

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.

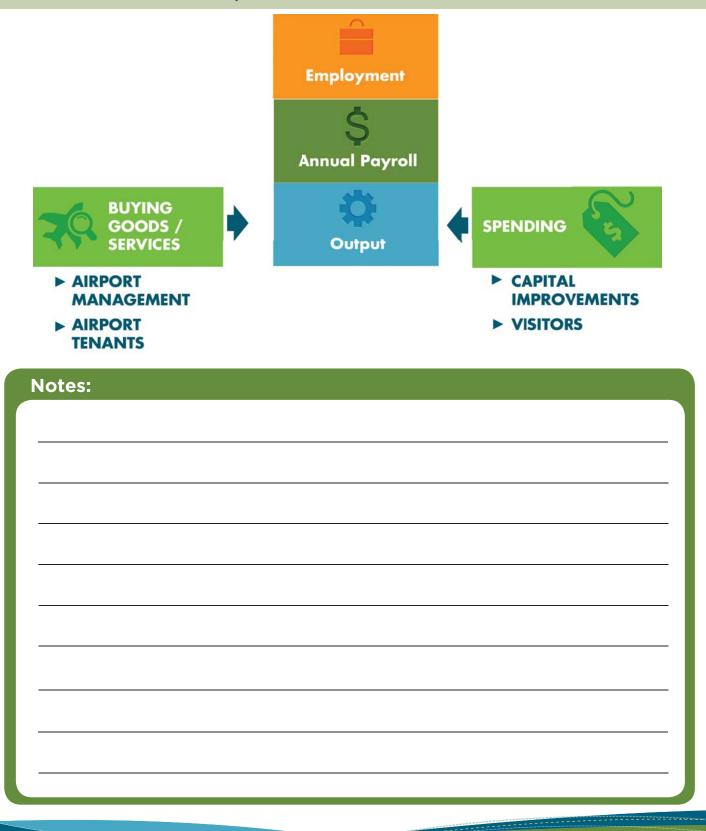
How Are Economic Impacts for My Airport Reported?



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





Where Do My Airport's **Direct Economic Impacts** Come From?

All Direct Economic Impacts Come from One of <u>Five</u> Economic Activity Centers:



On-Airport Related Activities

Airport Management - operational, administrative, and maintenance functions

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Airport Tenants - businesses providing aviation or customer support services

Capital Investment – federal, state, local, and private investment for improvement/expansion projects



Commercial Visitors – spending for hotels, food, ground transportation, retail, entertainment

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



How Were **Direct Airport Management/Tenant Impacts** Estimated for My Airport?

Direct Economic Impacts were collected for:

- 1. Employment
- 2. Payroll
- 3. Output

Sources of Information

- » Surveys/Phone Interviews/On-Site Visits with Airport Managers and Airport Tenants
- » Dun & Bradstreet/Manta Databases (tenants only)

Things to Remember

- Part-time and seasonal employment were converted to full-time equivalent jobs (FTE) based on hours worked directly in support of the airport.
- » Employment for Airport Management includes both on- and off-airport employment as applicable.
- » Tenant impacts include only businesses that are aviation related or dependent.







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Example of Direct Impacts for Airport Management

DIRECT	DIRECT	DIRECT
EMPLOYMENT	PAYROLL	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 x 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 Was Direct Capital Investment/Output

Estimated for My Airport?

Average Annual Capital Investment

Direct Annual Output from Capital Investment

Capital investments can change significantly year-to-year and between reporting periods for economic impact studies.

A three-year average of all federal (FAA), state, local, and private investment was used to help "smooth" changes in Direct Capital Investment (Output) and to present a better representation of economic impacts for Capital Investment at each North Dakota airport.

Sources for Direct Capital Investment information include NDAC, FAA, airport management, and airport tenants.

Economic impacts in this category last only while spending is "active."

Direct Output for Capital Investment is equal to the average of three years of spending (2012-2014) for capital projects.





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.

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Example of Direct Impacts from Average Annual Capital Investment

DIRECT	DIRECT	DIRECT
EMPLOYMENT	PAYROLL	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

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

Spending per general aviation visitor trip was estimated from the Study's general aviation user survey; surveys were distributed by more than 60 airports and FBOs statewide.

Survey results identified the percentage of day trips on general aviation planes with no overnight stay.

Spending for all visitors was allocated (as appropriate) to hotels, food, ground transportation, retail, and entertainment.

Survey results, airport attributes (facilities/services), community size, community location, and other factors were used to establish spending per general aviation visitor trip for each airport.

Spending per visitor trip varies by airport and between commercial and general aviation airports.

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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How Were **Direct** Employment and Payroll from General Aviation Visitor Spending Estimated for My Airport?

IMPLAN Model ratios were used to convert Direct Annual Output (Annual Visitor Spending) to Direct Annual Employment and Direct Annual Payroll in the General Aviation Visitor Category.

Example:

Direct Annual Output = \$95,460 (Annual General Aviation Visitor Spending)

Output/spending is entered into the IMPLAN model.

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

For this example, \$95,460/\$85,000 = 1.1 jobs rounded to 1 direct job supported by Direct Annual Output from General Aviation Visitor Spending

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

1 direct job x \$25,000 = \$25,000 in Direct Annual Payroll **for this example.**



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.





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

Annual Commercial Visitor Spending

Direct Annual Output from Commercial Visitors

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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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.





What are Indirect Economic Impacts?

Once direct impacts for employment, payroll, and output enter the economy, they generate successive waves of additional economic activity.

The spin-off activity from all direct impacts is referred to as indirect economic impact.

Indirect impacts are also sometimes referred to as "multiplier" impacts.

Example: An airport employee uses their paycheck to pay a doctor, buy groceries, and pay for day care.

Direct payroll and direct employment that started at the airport helps support portions of all of the jobs, payroll, and output associated with the three activities in the above example.

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





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	ουτρυτ
Direct	2	\$96,000	\$150,000
Indirect	1	\$77,760	\$112,500
Multiplier	1.89	1.81	1.75
Total	3	\$173,760	\$262,500

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	ουτρυτ
Direct	294	\$7,350,000	\$25,000,000
Indirect	88	\$3,160,500	\$9,000,000
Multiplier	1.38	1.43	1.36
Total	382	\$10,510,500	\$34,000,000

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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Local versus State Economic Impacts for Your Airport

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.



Comparison of State and Local Impacts

Direct Impacts Are the Same, Indirect and Total Impacts Are Lower for County Models

Airport Management Total Annual Economic Impacts – State Model Example

	EMPLOYMENT	PAYROLL	Ουτρυτ
Direct	2	\$96,000	\$150,000
Indirect	1	\$77,760	\$112,500
Multiplier	1.89	1.81	1.75
Total	3	\$173,760	\$262,500

Airport Management Total Annual Economic Impacts – County Model Example

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



Summary

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.

The NDAC Statewide Economic Impact Study provides other products to support information contained in this Guide, including: Technical Report, Executive Summary Report, Legislative Reports, Individual Airport Reports, Study Factsheet, and PowerPoint Presentation of Economic Impact Results.

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).









For more information contact: North Dakota Aeronautics Commission P.O. Box 5020 Bismarck, ND 58502 701.328.9650 http://www.aero.nd.gov

Prepared by:

