Airport Economic Impact Methods and Models

DETAILS

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP SYNTHESIS 7

Airport Economic Impact Methods and Models

A Synthesis of Airport Practice

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

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Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

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FOREWORD

By Staff
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Airport operators, service providers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the airport industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire airport community, the Airport Cooperative Research Program authorized the Transportation Research Board to undertake a continuing project. This project, ACRP Project 11-03, "Synthesis of Information Related to Airport Practices," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an ACRP report series, *Synthesis of Airport Practice.*

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

This synthesis documents how airport economic impact studies are currently conducted. It focuses specifically on the methods and models used to define and identify, evaluate and measure, and communicate the different facets of the economic impact of airports. The report discusses the various analysis methods, models, and tools that are available for local airport economic studies, as well as applicability and tradeoffs, including limitations, trends, and recent developments.

This study relies on three distinct data collection efforts: surveys targeting both users and authors of economic impact studies to collect information on the extent of the studies, their motivation and use; a literature review covering the economic impacts and community benefits of airports; and a case study analysis, where four specific studies were selected to illustrate various approaches to assessing economic impact.

Joakim Karlsson, Hoyle, Tanner, and Associates, Manchester, New Hampshire, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

AIRPORT ECONOMIC IMPACT METHODS AND MODELS

SUMMARY

The economic impact study is a tool frequently used by airport operators, planners, and regulatory agencies to measure the economic value that an airport contributes to its local and regional surroundings. It has become one of the standard airport planning documents, along with the airport master plan update, noise compatibility study, and required environmental documents. The traditional methods used in airport economic impact studies are based on guidance material provided at least 20 years ago. These methods, which focus on applying multipliers to airport jobs and visitor spending, may be inadequate today for capturing the unique value of an airport to its community. A new guide might be desirable in the future. This synthesis study documenting the state of practice today is the first step toward a new guide.

The focus of this synthesis is on how airport economic impact studies are conducted today. This project focuses specifically on methods and models used to (1) define and identify, (2) evaluate and measure, and (3) communicate the different facets of the economic impact of airports. This report synthesizes information received from nearly 70 organizations that were surveyed to collect information on the extent of these studies, their motivation, and use. This report also contains a review of more than 30 examples from the literature of studies on economic impacts and community benefits of airports. Finally, this report presents four case studies to illustrate the various analysis methods, models, and tools that are available and used for local airport economic studies. Based on the survey results, literature review, and case studies, this synthesis document discusses the applicability of the various methods and models, including their limitations.

Currently, the principal methods for determining the economic impact of an airport include the following:

- Input–output method: Typically measures three separate effects—direct, indirect, and induced effects. Direct effects include employment and output generated directly by the airport. Indirect effects represent employment and output generated by firms primarily off-airport, but whose activities are attributable to the airport. Induced effects are the multiplier effects caused by successive rounds of spending throughout the economy as a result of an airport's direct and indirect effects. In this method, an airport's total economic impact is the sum of the direct, indirect, and induced effects.
- Collection of benefits method: Quantitative or qualitative measures of benefits and costs brought about by an airport, including time saved; costs avoided by using air transportation; capacity improvements from reliever airports; and stimulation of business, recreation, commercial activities, and community benefits.
- Catalytic method: Measurement of spillover impacts or how the airport benefits performance in the supply-side of the economy including impacts on investment, trade, and overall productivity of the economy. Unlike the collection of benefits methods, catalytic impacts are usually quantified in monetary terms.

Of these, the first two are older methods, whereas the third is relatively new and does not commonly appear in the U.S. literature. By far the most prevalent of these methods is the input–output method, which is borne out both by the survey results and the literature review.

The surveying effort consisted of two separate online surveys administered as part of this synthesis study. The first was intended for users of economic impact studies. These users can be categorized as belonging to one of four groups:

- General aviation airports
- Non-hub commercial airports
- Hub airports
- State and regional aviation, transportation, or planning agencies.

A total of 58 recipients participated in the user's survey. The second survey was directed at authors of economic impact studies, primarily consulting firms. Eleven recipients participated in the author's survey. The survey recipients were distributed broadly across the United States.

According to the survey results, the main reason for conducting an economic impact study was to measure the airport's significance to its local community, most commonly to justify airport investment or expansion. The most frequently measured variables included employment, wages, local and regional spending, tourism, and air traffic levels. The most commonly cited methods were the economic input–output model and collection of benefits method, supplemented by qualitative surveys.

A clear majority of survey recipients, both users and authors, expressed confidence in the validity of the results of economic impact studies and rated them as useful or very useful. However, an equally clear majority reported that no follow-up or assessment was done. Also, a narrow majority of users reported that economic impact studies are only sometimes used as a factor in encouraging substantive change.

A number of trade-offs and limitations in the practice of airport economic impact studies were identified through the survey and literature review. These do not necessarily represent shortcomings in the methods, but instead highlight the risk of misapplying a method, the challenge of collecting proper input, or the possibility of misinterpreting results. They include:

- Cost of preparing economic impact studies and/or purchasing economic data;
- Insufficient data, sometimes caused by the lack of participation by fixed-base operators;
- Complexity of existing models;
- Lack of standards regarding definition of variables, impact areas, and application of multipliers;
- Omission of offsetting impacts;
- Static nature of results, causing them to quickly become outdated in part because studies rarely incorporate periodic updates; and
- Lack of validation or assessment; that is, the inability to corroborate the results of the airport economic impact study.

Aviation trends that have received specific attention in airport economic impact studies include growth in air freight; non-aviation commercial development attracted to the vicinity of the airport; use of air transportation in supply chains and just-in-time delivery; and reliance on aviation by specific industries, such as research and development, biotech, banking, and universities. However, only a minority of respondents replied taking into account growth in business aviation and fractional ownership, globalization, or the emergence of very light jets.

A number of refinements to existing methods were documented in the survey and literature review. Most of these represent evolutionary improvements to address existing limitations. Examples of such improvements include:

- Defining which impacts can clearly be linked to the operations of the airport,
- Relying more on direct and indirect impacts, and less on multiplier effects,

- Focusing on the incremental value of the airport by considering the opportunity cost of using the airport property for aviation purposes,
- Defining which impacts are additive, and
- Assessing offsetting impacts in addition to positive ones.

There have also been innovations in defining new impact areas that previously have not been considered in traditional methods. Examples of these include investment impacts and tax revenue impacts. The catalytic method takes a more comprehensive look at spillover effects on the supply-side of the economy, quantifying a broad range of effects including investment, trade, and productivity improvements.

As of the time of this writing, there is no standardization of these refinements and innovations. Also, no central clearinghouse exists for information directed at users or authors of economic impact studies. Consequently, the topic of airport economic impact studies is ripe for developing guidance and conducting research.

CHAPTER ONE

INTRODUCTION

BACKGROUND

This report summarizes the results of ACRP Topic S03-03, *Airport Economic Impact Methods and Models.* This chapter reviews the study's objectives, provides some background, and summarizes the traditional methods for conducting airport economic impact studies.

This synthesis documents how airport economic impact studies are conducted today, specifically covering methods and models used to (1) define and identify, (2) evaluate and measure, and (3) communicate the different facets of an airport's economic impact and the benefits that it provides to communities and regions. Note that economic impact studies are quite different from the cost–benefit analyses performed to justify specific investments in airport projects. However, economic impact analyses can be used as inputs to cost–benefit decisions, and are also frequently used as background material for letters of intent and environmental planning documents.

In this report, "method" means a basic approach to measuring economic impact, such as the input–output method. "Model," on the other hand, means a specific implementation of a method, such as the Regional Input–Output Modeling System (RIMS II) or Impact Analysis for Planning (IMPLAN).

One hypothesis framing this synthesis study is that traditional methods for airport economic impact studies may have become inadequate for capturing the unique value of the airport to its local community. Some newer studies have moved beyond the traditional method, promulgated more than 20 years ago, that focused on applying multipliers to airport jobs and visitor spending. This synthesis study documents the newer issues and tools that comprise the state of practice today, but also confirms that the majority of studies still use traditional methods.

This study relies on three distinct data collection efforts, which were conducted in parallel. The first is a surveying effort, targeting both users and authors of economic impact studies, to collect information on the extent of the studies, their motivation, and use. These surveys are described in more detail in chapter two. The second is a review of the literature of newer studies on the economic impacts and community benefits of airports. A summary of the literature search is provided in chapter three. The third is a case study analysis, in which four specific studies were selected to illustrate various approaches assessing economic impact. These case studies are described in chapter four. Findings derived from all three data collection efforts are summarized in chapter five, focusing on a discussion of limitations and trade-offs, a description of new methods and models, and recommendations for future research.

TRADITIONAL METHODS FOR ECONOMIC IMPACT ANALYSIS

Agencies, including airport operators and managers, conduct economic impact studies for several reasons: to demonstrate the significance of their airport, to persuade policy makers to protect airports against adjacent incompatible uses, and as a rationale to pursue projects and business lines that would add vitality to regional interests. The results of economic impact analyses are also used by the FAA as back-up documentation in letters of intent, required environmental documents, and evidence in cost–benefit analysis for specific airport improvements.

The three most common methods to analyze aviation impacts are:

- Input–output method—measures the sum of:
  - Direct impacts,
  - Indirect impacts, and
  - Induced (i.e., multiplier) impacts.
- Collection of benefits method—describes beneficial economic activities associated with an airport or airport system (e.g., one in three workers employed in Montana works for a company that uses the Smith Airport).
- Catalytic method—spillover effects on the supply-side of the economy, such as increased investment and productivity improvements.

Of these, the input–output and collection of benefits methods should be viewed as an older generation of methods. Guidance on these methods has been provided by the FAA since at least the mid-1980s, through work sponsored by the FAA and prepared at the U.S. DOT Volpe Transportation Systems Center (*1*). The catalytic method can be considered as one of the newer methodologies of measuring economic impact. Some studies also use multiple methods or perform "what if" analyses based on the results of one or more of the methods described previously.

Of these three methods, by far the most prevalent is the input–output method, which typically measures the sum of direct, indirect, and induced economic impacts (or multiplier effects). Each input–output study has specific definitions of impact areas that are related to economic activity measured as a flow of dollars. In general, these impact areas are defined as:

- Direct impacts: The direct impact results from spending in the local area by visitors who arrive by air, as well as spending in the local area for goods and services by airport tenants.
- Indirect impacts: The estimated flow of dollars generated from the supply of materials, goods, and services attributable to the airport by off-airport entities.
- Induced impacts: The multiplier effect of respending the dollars generated through direct and indirect activities. Spending resulting from direct and indirect activities is spent again by the recipient employees and local businesses. Employees use their salaries and wages to purchase goods and services from other businesses. Businesses make their own purchases and hire employees, who also spend their salaries and wages throughout the local, regional, and state economies.

It should be noted that individual studies vary in their exact definitions of these impact areas. Direct, indirect, and induced impacts are sometimes referred to as first-, second-, and third-round impacts. The third round of impacts is typically the largest, because it represents a recirculation of the first two rounds.

Variables or indices used to measure the flow of dollars within each of the three methods typically include the following:

- Employment—jobs in the aviation industry, jobs in sectors that support aviation or use aviation, etc.
- Payroll—wages paid to workers employed in the aviation industry or workers who support or use the aviation industry.
- Output—value of goods sold, value of services sold, capital expenditures, spending by visitors, operating budgets for aviation-dependent government agencies, etc.
- Multiplier effect—respending of dollars attributed directly or indirectly to an airport.
- Quasi-economic—loosely associated economic facts (usually collected through surveys).
- Qualitative—economic impacts related to safety, agriculture, medical uses, protection of open space, pest control, fire control, recreation, access to the national aviation system, military, wildlife management, disaster relief, traffic reporting, search and rescue, etc.

EVOLVING TRENDS IN AVIATION THAT AFFECT ECONOMIC IMPACT METHODOLOGIES

The role of local airports in regional and state economies has substantially changed in the past two decades and continues to evolve. The increased efficiency of air travel has led to changes in the relationship between airports and regional economies. Air cargo has the fastest growth rate of any freight mode, and has gained economic importance with the growth of national and global markets and supply chains for manufactured goods. General aviation specialty segments, such as corporate jets or aircraft maintenance, have also emerged. Passenger air travel has taken on increased importance for education, research and development (R&D), technology, and tourism clusters. The economic role of larger airports has also changed with the growth of international gateways, shifts in passenger and freight hubs, and changes in airline business practices. Fractional ownership has established itself as a business model and, at the time of this writing, there are expectations in parts of the industry that very light jets will create significant business opportunities. Maybe more significantly, aviation has become embedded in an increasingly globalized economy in a way that was not predicted when the traditional economic impact methodologies were developed.

The intricate role of airports in the economy has made the science of economic impact analysis more complicated, justifying a new look at how such studies are conducted. This synthesis report attempts to document to what extent users and authors of economic impact studies have begun to address these evolving trends. The survey, in particular, contains specific questions addressing evolving trends. The results of these and a broad range of questions documenting the use of economic impact studies are summarized in chapter two.

CHAPTER TWO

SURVEYING THE CRAFT OF AIRPORT ECONOMIC IMPACT STUDIES

SURVEY METHODOLOGY

An online survey program was utilized to design and implement two surveys, one for users of economic impact studies and one for authors. A standalone version of the survey was made available to those who did not complete the survey online and those results were then manually entered into the survey response database. Messages were distributed directly from the online survey program, as were reminders to complete the survey. These messages also provided background on the ACRP program and reiterated the purpose and importance of this study.

The questions were formulated to elicit consistent and comparable responses to draw reasonable and sound conclusions. The surveys are reproduced in Appendix A. Each of the two surveys was designed to address the specific concerns of both users and authors of airport economic impact studies. The user's survey was directed at four different groups: General aviation airports, non-hub commercial airports, hub airports, and state/regional agencies. In some cases, the state/regional agencies represented groups of airports, particularly smaller general aviation airports. It should be noted that for the purpose of this synthesis report, hub airports are defined in accordance with the National Plan of Integrated Airport Systems (NPIAS).

The recipients of the author's survey included professionals from academia, consulting firms, and private research groups. Online search engines were used to identify authors of recent airport economic impact studies. Such studies were also found on the websites of state departments of transportation (DOTs), airport commissions, and individual airports. Attempts were made to contact all authors of the economic impact studies.

