Chapter Eight: Commercial Airport Economic Impacts

INTRODUCTION

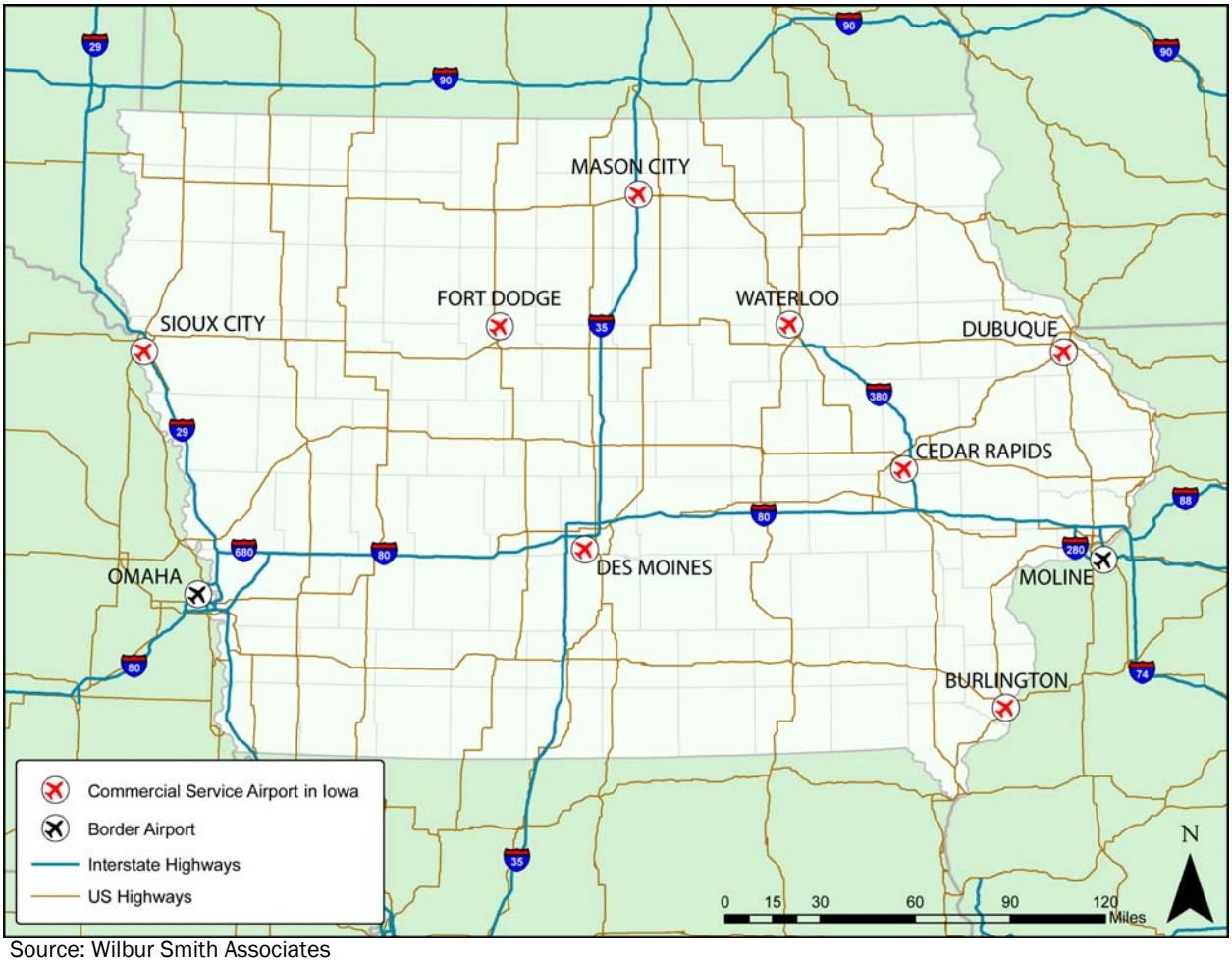
This report highlights the important economic contributions that Iowa realizes from commercial airports by quantifying employment, annual payroll, and total annual economic activity associated with commercial airports serving Iowa. The analysis considers the annual economic benefits associated with airport operations, construction, the military, visitors who arrive via commercial airlines, and visitors who arrive on privately owned general aviation aircraft.

The airline travel needs of Iowa residents, businesses, and visitors are met not only by the eight commercial airports in Iowa but also, to varying degrees, by the Border Airports and Outlying Hub Airports considered in this study. As a result of their close geographic proximity, Iowa accrues economic benefits from the operation of Eppley Airfield in Omaha and the Quad City International Airport in Moline. The benefits to Iowa derived from the Border Airports include the jobs and associated payroll they provide to Iowa residents. In addition, the Border Airports provide access to visitors arriving via air but are doing business in or staying in Iowa. **Exhibit 8-1** depicts the eight commercial airports in Iowa and the two Border Airports considered in the economic impact analysis.

The airports considered in this analysis provide Iowa with the following economic value:

- They support 14,209 jobs,
- These jobs have an annual payroll estimated at $515.0 million, and
- The airports are responsible for total annual economic activity or output totaling over $1.3 billion

Exhibit 8-1
Commercial Airports Considered In Economic Impact Analysis



Source: Wilbur Smith Associates

Quantitative modeling efforts were used to estimate impacts that occur as a result of on-airport activities (airlines, fixed base operators, flight schools, corporate flight departments, the military, government, capital improvement projects, and various other businesses), as well as from the expenditures of visitors who arrive via general aviation and commercial aircraft at the commercial airports. On-airport impacts and visitor expenditures, in turn, support additional economic activity in Iowa. These additional spin-off impacts, derived from airports and their operation, were measured using sector-specific employment, payroll, and output multipliers.

Using surveys, telephone interviews, airport visits, and accepted economic modeling procedures, this analysis quantified the annual economic benefit associated with the commercial airports. This process produced estimates of current annual output, payroll, and employment attributable to the commercial airports.

Remaining sections of this report discuss the methodology that was used to estimate total annual economic impacts associated with each of the airports shown in Exhibit 8-1. Also discussed are various data gathering efforts that were employed to support the economic modeling process. Economic impacts associated with airport operations, on-airport activities, and impacts stemming from visitor-related spending are documented for each of the commercial airports in **Table 8-1.** More information on the economic impact of each of the commercial airports in Iowa is presented in **Appendix C**.

Table 8-1
Iowa Total Economic Impact by Airport

Airport	Associated City	Total Employment*	Total Payroll	Total Output
Southeast Iowa Regional Airport	Burlington	114	$3,342,600	$10,417,100
The Eastern Iowa Airport	Cedar Rapids	2,695	$94,716,000	$223,983,500
Des Moines International Airport	Des Moines	5,476	$200,616,200	$522,440,100
Dubuque Regional Airport	Dubuque	383	$13,272,000	$34,386,200
Fort Dodge Regional Airport	Fort Dodge	279	$11,236,000	$36,185,000
Mason City Municipal Airport	Mason City	140	$4,668,800	$11,344,600
Sioux Gateway Airport	Sioux City	1,570	$64,039,700	$218,603,500
Waterloo Regional Airport	Waterloo	533	$14,723,100	$64,267,000
Iowa Subtotal		**11,190**	**$406,614,400**	**$1,121,627,000**
Quad City International Airport **	Moline	1,280	$46,546,300	$108,393,800
Eppley Airfield **	Omaha	1,739	$61,809,000	$106,894,000
Border Airport Subtotal**		**3,019**	**$108,355,300**	**$215,287,800**
Totals		**14,209**	**$514,969,700**	**$1,336,914,800**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Notes: *Full-time equivalent; ** Includes only the benefits of these airports realized in Iowa.

STUDY APPROACH

The total economic impact of each commercial airport in this analysis is quantified in terms of employment, payroll, and output. Output represents total economic activity or spending. It represents the total value of aviation-related activities supported by the commercial airports included in this analysis. This report presents the economic impact of the commercial airports in terms of three aviation-dependent groups:

- Airport operations and on-airport activities
- Visitors traveling to Iowa via commercial airlines
- Visitors traveling to/within Iowa via general aviation aircraft

Airport operations and on-airport activities, as well as Iowa visitors, are responsible for a significant percentage of the economic activity or benefit associated with the commercial airports. Through a separate non-aviation business survey, this analysis also identified the importance of aviation to non-

aviation employers throughout the State. In addition to the quantitative benefits of aviation, this report also discusses qualitative benefits that commercial airports support.

The Economic Modeling Process

All economic impacts or benefits of the 10 commercial airports considered in this analysis were calculated using an input-output model. The input-output model considers three impact categories to assess the economic benefits associated with on-airport activities, commercial service visitors, and general aviation visitors arriving at the commercial airports. These categories are:

1. Direct and Indirect Impacts

   Direct impacts are benefits that are associated with government agencies or businesses located on an airport. These airport tenants are directly related to the provision of aviation services. Direct impacts include the employment, payroll, and output related to entities such as airlines, concessionaires, rental car operators, food and beverage providers, government agencies, flight schools, fixed based operators (FBOs), and others. Benefits stemming from capital improvement projects are also measured in the direct impact category.

   Indirect impacts are usually realized off-airport. These impacts are typically attributed to visitor spending. Visitor spending indirectly supports jobs and provides wages and benefits. Industries most commonly supported by visitor spending are concentrated in the service sector and include hotels/motels, restaurants, transportation, retail, and entertainment.

2. Induced Impacts

   Induced impacts are those benefits that are the result of the recirculation of direct and indirect impacts within the economy. Recirculation of direct and indirect impacts within an economy is frequently referred to as the multiplier effect. For example, as an airport employee spends his or her salary for housing, food, or services, that spending circulates through the economy and leads to increases in associated spending, payroll, and employment in Iowa.

