



**STATEWIDE ECONOMIC IMPACT OF AVIATION IN NORTH DAKOTA**

# Methodology Guide

This Guide is designed to provide a general overview of the process used to estimate annual aviation economic impacts for individual airports and for the state of North Dakota. The actual process to estimate impacts, especially in terms of the input/output modeling, was far more complex than is described in this guide. However, sufficient detail is provided to enable airport managers and others to lead informed discussions on study findings and results.

## How Are Economic Impacts for My Airport Reported?



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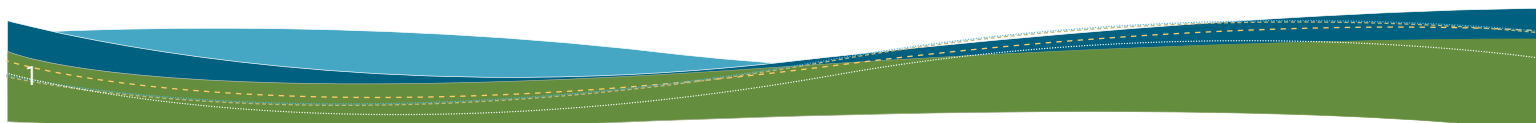
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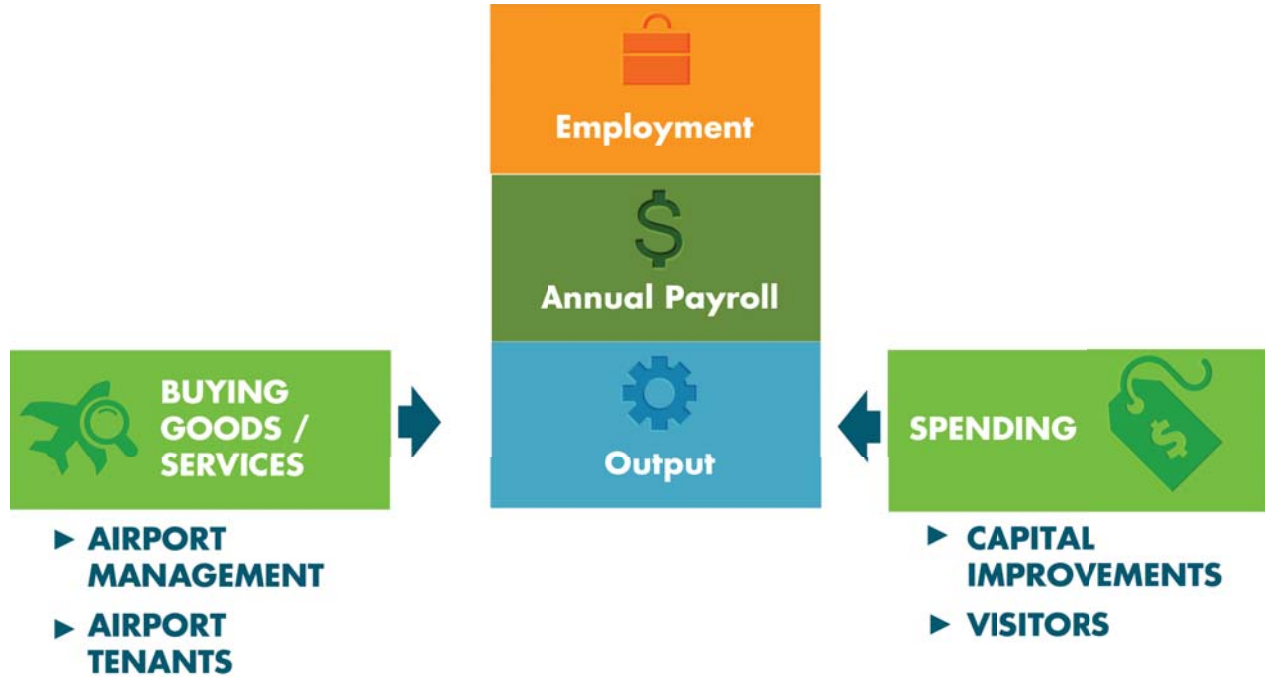
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## What Factors are Used to Quantify/Measure My Airport's Annual Economic Impacts?



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**General Aviation Visitors** - spending for hotels, food, ground transportation, retail, entertainment

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## Notes

## Example of Direct Impacts for Airport Management

DIRECT EMPLOYMENT	DIRECT PAYROLL	DIRECT OUTPUT
2	\$96,000	\$150,000

*Data Source: All direct impacts for the Airport Management category were provided by study airports.*

Direct Output for Airport Management reflects the cost to purchase goods and services to operate the airport.

