses, freight transfer operations, corporate flight departments, and government operations.

The project has been successfully completed following rigorous academic standards. The airport economic impact calculator has been updated and is hereby ready for the continued use of airport officials. The total economic impact of Minnesota airports has also been calculated.

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## **Appendix A. Survey Instruments**

## Airport Manager's Survey – September 2009

1. What county is your airport located in? -or- What is the name of your airport?
2. What were/will be total public expenditures for operation and maintenance of your airport in 2009? Do NOT include spending on capital improvements.
3. Do you have commercial and/or corporate businesses located at your airport?
  - a. If yes, please list them plus an estimated number of planes
4. In an average week, how many general aviation planes land at your airport?
  - a. What percent of these landings are planes that are not locally-owned?
  - b. What percent of the non-locally owned plane passengers spend a minimum of one-night in your area?
5. Do you have retail businesses located at your airport?
  - a. If yes, list total employment for each establishment.
6. Do you have commercial scheduled air service at your airport?
  - a. If yes, please list the total number of enplanements per month and the percent of passengers that are local.
7. Do you have government operations located at your airport (such as the National Guard?)
  - a. If yes, please list the number of planes and total number of employees.
8. Do you have a business that ship freight located at your airport?
  - a. If yes, please list the number of flights per week and distance to nearest airport with similar facilities.

FBO and Corporate/Commercial Airport Businesses Survey  
September 2009

1. How many aircraft do you currently own and/or operate?
2. How many full-time annual employees do you have?
3. How many full-time seasonal employees do you have?
4. How many part-time employees do you have?
5. What were/will be your total expenditures for your aviation business in 2009?
6. Please check the types of activities your business was active in during 2009.

Aircraft maintenance	Management Services
Fuel and Ramp Services	Pilot Supplies
Rental Services	Manufacturing
Charter Flights	Other
Flight School	