   For each wave of spending beyond the first round, a portion of the re-spending takes place outside the economic area being modeled (in this case, the State of Iowa). Employment, payroll, and spending that take place outside Iowa is considered economic leakage, and is, therefore, not reflected in the statewide multipliers.

3. Total Impacts

   Total impacts are the sum of direct, indirect, and induced economic impacts.

Because induced impacts are not as easily measured as direct and indirect impacts, a reliable method for estimating induced impacts must be employed. A leading method used to estimate induced impacts is an input-output model.

The Impact Analysis for Planning (IMPLAN) input/output model was used to measure the multiplier effect and to quantify induced impacts. An input-output model, in its most basic form, is a linear model that estimates purchases and sales between various sectors of the economy. This modeling process is considered to be one of the leading methods available for estimating the total economic

impact of an industry (in this case, commercial airports). The U.S. Forest Service in cooperation with several other government agencies initially developed the IMPLAN system. It is now considered one of the standard methods for evaluating the economic contribution of public facilities.

The IMPLAN model contains a large economic database that is used to generate input-output tables. It includes data from sources such as Dunn and Bradstreet, the U.S. Department of Commerce, and the U.S. Census Bureau. IMPLAN multipliers and data tables specific to Iowa's industrial sectors were obtained and used in this analysis. The IMPLAN input-output model used for this analysis requires impact estimates for three separate components of the economy. These categories are:

1. Employment
   Employment is based on full-time equivalent (FTE) positions. In this analysis, two part-time positions are the equivalent of one full-time (FTE) position.

2. Payroll
   Payroll represents the annual wages and benefits paid to all workers.

3. Output (Spending)
   Output for on-airport activities is typically assumed to be the sum of annual gross sales and average annual capital expenditures. While this assumption works well for profit-oriented tenants, it must be modified for government tenants, airlines, and visitor impacts as it relates to output. Government entities typically do not generate sales. While airlines do generate sales, ticket revenue is usually transferred outside the area being modeled. In order to estimate the impact of these two important tenant-related activities, government, and airline output is equated to the sum of payroll, operating expenditures, and average annual capital improvement outlays. For visitors using an airport, output is assumed to equal visitor spending.

It is important to note that payroll and output cannot be combined because elements of economic benefit related to payroll are also contained, to some extent, in the output estimate. Each of the three impact components (employment, payroll, and output) stands alone as a measure of an airport's total economic impact.

Data Requirements for the Economic Modeling Process

A number of data collection efforts were undertaken to gather information related to economic activity occurring at the commercial airports considered in this analysis. These data were inputs to the modeling process to identify total economic impact. The following groups were considered to obtain data to estimate direct and indirect impacts:

1. Airport Operations
   This group includes airport tenants or businesses with employees, such as airlines, fixed-base operators (FBOs), flight schools, concessionaires, airport restaurants, and governmental agencies. Governmental agencies include public airport sponsors, Federal Aviation Administration (FAA), Transportation Security Administration, (TSA), as well as various other State and Federal agencies.

2. Commercial Service Visitors
   This group includes estimated non-local passengers (visitors) arriving via commercial airlines. Average visitor spending for this group was estimated from passenger surveys conducted for this analysis.

3. General Aviation Visitors
   Impacts from general aviation visitors are produced by non-local passengers arriving via private or business aircraft. General aviation visitors are associated with that portion of each airport's itinerant general aviation operations that are transient (or visiting) in nature. Itinerant operations are those that leave the airport's local airspace. Some itinerant operations at an airport are attributable to residents of the airport's market area who fly their planes to more distant locations. The remaining itinerant operations are attributed to visitors. Itinerant operations performed by visitors are considered transient operations. Impacts for this group were identified through industry averages. Actual survey data from transient general aviation passengers in Utah, Nebraska, Arkansas, Maine, and Pennsylvania were used to estimate how much general aviation visitors spend in Iowa per trip.

4. Construction Impacts
   Each year, nearly all airports undertake capital improvement projects (CIP), such as runway rehabilitation or terminal improvements. In addition, businesses and other agencies undertake capital improvement projects. These projects employ persons in jobs such as construction, architecture, engineering, and consulting. For this analysis, construction impacts are included in the direct impact category. The methodology to estimate construction impacts is discussed below.

Direct and indirect economic impacts presented in this analysis were estimated primarily through surveys undertaken specifically to support this study. IMPLAN multipliers were then applied to direct and indirect impacts to estimate subsequent induced economic impacts.

SURVEYS AND DATA COLLECTION METHODS

Direct and indirect impacts for airport operations, on-airport government agencies, commercial service visitors, and general aviation visitors were identified primarily through survey efforts. Airport managers were surveyed to gather data related to airport operations and construction projects undertaken by each airport in recent years.

The methods used to collect information from each group considered in this analysis are discussed in the following sections.

Airport Operations and On-Airport Activities

Airport managers were contacted to provide names, mailing addresses, and telephone numbers for each aviation-related airport entity or business that operates at their airport. Surveys were sent directly to each. Follow-up calls were made to on-airport entities and businesses to ensure responses and to verify information on returned surveys. In-person site visits were made with non-responding operators. Additional survey responses were collected as a result of these on-site visits.

Airport operators at each airport were grouped into categories to aid in data interpolation; these categories include:

- Air Cargo Companies
- Concessionaires
- Corporate Flight Departments
- FBO/Flight Instruction/Aircraft Maintenance/Air Taxi
- Local/State/Federal Government (this category includes airport management, city/county personnel, etc.)
- Passenger Airlines

The survey sent to each on-airport business, including airport managers, requested the following information:

- Type of aviation activity conducted
- Number of full-time and part-time employees employed by their business on the airport in 2006
- Total annual wages and benefits paid to their on-airport employees in 2006
- Amount paid by the business for property taxes in 2006
- Total capital improvement expenditures (construction projects) by the business on the airport for each year, from 2003 through 2006
- Total operating expenses for the business at the airport (excluding payroll and capital improvements which were previously identified)
- Total gross sales (where applicable) by the business on the airport during 2006

In addition, on-airport entities were asked to identify any businesses that sub-lease property from them so that they could be included in the analysis.

A 100 percent response rate was desired for the airport operator survey. Several rounds of follow-up telephone calls were made to non-responding entities and to airport managers to obtain a 100 percent response rate for at least on-airport employment. For airport operators who did not supply complete information on payroll and output, estimates were developed using ratios of payroll per employee and output per employee. These ratios were developed from survey data obtained from those operators and businesses who did respond to the survey.

Airport operations were grouped by North American Industry Classification System (NAICS) code based on the primary service or good each business or entity provides. This was done to facilitate subsequent IMPLAN modeling to estimate induced impacts. The NAICS is a sector-specific code used to describe industry types. For this analysis, airlines, aircraft maintenance, FBOs, air cargo, and corporate flight departments were combined in the air transportation NAICS code. Impacts stemming from construction projects were divided among various construction-related codes, while concessions were distributed among retail, food and beverage, and auto rental codes.

Airport Operations and On-Airport Activities at Border Airports

There are many employees who work at Eppley Field or at the Quad City International Airport who live in Iowa. Wages paid to these employees are generally spent in Iowa. To measure the economic benefit that Iowa realizes from these workers, it was necessary to determine the percent of on-airport employment at each of these Border Airports that resides in Iowa.

The portion of on-airport employment at Eppley Airfield that is related to economic activity in Iowa was estimated using the ratio of the Omaha-Council Bluffs MSA employees whose jobs are located in Iowa versus Nebraska. Based on this employment ratio, 11 percent of the employees in the MSA live in Iowa. This percentage was used to estimate economic benefits from on-airport activity at Eppley Airfield that accrue to Iowa.

The portion of on-airport operator-related economic benefit that Iowa realizes from the Quad City International Airport was estimated using this study's survey responses. These surveys provided the number of employees living in Iowa versus Illinois. An estimated 28 percent of the employees associated with Quad City International reside in Iowa.

Commercial Service Visitors

Airline flights arriving at and departing from the commercial airports considered in this analysis provide access for thousands of business and leisure travelers. Visitors using commercial airports as a gateway to the State contribute to Iowa's economy through their expenditures for food, lodging, entertainment, transportation, retail sales, and other goods and services. Numerous service and goods producing industries in Iowa also benefit from the multiplier effects (induced impacts) stemming from indirect impacts associated with visitor spending.

Commercial airline passenger surveys for this study were conducted in October and November 2006. Departing travelers were interviewed prior to boarding their flight and were asked several questions related to their trip. Departing passengers were first asked to indicate whether they were a resident of the airport's market area or a visitor. Those passengers indicating that they were visitors were then asked several questions to determine the following:

- The purpose of their trip (business or leisure)
- Duration of their stay
- Total expenditures during their stay in each of the following categories: lodging, food and beverage, rental car/limo/taxi, entertainment, retail, and other
- The total number of people accounted for in the expenditures they identified

The following methodology was used to estimate commercial service visitor impacts:

- Annual enplanement data for 2006 was gathered for each of the 10 airports. The ratio of resident passengers to visitor passengers was identified for each individual airport through the US DOT O&D Survey. These ratios were applied to each airport's annual enplanement data to determine the number of visitors using each commercial airport.

- Using survey data, visitors were grouped into two categories: business-related visitors and leisure-related visitors.

- Information from passenger surveys conducted for this study was compared to and supplemented with results from passenger surveys from similar studies. After the results of this study's passenger survey were complied, it appeared that responses at some study airports were impacted by the sample size. In these instances, a substantial database that Wilbur Smith Associates maintains on visitor travel and expenditure patterns was used to adjust survey results. Average length of stay and average daily expenditures for business-related visitors and leisure-related visitors were estimated; this information was applied to the number of visitors using each airport to determine total annual economic activity (or output) associated with commercial airline visitors using each airport. The average length of stay and average daily expenditures for business-related and leisure-related commercial service visitors modeled in this analysis are provided in **Table 8-2**.

Table 8-2
Commercial Service Visitors Length of Stay and Spending Pattern in Iowa

Airport	Avg. Business Stay (in days)	Avg. Leisure Stay (in days)	Avg. Daily Business Spending	Avg. Daily Leisure Spending	Business Visitors	Leisure Visitors
Southeast Iowa Regional Airport	2.4	4.2	$88	$45	2,789	1,502
The Eastern Iowa Airport	1.6	2.4	$151	$70	123,487	75,686
Des Moines International Airport	1.6	2.4	$151	$70	188,634	212,715
Dubuque Regional Airport	2.0	2.8	$114	$50	8,084	12,126
Fort Dodge Regional Airport	2.4	4.2	$88	$45	1,166	1,425
Mason City Municipal Airport	2.4	4.2	$88	$45	2,203	2,921
Quad City International Airport	1.6	2.4	$151	$70	63,218	56,062
Eppley Airfield	1.6	2.4	$151	$70	87,780	29,260
Sioux Gateway Airport	2.0	2.8	$114	$50	13,537	3,599
Waterloo Regional Airport	2.0	2.8	$114	$50	4,386	9,762

- As reflected in Table 8-2, the average length of stay for visitors on business is shorter than that of leisure-related visitors. Average daily spending for leisure travelers in less than that for business travelers because a high percentage of leisure travelers stay with friends and family. Finally, the average length of stay for all visitors using single carrier airports is longer than that of those using the multi-carrier airports. This finding is influenced by higher flight frequencies at the multi-carrier airports which often shorten trip duration.

- The portion of commercial service visitor spending related to Iowa's economy realized from passengers who arrive in Iowa via Eppley Airfield or Quad City International was estimated as follows:

    - As presented in Chapter Four of the Iowa Air Service Study, Eppley Airfield serves a total of 308,000 Iowa-related enplanements annually. US DOT O&D information

indicates that 38 percent of all enplanements at this airport are attributed to visitor travel. The remaining 62 percent of the enplanements are associated with resident travel. This yields 117,040 Iowa-related visitors. These visitors arrive in Omaha but upon their arrival, they travel to Iowa where their spending takes place.

- As presented in Chapter Four of the Iowa Air Service Study, Quad City International Airport serves a total of 284,000 Iowa-related enplanements annually. The US DOT O&D information indicates that nearly 42 percent of these enplanements are attributed to visitor travel. This yields 119,280 Iowa-related visitors who arrive via this Border Airport.

- **Table 8-3** presents estimated annual commercial service visitor expenditures for the commercial airports in Iowa as well as the spending in Iowa by visitors arriving at Moline and Omaha.

Table 8-3
Estimated Commercial Service Visitor Expenditures in Iowa

Airport	Associated City	Annual Business Spending	Annual Leisure Spending	Annual Commercial Service Visitor Expenditures
Southeast Iowa Regional Airport	Burlington	$589,037	$283,878	$872,915
The Eastern Iowa Airport	Cedar Rapids	$29,834,459	$12,715,248	$42,549,707
Des Moines International Airport	Des Moines	$45,573,974	$35,736,120	$81,310,094
Dubuque Regional Airport	Dubuque	$1,843,152	$1,697,640	$3,540,792
Fort Dodge Regional Airport	Fort Dodge	$246,259	$269,325	$515,584
Mason City Municipal Airport	Mason City	$465,274	$552,069	$1,017,343
Quad City International Airport	Moline	$15,273,469	$9,418,416	$24,691,885
Eppley Airfield	Omaha	$21,207,648	$4,915,680	$26,123,328
Sioux Gateway Airport	Sioux City	$3,086,436	$503,860	$3,590,296
Waterloo Regional Airport	Waterloo	$1,000,008	$1,366,680	$2,366,688
Total		**$119,119,716**	**$67,458,916**	**$186,578,632**

- In order to estimate employment associated with commercial service visitor expenditures, Iowa-specific employment ratios per million dollars of visitor output (spending) were developed using the IMPLAN model. The IMPLAN model indicates that approximately 24.7 persons are employed in Iowa as a result of every $1 million in annual commercial service visitor output or spending.

- In order to estimate payroll impacts associated with employment supported by commercial service visitor spending, the average State wage for applicable industry sectors was applied to the estimated number of employees. Most visitor expenditures take place in the hotel/motel, food/beverage, entertainment, retail, and transportation sectors. Based on data obtained from the U.S. Bureau of Labor Statistics, an average annual wage of $28,740 per employee was used.

Example Calculation of Commercial Service Visitor Impacts

An example of the commercial service visitor spending activity associated with Des Moines International Airport is used to demonstrate this methodology. In 2006, this airport had a total of approximately 978,900 enplanements. It was determined through the US DOT O&D Survey that 41 percent of the enplanements were visitors. Business-related visitors served at this airport spent an estimated $151 per day during their trip, while leisure travelers spent an estimated $70 per day. Business travelers stayed an average of 1.6 days, while leisure travelers stayed an average of 2.4 days. This yields a total annual commercial service visitor expenditure estimate of more than $80 million. The overall indirect and induced output impact produced by commercial service visitors associated with the Des Moines International Airport is nearly $132 million.

IMPLAN indicates that for every $1 million of output in the hotel, food/beverage, retail, and entertainment industries, approximately 24.7 full-time positions are supported. Noting that Des Moines International has an estimated output of $80 million related to commercial service visitors, yields nearly 1,980 visitor-related jobs associated with the Des Moines International Airport's commercial service visitors ($80 x 24.7). Since most indirect visitor supported jobs are in the service and retail industries, multiplying the 1,980 visitor-related jobs by an average payroll of $28,740 produces an annual payroll impact of nearly $57 million for jobs associated with visitor spending. The overall indirect and induced payroll impact produced by commercial service visitors associated with the Des Moines International Airport is nearly $89 million. (Table 8-9 shows employment for all study airports that is supported by spending from commercial service visitors).

General Aviation Visitors

General aviation refers to all segments of aircraft activity that are not related to the commercial airlines or the military. The economic activity associated with visitors who arrive on general aviation aircraft at the commercial airports in Iowa was estimated using average stay and daily expenditure information. Transient general aviation pilots and passengers were not surveyed as part of this effort. In order to estimate total annual output associated with visitors who arrive in Iowa via general aviation aircraft, data was pulled from other similar economic impact studies.

General aviation visitor spending estimates are based on transient aircraft operations. Itinerant operations are defined as non-training flights that enter or leave an airport's airspace, whereas transient flights are assumed to have arrived from another airport. Estimates of each airport's total annual itinerant operations were obtained from FAA Form 5010.

This analysis assumes that general aviation visitors using Eppley Airfield and Quad City International Airport are visitors traveling to Nebraska or Illinois. General aviation visitors do not use the two Border Airports to access Iowa because of the availability of general aviation airports in Iowa. Hence, no portion of general aviation visitor spending associated with Eppley Airfield or Quad City International was assumed to be associated with Iowa's economy.

Example Calculation of General Aviation Visitor Impacts

An example of how general aviation visitor impacts were calculated follows:

- The number of itinerant general aviation arrivals for each airport was obtained from FAA Airport Master Record Form 5010 data. For example, Mason City Municipal Airport has an estimated 30,000 total general aviation operations (arrivals and departures). Of these 30,000 general aviation operations, 18,000 are itinerant operations (comprised of arrivals and departures). Fifty percent of itinerant operations are considered itinerant arrivals. On an annual basis, Mason City Municipal Airport has an estimated 9,000 itinerant arrivals.

- The number of itinerant arrivals performed by transient or visiting aircraft is required to calculate visitor impacts. By definition, transient operations are business or leisure flights conducted by aircraft not based locally. Transient operations are equated with that portion of each airport's general aviation activity associated with visitors. It is estimated by the Aircraft Owners and Pilots Association (AOPA) that 33 percent of all itinerant arrivals on general aviation aircraft are typically transient. Discussions with various FBOs at more active airports around the U.S. confirm that this percentage is a reasonable estimate for operations tied only to visitors. These transient flights are equated with either business or pleasure visitors. In this example, approximately 33 percent of the 9,000 itinerant arrivals equal 2,970 transient arrivals.

- The average number of aircraft occupants and average trip stay is then applied to the estimate of transient arrivals to determine total general aviation visitor days. The average trip length at the multi-carrier commercial airports was estimated at 0.8 days (19.2 hours) and the average trip length at single carrier airports was 1.2 days (28.8 hours). It is important to note that while some visitors will stay for several days, many visitors using general aviation stay for only a few hours. The average number of aircraft occupants for multi-carrier airports was 4.1 and the average number of aircraft occupants among single carrier airports was 2.7.

- In this example, the 2,970 transient arrivals at Mason City Municipal Airport yields the following number of total annual visitor days:

  - 2,970 arrivals x 1.2 days x 2.7 persons/aircraft = 9,623 total annual general aviation visitor days

- To calculate the impact of these visitors, it is necessary to estimate average expenditures per visitor, per day. It is assumed, on average, general aviation visitors spent $159 when visiting multi-carrier airports and $104 when visiting single carrier airports. This spending includes fuel purchases by those visitors who arrive as part of a fuel stop. The typical visitor expenditure was then applied to the estimated number of visitor days to produce general aviation visitor expenditures (output).

  - 9,623 days x $104/per person/day = $1,000,792 in annual general aviation visitor output

- For this analysis the average length of stay for general aviation visitors was shorter at the multi-carrier commercial airports. This shorter stay duration is influenced by the higher percentage of business-related visitors who come for short business trips. The multi-carrier airports tend to attract larger general aviation planes, hence their higher ratio of pilots and passengers per plane. Higher daily expenditures by general aviation visitors at the multi-carrier airports also reflect a higher proportion of business travelers and larger, more sophisticated general aviation aircraft.