Direct Output for Airport Management does not include payroll nor does it include any local share for capital investment projects.

Direct Output (cost of purchasing goods and services) **for this example** = \$150,000

Data collection **(example only)** showed that the average Annual Payroll for Airport Management jobs was \$48,000 ( $\$48,000 \times 2 = \$96,000$  Direct Annual Payroll).



## Example of Direct Impacts for Airport Tenants

DIRECT EMPLOYMENT	DIRECT PAYROLL	DIRECT OUTPUT
5	\$250,000	\$540,000

*Data Source: Most direct impacts provided by airport tenants; Dun & Bradstreet and Manta used to supply unreported information*

Direct Payroll and Direct Output vary by tenant type. For example, Payroll and Output for Aerial Applicators and FBO employees are not the same.

The example above reflects a blend of Employment, Payroll, and Output for all reported tenants. Payroll, employment, and output are **not** reported separately for each tenant in the report—each airport's tenant impacts for employment, payroll, and output are combined for all tenants.

Only economic impacts for aviation-related tenants/businesses are included in study results; activity for non-aviation tenants located at a study airport is not included in reported tenant impacts.

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## How Were **Direct Employment and Direct Payroll for Capital Investment** Estimated for My Airport?

IMPLAN Model\* ratios were used to convert Direct Average Annual Output to Annual Employment and Annual Payroll in the Capital Investment category

*\*Additional discussion of this model is provided later in the Guide.*

### **Example:**

1. Average Annual Capital Investment/Direct Annual Output for an airport is \$392,000.
2. Direct Annual Output of \$392,000 is entered into the IMPLAN model.
3. IMPLAN ratios indicate **(as an example only)** that each \$100,000 spent in the Capital Investment category supports one job; this means that for each \$100,000 spent in the Capital Investment category, one job is supported while the investment is taking place.
4. In this economic impact category, once spending to implement a project is complete, the employment, payroll, and output cease.
5. The ratio of jobs per Capital Investment Direct Output is not necessarily the same for each airport.
6. **For this example**,  $\$392,000 / \$100,000 = 3.92$  rounded to 4 jobs supported.
7. Direct Payroll per job for the Capital Investment category considers jobs in planning, engineering, permitting, and actual construction.
8. **For this example**, one job supported by Direct Capital Output has a Direct Annual Payroll of \$65,000
9. Four Direct Jobs x \$65,000 = \$260,000 in Direct Annual Payroll.

*Impacts in this category are supported only when spending is actually taking place.*

### **Notes:**

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## Example of Direct Impacts from Average Annual Capital Investment

DIRECT EMPLOYMENT	DIRECT PAYROLL	DIRECT OUTPUT
4	\$260,000	\$392,000

*Data Source: Output obtained NDAC, FAA, Airports, Tenants and employment and payroll estimated with IMPLAN model.*



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## How Were **Direct General Aviation Visitor** Impacts Estimated for My Airport?

## Average Annual General Aviation Visitor Spending

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## Direct Annual Output from General Aviation Visitors

North Dakota airports were the source of information used to estimate the number of annual general aviation visitors using each airport.

Estimates of general aviation visitors for each airport were bottom-up and airport-specific.

The AOPA rule of thumb approach can result in over- or underestimating general aviation visitors by airport.

Study estimates of general aviation visitors were sent to each airport for review prior to being used in this study.



## Steps Taken To Estimate General Aviation Visitors for Each North Dakota Airport

***Visiting aircraft are also referred to as transient aircraft.***

- » North Dakota airport managers provided estimates of weekly visiting (transient) general aviation aircraft.
- » Airport managers provided the fleet mix for weekly visiting general aviation aircraft.
- » Airport managers provided estimates of the number of travelers by visiting aircraft type.
- » Estimates of weekly visiting general aviation aircraft departures were translated into annual departures.
- » Estimates of annual visiting aircraft departures for each airport were compared to the airport's total annual itinerant departures.
- » Itinerant departures (source: FAA Form 5010) are conducted by both based and visiting aircraft.
- » Total annual visiting (transient) departures should always be less than total annual itinerant departures.
- » When an airport's annual visiting aircraft departures exceeded its total annual itinerant departures, additional review with the airport and NDAC staff was undertaken.

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## Example Calculation of Total Annual Visiting Aircraft Departures and General Aviation Visitors

Average visiting aircraft departures per week **for this example** are 10

10 weekly visiting general aviation aircraft departures x 52 weeks = 520 visiting general aviation aircraft departures per year.