Both surveys contained similar questions regarding the utility, validity, and reach of the economic impact studies. The author's survey specifically addressed the methodology used.

Before the survey's launch, recipients were contacted by telephone and/or e-mail to verify their interest in participating in the ACRP study and to confirm current contact information. Table 1 details the number of survey recipients contacted, how many agreed to participate, and how many ultimately completed the survey. Participation goals were set for each type of survey recipient. The final survey participation count represents 94.6% of the original participation goals. Of the 87 recipients who expressed an interest in completing the survey, 69 did, representing a 79% response rate. This is reasonably close to the 80% target response rate specified for ACRP synthesis studies. However, some categories did not meet the 80% goal, namely general aviation and non-hub commercial airports.

Note that the survey was designed so that users could not progress to the next question without responding. Consequently, the response rates for individual questions are identical to the survey response rate.

RESULTS

There were 69 total respondents for the two surveys: 58 responded to the user's survey and 11 responded to the author's survey. Appendix B contains a statistical summary of the survey results, including all written comments provided by the survey recipients. As shown in Figure 1, the respondents were fairly evenly distributed across the continental United States.

Of the 58 respondents to the user's survey, 46.6% work in airport management, 20.7% work in state government, 13.8% are members of an airport commission or authority, 10.3% work in local government, 1.7% work as consultants, and 6.9% responded "other." Of the authors who participated in the study, 36.4% were from private consulting firms, 54.5% were from academia, and one respondent (i.e., 9%) was from a state DOT.

Throughout this synthesis report, survey results from both groups are presented side by side. The tables are sorted according to the responses from the users of economic impact studies, the larger of the two groups of survey recipients. However, it should be noted that although the users represent the larger group, they are generally responding to one, or at most, a few studies. The authors, on the other hand, are responding in regards to a larger number of studies. More than 80% of both groups regarded themselves as "familiar to very familiar" with airport economic impact studies, although the majority indicated that they had completed, sponsored, or supervised five or fewer such studies. Three of the authors had completed more than 20 studies, but only one of the users had experience with more than 20 studies.

Both survey groups were comprised of professionals with significant experience. The average years of experience for

TABLE 1
SUMMARY OF SURVEY RECIPIENTS

Type	Participation Goal	Survey Recipients Initial Count	Confirmed to Take Survey	Survey Completion Count	Achieved Goal
Agency	10	18	17	16	160%
General Aviation	20	22	18	15	75%
Hub	10	25	19	14	140%
Non-Hub	20	26	22	13	65%
Authors	10	15	11	11	110%
Total	70	106	87	69	95%

the users and authors of airport economic impact studies were 20.9 and 15.6, respectively.

The intended audiences of the airport economic impact studies were primarily government agencies, citizen/resident groups, and airport management. The users of the airport economic impact studies also indicated that the intended audiences included elected officials, the business community, airline officials, and other, broader, sets of stakeholders.

Uses of Economic Impact Studies

The surveys examined the particular reasons to initiate an airport economic impact study. Both the users and authors groups indicated that the main reason was to measure the significance of the airport to the local community (93.1% and 100%, respectively). However, in practice, this result merely confirms the working definition of what an economic impact study is meant to accomplish. A more meaningful description of the use of such studies is found by examining the next highest ranking selections. Of these, the most frequently cited use is to justify airport investment or expansion (67.2% and 63.6%, respectively). The next three most commonly cited reasons included measuring the significance of the airport to specific industries, formulating an economic development or a planning initiative, and supplementing the airport system plan. These reasons were all cited by more than 40% of users and more than 50% of authors. Other reasons given for the initiation of airport economic impact studies are detailed in Table 2.

There is an interesting discrepancy between the two groups with regard to the studies' use as a mechanism for determining allocation of matching funds. The users considered it much less likely a factor than did the authors of the studies (3.4% vs. 34.6%). The users were also less likely than the authors to regard the studies as a tool to obtain financial support from other government entities (29.3% vs. 54.5%).

Figure 2 shows how the results to this survey question varied by type of airport. The results are relatively cohesive. More general aviation airports than commercial airports indicated

FIGURE 1 Location of respondents for user's survey.

TABLE 2
SUMMARY OF RESULTS FOR INITIATION OF STUDIES

Reasons for Economic Impact Studies	Users Response (%)	Author's Response (%)
To measure significance of the airport(s) to the local community	93.1	100
To justify airport investment/expansion	67.2	63.6
To measure significance of airport to specific industries	44.8	54.5
To formulate economic development/planning initiative	43.1	63.6
To supplement the airport system plan	43.1	63.6
To obtain financial support from other municipalities or from county/region level	29.3	54.5
Other	13.8	9.1
It was an academic initiative	5.2	0.0
To determine allocation of matching funds	3.4	36.4

that an objective was to measure the significance of the airport to specific industries. Non-hub airports were more likely than either general aviation or hub airports to use the economic impact study to supplement an airport system plan. Hub airports were less likely to use economic impact studies to obtain support from other local government entities, perhaps indicating greater financial independence at such airports.

Additional comments regarding the reasons for conducting airport economic impact studies included educating stakeholders about the importance of the airport, attracting investment, justifying noise issues, improving community and public relations, and developing political support for aviation programs or expansions.

Key Benefits of Airport Economic Impact Studies

An open-ended survey question asking for the top three benefits of airport impact studies identified by the users resulted in a wide variety of responses. These ranged from developing community-focused educational tools to influencing government authorities to fund airport improvements. Overall, the emphasis was to provide quantitative and qualitative data

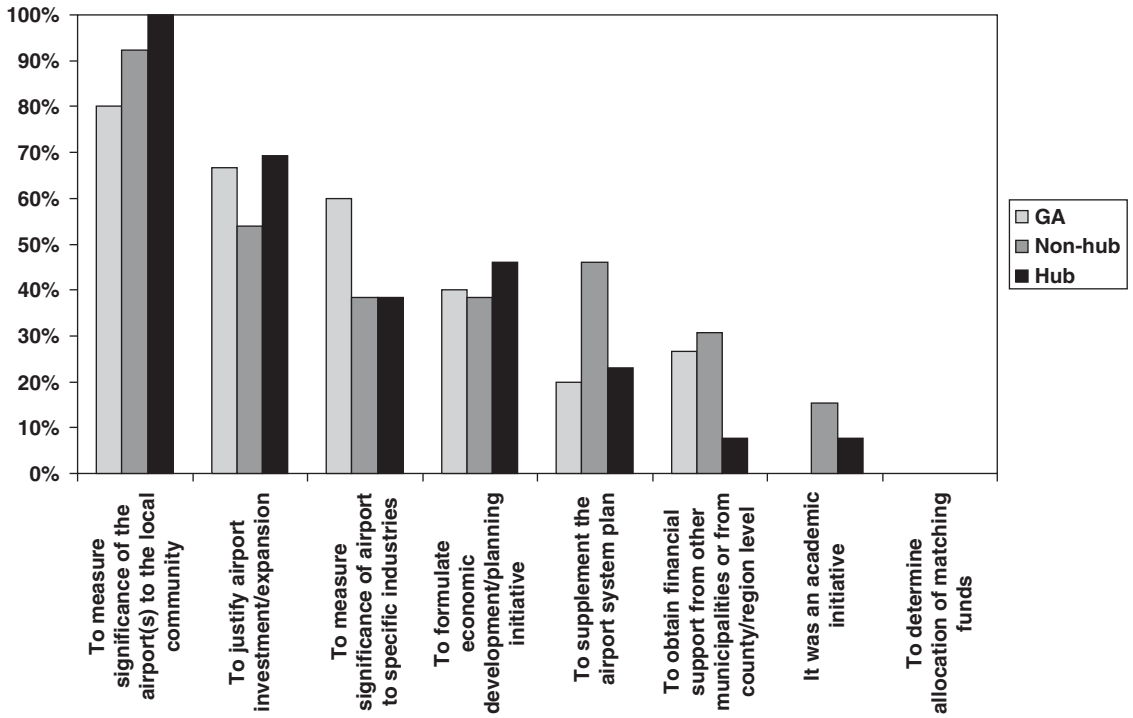

FIGURE 2 Reasons for economic impact studies by type of airport.

TABLE 3
SUMMARY OF RESULTS FOR VARIABLES MEASURED

Variables Measured	User's Response (%)	Author's Response (%)
Employment	96.6	100.0
Wages	93.1	90.9
Local/Regional Spending	79.3	90.9
Tourism	63.8	90.9
Air Traffic Levels	62.1	54.5
Cargo/Tonnage	52.2	36.4
Military/Emergency Services	24.1	54.5
Time Savings	24.1	18.2
Other	22.4	36.4

to illustrate the airport's importance to a region. According to the survey responses, the objectives included (among others): education, public relations, and justification for airport improvement funding. The key benefits identified by the authors included building community awareness, generating support for funding, and educating the community about the economic value of the airport.

Variables Measured

The surveys examined which variables were measured as part of airport economic impact studies. Table 3 shows that the responses to this question rank similarly across both groups. The exception is "military/emergency services," which was cited much more frequently by authors than by users. The leading variables included employment, wages, local and regional spending, tourism, and air traffic levels, which were reported by a majority in both groups of survey recipients. Variables identified in the category "other" included off-airport impacts, tax revenues generated by airports, induced economic impacts, investment impacts, regional economic growth, airport construction, and benefits to local businesses.

Figure 3 highlights differences among the various classes of airports in response to this question. The results indicate that hub airports, which focus more on tourism and cargo, include more variables than general aviation and non-hub airports.

Data Sources

The surveys conducted for this study also identified sources of data used for airport economic impact studies including airport authorities, airport planners, tenants, industries located on the airport, and local businesses. Other airport users, visitors, pilots, and passengers are also regularly surveyed as part of economic impact studies. Additional data sources used for impact studies included FAA aircraft activity databases, census data, other government data, Bureau of Economic Analysis (BEA) RIMS data, private-sector economic growth data, and information from airport master plans.

Models and Methodologies

An important part of the survey was to examine which specific models and methodologies are currently being used and which have been found to be the most effective. Table 4 shows detailed results from the survey questions on methodologies. Figure 4 provides a graphical summary of the results from this question, showing only the share of survey recipients that answered either "extremely useful" or "very useful."

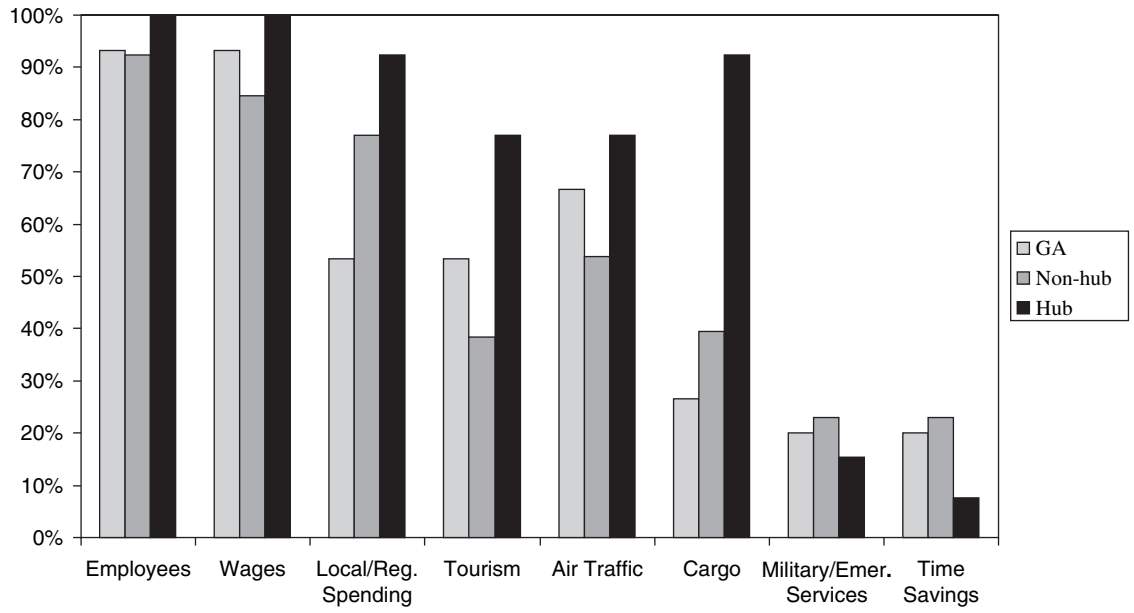

FIGURE 3 Variables measured by type of airport.

TABLE 4
USEFULNESS OF THE ECONOMIC IMPACT STUDIES

Methodology	Ranking	User's Response (%)	Author's Response (%)
Economic Input–Output Model [e.g., direct, indirect, induced multiplier or Regional Input–Output Modeling System (RIMS)]	Extremely useful	41.4	72.7
	Very useful	39.7	18.2
	Useful	12.1	9.1
	Not very useful	3.4	0.00
	Not used in study	1.7	0.00
	Not applicable	1.7	0.00
Community Benefits	Extremely useful	34.5	9.1
	Very useful	31.0	18.2
	Useful	19.0	45.5
	Not very useful	3.4	9.1
	Not used in study	3.4	9.1
	Not applicable	8.6	9.1
Qualitative Survey (survey of airport users, passengers, etc.)	Extremely useful	22.4	36.4
	Very useful	32.8	36.4
	Useful	25.9	9.1
	Not very useful	3.4	0.00
	Not used in study	5.2	0.00
	Not applicable	10.3	18.2
"What-if" Analyses	Extremely useful	12.1	9.1
	Very useful	8.6	9.1
	Useful	24.1	9.1
	Not very useful	5.2	18.2
	Not used in study	19.0	18.2
	Not applicable	31.0	36.4

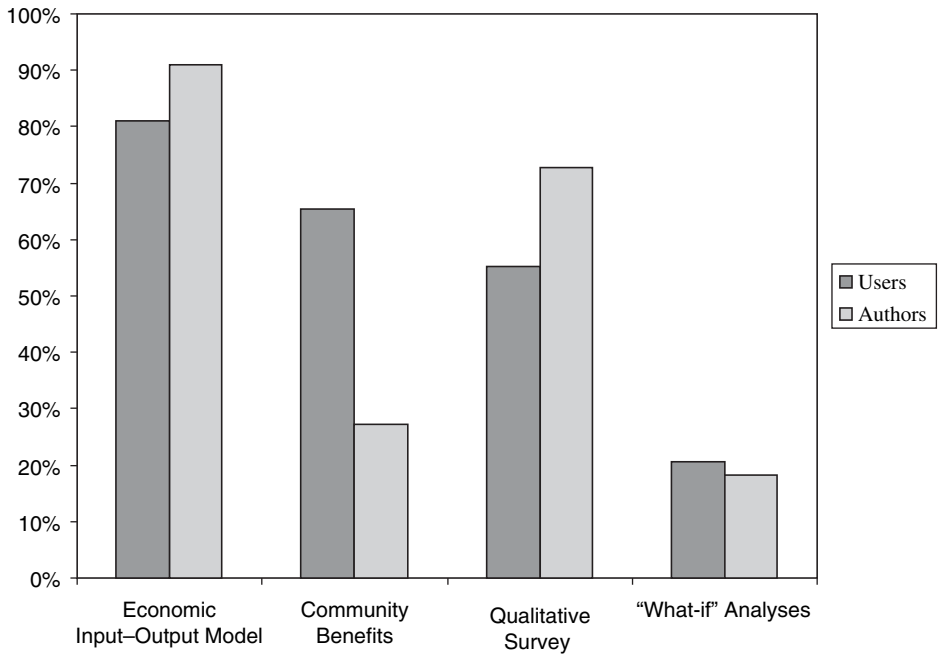

FIGURE 4 Share of respondents identifying method as "extremely" or "very" useful.