To determine direct payroll and employment impacts linked to general aviation visitor spending, IMPLAN ratios based on $1 million of output were used for each industry category. Ratios developed by the IMPLAN model indicate that for every $1 million in general aviation visitor output, approximately 28 full-time positions in the service/retail industries are supported.

In the previous example, spending from general aviation visitors using Mason City Municipal Airport would then support approximately 28 full-time jobs. The average statewide salary for service/retail jobs ($28,740) is then applied to the estimate of employment to determine annual payroll associated with general aviation visitor spending. In the Mason City Municipal Airport example, annual general aviation visitor-related payroll exceeds $800,000 (28 employees x $28,740).

Tables 8-4 and 8-5 present estimated general aviation visitor impacts for the commercial airports in Iowa. It is important to note that local and training operations attributable to general aviation aircraft do not factor into the calculation of general aviation visitor impacts.

Table 8-4
Estimates of Annual Transient General Aviation Arrivals

Airport	Associated City	Total General Aviation Operations*	Itinerant Operations	Itinerant Arrivals	Estimated Transient Arrivals
Southeast Iowa Regional Airport	Burlington	15,000	9,000	4,500	1,485
The Eastern Iowa Airport	Cedar Rapids	30,797	22,765	11,383	3,756
Des Moines International Airport	Des Moines	42,245	37,653	18,827	6,213
Dubuque Regional Airport	Dubuque	48,928	26,464	13,232	4,367
Fort Dodge Regional Airport	Fort Dodge	17,500	10,000	5,000	1,650
Mason City Municipal Airport	Mason City	30,000	18,000	9,000	2,970
Sioux Gateway Airport	Sioux City	20,008	15,682	7,841	2,588
Waterloo Regional Airport	Waterloo	29,600	19,360	9,680	3,194
Total		**234,078**	**158,924**	**79,462**	**26,222**

Sources: Airport Master Record Form 5010 Data and AOPA
Note: Does not include operations by commercial airlines.

Table 8-5
Estimated Annual General Aviation Visitor Expenditures

Airport	Associated City	Estimated Transient Arrivals	Annual General Aviation Visitors	Total Annual Days Stayed	Annual General Aviation Visitor Expenditures
Southeast Iowa Regional Airport	Burlington	1,485	4,010	4,811	$502,000
The Eastern Iowa Airport	Cedar Rapids	3,756	15,401	12,320	$1,966,900
Des Moines International Airport	Des Moines	6,213	25,742	20,378	$3,253,200
Dubuque Regional Airport	Dubuque	4,367	11,790	14,148	$1,476,200
Fort Dodge Regional Airport	Fort Dodge	1,650	4,455	5,346	$557,800
Mason City Municipal Airport	Mason City	2,970	8,019	9,623	$1,004,100
Sioux Gateway Airport	Sioux City	2,588	6,986	8,384	$874,800
Waterloo Regional Airport	Waterloo	3,194	8,625	10,350	$1,079,900
Total		**26,222**	**85,028**	**85,360**	**$10,714,900**
Source: Wilbur Smith Associates					

Construction Impacts

The following methodology was used to estimate direct construction impacts:

- CIP data for 2003-2006 was gathered from airport managers as well as aviation-related businesses and government agencies located on each airport.
- CIP data for the four-year period was averaged to avoid showing peaks or troughs in construction spending.
- The IMPLAN Input/Output model indicates that for every $1 million spent annually on construction activity supports 11.7 "construction-related" jobs in Iowa. These jobs include construction workers, equipment operators, foremen, engineers, and managers.
- CIP activity at the two Border Airports that translates into economic activity in Iowa was estimated using the percentage of construction workers in the Metropolitan Statistical Area (MSA) for each Border Airport that reside in Iowa.

    - Eppley Airfield is located in the Omaha-Council Bluffs, Nebraska-Iowa MSA. Of the total construction jobs in this MSA, nine percent are located in Iowa. This analysis assumed nine percent of the total annual CIP impact generated by Eppley Airfield accrues to Iowa.

    - Quad City International Airport is located in the Quad Cities, Illinois-Iowa MSA. This MSA includes the cities of Moline and Rock Island in Illinois and the cities of Davenport and Bettendorf in Iowa. Of the total construction jobs in this MSA, 48 percent are located in Iowa. This analysis assumed 48 percent of the total annual CIP impact generated by Quad City International Airport accrues to Iowa's economy.

Study Multipliers

Employment, payroll, and output impacts derived from airport operations and on-airport activities as well as visitors comprise each airport's direct and indirect economic impacts. As these impacts enter the economy, they circulate among other sectors, creating successive waves of additional spending. This phenomenon is referred to as the multiplier effect. Multiplier effects are also referred to as induced impacts.

Multiplier effects arise from various interdependencies within an economic system. For example, the operation of an airport requires inputs in the form of supplies, equipment, and maintenance. These inputs generate a boost in sales for those firms or businesses providing these services and products. Moreover, the goods and services themselves require inputs for their production. The process continues as a large number of impacts re-circulate through the economy. The total requirement for goods and services is the multiple of the initial needs of the commercial airports considered in this analysis; hence it is referred to using the term "multiplier."

Multipliers for estimating induced impacts were derived from the IMPLAN model. The multipliers used in this analysis were developed specifically to measure economic impacts in Iowa. Individual multipliers for each sector of the economy being modeled were used. As previously mentioned, individual IMPLAN multipliers were obtained for various NAICS codes. The NAICS is a sector-specific list used to develop multipliers. The NAICS codes used for modeling on-airport operator impacts and visitor impacts in this analysis are depicted in **Table 8-6**.

Table 8-6
Iowa IMPLAN Multipliers by NAICS Code

NAICS Industry Classification	Employment Multiplier	Payroll Multiplier	Output Multiplier
Government (including Airport Owners)[1]	1.60	1.42	1.68
Construction C.I.P.[2]	1.64	1.45	1.61
Concessions[3]	1.83	1.86	1.64
Aviation Sector[4]	1.83	1.86	1.64
Commercial Service Visitor Expenditures[5]	1.36	1.56	1.64
General Aviation Visitor Expenditures[5]	1.28	1.56	1.68

Sources: Wilbur Smith Associates and IMPLAN multipliers

Notes: 1. Government multipliers are the weighted average of State & Local Government.
2. Construction multipliers are the weighted average of the New Industrial & commercial Construction, Maintenance and Repair, and Engineering and Architecture Industries.
3. Concessions multipliers are the weighted average of the Food/Beverage, Hotels/Motels, Miscellaneous Store Retailers, and Business Support Services.
4. Aviation-related multipliers are the weighted average of the Air Transportation and Aircraft Maintenance and Manufacturing Industries.
5. Visitor industries multipliers are the weighted average of the Hotel, Food/Beverage, Retail, and Automobile Rental Industries.

While these NAICS groups do not cover all on-airport operator and visitor impact categories, they do provide a representative average for generating multipliers. For example, aviation-related business expenditures at the study airports were grouped into air transportation and various industry types

related to aerospace NAICS codes. Visitor expenditures were grouped into retail sales, auto rental, hotel/motel, and food/beverage NAICS codes.

The multipliers presented in Table 8-6 were used to estimate induced impacts in this analysis. For example, $100 in direct expenditures (output) in the aviation sector supports a total output impact equivalent to $164. In this example, induced impacts would be $64 ($164 minus $100).

EMPLOYMENT IMPACTS FOR STUDY AIRPORTS

The findings of this analysis indicate that commercial airports in Iowa are an important source of jobs. Employment, as defined in this analysis, is based on "Full-Time Equivalent" (FTE) estimates where two part-time jobs are generally assumed to equal one full-time job. Employment impacts are calculated for airport operations, on-airport activities, and visitors. On-airport activity includes private businesses and government agencies. For on-airport military units, their employment was also considered. Spending for CIP and other improvement and construction projects also contribute to on-airport employment.

The components of the direct employment numbers are:

AIRPORT OPERATIONS
Airport operations include expenditures made by the airport sponsor to run, operate, improve, and expand the airport each year. The benefits from all capital improvement projects are measured in this category. Also included are FAA activities and funding and TSA operations.
COMMERCIAL AIRLINES
Commercial airlines include airline employees and airline support personnel who work at the airport.
CONCESSIONAIRES/AIR CARGO
Concessionaires/air cargo includes benefits from air cargo/air freight companies or from concessionaires supporting functions related to the passenger terminal building.
GENERAL AVIATION
General aviation includes all FBOs; flight schools; providers of maintenance, repair and avionics services; Part 135 charter operators; and corporate flight departments.
MILITARY
Some, but not all, of the commercial airports in Iowa have on-site National Guard or Reserve activity.

Employment from On-Airport Activity

Table 8-7 presents direct employment by category for each of the airports. These estimates of direct employment were obtained from surveys completed as part of this study.

Table 8-7
Direct Airport Operations Employment by Category

Airport	Commercial Airlines	Government CIP	Government Non-CIP	General Aviation/ Corporate	Military	Other	Total
Southeast Iowa Regional Airport	5	7	9	6	0	10	37
The Eastern Iowa Airport	74	74	148	149	0	241	686
Des Moines International Airport	136	204	304	213	260	434	1,551
Dubuque Regional Airport	10	16	27	42	0	26	121
Fort Dodge Regional Airport	5	8	40	7	82	4	146
Mason City Municipal Airport	6	9	12	9	0	4	39
Sioux Gateway Airport	12	25	44	65	694	27	866
Waterloo Regional Airport	7	9	22	33	167	15	253
Iowa Subtotal	**255**	**352**	**606**	**523**	**1,203**	**761**	**3,699**
Quad City International Airport*	31	38	115	97	0	29	309
Eppley Airfield*	37	25	57	76	0	71	265
Border Airports Subtotal*	**68**	**63**	**172**	**173**	**0**	**100**	**574**
Total	**323**	**415**	**778**	**696**	**1,203**	**861**	**4,273**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This estimate reflects only those employees at these airports who reside in Iowa; Employment may not sum to totals due to rounding

Table 8-8 identifies the total number of jobs associated with on-airport aviation-related activities, businesses, and construction activities at the study airports. Direct jobs consist of employees who are engaged in the provision of aviation-related services on an airport. In the case of on-airport aviation-related military units, full and part-time military personnel and military-related civilian employees were also included. In addition, average employment impacts from airport-related construction projects were modeled in this analysis. In total, there are 4,273 direct jobs supported in Iowa at the study airports.

Table 8-8
Employment Associated with On-Airport Activity

	Direct Employment	Induced Employment	Total Employment
Southeast Iowa Regional Airport	37	30	67
The Eastern Iowa Airport	686	526	1,212
Des Moines International Airport	1,551	1,126	2,677
Dubuque Regional Airport	121	94	215
Fort Dodge Regional Airport	146	95	241
Mason City Municipal Airport	39	30	69
Sioux Gateway Airport	866	551	1,417
Waterloo Regional Airport	253	167	420
Iowa Subtotal	**3,699**	**2,619**	**6,318**
Quad City International Airport*	309	227	536
Eppley Airfield*	265	206	471
Border Airports Subtotal*	**574**	**433**	**1,007**
Total	**4,273**	**3,052**	**7,325**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This estimate reflects only those employees at these airports who reside in Iowa

Induced impacts represent the jobs created by the multiplier effect stemming from each airport's direct employment. For example, an employee of a fuel distributor may owe a portion of their job to an airport since the distributor sells fuel to the airport's FBO. As a result of on-airport operations activity, additional induced employment is created. Induced impacts associated with the day-to-day operation of airports add 3,052 full-time jobs. When direct and induced airport-related employment impacts are combined, airport operations, on-airport aviation-related businesses, the military, and construction projects support 7,325 jobs at the study airports.

Employment from Commercial Service Visitor Spending

Visitors arriving via commercial airlines typically spend money, thereby supporting additional employment. **Table 8-9** identifies the number of employees in Iowa whose jobs are supported by the spending of visitors arriving via commercial airlines.

Table 8-9
Iowa Employment from Commercial Service Visitor Spending

	Indirect Employment	Induced Employment	Total Employment
Southeast Iowa Regional Airport	22	7	29
The Eastern Iowa Airport	1,042	371	1,413
Des Moines International Airport	1,979	704	2,683
Dubuque Regional Airport	85	30	115
Fort Dodge Regional Airport	13	5	18
Mason City Municipal Airport	26	9	35
Sioux Gateway Airport	89	32	121
Waterloo Regional Airport	55	19	74
Iowa Subtotal	**3,311**	**1,177**	**4,488**
Quad City International Airport*	549	195	744
Eppley Airfield*	936	415	1,268
Border Airports Subtotal*	**1,485**	**610**	**2,012**
Total	**4,796**	**1,787**	**6,500**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: * This estimate reflects only those jobs supported by visitor spending that take place in Iowa

As previously discussed, it is possible to calculate visitor spending, and subsequently, the number of jobs supported by visitors. Indirect jobs supported by visitor spending are attributed to a variety of sectors; however, most of the jobs are concentrated in the hotel/motel, restaurant, recreational and entertainment, and retail sectors.

There are 4,796 indirect jobs supported by commercial service visitor spending. Induced impacts include those jobs that exist due to the multiplier effect. Induced impacts result in 1,787 additional full-time positions supported by the spending of commercial service visitors. When indirect and induced visitor-related employment impacts are combined, approximately 6,500 jobs are supported by spending from visitors to Iowa who arrive via the commercial airlines.

Employment from General Aviation Visitor Spending

Similar to visitors using commercial airline service, visitors using general aviation aircraft typically spend money while visiting, thereby helping to support additional employment. **Table 8-10** identifies the number of Iowa jobs supported by spending from visitors arriving by general aviation aircraft via one of the eight commercial airports.

Table 8-10
Employment from General Aviation Visitor Spending

Airport	Indirect Employment	Induced Employment	Total Employment
Southeast Iowa Regional Airport	14	4	18
The Eastern Iowa Airport	55	15	70
Des Moines International Airport	91	25	116
Dubuque Regional Airport	42	11	53
Fort Dodge Regional Airport	16	4	20
Mason City Municipal Airport	28	8	36
Sioux Gateway Airport	25	7	32
Waterloo Regional Airport	31	8	39
Total	**302**	**82**	**384**

Source: Wilbur Smith Associates and IMPLAN multipliers

As previously discussed, it is possible to calculate annual general aviation spending; and subsequently, the number of jobs supported by this spending. Indirect jobs associated with general aviation visitor spending are attributed to a variety of sectors; however, most of these jobs are concentrated in the hotel/motel, restaurant, recreational and entertainment, and retail sectors. As a result of general aviation visitor expenditures tied to the eight commercial airports in Iowa, there are 302 indirect jobs supported in Iowa.

Induced employment includes those jobs that exist due to continued circulation (multiplier impact) of general aviation visitor expenditures. Induced impacts result in 82 additional full-time jobs. When indirect and induced general aviation visitor-related employment impacts are combined, 384 jobs are supported by the spending of visitors arriving via general aviation aircraft at the commercial airports in Iowa.

Total Employment

Table 8-11 identifies the total number of jobs are supported by activities at the study airports. As a result of on-airport activities and spending by visitors using the study airports, there are 9,371 direct and indirect full-time equivalent jobs. The multiplier effect (induced impact) adds 4,921 additional jobs. In total, 14,209 jobs are supported in Iowa by aviation-related operators and businesses, and visitors at the study airports. Roughly 79 percent of these jobs (11,190) are attributable to the eight commercial airports in Iowa. The remaining 21 percent are linked to the two Border Airports considered in this analysis.

Table 8-11
Total Iowa Total Commercial Airport-Related Employment

	Direct and Indirect Employment	Induced Employment	Total Employment
Southeast Iowa Regional Airport	73	41	114
The Eastern Iowa Airport	1,783	912	2,695
Des Moines International Airport	3,621	1,855	5,476
Dubuque Regional Airport	248	135	383
Fort Dodge Regional Airport	175	104	279
Mason City Municipal Airport	93	47	140
Sioux Gateway Airport	980	590	1570
Waterloo Regional Airport	339	194	533
Iowa Subtotal	**7,312**	**3,878**	**11,190**
Quad City International Airport*	858	422	1,280
Eppley Airfield*	1,201	621	1,739
Border Airports Subtotal*	**2,059**	**1,043**	**3,019**
Total	**9,371**	**4,921**	**14,209**

Source: Wilbur Smith Associates and IMPLAN multipliers
Note: *This total includes only that portion of the total employment for these airports that resides in Iowa

PAYROLL IMPACTS FOR STUDY AIRPORTS

Employment linked to the study airports results in a significant annual payroll benefit to Iowa. Payroll impacts relate to the previously identified employment benefits associated with on-airport operators and their activities, commercial service visitors, and general aviation visitors.

Payroll from On-Airport Activity

Table 8-12 identifies annual payroll benefits associated with on-airport activity at each of the study airports.

Table 8-12
On-Airport Activity Payroll

Airport	Direct Payroll	Induced Payroll	Total Payroll
Southeast Iowa Regional Airport	$1,087,800	$671,800	$1,759,600
The Eastern Iowa Airport	$27,170,200	$18,410,700	$45,580,900
Des Moines International Airport	$67,476,100	$40,408,000	$107,884,100
Dubuque Regional Airport	$4,581,100	$3,057,300	$7,638,400
Fort Dodge Regional Airport	$6,841,300	$3,133,600	$9,974,900
Mason City Municipal Airport	$1,440,600	$849,400	$2,290,000
Sioux Gateway Airport	$40,156,300	$18,820,900	$58,977,200
Waterloo Regional Airport	$7,274,400	$3,658,500	$10,932,900
Iowa Subtotal	**$156,027,800**	**$89,010,200**	**$245,038,000**
Quad City International	$13,765,000	$8,202,400	$21,967,400
Eppley Airfield	$11,960,665	$7,934,600	$19,895,300
Border Airports Subtotal	**$25,725,665**	**$16,137,000**	**$41,862,700**
Total	**$181,753,465**	**$105,147,200**	**$286,900,700**
Sources: Wilbur Smith Associates and IMPLAN multipliers			

As previously noted, this payroll includes, in addition to the on-airport operations, payroll supported by airport construction projects and for some on-airport employment from military units.

In 2006, direct annual payroll impacts were more than $181.8 million. This direct payroll impact also ripples throughout the Iowa economy creating induced payroll impacts that can be measured through the use of the IMPLAN model. The induced annual payroll impact related to on-airport activities at the study airports, estimated through the multipliers, is $105.1 million. Total payroll impacts produced by commercial service airport activities, which include direct and induced annual payroll, are nearly $287 million annually.

Payroll from Commercial Service Visitor Spending

Table 8-13 identifies the annual payroll impact attributed to spending by commercial service visitors using the study airports.

Table 8-13
Iowa Annual Payroll from Commercial Service Visitor Spending

Airport	Indirect Payroll	Induced Payroll	Total Payroll
Southeast Iowa Regional Airport	$613,100	$342,900	$956,000
The Eastern Iowa Airport	$29,936,300	$16,742,400	$46,678,700
Des Moines International Airport	$56,866,000	$31,803,300	$88,669,300
Dubuque Regional Airport	$2,430,700	$1,359,300	$3,790,000
Fort Dodge Regional Airport	$362,000	$202,500	$564,500
Mason City Municipal Airport	$721,400	$403,500	$1,124,900
Sioux Gateway Airport	$2,546,000	$1,424,000	$3,970,000
Waterloo Regional Airport	$1,565,800	$875,700	$2,441,500
Iowa Subtotal	**$95,041,300**	**$53,153,600**	**$148,194,900**
Quad City International Airport*	$15,763,100	$8,815,800	$24,578,900
Eppley Airfield*	$26,880,400	$15,033,300	$41,913,700
Border Airport Subtotal*	**$42,643,500**	**$23,849,100**	**$66,492,600**
Total	**$137,684,800**	**$77,002,700**	**$214,687,500**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This total includes only that portion of the total employment for these airports that resides in Iowa

Indirect payroll consists of wages and benefits paid to employees working at restaurants, hotels/motels, retail businesses, and other service industries that are used by commercial service visitors. Indirect annual payroll attributable to spending by commercial service visitors is estimated at nearly $137.7 million.

As employees in the service industries spend their payroll, the money continues to circulate, generating additional employment and subsequent payroll. Annual induced payroll impacts associated with commercial service visitor-supported employment are estimated at more than $77.0 million. When indirect and induced annual payroll impacts stemming from commercial service visitor spending in to Iowa are combined, a total annual payroll impact of nearly $214.7 million is produced.

Payroll from General Aviation Visitor Spending

Table 8-14 identifies the payroll impacts attributed to spending by visitors arriving at one of the eight commercial airports in Iowa via general aviation aircraft.

Table 8-14
Iowa Annual Payroll from General Aviation Visitor Spending

Airport	Indirect Payroll	Induced Payroll	Total Payroll
Southeast Iowa Regional Airport	$401,000	$226,000	$627,000
The Eastern Iowa Airport	$1,571,100	$885,300	$2,456,400
Des Moines International Airport	$2,598,500	$1,464,300	$4,062,800
Dubuque Regional Airport	$1,179,100	$664,500	$1,843,600
Fort Dodge Regional Airport	$445,600	$251,000	$696,600
Mason City Municipal Airport	$802,000	$451,900	$1,253,900
Sioux Gateway Airport	$698,700	$393,800	$1,092,500
Waterloo Regional Airport	$862,600	$486,100	$1,348,700
Total	**$8,558,600**	**$4,822,900**	**$13,381,500**
Sources: Wilbur Smith Associates and IMPLAN multipliers			

Indirect payroll includes salaries paid to employees working in visitor-related businesses and other service industries that are utilized by general aviation visitors. Indirect annual payroll attributable to spending by general aviation visitors is estimated at nearly $8.6 million.

As employees in the visitor-related industries spend their payroll, this spending continues to circulate generating additional employment and subsequent payroll. The induced annual payroll impact associated with general aviation visitor spending is estimated at over $4.8 million. When indirect and induced payroll impacts stemming from general aviation visitor spending are combined, a total payroll impact of nearly $13.4 million is produced.

Total Annual Payroll

The total benefit of combined airport operations, on-airport activities, commercial service visitor, and general aviation visitor-related payroll impacting Iowa is identified in **Table 8-15**. The collective direct and indirect annual payroll impact supported by the study airports is nearly $328 million. With close to $187.0 million in induced annual payroll benefits, nearly $515.0 million in total annual payroll is realized in Iowa as a result of visitor spending and on-airport activity associated with the study airports. More than 79 percent of this total annual payroll benefit is linked to the eight commercial airports in Iowa.

Table 8-15
Total Iowa Commercial Airport Annual Payroll

Airport	Direct And Indirect Payroll	Induced Payroll	Total Payroll
Southeast Iowa Regional Airport	$2,101,900	$1,240,700	$3,342,600
The Eastern Iowa Airport	$58,677,600	$36,038,400	$94,716,000
Des Moines International Airport	$126,940,600	$73,675,600	$200,616,200
Dubuque Regional Airport	$8,190,900	$5,081,100	$13,272,000
Fort Dodge Regional Airport	$7,648,900	$3,587,100	$11,236,000
Mason City Municipal Airport	$2,964,000	$1,704,800	$4,668,800
Sioux Gateway Airport	$43,401,000	$20,638,700	$64,039,700
Waterloo Regional Airport	$9,702,800	$5,020,300	$14,723,100
Iowa Subtotal	**$259,627,700**	**$146,986,700**	**$406,614,400**
Quad City International Airport*	$29,528,100	$17,018,200	$46,546,300
Eppley Airfield*	$38,841,100	$22,967,900	$61,809,000
Border Airport Subtotal*	**$68,369,200**	**$39,986,100**	**$108,355,300**
Total	**$327,996,900**	**$186,972,800**	**$514,969,700**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This total includes only that portion of the total payroll associated with employment for these airports that resides in Iowa

OUTPUT IMPACTS FOR STUDY AIRPORTS

Output or economic activity is defined as annual gross sales and average annual capital expenditures for on-airport operations. The exceptions are government entities and airlines located on the airports. Government and airline output is defined as the sum of annual capital expenditures, payroll, and operating expenses. Output related to commercial service and general aviation visitors is defined as expenditures made during their visits. Annual economic output benefiting Iowa's economy is discussed in the next section.

Output from On-Airport Activity

Table 8-16 identifies direct, induced, and total annual output for all on-airport activities. As aviation-related businesses and government entities located on each study airport spend money, these expenditures ripple through Iowa's economy. For example, if an airport were to improve or expand its terminal to accommodate commercial airline passengers, money would be spent in the area's economy on construction materials, labor, and other services.

Table 8-16
Iowa On-Airport Activity Output

	Direct Output	Induced Output	Total Output
Southeast Iowa Regional Airport	$4,942,800	$3,208,800	$8,151,600
The Eastern Iowa Airport	$91,649,500	$59,599,500	$151,249,000
Des Moines International Airport	$232,667,200	$152,420,500	$385,087,700
Dubuque Regional Airport	$15,926,400	$10,342,200	$26,268,600
Fort Dodge Regional Airport	$20,588,300	$13,819,900	$34,408,200
Mason City Municipal Airport	$4,833,200	$3,151,200	$7,984,400
Sioux Gateway Airport	$126,476,200	$84,752,600	$211,228,800
Waterloo Regional Airport	$35,267,500	$23,553,500	$58,821,000
Iowa Subtotal	**$532,351,100**	**$350,848,200**	**$883,199,300**
Quad City International Airport*	$44,032,400	$27,802,900	$71,835,300
Eppley Airfield*	$35,308,800	$22,691,800	$58,000,600
Border Airport Subtotal*	**$79,341,200**	**$50,494,700**	**$129,835,900**
Total	**$611,692,300**	**$401,342,900**	**$1,013,035,200**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This reflects on that portion of the annual output/spending impact associated with these airports that is realized in Iowa.

Total direct annual output from on-airport operations and activities is estimated at $611.7 million. Induced airport operations-related output or spending impacts are estimated using IMPLAN multipliers. Using the IMPLAN model, induced annual output is estimated at $401.3 million. When direct and induced impacts are combined, the total annual output for the study airports attributed to on-airport operations is more than $1 billion.

Four commercial airports in Iowa have economic impact from military activities. The total output associated with military activities at each airport is:

- Des Moines International Airport: $60,961,500 (16 percent of total output)
- Fort Dodge Regional Airport:$21,883,300 (64 percent of total output)
- Sioux Gateway Airport: $162,528,100 (74 percent of total output)
- Waterloo Regional Airport: $38,269,000 (65 percent of total output)

Output from Commercial Service Visitor Spending

Table 8-17 identifies the output attributed to commercial visitor spending.

Table 8-17
Iowa Output from Commercial Service Visitor Spending

Airport	Indirect Output	Induced Output	Total Output
Southeast Iowa Regional Airport	$864,600	$557,400	$1,422,000
The Eastern Iowa Airport	$42,215,100	$27,214,700	$69,429,800
Des Moines International Airport	$80,190,300	$51,696,100	$131,886,400
Dubuque Regional Airport	$3,427,600	$2,209,700	$5,637,300
Fort Dodge Regional Airport	$510,500	$329,100	$839,600
Mason City Municipal Airport	$1,017,300	$655,900	$1,673,200
Sioux Gateway Airport	$3,590,300	$2,314,600	$5,904,900
Waterloo Regional Airport	$2,208,100	$1,423,400	$3,631,500
Iowa Subtotal	**$134,023,800**	**$86,400,900**	**$220,424,700**
Quad City International Airport*	$22,228,500	$14,330,000	$36,558,500
Eppley Airfield*	$37,905,700	$24,436,600	$62,342,300
Border Airport Subtotal*	**$60,134,200**	**$38,766,600**	**$98,900,800**
Total	**$194,158,000**	**$125,167,500**	**$319,325,500**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *This estimate reflects only those employees at these airports who reside in Iowa

Indirect output is comparable to total annual visitor expenditures. Indirect output from commercial service visitor spending is estimated at nearly $194.2 million. As the service industries re-spend this output, the spending continues to circulate resulting in induced impacts. Induced annual impacts related to commercial service visitor output or spending are estimated at close to $125.2 million each year. In total, the combined annual output from commercial service visitor spending is more than $319.3 million.

Output from General Aviation Visitor Spending

Table 8-18 identifies the output attributed to general aviation visitors using the eight commercial airports in Iowa. Indirect annual output is comparable to all general aviation visitor expenditures at these airports. Total indirect annual output from general aviation visitor spending is estimated at more than $10.7 million.

Table 8-18
Iowa Output from General Aviation Visitor Spending

Airport	Indirect Output	Induced Output	Total Output
Southeast Iowa Regional Airport	$502,000	$341,500	$843,500
The Eastern Iowa Airport	$1,966,900	$1,337,800	$3,304,700
Des Moines International Airport	$3,253,200	$2,212,800	$5,466,000
Dubuque Regional Airport	$1,476,200	$1,004,100	$2,480,300
Fort Dodge Regional Airport	$557,800	$379,400	$937,200
Mason City Municipal Airport	$1,004,100	$682,900	$1,687,000
Sioux Gateway Airport	$874,800	$595,000	$1,469,800
Waterloo Regional Airport	$1,079,900	$734,600	$1,814,500
Total	**$10,714,900**	**$7,288,100**	**$18,003,000**
Sources: Wilbur Smith Associates and IMPLAN multipliers			

As the service industries re-spend indirect output, money continues to circulate, resulting in induced impacts. The induced impacts related to general aviation visitor output are estimated at nearly $7.3 million each year. The total annual output from spending by visitors arriving via general aviation visitors at the commercial airports exceeds $18 million.

Total Annual Output

The total combined annual output related to on-airport operations and commercial service and general aviation visitor spending is presented in **Table 8-19**. Direct and indirect annual output measures more than $808.4 million. Induced output impacts are estimated at $528.5 million. Combined direct, indirect and induced output from airport activities, visitors, and the multiplier effect produce a total annual output estimate of over $1.34 billion for Iowa's economy. Of the total annual economic output that Iowa realizes from commercial airports, $1.12 billion is linked to the eight commercial airports in Iowa, while the remaining $215.3 million is related to the two Border Airports analyzed in this effort.

Table 8-19
Total Iowa Commercial Airport Annual Output

	Direct and Indirect Output	Induced Output	Total Output
Southeast Iowa Regional Airport	$6,309,400	$4,107,700	$10,417,100
The Eastern Iowa Airport	$135,831,500	$88,152,000	$223,983,500
Des Moines International Airport	$316,110,700	$206,329,400	$522,440,100
Dubuque Regional Airport	$20,830,200	$13,556,000	$34,386,200
Fort Dodge Regional Airport	$21,656,600	$14,528,400	$36,185,000
Mason City Municipal Airport	$6,854,600	$4,490,000	$11,344,600
Sioux Gateway Airport	$130,941,300	$87,662,200	$218,603,500
Waterloo Regional Airport	$38,555,500	$25,711,500	$64,267,000
Iowa Subtotal	**$677,089,800**	**$444,537,200**	**$1,121,627,000**
Quad City International Airport*	$66,260,900	$42,132,900	$108,393,800
Eppley Airfield*	$65,037,200	$41,856,800	$106,894,000
Border Airport Subtotal*	**$131,298,100**	**$83,989,700**	**$215,287,800**
Total	**$808,387,900**	**$528,526,900**	**$1,336,914,800**

Sources: Wilbur Smith Associates and IMPLAN multipliers
Note: *Represents only that portion of total annual output from these airports that are realized in Iowa

OTHER BENEFITS

Non-Aviation Business Benefits

The economic impacts associated with aviation in Iowa extend beyond on-airport activities and commercial service and general aviation visitors. Many employees in Iowa, and the companies that provide their jobs, rely heavily on aviation. As a result, Iowa benefits from "value-added" impacts associated with air transportation supported at the commercial airports in Iowa. A separate survey was developed to gather data from employers to identify additional value-added benefits.

Twenty-one large employers in Iowa provided information on their benefit from the commercial airports. Combined, these businesses account for 37,000 employees in Iowa and have a combined annual travel budget that exceeds $52 million. Information collected indicates that these businesses average one annual airline trip annually for each person they employ in Iowa. All businesses that participated in this business survey indicated that being within close proximity to a commercial airport is critical to their business operations.

Business Use of Air Cargo

Air cargo activity at commercial airports in Iowa provides jobs and supports economic activity in Iowa. Many businesses and industries rely on air cargo to transport commodities to their customers or as a function in their manufacturing supply chain. Sixty (60) percent of the businesses in Iowa that responded to the survey use some form of air cargo service on a regular basis. Of the 60 percent of the respondents who indicate they rely on air cargo, these businesses use air cargo as follows:

- More than 50 percent ship parcels weighing between two and seventy pounds.
- Just less than 59 percent ship documents weighing less than two pounds.
- About 20 percent use air cargo to ship freight weighing more than seventy pounds.

When businesses ship and receive packages that weigh less than two pounds, they are most likely sending overnight mail. Businesses that ship parcels in the 2 to 7 pound range most likely rely on air cargo for just-in-time supply chain, inventory, and parts management. Generally speaking, packages in the 2 to 7 pound range do not require dedicated air cargo facilities.

Business Use of General Aviation at Commercial Airports

Business use of general aviation aircraft can range from the rental of small single-engine aircraft to multiple aircraft corporate fleets that are supported by dedicated flight crews and mechanics. Iowa businesses use general aviation to visit customers, vendors and branch offices. Forty-seven (47) percent of the responding businesses reported that they own, rent or charter general aviation aircraft. All businesses in Iowa who participated in the non-aviation business survey rely on general aviation in some way to support their activities.

Airport Influence on Business Locations

The business survey questioned respondents on the importance of various factors that they would consider if they were contemplating relocation or expansion. When the scores were averaged, the top ten factors in order of importance considered by Iowa companies when relocating or expanding are as follows:

1. Availability of Trained Workforce
2. Tax Incentives
3. *A Commercial Airport*
4. Convenient Highway Access
5. Cost of Living
6. *A General Aviation Airport*
7. Proximity of Suppliers
8. Academic or Cultural Centers
9. Universities or R&D Centers
10. Raw Materials/Natural Resources

As shown, proximity to a commercial airport ranked third and proximity to a general aviation airport ranked sixth. This information underscores the value that Iowa businesses gain from their proximity to airports.

Qualitative Airport Benefits

Previous sections of this report focused on the quantitative economic benefits resulting from the study airports. There are also a number of qualitative benefits that must be considered when assessing the total value of the commercial airports. While it is difficult to place a dollar value on qualitative impacts, these benefits improve the quality of life in Iowa in a variety of ways. Among these benefits are activities such as educational opportunities, medical flights, police and law enforcement, and recreational resources.

All commercial airports report that corporate business activity frequently occurs at their facilities. Airports serve as gateways for visitor travel. Flight training and education is another qualitative benefit supported by many airports.

LOST BENEFITS FOR COMMERCIAL AIRPORTS IN IOWA

This section estimates annual economic benefits that are "lost" as a result of Iowa-related enplanements that originate at commercial airports beyond the State. As the economic analysis presented in this section has clearly shown, Iowa and the communities served by the eight commercial airports realize notable benefits from each passenger that boards a commercial airline flight.

The air service portion of this study documented that in addition to the more than 1.6 million annual enplanements at the eight commercial airports in Iowa, there are an estimated additional 905,400 Iowa-related enplanements that leave the State to start their commercial airline trip at one of the Border or Outlying Hub airports considered in this study. The Border and Outlying Hub airports that serve Iowa-related demand benefit from these enplanements. These benefits include the following:

- Collection of Passenger Facility Charges (PFCs)
- Receipt of FAA Entitlement funds
- Collection of Revenue from parking and concessions

Lost PFC Revenue

In current legislation, PFCs can vary by airport and range from $3.00 per boarding passenger to $4.50 per boarding passenger. Not all airports collect a PFC. Of the Border and Outlying Hub airports considered in this analysis, Eppley Airfield and Sioux Falls Regional do not collect PFCs. All other Border and Outlying Hub airports currently collect a PFC of $4.50.

Outgoing enplanements (with the exception of those served at Eppley Field and Sioux Falls where no PFC is collected) were multiplied by a PFC of $4.50. A total of 551,480 Iowa enplanements provide Border and Outlying Hub airports with PFC revenue. Applying a PFC fee of $4.50 per enplanement produces an estimate of $2,481,600 in PFC revenue that the Border and Outlying Hub airports realize.

This section bases its estimates of lost and potential revenue on current legislation. Legislation proposed to replace current law may make it necessary for all airports to impose a PFC just to maintain current income levels. Proposed replacement legislation may allow airports to increase their PFCs to $6.00 or $7.00 per enplanement. Assuming all Border and Outlying Hub airports had a PFC of $6.00, Iowa-associated PFC revenue for these airports could exceed $5.4 million each year. If the Border and Outlying Hub airports all had a PFC of $7.00, revenue for these airports from this source could increase to $6.3 million. This estimate of lost revenue would be up from the current estimate of $2.5 million.

Lost Entitlement Revenue

Six of the eight commercial airports in Iowa are classified by the FAA as "primary" airports. To qualify as a primary airport, annual enplanements must exceed 10,000. The six commercial airports in Iowa designated as primary airports are:

- The Eastern Iowa Airport
- Des Moines International Airport
- Dubuque Regional Airport
- Mason City Municipal Airport
- Sioux Gateway Airport
- Waterloo Regional Airport

Southeast Iowa Regional Airport and Fort Dodge Regional Airport are non-primary airports. These two airports each enplane fewer than 10,000 passengers annually. Each of these non-primary airports is now eligible for up to $150,000 in annual entitlement funding. It is important to note that if annual enplanements at these two airports (under current legislation) exceed 10,000, their annual entitlement funding would increase to $1 million.

Entitlement funding for primary airports is distributed on a sliding scale based on the number of annual enplanements the airport serves. Based on the estimated entitlements per enplanement shown in **Table 8-20**, there is an additional $2.6 million in lost entitlement funding from Iowa residents and visitors utilizing out-of-state airports.

Table 8-20
Iowa Entitlement Funding
Lost to Border and Outlying Hub Airports

Airport	Associated City	Estimated Iowa Generated Demand	Estimated Entitlement Per Enplanement	Iowa-Related Entitlement Revenue
Chicago-Midway	Chicago	23,700	$1.00	$23,700
Chicago-O'Hare	Chicago	23,700	$1.00	$23,700
Dane County Regional	Madison	11,200	$1.30	$14,600
Eppley Airfield	Omaha	308,200	$1.00	$308,200
Greater Peoria Regional	Peoria	11,100	$5.20	$57,700
Kansas City International	Kansas City	66,400	$1.00	$66,400
La Crosse Municipal	La Crosse	11,200	$5.20	$58,200
Lambert-St. Louis International	St. Louis	14,200	$1.00	$14,200
Minneapolis-St. Paul	Minneapolis-St. Paul	53,000	$1.00	$53,000
Quad City International	Moline	284,000	$5.20	$1,476,800
Rochester International	Rochester	53,000	$5.20	$275,600
Sioux Falls Regional	Sioux Falls	45,700	$5.20	$237,600
Iowa Associated Airline Employment		**905,400**		**$2,609,700**
Sources: Airport Websites, Wilbur Smith Associates				

Lost Concessions Revenue

Commercial airline travelers who leave Iowa and enplane at one of the Border or Outlying Hub airports also most often provide revenue to the airport they use in the form of parking income and/or purchases from concessionaires in the passenger terminal.

All 905,400 Iowa-related enplanements now using Border or Outlying Hub airports do not park a car when traveling. Information from the study's passenger surveys shows the average travel party size is 1.5 people. This translates into 603,600 cars leaving Iowa that carry the 905,400 enplanements. Of this total, it is estimated that 10 percent are not parking at airport-related parking facilities. These cars park at hotels, at friends and family, or they return to Iowa. This translates into 543,240 cars generating revenue from Border and Outlying Hub airports.

The daily long-term parking rates assessed at the Border and the Outlying Hub airports range from no parking fees at the Greater Peoria Regional Airport to $13 at Chicago-O'Hare. On average, the long-term parking fee charged at the Border and Outlying Hub airports is $7.75 per day.

It is estimated that the average trip that Iowa-related travelers make from an airport beyond the State lasts 4.4 days. Parking revenue associated with each trip is estimated at $34. When all factors are considered, it is estimated that annually "lost" parking revenue now approaches $18.5 million.

In addition to parking revenue, the Border and Outlying Hub airports also collect concession revenue from Iowa-related enplanements. The 2006 gross sales revenue generated by concessionaires located inside the airport terminals of the commercial airports in Iowa was divided by enplanements at these airports to estimate average concession expenditures per passenger. Using this methodology, the estimated concession expenditure per enplaning passenger is $6.30.[1] Total concession revenue from the 905,400 Iowa-associated enplanements that are accommodated by one of the Border or Outlying Hub airports equates to more than $5.7 million each year.

[1] Estimated from 2006 gross sales revenue as reported by airport operators divided by enplanements.

Summary of Lost Revenue

Table 8-21 provides a summary of revenue that is lost when an estimated 905,400 annual enplanements leave Iowa and start their trip from one of the Border or Outlying Hub airports. As this study's drive time analysis concluded, of the 905,400 annual enplanements that now leave Iowa, 381,600 of these enplanements are more conveniently served by one of the Border Airports. The remaining 523,800 enplanements that leave the State have been classified as leakage in this analysis. Table 8-21 compares lost revenue considering and comparing revenue that is lost when all 905,400 enplanements that leave the State are considered, versus the 523,800 that have been classified as true leakage.

Table 8-21
Estimated Lost Annual Revenue

	Lost Revenue at 905,400 Annual Enplanements (millions)	Lost Revenue at 523,800 Annual Enplanements (millions)
PFCs	$2.5	$1.4
Entitlements	$2.6	$1.5
Parking	$18.5	$10.7
Concessions	$5.7	$3.3
Total	**$29.3**	**$16.9**
Source: Wilbur Smith Associates		

ECONOMIC IMPACT SUMMARY

The 10 commercial airports considered in this analysis are a major catalyst for Iowa's economy. In 2006, the annual economic value of the airports was estimated at $1.3 billion. This includes expenditures and activities associated with on-airport businesses and activities and spending by thousands of visitors using aviation to reach Iowa, as well as the multiplier effect that goes also with that economic activity. Findings from this analysis include:

- Nearly 1 million visitors use the study airports travel to Iowa annually. Of the 1 million visitors who arrived in Iowa via the study airports, 85,000 arrived on general aviation aircraft. Spending by these visitors equates to $337.3 million in total economic output.

- In total, 14,209 Iowa residents owe their jobs, directly or indirectly, to the study airports. These employees represent nearly one percent of all the estimated 1.8 million jobs in Iowa[2].

- The 14,209 jobs tied to the study airports have an estimated annual payroll of $515.0 million.

- The total economic impact identified in this analysis ($1.3 billion) comprises 1.2 percent of Iowa's estimated Gross State Product of $113 billion[3].

Tables 8-22, **8-23**, and **8-24** summarize the overall Iowa-related economic impact supported by the study airports.

[2] US Bureau of Economic Analysis
[3] US Bureau of Economic Analysis

Table 8-22 provides a summary of economic impacts for the eight commercial airports in Iowa. As shown, the commercial airports in Iowa help to support a total of 11,190 jobs that have an annual payroll of $406.6 million. The eight commercial airports in Iowa account for a total of over $1.1 billion in total annual economic activity or output.

Table 8-22
Economic Impact Summary for Commercial Airports in Iowa

	Direct and Indirect Impacts	Induced Impacts	Total Impacts
Employment For Commercial Airports In Iowa			
On-Airport Operations Impact	3,699	2,619	6,318
Commercial Service Visitor Impacts	3,311	1,177	4,488
General Aviation Visitor Impacts	302	82	384
Total Employment	**7,312**	**3,878**	**11,190**
Payroll For Commercial Airports In Iowa			
On-Airport Operations Impact	$156,027,800	$89,010,200	$245,038,000
Commercial Service Visitor Impacts	$95,041,300	$53,153,600	$148,194,900
General Aviation Visitor Impacts	$8,558,600	$4,822,900	$13,381,500
Total Payroll	**$259,627,700**	**$146,986,700**	**$406,614,400**
Output For Commercial Airports In Iowa			
On-Airport Operations Impact	$532,351,100	$350,848,200	$883,199,300
Commercial Service Visitor Impacts	$134,023,800	$86,400,900	$220,424,700
General Aviation Visitor Impacts	$10,714,900	$7,288,100	$18,003,000
Total Output	**$677,089,800**	**$444,537,200**	**$1,121,627,000**

Sources: Wilbur Smith Associates and IMPLAN multipliers

Table 8-23 summarizes economic benefits that Iowa realizes from Eppley Field and Quad City International. Employment, payroll, and output impacts shown in Table 8-22 reflect only that portion of the economic impacts from these two Border Airports that accrue to Iowa. Iowa's economy benefits from an additional 3,019 jobs, $108.4 million in annual payroll, and $215.3 million in annual output from these Border Airports.

Table 8-23
Economic Impact Summary for Border Airports

	Direct and Indirect Impacts	Induced Impacts	Total Impacts
Employment For Border Airports			
On-Airport Operations Impact	574	433	1,007
Commercial Service Visitor Impacts	1,485	610	2,012
General Aviation Visitor Impacts	0	0	0
Total Employment	**2,059**	**1,043**	**3,019**
Payroll For Border Airports			
On-Airport Operations Impact	$25,725,665	$16,137,000	$41,862,700
Commercial Service Visitor Impacts	$42,643,500	$23,849,100	$66,492,600
General Aviation Visitor Impacts	$0	$0	$0
Total Payroll	**$68,369,200**	**$39,986,100**	**$108,355,300**
Output For Border Airports			
On-Airport Operations Impact	$79,341,200	$50,494,700	$129,835,900
Commercial Service Visitor Impacts	$60,134,200	$38,766,600	$98,900,800
General Aviation Visitor Impacts	$0	$0	$0
Total Output	**$131,298,100**	**$83,989,700**	**$215,287,800**

Sources: Wilbur Smith Associates and IMPLAN multipliers

Table 8-24 summarizes total annual economic benefit calculated in this study. As shown, aviation-related activities and visitor spending at all study airports support 14,209 jobs that have a total annual payroll of $515.0 million. In total, Iowa's economy benefits from $1.3 billion in annual economic impact from the study airports.

Table 8-24
Economic Impact Summary for All Study Airports

	Direct and Indirect Impacts	Induced Impacts	Total Impacts
Total Employment			
On-Airport Operations Impact	4,273	3,052	7,325
Commercial Service Visitor Impacts	4,796	1,787	6,500
General Aviation Visitor Impacts	302	82	384
Total Employment	**9,371**	**4,921**	**14,209**
Total Payroll			
On-Airport Operations Impact	$181,753,465	$105,147,200	$286,900,700
Commercial Service Visitor Impacts	$137,684,800	$77,002,700	$214,687,500
General Aviation Visitor Impacts	$8,558,600	$4,822,900	$13,381,500
Total Payroll	**$327,996,900**	**$186,972,800**	**$514,969,700**
Total Output			
On-Airport Operations Impact	$611,692,300	$401,342,900	$1,013,035,200
Commercial Service Visitor Impacts	$194,158,000	$125,167,500	$319,325,500
General Aviation Visitor Impacts	$10,714,900	$7,288,100	$18,003,000
Total Output	**$808,387,900**	**$528,526,900**	**$1,336,914,800**

Sources: Wilbur Smith Associates and IMPLAN multipliers

As this analysis has shown, the commercial airports in Iowa are major economic catalysts for the state and for the communities they serve. Additionally, commercial airports provide important qualitative benefits for businesses and residents of Iowa. Good and reliable airline service contributes to each airport's economic impact. The economic benefits highlighted in this report reflect the importance of community air service development initiatives to maintain and enhance air service in Iowa for continued economic return.