10 weekly departing visiting aircraft = 2 (20%) jet (104 departures x 6) with 6 passengers/pilots  
(624 annual visitors)

3 (30%) twin-engine (156 departures x 3) with 3 passengers/pilots  
(468 annual visitors)

5 (50%) single-engine (260 departure x 2) with 2 passengers/pilots  
(502 annual visitors)

Data on visiting fleet mix and visitors per visiting aircraft were obtained directly from each North Dakota airport manager.

$624 + 468 + 502 = 1,594$  total annual general aviation visitors **for this example**.

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## Estimates of Direct Annual Output for General Aviation Visitors

Local spending by visiting aerial applicators is treated as general aviation visitor spending at applicable airports.



## Example Calculation of Total Annual Direct Output (Spending) for General Aviation Visitors

**Annual Visitor Spending**

**=**

**Direct Annual Output from General Aviation Visitors**

**Example:**

There are 1,594 annual general aviation visitors.

In this example, each general aviation visitor spent an average per trip \$60.

Average spending reflects visitors who only come for the day and do not have any off-airport spending, along with spending by visitors who stay for several days.

1,594 annual visitors X \$60 per visitor trip = \$95,640 Direct Annual General Aviation Visitor Output

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## Example of Direct Impacts from General Aviation Visitor Spending

DIRECT EMPLOYMENT	DIRECT PAYROLL	DIRECT OUTPUT / ANNUAL VISITOR SPENDING
1	\$25,000	\$95,460

*Data Source: Output obtained from Study Surveys/Study Estimates of Annual General Aviation Visitors by Airport, and employment and payroll estimates obtained from IMPLAN model.*



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## How Were **Direct Commercial Visitor Impacts** Estimated for My Airport?

$$\begin{array}{c} \text{Annual Commercial Visitor Spending} \\ = \\ \text{Direct Annual Output from Commercial Visitors} \end{array}$$

These impacts are applicable only to the eight commercial airports.

Airports/NDAC provided annual enplanements for each commercial airport.

Annual enplanements for Jamestown/Devils Lake are estimated based on first quarter enplanements after re-start of commercial airline flights.

Annual visitors estimated as a percentage of total enplanements; visitor/resident enplanement data obtained from USDOT 10% ticket sample.

Over 4,000 completed passenger surveys provided information on how much visitors who arrive on a commercial airline spend while in North Dakota.

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## Notes

## Example Calculation of Total Annual Direct Output (Spending) from Commercial Visitors

**Annual Commercial Visitor  
Spending**

**=**

**Direct Annual Output from  
Commercial Visitors**

### **Example:**

120,000 annual enplanements x 41.7% visiting =  
50,000 annual visitors

50,000 annual commercial visitors.

Average spending per visitor is \$500 (actual  
spending per visitor trip was derived from study  
specific passenger surveys; \$500 per visitor is used  
as an **example**).

Average spending reflects visitors who spend no  
night or multiple nights on their visit.

**For this example**, 50,000 annual commercial  
visitors X \$500 per visitor trip = \$25,000,000  
Direct Annual Commercial Visitor Output

## How Were **Direct Employment and Direct Payroll for Commercial Visitor Spending** Estimated for My Airport?

IMPLAN Model ratios were used to convert Direct Annual Output (Annual Commercial Visitor Spending) to Annual Employment and Annual Payroll.

### **Example:**

In this example, Direct Annual Output = \$25,000,000 (Annual Commercial Visitor Spending)

Output/spending is entered into the IMPLAN model.

**For this example**, each \$85,000 spent by commercial visitors supports one direct job.

The \$25,000,000 in Direct Annual Visitor Output divided by \$85,000 = 294 direct jobs supported by Commercial Visitor Spending **in this example**.

Annual Direct Payroll per job supported by visitor spending (hospitality, retail, entertainment) is \$25,000 **in this example**.

**For this example**, 294 direct jobs x \$25,000 = \$7,350,000 in Direct Annual Payroll

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## Example of Direct Impacts from Commercial Visitor Spending

DIRECT EMPLOYMENT	DIRECT PAYROLL	DIRECT OUTPUT / ANNUAL VISITOR SPENDING
294	\$7,350,000	\$25,000,000

*Data Source: Output obtained from Study Surveys/Estimates of Annual Commercial Visitors by Airport, and employment and payroll estimates obtained from IMPLAN model.*



## Notes

Jobs, payroll, and output for the doctor, grocer, and day care are reflected in the indirect economic impacts.

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## How Were **Total Economic Impacts** for My Airport Calculated?