The input–output method was ranked as the most useful by both groups. The majority of both groups also indicated that the input–output method and the use of qualitative surveys were either "very useful" or "extremely useful." The groups differed in their evaluation of measuring community benefits. The majority of users found this method "very useful" or "extremely useful," compared with only 27.3% of authors. The majority in both groups described what-if analysis modeling as either not used in the studies or not applicable. In an explanatory note, one user suggested that community benefits and what-if analyses were not methodologies, but outcomes of developing the economic impact model (presumably using a traditional input–output model). The survey did not specifically ask about the catalytic method or about the specific models used for the input–output method.

Disseminating Results of Airport Economic Impact Studies

The survey responses regarding methods of disseminating the results of economic impact studies are detailed in Table 5. Summary executive reports, presentations, and technical reports were the most commonly cited forms of disseminating results. The responses varied somewhat between the users and authors groups. The use of web-based products was reported much more frequently by authors than by users (81.8% vs. 43.1%). Conversely, the use of brochures for public distribution was reported more frequently by the users group. Only a minority of either group reported that video was used to disseminate results.

Presentations of the results were given to a wide range of audiences including the general public, elected officials, key stakeholders, state DOTs, chambers of commerce, airport staff, airport users, as well as various commissions, civic groups, business organizations, and economic development agencies. Press releases, seminars, and community presentations were also indicated as methods of disseminating the results of studies. Differences in responses between the two groups are evident, especially for the responses "technical reports" and "web-based products." These differences may reflect that certain methods authors use to disseminate the results to airports are not used as frequently when the airports retransmit the results to its audiences.

TABLE 5
DISSEMINATING THE RESULTS OF ECONOMIC IMPACT STUDIES

Medium Used to Disseminate Results	User's Response (%)	Author's Response (%)
Summary of Executive Reports	86.2	100.0
Presentations	74.1	81.8
Brochures for Public Distribution	69.0	45.5
Technical Reports	62.1	100.0
Web-Based Products	43.1	81.8
Other	12.1	18.2
Video	10.3	27.3

Trade-Offs and Limitations

The focus here is on describing trade-offs and limitations of airport economic impact studies directly identified by the survey recipients. Limitations identified by both survey groups included the lack of participation resulting in inadequate data, the expense of conducting the studies, and the absence of standard models and methodologies for measuring impacts.

Airport surveys were the most commonly used sources of data for airport economic impact studies. However, users indicated that the lack of participation by fixed-base operators (FBOs) was problematic. This is confirmed in a 2005 report by the Minnesota DOT on the development of an online economic impact calculator for small- and medium-size airports, which reported that only 20 of 98 FBOs responded to questionnaires for financial information (*2*).

Another limitation frequently reported by survey recipients is the lack of assessment or validation. Only 25.9% of users and 27.3% of authors reported that any follow-up was conducted in terms of updates, ongoing assessment, or validation (i.e., corroborating the model against other metrics or otherwise using external information to verify the model). An analysis of written comments related to this question indicates that follow-up efforts primarily consisted of periodic model updates and did not include validation or assessment.

Nearly all studies described in the survey were static in nature. Both users and authors specifically commented that the economic impact studies were snapshot views of the economic impact at the time the study was conducted. Similar comments expressed the sentiment that airport economic impact studies tend to quickly become outdated. Some respondents indicated that the impact studies were updated periodically; however, the majority of respondents were not aware of any follow-up procedure or updates.

The majority of users and authors were of the opinion that the results were only sometimes used to encourage substantive change. Examples of substantive change provided in the survey included encouraging airport investment, changing airport policy, or making changes to land use regulations.

There were several comments among users of economic impact analyses addressing the general credibility of the results of such studies. One reason cited was the use of multipliers, which are described as difficult to explain. Also, the high dollar estimates that can result from economic impact analyses were cited as possible evidence of overstating impacts or otherwise contributing to the credibility problem.

TABLE 6
TRENDS IN AVIATION CAPTURED IN AIRPORT ECONOMIC IMPACT STUDIES

Variables Measured	User's Response (%)	Author's Response (%)
Non-aviation commercial development attracted to the vicinity of the airport	50.0	36.4
Reliance on aviation by specific industries, such as R&D, biotech, banking, universities, etc.	41.4	36.4
Use of air transportation in supply chains and just-in-time delivery	32.8	9.1
Growth of air freight	31.0	18.2
None of the above	25.9	36.4
Growth in business aviation/emergence of fractional ownership	24.1	18.2
Emergence of very light jets	12.1	0.00
Development of international gateways	10.3	27.3
Other (please specify)	8.6	27.3
Consolidation and globalization	3.4	9.1

Other limitations are also worth noting. Both groups indicated dissatisfaction with the lack of standardization in the airport economic impact study process. A number of users mentioned the high costs of preparing economic impact studies.

Trends and Recent Developments

The surveys also attempted to capture the treatment of specific trends in aviation. The results are shown in Table 6. The most commonly cited trends were non-aviation commercial development attracted to the vicinity of the airport; reliance on aviation by specific industries, such as R&D, biotechnology, banking, and universities; use of air transportation in supply chains and just-in-time delivery; growth of air freight; and growth of fractional ownership. These trends serve to highlight the extent to which aviation has become enmeshed into the economy. Less frequently cited trends were the emergence of very light jets and the development of international gateways. A total of 25.9% of users and 36.4% of authors surveyed indicated that no specific trends were captured for the airport economic impact studies in question.

CHAPTER THREE

REVIEW OF A SELECTION OF ECONOMIC IMPACT STUDIES

METHODOLOGY

To assess the current state of practice in analyzing aviation economic impacts, a limited literature review was undertaken covering 31 pieces of literature. The focus was on reviewing actual airport economic impact studies. The full annotated literature review is presented in Appendix C. Literature sources include economic impact studies prepared by consultants, government agencies, and institutions. The intent of the literature review was to describe the current body of knowledge regarding the methods used to examine the economic impact of airports. Studies were obtained through online searches, government and university libraries, and from the consultant's library.

RESULTS

The literature includes many approaches to estimating the economic contribution of an airport. The most common methodology used is one that employs an input–output method that examines the sum of direct, indirect, and induced economic impacts. This methodology is consistent with the results of both the users and authors surveys.

The three most commonly used input–output models are the U.S. Department of Commerce RIMS II model; the Minnesota IMPLAN Group, Inc. model; and the Regional Economic Modeling, Inc. (REMI) model. Note that the U.S. DOT Office of Research and Special Programs has published a guide to these three input–output models, with in-depth descriptions and examples of their use (*3*).

The following summarizes the salient points of each model, including approximate costs for analyzing a general aviation airport with one geographical unit, such as a county.

1. RIMS II: The RIMS II model is based on an input–output table that shows the industrial distribution of inputs purchased and outputs sold for any individual industry sector. In very simple terms, a particular industry (or organization within that industry) purchases goods and services from a number of other "input" industries. These include not only raw materials and supplies, but also labor (i.e., households). This industry then sells goods or services to other industries. As an aviation example, the revenue received by an FBO for fueling a personal aircraft is, in turn, used to pay for the fuel purchased from a wholesale supplier, the wages for the FBO ground worker to fuel the aircraft, as well as the necessary fueling equipment and other operating costs (such as insurance and utilities). An input–output table (for a given set of industries such as the U.S. economy) indicates on a ratio basis how every dollar of input and output affects all other industries. Compared with the three models, this model is generally considered to be the most inexpensive ($2,000 to $5,000) and is widely used in public, private, and military applications.
2. IMPLAN: The IMPLAN model is a more complex (as compared with RIMS II) and somewhat more expensive ($5,000 to $15,000) application of the input–output approach in its dynamic application of multipliers. The primary source of data used in IMPLAN is provided by the U.S. Census Bureau and the BEA.
3. REMI: The REMI model is generally considered to be the most expensive ($20,000 to $100,000) and complex of the three models. The model consists of the following five components: (1) output; (2) labor and capital demands; (3) population and labor supply; (4) wages, prices, and profits; and (5) market shares. The detailed structure of the REMI model requires a large array of data including BEA employment, wage, and personal income data; the Quarterly Census of Employment and Wages (ES-202) business establishment, employment and wage data; and U.S. Census Bureau County Business Plan data.

The following are advantages and disadvantages of these methods:

Advantages

- The main advantage of the RIMS II model is the accessibility and detail of the main data source provided by the BEA. RIMS II is also relatively simple to understand and the most inexpensive.
- IMPLAN and REMI are computer-based software-based models that allow for easy modification of variables.
- Although REMI and IMPLAN are both fairly easy to use, IMPLAN has the advantages of easier data entry analysis.
- IMPLAN divides impacts into the traditional subcategories: direct, indirect, and induced effects.
- Data in RIMS II can easily be inflated or deflated depending on the desired year of analysis.

Disadvantages

- RIMS II is a spreadsheet-based model where the user is responsible for setting up the multiplier worksheet. Each time a new variable is added the worksheet must be physically changed.
- Data used in IMPLAN and REMI must be inflated or deflated before being entered.

The multipliers used in these three techniques are based on the input geography applied for the study in question. If the study is measuring the impact of an airport on a single county and the input–output table for that county is used, then the output is measured over that basis. Similarly, if the impact on a state is desired, an input matrix is selected for all of the counties in that state, and the output multipliers apply to that. In other words, the BEA data used as the basis for the input–output matrices are typically collected and reported on a county-by-county basis and are then aggregated to larger geographical units.

There are some differences among the three models in the geographic scope of their inputs. RIMS II is primarily county-based and the user must aggregate the data to larger geographical units, as described earlier. IMPLAN uses a somewhat more varied set of geographical scales, including data aggregated at the metropolitan statistical area (MSA) level (where available). This depends in part on how the BEA collects the data, which is usually accomplished through agglomeration of county-level data. The REMI model can also be applied to city-sized geographical units when adjusted input–output data reflecting these sub-economies are available. REMI also uses several other sources of economic data (e.g., local unemployment statistics), which is one reason it is considered more sophisticated than the RIMS II and IMPLAN models.

There is no indication from the literature (review or the survey) that any of the input–output models is better suited for a specific class of airport. However, the low cost of the RIMS II model makes it the preferred choice for many general aviation airports.

In addition to the input–output method, two other methods were featured in the literature reviewed:

- Collection of benefits method: A collection of facts or stated benefits related to an airport or aviation system's connection to the local or regional economy. These are meant to capture aspects of airports that are significant in economic value, but difficult to quantify. For example, an airport might state that it contributes funds for local scholarships, provides medical flight services to local patients needing medical care outside the region, stimulates business, or provides access to the National Airspace System.
- Catalytic method: Catalytic effects are defined as the net economic effects (e.g., on employment, incomes, and government finances) resulting from the contribution of air transport to tourism and trade and its long-run contribution to productivity and gross domestic product (GDP). Although most airport economic impact studies concentrate on the direct, indirect, and induced contributions of airports, catalytic (or spillover) impacts on the economy have received relatively little attention.

Many variations of these approaches are worth noting. These variations differ primarily by the number and type of variables or indices analyzed. The most common variables or indices used are those identified in chapter one, namely employment, payroll, and output, as well as taxes, quasi-economic indicators, and qualitative descriptors.

In many of the reviewed economic impact studies, the application of multipliers is a commonly accepted practice to account for the recirculation of direct and indirect impact dollars. However, there is little evidence in that literature documenting a standard application of economic multipliers. Although many studies cite the source and methodology behind the application of multipliers, others do not.

The reviewed airport economic impact studies incorporated a variety of refinements on traditional approaches. These refinements included:

- Incorporating examples of business establishments and testimonials from business owners regarding their economic relationship or linkage to a respective airport.
- Estimating the amount of "new money" generated; that is, non-local demand for airport goods or services that could not be satisfied if the airport were not there.
- Updating the results of economic impact studies at regular intervals (every 3 to 5 years) to account for market shifts and changing business cycles, in addition to providing a proactive decision-making tool.
- Carefully delineating which impacts overlap and therefore are not additive.
- Incorporating several standalone measures (e.g., revenue, personal income, employment, and tax impacts) of airport economic activity to further address the issue of overlapping impacts.
- Incorporating only the proportional share of a respective variable (e.g., employment) that supports aviation when estimating direct impacts.
- Accounting for offsetting impacts (e.g., outflow of tourist dollars to overseas destinations made accessible by an airport).

The catalytic method deserves special mention, as it does not yet appear to be common in the United States. Catalytic effects of air transportation can be defined as:

> The net economic effects (e.g., on employment, incomes, government finances etc.) resulting from the contribution of air transport to tourism and trade (demand-side effects) and

the long-run contribution to productivity and GDP of growth in air transport usage (the supply-side performance of the economy) (*4*).