**Total Annual Economic Impacts are the Sum of Direct and Indirect Impacts; the IMPLAN Model Actually Estimates Total Impacts. Indirect Impacts are Calculated by Subtracting Direct Impacts from Total Impacts.**

Each airport's **Total Annual Economic** reflects **Direct** and **Indirect** impacts.

Total annual economic impacts were calculated using the IMPLAN Model.

IMPLAN is an acronym for **IM** pact analysis for **PLAN**ning.

The input/output model used for North Dakota's Economic Impact Study was developed more than 35 years ago and is approved by FAA.

IMPLAN provides a system to estimate the interdependency between economic sectors using county economic data for building blocks.

IMPLAN data is continually updated; IMPLAN measures Indirect and Total impacts using current North Dakota data.

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## IMPLAN Estimates Total Annual Economic Impacts for Employment, Payroll, and Output

Direct economic impacts were estimated for employment, payroll, and output.

Direct economic impacts were estimated for the five economic activity centers: airport management, airport tenants, capital investment, general aviation visitors, and commercial visitors.

Separate model “entries” need to be made for direct employment, payroll, and output in each of the five categories.

Model entries consider the location of the airport in the state.

The same entry for Direct Employment in the Airport Management category and the Capital Investment category does **not** yield the same Total Employment.

The same Direct Impact entered into the model does **not** yield the same Total Impact for airports that are located in different parts of North Dakota.

There is no “one size fits all” multiplier; in fact, thousands of multipliers are involved in estimating Total Annual Economic Impacts for North Dakota airports.

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## Example of Direct, Indirect, Total Economic Impact Calculations For Airport Management

### Airport Management Total Annual Economic Impacts

	EMPLOYMENT	PAYROLL	OUTPUT
Direct	2	\$96,000	\$150,000
Indirect	1	\$77,760	\$112,500
<i>Multiplier</i>	<i>1.89</i>	<i>1.81</i>	<i>1.75</i>
<b>Total</b>	<b>3</b>	<b>\$173,760</b>	<b>\$262,500</b>

**In this example**, for Employment for every one (1) direct job in the Airport Management category, another .89 jobs are supported in the indirect category.

***Total Impact Divided by Direct Impact Yields the Implied Multiplier.***

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## Example of Direct, Indirect, Total Economic Impact Calculations for Commercial Visitors

### Commercial Total Annual Economic Impacts

	EMPLOYMENT	PAYROLL	OUTPUT
Direct	294	\$7,350,000	\$25,000,000
Indirect	88	\$3,160,500	\$9,000,000
<i>Multiplier</i>	<i>1.38</i>	<i>1.43</i>	<i>1.36</i>
<b>Total</b>	<b>382</b>	<b>\$10,510,500</b>	<b>\$34,000,000</b>

**In this example** for Employment for every one (1) direct job in the Commercial Visitor category, another .38 jobs are supported in the indirect category.

***Multipliers from North Dakota's Economic Impact Analysis were seldom above 2.0.***

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For this study, IMPLAN input/output models were constructed for each county, as well as for the state.

The state model estimates each airport's impact on the statewide economy; these are the impacts used to build the study's technical report and executive summary.

Local impacts (developed using county models) show each airport's impact on just its local (county or MSA) economy.

Local impacts for each airport will be provided in Appendix A of the final technical report.

Local Indirect and Total Impacts, generated using the county/local models, are almost always lower than Indirect/Total Impacts resulting from the state model.

The difference between state and local impacts are best explained by the inability to buy goods and services locally that still can be purchased within the state.

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## Notes

## Airport Management Total Annual Economic Impacts – State Model Example

	EMPLOYMENT	PAYROLL	OUTPUT
Direct	2	\$96,000	\$150,000
Indirect	1	\$77,760	\$112,500
<i>Multiplier</i>	<i>1.89</i>	<i>1.81</i>	<i>1.75</i>
<b>Total</b>	3	\$173,760	\$262,500

## Airport Management Total Annual Economic Impacts – County Model Example

	EMPLOYMENT	PAYROLL	OUTPUT
Direct	2	\$96,000	\$150,000
Indirect	<1	\$38,400	\$55,500
<i>Multiplier</i>	<i>1.28</i>	<i>1.40</i>	<i>1.37</i>
<b>Total</b>	2	\$134,400	\$205,500

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This guide provides a high-level overview of the process and approach used to estimate economic impacts for North Dakota's 89 public-use commercial and general aviation airports.

Each airport will receive electronic copies of all collateral materials noted above.

Questions on the study approach can be directed to the North Dakota Aeronautics Commission or to Jviation, the study consultant (Barb.Fritsche@Jviation.com).

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