Examples of impacts on the supply-side of the economy include business investment and productivity gains. As such, this method takes a broader, yet quantifiable, view of aviation's impact on the economy. This method captures the extent to which growth in air transport boosts the performance of other industries (e.g., through tourism, investment, or productivity). Individual catalytic effects can be either positive or negative. It should be noted, however, that the catalytic method does not replace traditional methods such as input–output models, but is a supplementary tool for determining an airport's impact on the economy. In particular, input–output models do not pick up the effects of aviation services on the supply-side potential of the rest of the economy, which is the focus of catalytic impact studies.

CHAPTER FOUR

CASE STUDIES: PRACTICES IN AIRPORT ECONOMIC IMPACT ANALYSIS

Four studies were selected from the literature review to illustrate the different facets of economic impact and approaches used to assess impact. The focus here is to highlight specific methodologies, particularly innovative ones. A detailed narrative has been provided for each study summarizing the salient points relative to the methodology used and the final results.

The first study was completed by the Association of Monterey Bay Area Governments and is an assessment of the economic impact of six airports in three California counties. This study is unique in that it employs the California Airport Economic Impact Model—a model that only considers the net amount of dollars that remain in the local economy.

The second study, completed by Breitenbach Weiss and Martin Associates for the General Mitchell International Airport in Milwaukee, was selected as an example of an airport economic impact study that does not attempt to reduce the economic impact to a single number. Instead, airport activity creates several impact areas including revenue, employment, personal income, and tax.

The third study was an examination of the impact of the Capital City Airport on each of the three counties in the Tri-County Region (Michigan) and was completed by the Economic Development Research Group and Mead and Hunt. Relying heavily on surveys for primary data, this study was selected because of its comprehensive approach. This study measured six types of business activities that comprised the airport's total economic contribution.

The fourth and final study, completed by the Commonwealth of Virginia, evaluates the economic contribution of Virginia's airport system. Although many aviation economic impact studies evaluate two or three impact categories, this study is unique in that it quantifies total economic impacts based on four impact categories: on-airport direct impacts, off-airport direct impacts, airport dependent impacts, and spin-off impacts.

Airports Economic Impacts Study for Monterey, San Benito, and Santa Cruz Counties—Association of Monterey Bay Area Governments, California, 2003

This study evaluated the economic impact of each of six airports in Monterey, San Benito, and Santa Cruz counties (California), as well as a regional combined picture of the importance of the facilities to the three-county economy. The study uses the California Airport Economic Impact Model developed for the California DOT, Division of Aeronautics, to assist local medium- and small-size airports to assess economic parameters useful in defining the airport's contribution to the total economy. The model measures net economic impact by considering only the net amount of dollars that remain in the local economy, which means the model only considers those economic activities that would not have taken place without the availability of the local airport.

The model reports impacts in three categories: direct, indirect, and induced impacts. The sum of the three categories comprises the total economic impact of the airports studied. The induced economic impact category looked at the gross revenues and jobs lost should the airport(s) cease to exist. A more detailed description of each type of impact is as follows:

- Direct impact: The direct impact results from spending in the local area by visitors who arrive by air, and spending in the local area for goods and services by airport tenants (airport administration, FBOs, airlines, airport concessions, and a variety of non-aviation-related businesses located on airport property). Only visitors who indicated that they would not have visited the area without the availability of the airport were taken into account.
- Indirect impact: Within the context of this study, indirect impact is defined as the business community's perception of the airport's impact on local business operations. Only data from businesses that responded they would lose revenue, lay off workers, or relocate out of the area if the airport were closed were included in the calculation of the indirect impact for the airports. Local businesses that indicated tourism as their business type were excluded from the indirect impact calculations. The airports' impacts on tourism-based businesses were accounted for in the direct impact category.
- Induced impact: The induced impact consists of the multiplier effect that results from the respending of the direct impact. The study uses a set of multiplier coefficients for more than 500 industries developed by the U.S. Department of Commerce.

The study summarizes the economic impact of each of the six airports relative to jobs, payroll, state and local taxes, and spending. Also, aggregate estimates are provided that accrue to

more than $1.3 billion in overall economic activity, including $307 million in payroll, $11.5 million in taxes, $1.1 billion in spending, and more than 10,000 jobs. The most interesting part of this methodology is that the values indicated are the "net contribution" to the regional economy and represent those values that are contributed owing to the existence of the six airports.

Breitenbach Weiss and Martin Associates—*The Local and Regional Economic Impacts of Milwaukee County's General Mitchell International Airport,* Milwaukee County, Wisconsin, 2005

The county of Milwaukee retained Breitenbach Weiss and Martin Associates to measure the economic impact of airport activity generated by the General Mitchell International Airport in 2005. This study is unique in that, unlike many other studies, it is based on the assumption that the impact of an airport on the local, regional, or national economy cannot be reduced to a single number. Instead, airport activity is modeled as several impacts (that are not additive) including:

- Revenue impact—Business revenue is generated by airport businesses that provide air passenger service, freight service, and ground support services for aviation activity. This revenue is dispersed throughout the economy by such activities as hiring staff to provide the aviation services, purchasing goods and services, paying for the use of the airport, etc. The remainder is used to retire debt, make investments, or is held as retained earnings. Only revenues that can be definitely identified as remaining in the state (salaries to direct employees, state and local taxes, local purchases, and airport fees) are used.
- Employment impact—The study considers four levels of job impacts:
  - Direct employment—jobs directly generated by airport activity that would vanish if activity at the airport were to cease.
  - Indirect employment—jobs generated as a result of the purchase of goods and services by firms dependent on airport activity.
  - Induced employment—jobs created throughout the regional economy because individuals directly employed owing to airport activity spend their wages locally on goods and services.
  - Related employment—jobs with firms in the regional economy. These firms use the airport for air cargo shipments, etc. Related jobs are not as directly dependent upon the airport as the direct and induced jobs, but reflect the importance of the airport as a catalyst for economic development.
- Personal income impact—a measure of personal wages and salaries received by individuals directly employed as a result of airport activity. This income is then re-spent throughout the region.
- Tax impact—tax payments to the state and local governments by both firms and individuals involved in providing services in support of airport activity.

As stated, these impacts are not additive. For example, the personal income impact is part of the revenue impact, and adding these impacts together would result in double counting.

Airport-generated, visitor-generated, and total-airport impacts were estimated based on interviews with 160 tenants and firms that provide services to General Mitchell International Airport. These firms were categorized into five sectors:

- Airline/airport service,
- Freight transportation,
- Passenger ground transportation,
- Contract construction/consulting services, and
- Visitor industry services.

As the economic impacts are not additive, airport- and visitor-generated estimates for each area (i.e., revenue, employment, income, and tax impact) are provided separately (see Table 7).

Economic Development Research Group, and Mead and Hunt—*Economic Impact Study: Preliminary Final Report,* Capital Region Airport Authority, Michigan, 2004

This comprehensive report quantified the economic impact of the Capital City Airport on each of three counties in the Tri-County Region, as well as the combined region. As with many studies, surveys were relied on to collect wage, employment, and spending data. In this study, surveys were distributed to airport managers, tenants, airport travelers (both residents and visitors), regional businesses, and institutions. The most valuable contribution this report makes lies in its comprehensive methodology. It measured six types of business activities that comprised the airport's total economic impact, including:

- Airport-based economic activities, including airlines and terminal services.
- Off-airport businesses serving airport travelers.
- Airport-dependent businesses that rely on the airport to transport personnel and cargo.
- Off-airport businesses that provide goods and services to the airport, airlines, other on-airport agencies, and airport-dependent businesses.
- Off-airport businesses that provide goods and services to employees who earn their income on the airport.
- Local tax revenues generated by all of these types of business activities.

These data were put into a three-county IMPLAN economic model to understand business sales activity inside the three-county region.

Although some airport economic impact studies do not aggregate each of the individual economic measures (in this case the six types of business activities), this study aggregates the total of each measure to obtain an overall airport economic

TABLE 7
SUMMARY OF IMPACTS GENERATED BY GENERAL MITCHELL INTERNATIONAL AIRPORT

Impacts	Airport Generated	Visitor Generated	Total Impact
Jobs			
Direct	6,340	18,956	25,296
Induced	3,807	5,667	9,474
Indirect	3,174	651	3,825
Total	13,321	25,274	38,595
Personal Income (*millions*)			
Direct	$262.7	$279.6	$542.3
Induced	$318.2	$209.6	$527.8
Indirect	$107.1	$10.6	$117.7
Total	$688.0	$499.8	$1,187.8
Average Income/Direct Employee	$41,432.0	$14,752.0	
Business Revenue (millions)	$977.4	$820.5	$1,979.9
Local Purchases (millions)	$243.1	$16.5	$259.6
State and Local Taxes (millions)	$78.4	$86.8	$165.2
Federal Government Aviation Specific Taxes (millions)	$69.9	N/A	$69.9

N/A = not available.

impact estimate. According to the study, the airport accounts for $45.4 million in business activity and provides 450 jobs. Off-airport business activities increase the airport's impact to $358 million in sales, which, in turn, support 4,021 jobs. When the economic activity of businesses that provide goods and services that directly affected businesses is added in, the airport's total economic impact is approximately $652 million in sales, $239 million in wages, and 7,400 jobs in the region (see Table 8).

Virginia Department of Aviation, *Virginia Airport System Economic Impact Study: Final Technical Report,* Commonwealth of Virginia, 2004

Using a base year of 2001, this study quantifies the economic impacts of public use airports in Virginia, and describes the relationship between the airports and the Commonwealth's economy. Although most studies analyze two or three impact categories, this study is unique in that it quantifies total economic impacts based on four impact categories:

- On-airport direct impacts: impacts that would not occur if the airport did not exist (e.g., airlines and FBOs).
- Off-airport direct impacts: financial transactions that occur primarily off-site and are associated with visitor spending (lodging, food, entertainment, etc.).
- Airport-dependent impacts: businesses that are dependent on an airport and would relocate or suffer substantial loss if the airport were not available.
- Spin-off impacts: an estimate of the recycling of dollars through the economy, calculated using impact multipliers.

Each of the four impact types were measured in three ways:

- Jobs—total number of individuals employed (not full-time equivalent positions).

TABLE 8
OVERALL ECONOMIC IMPACT OF THE AIRPORT

Category of Economic Impact	Jobs	Wages ($millions)	Sales ($millions)
On-airport activity	540	26.76	45.44
Off-site visitor spending	1,324	20.38	51.15
Off-site air-dependent business activity	2,157	85.78	261.46
Suppliers of goods and services	1,192	39.39	126.55
Wage spending	2,186	67.07	167.49
Total impact	7,399	239.38	652.09

TABLE 9
TOTAL ECONOMIC IMPACT FOR VIRGINIA PUBLIC USE AIRPORTS

Type of Impact	Jobs	Wages	Activity
On-Airport Direct	8,190	$275,372,000	$610,059,000
Off-Airport Direct (Visitor Spending)	17,103	$266,432,000	$695,768,000
Spin-Off	13,451	$379,577,000	$1,093,312,000
Total Economic Impact*	38,744	$921,381,000	$2,399,139,000
Airport-Dependent Business	23,606	$773,179,000	$2,268,056,000
Ronald Reagan Washington National Airport (Virginia Impacts)	35,779	$1,026,891,000	$1,715,653,000
Dulles International Airport (Virginia Impacts)	65,961	$2,122,560,000	$4,368,960,000
Total Economic Impact for All Virginia Airports	164,091	$4,844,011,000	$10,751,808,000

Source: EDRG and HNTB Analysis.
*All airports except Ronald Reagan Washington National and Dulles International.
Note: Totals may not add as a result of rounding.

- Wages—payroll expended for employees, including all taxes and benefits.
- Economic activity—commonly referred to as output, this represents business sales. For government or non-profit entities, output represents their annual budget; for visitor spending, output represents visitor expenditures.

Although many studies utilize surveys to generate economic data, this study employed an extensive array of surveys of the following groups:

- Airport managers
- Airport tenants
- Airport-dependent businesses
- Corporate-based aircraft owners
- Air carrier visitors
- General aviation visitors.

Total economic impacts were derived from the sum of on-airport direct impacts, off-airport direct impacts (visitor spending), and spin-off impacts (multiplier effects). As detailed in Table 9, the total economic impact of all Virginia airports, including Ronald Reagan Washington National Airport and Dulles International Airport, is greater than $14 billion. This is, interestingly, an aggregation of total wages and spending activity. Impact estimates are also provided for each public use airport in the Commonwealth.

Additionally, whereas many studies recognize the qualitative benefits of airports simply by mentioning the notion, this study quantifies the "value-added" contributions of airports. This is achieved by showing each airport's qualitative impacts based on 22 different impact areas (recreational flying, ballooning, search and rescue, etc.).

CHAPTER FIVE

TRADE-OFFS, LIMITATIONS, TRENDS, AND RECENT DEVELOPMENTS

This study identified a number of limitations in how existing methods are applied, as well as trends and recent developments, which are summarized here. Some survey recipients addressed the high cost of conducting economic impact studies as a potential limitation. In general, there is a basic trade-off between the cost and complexity of a study. At the same time, a more complex study need not be more effective, as some survey responses disclosed that complex studies can hamper comprehension. One reported limitation is that airport economic impact studies can be difficult for the average reader to understand and that the results can be misinterpreted.

Other limitations can be summarized as belonging to one of three categories: limitations affecting the collection of inputs, limitations affecting the application of the model, and limitations affecting the use of the output. Examples of these are summarized in the following sections.

LIMITATIONS AFFECTING COLLECTION OF INPUTS

A recurring theme appears to be that airport economic impact studies frequently suffer from insufficient data or data quality issues. This is caused at least in part by a lack of participation by airport tenants or operators. To measure the flow of money properly, corporate users need to be identified and origin–destination data must be made available. These areas are particularly challenging because of confidentiality concerns. As a result, it can be difficult to identify the mechanisms of spending or the geographic scope of economic impacts.

There are a number of comments in the survey indicating other challenges in obtaining data for economic impact studies. The survey responses indicated that the data collection process is cumbersome, that the data are frequently outdated, or that the data are otherwise of questionable value. In the worst case, the use of old data (e.g., outdated multipliers) may result in inaccurate results.

LIMITATIONS AFFECTING APPLICATION OF THE MODEL

Although traditional methods for conducting economic impact studies can be relatively cost-effective to implement, they also suffer from a number of limitations in how they are applied. These limitations can lead to misapplication of the method, which in turn can result in misstating the results. The key limitations affecting the application of airport economic impact studies include:

- Lack of standardization: This appears to be the key theme describing the limitations affecting the application of traditional models. The literature review conducted for this synthesis report identified a smorgasbord of variables and indices used to measure economic contribution. One risk is that studies select the most favorable definition for the airport in question, so that there is an upwards bias in the results. The literature review also shows that the economic impact studies do not employ standard definitions for either impact areas or variables measured. This lack of standardization is also borne out by comments on the survey. One example is the possible misstating of economic impact by assuming that the entire output of the firm tied to an airport contributes to the impact of the airport. Finally, there are large variations in how multipliers are defined and applied.
- Omission of offsetting impacts: In addition to positive economic impacts, airports also have offsetting impacts which, if measured, manifest themselves as negative dollar impacts. Such impacts include increased congestion, environmental impacts, and other so-called externalities. They can also include the outflow of dollars from the local economy through airport-enabled leisure travel (although it can be argued that increased access to leisure travel is a positive impact in its own right). The literature review indicates that such offsetting impacts are rarely included, except in catalytic impact studies.
- Static results and lack of information on trends: In most cases, economic impact analyses create a snapshot in time, often placed considerably in the past. There are several survey responses indicating that results quickly become outdated. This may limit the value of economic impact studies, as it prevents the detection of trends and does not allow for a predictive capability.
- Lack of validation and ongoing assessment: Only a minority of survey recipients reported conducting follow-up efforts that could be classified as an ongoing assessment of their economic impact studies. The user comments suggest that follow-up activities primarily consist of periodic updates of the data or model calculations. There does not appear to be a working practice of corroborating model results against other evidence or providing an assessment of how well the model performs over time. A related problem is that economic impact reports

do not always contain sufficient detail to allow the results to be reproduced. This limits the ability of other parties to reproduce results to review their validity.

Other limitations were also identified. For example, when an economic impact study is prepared for an airport, it generally attempts to measure what net change there would be on the economy if the airport were to disappear. This ignores substitution effects and opportunity costs; that is, what the economic impact would be of activities that relocate to other communities and of the non-aviation replacement activities at the airport site. This is an underlying assumption that is often not made explicit.

The extent to which individually calculated impacts can be added is also a potential limitation. Economic impact studies frequently include impact areas that either have overlaps or cannot be added because it would not be meaningful. This is potentially confusing to the reader and a possible source for misapplication of the results. For example, there is a risk of adding economic impact computations to the benefit side of a cost-benefit analysis and of using this sum to offset construction and maintenance costs.

Potential limitations of the application of economic impact studies that have been identified by other authors include the following (*5*):

- The question that the analysis is intended to answer is not clear.
- The base case is not properly defined or is not relevant.
- An improper method is enlisted.
- The relevant study area and time frame are not identified.
- The findings of the analysis are not presented in a convincing manner.

Also, owing to the large variation in methods and models, and as no two airports are identical, it is difficult to make valid comparisons between different studies and comparable airports. This is in part the result of a lack of standard definitions noted previously. The survey effort and literature review were unable to document any existing guidelines that would support airport-to-airport comparisons.

LIMITATIONS AFFECTING USE OF THE OUTPUT

The use of the output can suffer from several limitations. As previously discussed, the results are usually static and quickly become outdated. Only a few studies feature periodic updates that are desired to detect trends. There is also the potential for presentation problems that can manifest themselves in several ways. The finished reports can be too complex to be effective, or there can be a knowledge gap between the reader and the author, raising unreasonable expectations about the meaning of the results. In short, the studies are easily misinterpreted. This problem is not unique to economic impact studies, but may be worsened by the readers' lack of familiarity with the methodologies applied.

Finally, there may be a need for a discussion of the motivation for conducting an economic impact study. The motivation can range from advocacy purposes to conducting an academic study that can stand up to peer review.

TRENDS AND RECENT DEVELOPMENTS

Traditional methods still dominate the field of airport economic impact studies, especially the use of input–output models. However, the increasing extent to which airports are embedded in the economy means that determining the economic impact of airports has become a more challenging proposition. Consequently, traditional methods may need to be improved. This synthesis study has documented a relatively modest number of such improvements and most of these can be categorized as evolutionary developments to the traditional methods.

Clearly, the practitioners of airport economic impact studies are aware of the issues identified in this study, and have incorporated a number of refinements to address them. Examples include carefully delineating which impacts actually are tied to the airport; relying more heavily on direct impacts as a measure of an airport's economic contribution, thereby moving away from the multiplier-driven analysis; addressing opportunity costs and focusing more on the incremental value of the airport; defining which impacts are additive; and assessing adverse impacts in addition to positive impacts.

An example of a method that addresses the issues of outdated results and periodic updates is a new index developed for Stockholm's Arlanda airport, the city's major international gateway. The Arlanda Index correlates various measures of airport statistics with economic activity, particularly spending by tourists. It has the benefit of being easy to update, simple to explain, and provides a predictive capability, although it is relatively narrowly defined to measuring tourism impacts (*6*).

An alternative approach to what is usually adopted in traditional economic impact studies is to highlight the effects of airport constraints on the regional economy. An example of this is the 2001 study prepared for the San Diego Association of Governments (*7*). This study projects the point at which constrained airport capacity limits future growth and then relates that limitation to changes in overall economic development and value. This approach attempts to measure opportunity cost, and may represent an improvement compared with a study that measures airport economic activity in the absence of constraints.

The measurement of catalytic impacts is a possibly significant development, which specifically attempts to address the notion that aviation has become increasingly intertwined with general economic development. A catalytic impact study documents the extent to which air transportation contributes to overall economic success. Catalytic impacts quantify many

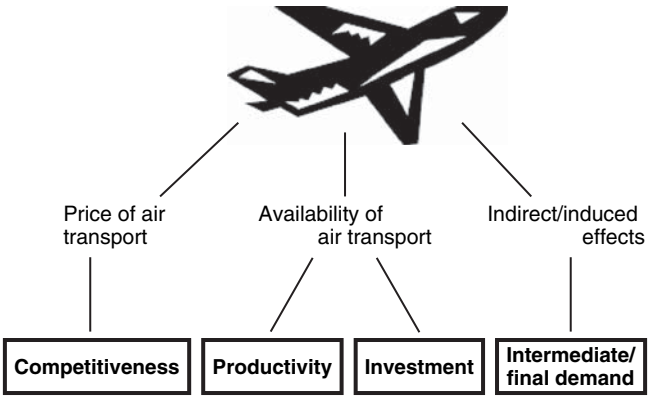

FIGURE 5 Catalytic impacts (reproduced with permission of Oxford Economics Ltd.).

impacts of airports that previously have been addressed only in anecdotal ways, if at all. A catalytic impact analysis reviews the net economic effects primarily on the supply-side of the economy, including the impacts of tourism, transportation of exports, business investment, and productivity. As an example, Eurocontrol has estimated that these aviation-related catalytic impacts have contributed to a 4% annual increase in GDP levels in the European Union (*4*).

Figure 5 conceptually illustrates how air transportation affects the economy in a broader way than that measured by traditional input–output models. The figure and the mechanisms it illustrates are described in a report by Oxford Economics Ltd., which measures the impact of air transportation on the economy of the United Kingdom (*8*). These mechanisms include:

- Reduced competitiveness among companies that make heavy use of air transportation if prices of aviation services increase owing to restrictions leading to higher fares or longer transport times (or vice versa).
- Long-run identifiable impact of aviation on productivity growth in other sectors of the economy.
- Impact of changes in productivity growth on investment and hence the amount of capital equipment available for production in other sectors of the economy.
- Types of jobs and industries that can be attracted in the long term, as well as the living standards they can support, as a result of air transportation.

In principle, the catalytic impact method can be applied to any geographic unit for which economic output can be defined. In practice, however, the aviation-related catalytic impact studies that exist today focus on country-size regions (e.g., the United Kingdom) or multinational regions (e.g., the European Union).

Another noteworthy feature of catalytic impact analyses is that they address both favorable and adverse impacts. Examples of adverse impacts include ground congestion caused by aviation growth and the outflow of dollars through airport-enabled tourism. The total estimate of catalytic impacts is the net of positive and negative dollar impacts.

It should be noted that catalytic impact analyses do not replace the need for traditional methods, as they do not in and of themselves measure direct, indirect, and induced effects on the demand-side of the economy. Also, several of the questions facing traditional methods must also be addressed for the catalytic impact method including the question of standardization and the potential lack of periodic updates, validation, and assessment.

CHAPTER SIX

CONCLUSIONS

The survey and literature review included in this synthesis report confirm that airport economic impact studies are commonly used as tools for airport operators, planners, and state agencies. They are used for a number of purposes, including measuring the economic value of the airport to the local community, region, and specific industries; justifying capital expenditures of public funds for airport improvement projects; and supporting ongoing airport and community planning efforts. Airport economic impact studies also rank highly as tools to support community education and public relations, as well as to raise public awareness.

The review presented here shows that both users and authors of airport economic impact studies have identified a number of areas that could benefit from innovation. These needs pertain to the data collection process, the application of the model, and the presentation and use of the results. Some practitioners have begun to address some of these shortcomings. However, there is no central clearinghouse for information on airport economic impact studies and few documents that define standardized methodologies.

The combination of a relatively large number of identified shortcomings and a relatively moderate number of innovative techniques points to the need for future research. Part of the motivation for future research is simply that the FAA's official guidance on economic impact analyses (*Measuring the Regional Economic Significance of Airports*) was originally developed in 1986, with only a major update in 1992 (*Estimating the Regional Significance* of Airports). Therefore, there is no current, comprehensive guidance on this topic. This is especially noticeable for users of economic impact studies, which are less likely to be exposed to the broader (i.e., non-aviation) literature on economic impacts. Other reasons for conducting future research include the large range of variations in definitions of variables and impact categories, the desire to address dynamic trends, the need to provide models that present more than static snapshots, and the flexibility to tailor methods to the unique circumstances at specific airports. This research should be structured to address two fundamental approaches: (1) validation, assessment, and improvement of traditional methods; and (2) development of new methods.

The following are specific suggestions for possible research in the area of airport economic impact studies. These suggestions are not intended to be exhaustive, but document some of the needs identified as part of this synthesis study.

- Comparison of models: The literature review conducted for this study did not uncover any aviation-specific studies comparing input–output models. Such a comparison, especially of Regional Input–Output Modeling System (RIMS II), Impact Analysis for Planning (IMPLAN), and Regional Economic Models, Inc. (REMI), would be useful because it would highlight the strengths and weaknesses of the models, and would provide input to the broader question of whether standardization is warranted. A study prepared for the U.S.DOT Office of Research and Special Programs provides limited evidence that the models can differ significantly, by a factor of 100% in one example. However, this study is based on hypothetical examples and is not specific to airports. Another article, by Rickman and Schwer, "A Comparison of the Multipliers of IMPLAN, REMI, and RIMS II: Benchmarking Ready-Made Models for Comparison," compares the multipliers for RIMS II, IMPLAN, and REMI, as applied to a single county in Nevada. This report finds significant differences in the multipliers. The differences can be explained by the techniques used to regionalize national input–output coefficients. However, this study is also not aviation-specific. A more direct approach is recommended here, where each model is applied in an aviation setting, comparing results across models for one or more airports.
- Evaluation of the benefits and trade-offs of standardization: It appears that standardization could resolve many of the issues identified as limitations to existing models in the survey and literature review. Standards for specifying data sources, geographic boundaries, and impact categories, for example, could allow airport-to-airport comparisons, as well as comparisons over time at any one specific airport. Standardization could also reduce the large variation in definitions and applications of impact areas, variables, and multipliers, as well as address how offsetting impacts should be handled. Overall, this should contribute to improved credibility and familiarity with the methods used.

  Some drawbacks however are possible, such as increased cost and complexity, especially for smaller airports, and a reduced flexibility in designing creative or highly tailored approaches. New approaches should, to the extent possible, address the unique aspects of each airport. Standardization should not result in the use of an identical approach to measure the impact of all airports, but should instead focus on improving the process

of applying the models and methodologies. Standardization may also constrain the currently available wide range of budget options for conducting economic impact studies. Consequently, both the benefits and trade-offs of standardization should be evaluated. This analysis should include specific recommendations as to which aspects of economic impact studies represent the best candidates for standardization.

- Research on improvements over the traditional input–output multiplier driven analysis: The primary objective here would be to refine the existing approach. One possible technique for investigation includes relying more heavily on direct and indirect impacts, and less on induced effects. This would address the critique that induced impacts and the use of multipliers can be difficult to explain. Impacts could also be divided into a more refined quantification of impacts, such as:
  - On-airport impacts;
  - Off-airport direct and indirect impacts (e.g., visitor spending);
  - Airport-dependent impacts (i.e., businesses that rely on transporting cargo and personnel by means of air transport);
  - Airport-related impacts through the provision of goods and services to airports, airlines, airport agencies, and airport-dependent businesses;
  - Investment impacts (i.e., economic benefits from investment in airport infrastructure); and
  - Tax revenue impacts (i.e., aviation-related tax revenues generated in the economy such as airport fees, fuel taxes, state income taxes, sales taxes, local property taxes for airport business users and suppliers, etc.).
- Publication of a guide describing best practices for preparing economic impact studies: Such a guide should be intended both for users (e.g., how to define studies, select consultants, analyze results, and communicate to constituents) and authors (e.g., recommended models, specific methodologies, validation techniques, and standardized practices). The guide should pay considerable attention to the development of strategies for improved data collection of more accurate information on aircraft operations and origin–destination data, especially at general aviation airports. Because one of the challenges relating to data collection at such airports may be fixed-base operator concerns over releasing commercially sensitive information, a survey of best practices has the potential of identifying approaches for obtaining this information.

  Traditional methodologies generally do not separate impacts by types of airport use, such as corporate, recreational, passenger, and cargo. These uses have different impacts, which may need to be approached in different ways. This is particularly applicable to general aviation activities, which often are treated as a single entity. Indeed, there is a wide range of different types of general aviation facilities that may provide unique impacts. At the same time, operators of general aviation airports are more likely to have budgetary constraints and therefore have less ability to initiate more complex, nuanced studies. More than any other type of operator, general aviation airports are likely to benefit from additional attention spent on documenting best practices for conducting airport economic impact studies.

  Additionally, the guide should incorporate practical advice for conducting catalytic impact studies and other innovative approaches. The publication should also identify the risk of double counting impacts in hybrid approaches that combine methods. It should describe how economic impacts relate to the cost and benefit of a specific improvement to avoid a misapplication of economic impact studies where economic impact dollar amounts are used to directly offset cost dollar amounts. Finally, this evaluation should also consider the establishment of a clearinghouse for information related to the conduct of airport economic impact studies.
- Research on dynamic models and other methods to capture trends: The purpose of this research would be to address the issue of outdated results and the notion that economic impact studies represent a static snapshot in time. It would also address the absence of periodic updates documented in the survey results and the lack of information on trends. For example, one possible trend is that direct impacts may actually decrease over time with increases in industry efficiency. This trend, if documented, may place additional emphasis on the use of the measurement of catalytic impacts.

Additional contributions to this list are possible. In general terms, the goal of such research should be to address the limitations of current methods, especially the lack of unique approaches for different types of airports, the difficulty of identifying trends over time, the challenge in comparing economic impact studies, and the inability to update an economic impact report without conducting an entirely new study. New models should be considered, as well as improvements on existing techniques that reduce the risk of misapplying or misinterpreting current methods. Successful research could potentially allow for an economic impact analysis to be used to capture new sources of funding, which would increase its value as tool for communities facing local investment decisions.

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ACRONYMS

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BRAC	Base Realignment and Closure
DOTs	Departments of transportation
FBO	Fixed-base operator
GDP	Gross domestic product
IMPLAN	Impact Analysis for Planning
R&D	Research and development
REMI	Regional Economic Models, Inc.
RIMS II	Regional Input–Output Modeling System

APPENDIX A

Survey Instruments

USERS SURVEY

S03-3 Survey for Users of Airport Economic Impact Studies (Airports and State/Regional Transportation Agencies)

On behalf of the Transportation Research Boards (TRB 's) Airport Cooperative Research Program (ACRP), Hoyle, Tanner & Associates, a national engineering and aviation consulting firm, and RKG Associates, an economics and planning consulting firm, are conducting research on airport economic impact studies. The goal of the research is to determine the benefits and challenges of traditional airport economic impact studies, and how to address the shortcomings of these traditional methods. Another objective is to identify innovative models and methodologies or studies that have been found to be particularly effective in achieving their objectives. Additional information about this project is available at: http://www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1554.

As someone who has either conducted, reviewed, or sponsored an economic impact assessment for an airport or a group of airports, we would like to have your input on the extent of the assessment, the motivation for initiating the project, and the use of the final product.

Please be assured that your responses will be kept in strictest confidence, to be aggregated with all other responses. The survey is designed so that you do not need to complete it all at once. It is possible to exit the survey and resume where you left off at a later date. However, you will be required to log back in with your username and password.

In appreciation for your time in completing this survey, we will make the final research report of this survey available to you. In addition, your name will be entered into a drawing for a hand-painted and detailed 1/32-sized mahogany model of Charles Lindbergh's airplane, *The Spirit of St. Louis* (measuring 171/2 in. long; 171/2 in. wingspan). The model comes ready to display on a mahogany base.

1) Please indicate the state in which your airport(s) or the airport you studied is located?

2) Please indicate the number of years of experience that you have in the aviation industry:

3) Please indicate the nature of your current involvement with the airport(s) or airport system:
____ Local government
____ State government
____ Federal government
____ Airport commission/authority
____ Airport management
____ Consultant
____ Other (please specify): _____

4) How familiar are you with airport economic impact studies?
____ Not familiar
____ Somewhat familiar
____ Familiar
____ Very familiar

5) How many airport economic impact studies have you been involved with (completed, sponsored, supervised, reviewed, etc.) over the past 10 years?
____ None
____ 5 or less
____ 6 to 10
____ 11 to 20
____ More than 20

6) Please indicate the intended audience(s) of the studies you have been involved with (select all that apply):
____ Government agency
____ Citizens/residents
____ Planning agency
____ Fixed-base operator
____ Airport management
____ Other (please specify): _____

7) Please indicate the reason(s) airport economic impact studies were initiated (select all that apply):
____ To justify airport investment/expansion
____ To determine allocation of matching funds
____ To formulate economic development/planning initiative
____ It was an academic initiative
____ To supplement the airport system plan
____ To measure significance of airport to specific industries
____ To obtain financial support from other municipalities or from county/region level
____ To measure significance of the airport(s) to the local community
____ Other (please specify): _____

8) Please indicate the variables measured or estimated in the airport economic impact studies in which you have been involved (select all that apply):
____ Wages
____ Employment
____ Cargo tonnage
____ Tourism
____ Air traffic levels
____ Time savings
____ Local/regional spending
____ Military/emergency services
____ Other (please specify): _____

9) Please rank the usefulness of the methodologies that were used in the airport economic impact studies.

	Extremely Useful	Very Useful	Useful	Not Very Useful	Not Used In Study	Not Applicable
9.1) Economic input–output model [e.g., direct, indirect, induced multiplier, or Regional Input–Output Modeling System (RIMS)]						
9.2) Qualitative survey (survey of airport users, passengers, etc.)						

9.3) Community benefits

9.4) What-if analyses

Additional comments:

10) Did the airport economic impact study(ies) attempt to capture any of the following trends in aviation (select all that apply)?
____ Growth of air freight
____ Development of international gateways
____ Non-aviation commercial development attracted to the vicinity of the airport
____ Use of air transportation in supply chains and just-in-time delivery
____ Reliance on aviation by specific industries, such as R&D, biotech, banking, universities, etc.
____ Growth in business aviation/emergence of fractional ownership
____ Consolidation and globalization
____ Emergence of very light jets
____ None of the above
____ Other (please specify): _____

11) How would you rate the airport economic impact studies that you have been involved with in terms of the validity of the results and the methodology?
____ Not valid
____ Somewhat valid
____ Valid
____ Very valid

Additional comments:

12) How would you rate the studies in terms of impact and utility (i.e., how successful was it in meeting its objectives)?
____ Not useful
____ Somewhat useful
____ Useful
____ Very useful

Additional comments:

13) What methods were used to disseminate the results (select all that apply)?
____ Technical reports
____ Summary or executive reports
____ Brochures for public distribution
____ Presentations
____ Web-based products
____ Video
____ Other (please specify): _____

14) If presentations were used to disseminate the results, please indicate type(s) of audience.

15) Was there any follow-up done to the studies in terms of ongoing assessment or validation?
____ Yes
____ No

Additional comments:

16) In your opinion, how often are the results of airport economic impact studies used as a factor in encouraging substantive change (encourage airport investment, changing airport policy, suggest land use regulatory changes, etc.)?
____ Never
____ Sometimes
____ Frequently
____ Always

Additional comments:

17) In your opinion, what are the top three benefits of airport economic impact studies?

18) What are the top three constraints or disadvantages of airport economic impact studies?

19) What one thing would you suggest to improve the reliability or applicability of future airport economic impact studies?

20) Please use this space to provide any additional comments regarding airport economic impact studies.

21) All survey recipients will receive an electronic copy of the final study. Please provide a mailing address if you also would like a printed copy mailed to you.

Name: _____
Address: _____
City, State, and Zip Code: _____

Thank you for your assistance in completing this survey. Your responses will help provide insights into how to better analyze the economic impact of airports.

AUTHOR'S SURVEY

S03-3 Survey for Authors of Airport Economic Impact Studies (Airports and State/Regional Transportation Agencies)

On behalf of the Transportation Research Board's (TRB's) Airport Cooperative Research Program (ACRP), Hoyle, Tanner & Associates, a national engineering and aviation consulting firm, and RKG Associates, an economics and planning consulting firm, are conducting research on airport economic impact studies. The goal of the research is to determine the benefits and challenges of traditional airport economic impact studies, and how to address the shortcomings of these traditional methods. Another objective is to identify innovative models and methodologies or studies that have been found to be particularly effective in achieving their objectives. Additional information about this project is available at: http://www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1554.

As someone who has completed or authored an economic impact assessment for an airport or a group of airports, we would like to have your input on the extent of the assessment, the motivation for initiating the project, and the use of the final product.

Please be assured that your responses will be kept in strictest confidence, to be aggregated with all other responses. The survey is designed so that you do not need to complete it all at once. It is possible to exit the survey and resume where you left off at a later date. However, you will be required to log back in with your username and password.

In appreciation for your time in completing this survey, we will make the final research report of this survey available to you. In addition, your name will be entered into a drawing for a hand-painted and detailed 1/32-sized mahogany model of Charles Lindbergh's airplane, *The Spirit of St. Louis* (measuring 171/2 in. long; 171/2 in. wingspan). The model comes ready to display on a mahogany base.

1) Please indicate the state in which your airport(s) or the airport you studied is located?

2) Please indicate the number of years of experience that you have in the aviation industry:

3) How familiar are you with airport economic impact studies?
____ Not familiar
____ Somewhat familiar
____ Familiar
____ Very familiar

4) How many airport economic impact studies have you been involved with (completed, sponsored, supervised, reviewed, etc.) over the past 10 years?
____ None
____ 5 or less
____ 6 to 10
____ 11 to 20
____ More than 20

5) Please indicate the intended audience(s) of the studies you have been involved with (select all that apply):
____ Government agency
____ Citizens/residents
____ Planning agency
____ Fixed-base operator
____ Airport management
____ Other (please specify): _____

6) Please indicate the reason(s) airport economic impact studies were initiated (select all that apply):
____ To justify airport investment/expansion
____ To determine allocation of matching funds
____ To formulate economic development/planning initiative
____ It was an academic initiative
____ To supplement the airport system plan
____ To measure significance of airport to specific industries
____ To obtain financial support from other municipalities or from county/region level
____ To measure significance of the airport(s) to the local community
____ Other (please specify): _____

7) Please indicate the variables measured or estimated in the airport economic impact studies in which you have been involved (select all that apply):
____ Wages
____ Employment
____ Cargo tonnage
____ Tourism
____ Air traffic levels
____ Time savings
____ Local/regional spending
____ Military/emergency services
____ Other (please specify): _____

8) Please rank the usefulness of the methodologies that were used in the airport economic impact studies.

	Extremely Useful	Very Useful	Useful	Not Very Useful	Not Used In Study	Not Applicable
8.1) Economic input–output model [e.g., direct, indirect, induced multiplier, or Regional Input–Output Modeling System (RIMS)]						
8.2) Qualitative survey (survey of airport users, passengers, etc.)						
8.3) Community benefits						
8.4) What-if analyses						

Additional comments:

9) Please list the types of data sources that you typically use for developing airport economic impact studies.

10) Of the data sources identified in Question 9, what were the benefits of using those data sources?

11) Of the data sources identified in Question 9, what were the disadvantages of using those data sources?

12) Please list the data sources, if any, that you would have liked to have utilized for airport economic impact studies, but were unavailable.

For Questions 13–18, please pick a single study that you believe is representative of your experience in the field.
____ Growth of air freight
____ Development of international gateways
____ Non-aviation commercial development attracted to the vicinity of the airport
____ Use of air transportation in supply chains and just-in-time delivery

____ Reliance on aviation by specific industries, such as R&D, biotech, banking, universities, etc.
____ Growth in business aviation/emergence of fractional ownership
____ Consolidation and globalization
____ Emergence of very light jets
____ None of the above
____ Other (please specify): _____

13) Did the study attempt to capture any of the following trends in aviation (select all that apply)?

14) In retrospect, how would you rate the study in terms of the validity of the results and the methodology?
____ Not valid
____ Somewhat valid
____ Valid
____ Very valid

Additional comments:

15) Was there any follow-up done to the study in terms of on-going assessment or validation?
____ Yes
____ No

Additional comments:

16) If yes, what assessment/validation efforts were undertaken?

17) How would you rate the studies in terms of impact and utility (i.e., how successful was it in meeting its objectives)?
____ Not useful
____ Somewhat useful
____ Useful
____ Very useful

Additional comments:

18) What methods were used to disseminate the results (select all that apply)?
____ Technical reports
____ Summary or executive reports
____ Brochures for public distribution
____ Presentations
____ Web-based products
____ Video
____ Other (please specify): _____

19) If presentations were used to disseminate the results, please indicate type(s) of audience.

20) In your opinion, how often are the results of the airport economic impact studies used as a factor in encouraging substantive change (encourage airport investment, changing airport policy, suggest land use regulatory changes, etc.)?
____ Never
____ Sometimes
____ Frequently
____ Always

21) In your opinion, what are the top three benefits of airport economic impact studies?

22) What are the top three constraints or disadvantages of airport economic impact studies?

23) What one thing would you suggest to improve the reliability or applicability of future airport economic impact studies?

24) All survey recipients will receive an electronic copy of the final study. Please provide a mailing address if you also would like a printed copy mailed to you.

Name: _____
Address: _____
City, State, and Zip Code: _____

Thank you for your assistance in completing this survey. Your responses will help provide insights into how to better analyze the economic impact of airports.

APPENDIX B

Statistical Summary of Survey Results

Survey Results and Analysis

for

S03-3 Survey for Users of Airport Economic Impact Studies

(Airports and State/Regional Transportation Agencies)

TRB
TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Wednesday, June 20, 2007

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Executive Summary

This report contains a detailed statistical analysis of the results to the survey titled *S03-3 Survey for Users of Airport Economic Impact Studies* (*Airports and State/Regional Transportation Agencies*). The results analysis includes answers from all respondents who took the survey in the 35-day period from Thursday, May 3, 2007 to Wednesday, June 6, 2007. There were 58 completed responses to the survey received during this time.

Survey Results and Analysis

Survey: S03-3 Survey for Users of Airport Economic Impact Studies (Airports and State/Regional Transportation Agencies)

Author: Joakim Karlsson, Hoyle, Tanner & Associates and RKG Associates
Responses Received: 58

1) Please indicate the state in which your airport(s) or the airport you studied is located?

Response	Count	Percent
Alabama	2	3.4
Alaska	1	1.7
Arizona	2	3.4
Arkansas	2	3.4
California	4	6.9
Colorado	1	1.7
Florida	4	6.9
Georgia	2	3.4
Idaho	2	3.4
Illinois	1	1.7
Iowa	1	1.7
Kansas	1	1.7
Kentucky	1	1.7
Maine	2	3.4
Maryland	1	1.7
Massachusetts	2	3.4
Michigan	2	3.4
Minnesota	1	1.7
Missouri	1	1.7
Nevada	1	1.7
New Hampshire	1	1.7
New York	2	3.4
North Dakota	1	1.7
Ohio	2	3.4
Oregon	2	3.4
Pennsylvania	1	1.7
Rhode Island	1	1.7
South Dakota	1	1.7
Tennessee	2	3.4
Texas	3	5.2
Virginia	1	1.7
Wisconsin	6	10.3
Wyoming	1	1.7

2) Please indicate the number of years of experience that you have in the aviation industry:

No. of Respondents	Year of Experience	Percentage
11	0–9	19.0
18	10–19	31.0
13	20–29	22.4
13	30–39	22.4
3	40–49	5.2

Mean = 21.19, Min. = 3.00, Max. = 41, Median = 20.00

3) Please indicate the nature of your current involvement with the airport(s) or airport system:

No. of Respondents	Current Involvement	Percentage
6	Local Government	10.3
12	State Government	20.7
0	Federal Government	0.0
8	Airport Commission/Authority	13.8
27	Airport Management	46.6
1	Consultant	1.7
4	Other	6.9

Other:
Port district (both maritime and aviation)
Market Development Coordinator
Airport Manager and Local Government
Town of Erwin Industrial Development Agency
Chair Transportation Committee for Real Estate Trade Group

4) How familiar are you with airport economic impact studies?

No. of Respondents	Familiarity with Economic Impact Studies	Percentage
1	Not Familiar	1.70
8	Somewhat Familiar	13.80
30	Familiar	51.7
19	Very Familiar	32.8

5) How many airport economic impact studies have you been involved with (completed, sponsored, supervised, reviewed, etc.) over the past 10 years?

No. of Respondents	No. of Economic Impact Studies	Percentage
2	None	3.4
49	5 or Less	84.5
6	6 to 10	10.3
0	11 to 20	0.0
1	More than 20	1.7

6) Please indicate the intended audience(s) of the studies you have been involved with (select all that apply):

No. of Respondents	Intended Audiences	Percentage
51	Government Agency	87.9
45	Citizens/Residents	77.6
31	Planning Agency	53.4
15	Fixed Base Operator	25.9
39	Airport Management	67.2
12	Other	20.7

Other Responses:
- Elected officials, carriers/tenants, internal staff
- Local, state, and federal elected officials
- Any organization that has an interest in the Airport System
- Federal, state, and local elected representatives
- Business community

- Business and industry
- Business community
- Local municipalities
- The studies were typically prepared for an airport authority or state department of transportation. However, those agencies commissioned the studies to inform a much broader set of stakeholders
- Local communities
- Airline management, elected officials
- Legislative, to help promote airport FBO, to help promote airport management
- Economic Development Commission/chamber of commerce
- Political body

7) Please indicate the reason(s) airport economic impact studies were initiated (select all that apply):

No. of Respondents	Reasons for Economic Impact Studies	Percentage
39	To justify airport investment/expansion	67.2
2	To determine allocation of matching funds	3.4
25	To formulate economic development/planning initiative	43.1
3	It was an academic initiative	5.2
25	To supplement the airport system plan	43.1
26	To measure significance of airport to specific industries	44.8
17	To obtain financial support from other municipalities or from county/region level	29.3
54	To measure significance of the airport(s) to the local community.	93.1
8	Other	13.8

Other Responses:

- Use with elected bodies: city council, state legislature; educate stakeholders about the importance of the Port
- To attract private, state, and federal investment in the airport
- To justify noise issues
- One primary purpose of the study was to measure the significance of the airports to the state, region, municipalities, and local communities. It may also be used for several other items listed above.
- Ownership feasibility
- The State Aeronautics Commission conducts the study every five years.
- To measure significance of the airports to the state and to the region.
- Community and public relations, marketing
- Reasons for initiating studies varied with the study, but generally there was a desire to develop political support for aviation programs or airport expansion.
- To gain an understanding of who/what firms constituted the airports business constituents

8) Please indicate the variables measured or estimated in the airport economic impact studies in which you have been involved (select all that apply):

No. of Respondents	Variables Measured	Percentage
54	Wages	93.1
56	Employment	96.6
32	Cargo/Tonnage	52.2
37	Tourism	63.8
36	Air Traffic Levels	62.1
14	Time Savings	24.1
46	Local/Regional Spending	79.3
14	Military/Emergency Services	24.1
13	Other	22.4

Other Responses:

- General aviation system airport impacts
- Taxes, revenues, spending, sales, transportation, and shipping benefits to local businesses
- Local and state taxes generated by airport

- Non-quantitative items such as air ambulance, parts delivery, etc. Also property taxes paid on aircraft and used by local government
- Airport construction, aerial applicators
- Taxes paid by business/industry and employees and employee commuting distances
- Educational requirements for entry-level jobs
- Tax impact
- Air passenger volumes, cruise passenger volumes, bridge traffic volumes
- Payroll; total annual economic activity
- The specific metrics used in each study varied with the study but generally included some measure of payroll and airport spending, as well as visitor spending.
- Investment impact
- Economic growth of the area/region
- Aviation-related industry—off airport, airport related construction, business sales directly related to air travel, indirect impacts on the economy, qualitative benefits
- Multiplier affects of additional rounds of spending

9) Please rank the usefulness of the methodologies that were used in the airport economic impact studies.

Methodology	No. of Respondents	Rank the Usefulness of the Economic Impact Studies	Percentage
Economic input–output	24	Extremely Useful	41.4
model [e.g., direct,	23	Very Useful	39.7
indirect, induced	7	Useful	12.1
multiplier, or Regional	2	Not Very Useful	3.4
Input–Output Modeling	1	Not Used in Study	1.7
System (RIMS)]	1	Not Applicable	1.7
Qualitative survey (survey	13	Extremely Useful	22.4
of airport users,	19	Very Useful	32.8
passengers, etc.)	15	Useful	25.9
	2	Not Very Useful	3.4
	3	Not Used in Study	5.2
	6	Not Applicable	10.3
Community benefits	20	Extremely Useful	34.5
	18	Very Useful	31.0
	11	Useful	19.0
	2	Not Very Useful	3.4
	2	Not Used in Study	3.4
	5	Not Applicable	8.6
What-if analyses	7	Extremely Useful	12.1
	5	Very Useful	8.6
	14	Useful	24.1
	3	Not Very Useful	5.2
	11	Not Used in Study	19.0
	18	Not Applicable	31.0

Comment Responses:

- Community benefits and what-ifs were not methodologies, but outcomes of using the economic impact model.
- The audience's degree of understanding of the use of RIMS significantly impacted the acceptance of the final result of the project.
- What-if analyses would be useful if possible to demonstrate to the general public the role of aviation.
- RIMS method is the most authoritative.
- This is not really a meaningful question. Useful to whom? Obviously the value of the results of any particular methodology depends on how it is applied. The above answers reflect my opinion of the relative value of the various methodologies.
- RIMS is not a good model for aviation data. Tried to integrate airport study into MEDOT study. MEDOT study excluded aviation study due to limitations of the RIMS model.

10) Did the airport economic impact study(ies) attempt to capture any of the following trends in aviation (select all that apply)?

No. of Respondents	Variables Measured	Percentage
18	Growth of air freight	31.0
6	Development of international gateways	10.3
29	Non-aviation commercial development attracted to the vicinity of the airport	50.0
19	Use of air transportation in supply chains and just-in-time delivery	32.8
24	Reliance on aviation by specific industries, such as R&D, biotech, 41.4 banking, universities, etc.	
14	Growth in business aviation/emergence of fractional ownership	24.1
2	Consolidation and globalization	3.4
7	Emergence of very light jets	12.1
15	None of the above	25.9
5	Other (please specify)	8.6

Other Responses:

- Port-owned commercial land not immediately adjacent to the airfield was measured in our Port industrial park economic impact analysis.
- Impact of construction resulting from improvements and expansion
- Funding was a determining factor for the most recent study and, as such, we missed several of the above mentioned trends.
- Look at the web pages for Falcon Field Airport, Mesa, Arizona
- The studies were generally static views of the economic impact of the system at the time they were performed and as such did not really address trends.
- Importance of the hub airport in retaining regional business and assisting growth of regional business
- Low-cost carriers

11) How would you rate the airport economic impact studies that you have been involved with in terms of the validity of the results and the methodology?

No. of Respondents	Rate Validity	Percentage
1	Not Valid	1.7
8	Somewhat Valid	13.8
34	Valid	58.6
15	Very Valid	25.9

Comment Responses:

- Let's be honest, there is some "art" to conducting these things.
- It has not been possible to accurately measure impacts since construction, which began right after the study was complete.
- Study is in process.
- Most studies confuse costs and benefits. For example, payroll is a cost not a benefit of aviation. Most studies fail to address the concept of consumer surplus.
- Confidence in products varies widely. Many studies take a very broad view as to what constitutes an airport impact. For instance, Corporation XYZ uses the airport extensively; therefore, all of XYZ's income is consigned as an airport-related economic.
- Somewhat difficult to get airport managers to assist in the data collection.
- Would be more valid with better airport business participation.

12) How would you rate the studies in terms of its impact and utility (i.e., how successful was it in meeting its objectives)?

No. of Respondents	Rate Utility	Percentage
1	Not Useful	1.70
10	Somewhat Useful	17.2
22	Useful	37.9
25	Very Useful	43.1

Comment Responses:

- Would be more valid with better airport business participation.
- It was very useful as a PR piece and satisfied all who asked
- In progress, but early results are encouraging
- There was some resistance to the document, describing it as propaganda
- It depends who you ask. The study sponsors presumably felt that their objectives were met—the studies resulted in a large number. Thoughtful critics find the number meaningless, and thus the studies not useful as a basis for planning or policy.
- In-terminal passenger questionnaires were invaluable. The demographic profiles proved very insightful.
- Would be more valid with better airport business participation.

13) What methods were used to disseminate the results (select all that apply)?

No. of Respondents	Methods Used to Disseminate Results	Percentage
36	Technical Reports	62.1
50	Summary of Executive Reports	86.2
40	Brochures for Public Distribution	69.0
43	Presentations	74.1
25	Web-Based Products	43.1
6	Video	10.3
7	Other	12.1

Other Responses:

- Press releases, annual report
- Community speeches/handouts
- Press conference, speakers bureau, direct mail campaign
- Distributed to individual airports as well
- News release
- Seminar
- The dissemination methods varied with the study. All the ones I have reviewed had a technical report. One study was published on CD-ROM.
- News release
- Hall of Flags—Distribute to legislators

14) If presentations were used to disseminate the results, please indicate type(s) of audience.

Port Commission monthly public meeting
Government and elected officials, civic organizations and clubs, chamber of commerce, tourism boards, travel clubs, airlines, academic settings, industry groups
News media, community and business organizations such as chamber of commerce, convention/visitors bureau, Rotary, Kiwanis, National Association of University Women, business and professional women's clubs, etc.
Not used
Airport commissioners, elected leaders, chamber of commerce, congressional delegation
Community at large
Management, board members, state and city leaders, etc.
Elected officials, economic development agencies, citizen/civic groups
Board members, management
City/county government officials, civic groups, University of Georgia
Chambers of commerce, neighborhood associations, economic development commissions, local and state governments
Chambers of commerce, business organizations, public presentations as part of a planning process, public airport board meetings
Aviation board members, members of the public present at public meetings
Airport users/citizens
Government, residents, community service groups, and community leaders

Local government and civic organizations
Airport operators
Government officials, business leaders, convention and tourism executives
Governing board of targeted owner, Town of Erwin Industrial Development Agency
County airport commission county supervisors
Rotary club meetings, city council meetings, airport board presentation
Civic groups and governing bodies
Civic clubs
Seminar will be a mix of lift providers, freight forwarders, academics, and politicians
Mayor/council, airport board conference attendees, council of governments, chamber of commerce
Business community; branches of state government
Chambers of commerce, convention and visitors bureau, governmental agencies
Airport authority members, local and state elected officials, economic development officials, convention and visitor bureau officials, hotel industry, travel agents
Chambers, Rotaries, local governments, and media
Community groups tenants business and industry governmental entities
Local community organizations, members of state legislature, economic development agencies
Chambers of commerce, both local and regional
Local assembly and airport users
The airport's mid- and upper-management, aviation committee of the full board of commissioners, local noise abatement meetings, as part of all speaking engagements and within content of all airport collateral materials
Chambers of commerce, governmental bodies
Airport management
Local government, airport commission
Public hearings that targeted nearby property owners because of expansion
Presumably presentations were made to the study sponsor. The results of some studies were presented at professional meetings. I am not aware what other presentations may have been made. You would need to obtain this information from study sponsors or those performing the studies.
PowerPoint presentation to stakeholders
Results were included in speeches and PowerPoint presentations to a wide variety of audiences ranging from legislators, to aviation industry representatives, to chambers of commerce, to the general public.
Board citizen groups
Business and civic groups, elected officials—city and state, and economic development groups
Three principal audiences: (1) elected officials; (2) metropolitan/regional planning organizations; (3) business/chamber of commerce organizations including trade organizations
Economic development councils of Maine, airport meetings, state planning organizations
City council, community organization, chamber of commerce
Local officials, citizen's groups, MPOs and Portland Development Committees, aviation board meeting attendees
Political

15) Was there any follow-up done to the studies in terms of ongoing assessment or validation?

No. of Respondents	Follow up	Percentage
15	Yes	25.9
43	No	74.1

Comment Responses:

- Started baseline survey in late 1980s and update every 3 years
- Actually done by UNLV Center for Business and Economic Research
- An original study was conducted in 1998. It was updated in 2001 and 2006.
- Not yet
- Informal, based on traffic and usage
- Study was recent and no follow-up has been done yet.
- EIS is underway and we have not budgeted for a follow up assessment.
- We are expecting to conduct another Economic Impact Study within the next two years.
- Not that I am aware of—the state agency might have an ongoing assessment.
- On-going; no results yet
- Leading economic impact numbers are updated on an annual basis for 2 years after completion of new comprehensive economic study initiative.
- Not that I am aware of.
- Nothing formal, but we determined it very successful as we heard people quoting the economic impact numbers. We will be doing a follow-up economic impact this year; last one was done in 2000.
- Follow-up varied widely and usually was dependent on funding or budgeting process.
- Just completed in early 2007

16) In your opinion, how often are the results of airport economic impact studies used as a factor in encouraging substantive change (encourage airport investment, change airport policy, suggest land use regulatory changes, etc.)?

No. of Respondents	Results Used as a Factor in Encouraging Change	Percentage
1	Never	1.7
30	Sometimes	51.7
23	Frequently	39.7
4	Always	6.9

Comment Responses:

- Always in terms of encouraging substantive public and private investment in airport and economic incentives for potential airport customers
- Like to have answered almost never
- If the community views the study as valid, they will use the data; otherwise, they will put the study on the shelf.
- We as a government agency use the data frequently. The current report itself is dated and has lost much of its impact.
- This is typically why they are performed. However, how effective they are at meeting this goal is another question.
- Our state-wide aviation economic impact study is very effective in broadly educating decision makers. When used in an individual airport situation they have also proven to be effective.

17) In your opinion, what are the top three benefits of airport economic impact studies?

Showing the link between our facilities and the community we serve	Informing public policy debate	Allowing for what-if analyses for future project and capital investments
Providing financial justification for airport	Establishing snapshot of airport fiscal capability	Marketing tool
To quantify and know the airport's impact	To convince and make aware to stakeholders the significance of its impact as an economic engine to the community/region	To convey to community the need to protect this valuable resource; to justify continued investment, expansion, growth for future benefits

Affirms the positive return on investment for airport funding	Makes case for additional public/private funding	Gives politicians firm reasons for legislative changes that enhance the airport's position
Satisfy community requests	Satisfy local development agencies	Satisfy local government requests
Know what is really happening on your airport	Tell others what is really happening	Justify the existence of airport
Airport acceptance	To combat crazy politics	To support future investment
Understanding the economic impact to the community	Understanding the economic impact to the local governments; i.e., taxes received	Understanding the economic benefits from commercial airline service to the community and businesses
Community support of airport development	Public relations	User relations
Public awareness of the benefits of airports	Tool to evaluate and substantiate investment and development	Other public affairs
Provides an end dollar amount that people can relate to	Communities feel that they are important	Larger airports can obtain more funding
Improved elected official support	Increased airport appreciation	Increased investment in airport
Setting goals	Planning	
Justification for investment in an airport	To quantify its impact on the community	Education tool
Value and importance of the airport to the local community	Economic development tool for local chambers and community	Where additional or less emphasis needs to be placed when awarding grants for community improvement program projects
It shows the value of air service	Enhances the image of the airport with citizens	Enhances the image of the airport with developers
Public awareness	Tool for garnering support for elected officials for program implementation	Key analysis for both aviation-related and non-aviation-related collateral development surrounding the airport
Quantifying the level of economic impact	Providing statistical data that can be used to support any number of initiatives	Validity of economic impacts and benefits of the airport to the local and state economy by someone outside of the local airport
Validation of airport benefits to the community	Documentation of aviation-related business impact	Documentation of non-aviation business located on the airport
Bringing awareness of the airport's benefit to the community	Protection of the airport from incompatible land uses	As a tool to help leverage additional money for airport needs
Airport justification to the community.	Encouraging local government investment in the airport	

Influence investment in airport infrastructure	Protect existence of airport facilities	Educating public of quantifiable and non-quantifiable value of aviation
Illustrates to airport neighbors how many jobs exist because of the presence of the airport	Illustrates to government officials the jobs and revenue created by the airport	Makes the case for continued investment to modernize and/or expand facilities
Justifies capital investment	Justifies public ownership	Use as a planning tool
Relating airport value to the communities	Justification of capital improvements at airport	
Support expenditures	Support value to community	Specify commerce supported by aviation
Independent assessment of the role of airports in dollars	Garners support for ongoing investment	Helps general public see what aviation does
Communicate the value of public investment in airport	Document the value of private investment in airport business	Gain public support for airport operations and development
Economic benefits	Jobs	Growth and facilities development and planning
Educating the general public		
Snapshot of airport economic impact	Informational tool for community	Potential use to justify investment
Aids a state to focus their scarce resources in airport system development	Airport sponsor can prioritize capital improvement projects and fund the most important ones	Aide communities to understand and thus support their airports
Public education	Public relations	Justifying capital expenditures
Airport system planning	Economic analysis	Transportation system planning
Validates the importance of the airport to the community and surrounding region	Confirms the airport plays a vital role in the continued expansion of the metropolitan and regional economy	Draws positive attention to the airport and aviation industry for Fargo and the surrounding region
Measuring airport's benefit to local economy	Helps with requesting funding (lobbying)	
Measure the direct impact of airport on community	Display impact of capital investments and tax impact on community	
Community education	Level of impact	Importance of aviation as an economic engine
Reminds/informs public and elected officials of the broader value of airports beyond just transportation	Provides additional avenue of communication with tenants and customers	Validates or revalidates worth of the enterprise for employees
Finding funds	Qualifying funding request	General knowledge
Community support	Community support	Community support
Gauge strength of airport/aviation on community or regional economy	Gauge employment generated by airport/aviation	Gauge impact of related and support industries within industries of tourism and trade

Learn the economic impact of your airport(s)	Learn about reasons for businesses' use of airports	Demonstrate to the community the economic benefits of its airport(s)
Airport's economic contribution to the community	Impact of jobs	
Provides information about the benefit of the airport to the community		
Show community what is at the airport	Help lobby local government for more/sustained funding levels	Shows trends in airport growth if the study is completed every two to three years
Use	Revenue	Benefits
The value of any given study is so dependent on its scope, how it is performed, and how the results are used that it is not meaningful to speak of the top three benefits in general terms.	Ideally, economic impact studies would identify how planning decisions or policy changes could influence the economic contribution of aviation and airports. However, due to the methodology used, they can rarely do this.	
Proves the often under-appreciated worth of the local airport	As a "joint-use" facility the EIS may help should Base Realignment and Closure target the facility.	Useful in demonstrating the business climate at the airport and in the community.
It's an economic multiplier	Job, wages, and income sustenance	It shows how the airport supports economic growth
Build community support for airport activities	Build legislative support for airport activities	Track changes in economic impacts over time
Identify what the airport contributes to the local economy	Identify where community is going economically	
Highlights the importance of airports—statewide education for local and state decision makers	Details the benefits—quantitative and qualitative—of an airport in a community	
Informing elected officials	Grasping the significance of air travel to the business community	Depending on the veracity of the data it can be valuable in benefit/cost analyses
Local, regional, and state support of airport	Provide material for specific airport marketing campaigns	Maine DOT acceptance of airport projects as pricing in a highway system
Importance of airport in community	Dealing with neighboring communities	Elected officials
Gives community a sense of the role of their airport in their community	Allows for development of performance measures	Provides tools for decision makers with regard to qualitative results
Show value	Show trends	Illustrates airport users other than aviation companies

18) What are the top three constraints or disadvantages of airport economic impact studies?

Can be viewed as self-serving or inflated	Data intensive	
Lack of participation by airport tenants	Multipliers often discounted	Numbers age rapidly
No one single method used by all airports—standardization among airports would make comparisons easier	Getting tenants to reveal financial data or them not wanting them used except in aggregate form	Finding the right contact with authority to release the information/labor and time intensive/constant changes in organizations and procedures and record keeping
Time-consuming to conduct thoroughly	Difficulty getting all airport business partners to respond with accurate data in a timely manner	
They are generally either too specific or too generic	They are quite expensive in terms of time and money	
Willingness of participants to tell the whole truth	Willingness of participants to take the time to give good information	Too small a sample
No standard format leaves reports open for challenge		
Education needed to explain results	Frequency of updating needed	Time required of sponsor to disseminate results
Assumptions can be challenged	Snapshot	Effort to prepare a quality study
No realized benefit for smaller airports	Output is money driven . . . no other benefits can be evaluated; i.e., airport geographic location, emergency services	Transportation infrastructure is equated to a dollar amount for its own benefit? Realizing there are some exceptions, are roads and bridges evaluated for their economic value?
They're becoming overdone/overused		
Misinformation	Lack of resources to perform study	
Funding the study	Finding qualified agencies to conduct the study	Dissemination
Outdated data by the time of production	Results tend to be conservative and/or overinflated at times	
Non-standard—Comparing different airports difficult	Difficult to breakout specifics from aggregated numbers	Difficult to explain the modeling and methodology used, to public groups
Dependence on results can create a lighting rod for community opposition to growth of an airport	The results need to be developed in manner in which people can identify. Simply indicating that a project or airport development can lead to 100 million or 1 billion dollars in economic impact is beyond the comprehension of most people.	It should be developed in terms of what is this one flight worth. What industries does this flight affect both direct and indirect. How does this construction project create direct and indirect benefits?
Methodology used in current study did not project growth factors		

Technicality of information makes it subject to criticism	Cost	Finding qualified consultant to do the study
The results might not be as good as you think	The information is outdated even before it reaches my desk	
Lack of understanding and acceptance by the non-aviation public	The model we have used has been difficult to apply on a statewide basis	
Not all use the same base model, so it is difficult to compare		
Induced impact tough to substantiate with actual data	Number of assumptions not well-grounded in fact	Indirect impacts tough to accurately estimate
They tend to use multipliers etc., to determine indirect benefits to community	They are hard to relate to non-users/taxpayers in community	Use of old methodology to compile data
Explaining the concept to the public	Making it sound believable since the numbers are so large	Making it real when comparing with parks, streets, water/sewer, etc.
Aviation activity is hard to measure	Impact of aviation can only be truly seen if you paint a picture for citizens of what a community would be like without the local airport	It is easy to not be realistic with the numbers and over inflate them to the point people do not believe you
Only a snapshot of a complex, changing operation	Without 90% participation from businesses/organizations, results may not be as meaningful	An outside agency should compile/complete the survey for objectivity
NIMBY still highest consideration so studies ineffective	Industry information is limited	Industry cooperation particularly air cargo is limited
Induced impact is not widely accepted	False information provided by airport tenants	Continuity of reports from previous years
Methodology sometimes not understood	Other factors determine investments	Cost of studies, if not used to implement policy
Validity of the study	Cost prohibitive for communities to conduct these needed studies	Insufficient survey return rate—small sample sizes
Reliability of input information	Limitations of the model used	Quality of assumptions used
Timeliness of information	Overuse and overreliance on the data	General resistance to the data
The timeliness of collecting the data	The difficulty in obtaining data from stakeholders	
Usually not conducted annually		
Difficult to explain to multiplier effects	Quality control of the data	Believability
Always subject to the criticism that it is self-serving	Generally shows economic value at a point in time; not readily dynamic.	Some risk to interviewing tenants and customers. Not all are equally eager to share confidential information.

Time consuming	Cost	
Keeping information current	No local linkage or specific examples	Output less useful without a frame of reference
True validity of all information provided by industry partners	Government agencies unwillingness to cooperate or fully cooperate in divulging information	Some multipliers or factors are one size fits all in an industry that is very diverse . . . Not all domestic routes provide similar impact . . . or evaluate impact of flight from Bahamas vs. Tokyo.
Expensive to conduct	Can be targets for community criticism	Shelf life can be short, because airports are constantly changing
Narrow scope	Takes only wages and jobs into account	Did not study impact of airline ticket sales
Sometimes the manner in which a report is written may not be user-friendly	Sometimes the information is hard to grasp	
Members of the public question its validity	You are hopeful that the information you received from your fixed-base operators and survey takers is correct and factual	Trying to get the information out to the local media and having them understand it correctly
The principal problem with most economic impact studies is that the methodology used is fundamentally flawed and the results are meaningless. What else is there to say?		
The EIS needs to be updated often	The multiplier is often difficult to explain	Some people, or groups, consider an EIS as fiction
Insufficient updates	Budget constraint	
Formulas tend to be questionable, with impacts likely overstated	Costly to conduct	No universal methodologies for measuring impacts
Getting people to understand the multiplier impact	Changing people's views when they do not support airport expansion	
Validity is questioned on those done by a paid consultant	May highlight that some smaller airports have very little economic impact	Hard to quantify economic development benefits of an airport
Validity/rigor of data, accuracy uncertain	Qualifications of firms performing the studies	Failing to integrate the study into some broader program objective or economic growth policy
One generally accepted economic modeling so one study is relevant to another study	General aviation data are inherently difficult to obtain	Follow-up funding from FAA for marketing studies
Participation of on-airport businesses	Adequacy of data	Distribution of results
Limited by modeling.	Secondary impacts difficult to qualify	May be misinterpreted by audience
It is difficult to capture non-aviation value	General aviation (non-business related) may appear as not contributing a fair share	In-direct benefit multipliers are not always believable

19) What one thing would you suggest to improve the reliability or applicability of future airport economic impact studies?

Choose methodology that is defensible rather than just using the one that produces the biggest numbers
Annual updates
Standardization in the industry
In every airport lease, operating permit, contract, vendor agreement, and so forth include a stipulation that the business must fully and accurately complete the economic impact survey and return it by the deadline whenever the survey is conducted.
I don't think there is such a thing. Reliability is subjective and applicability is time sensitive. To do one just to do one is likely wasteful and to do one without answering the original need for sure is wasteful.
Validate/cross check the employment and spending data
Use local established authorities
Establish standard criteria
Choose a standard method to calculate indirect and induced benefits to aid comparing one facility with another.
Have a detailed understanding of assumptions and methodology used
Write them in laymen's terms
Summaries need to be written for the audience, not for economists
Use a reputable agency to conduct the study in order to get factual information that the public will trust.
The use of a realistic baseline as a starting point and an ability to somehow get the results in a quicker manner so that a majority of the data is not completely outdated by the time the project is completed.
Standardization
A post-study follow-up to validate the results to the extent possible
Forecasting for economic impact of possible improvements to provide return on investment data
Involvement from a large diverse group
Allow for easy end user updating
A standard methodology for key study components that would allow apples-to-apples comparison among airports
Analysis of actual performance compared with previous studies would produce trending data and a way to predict accuracy.
More time should be given to airport users to research the value of the airport. Especially industries that typically don't take enough time to fully evaluate the airport's role in their business; i.e., more time should be given to those being surveyed in order to receive more accurate data for use in compiling the surveys.
Be sure to make the results easy to compare with other economic impact studies. The economic impact of the new plant with 100 jobs is easy to understand. The airport that has 100 based aircraft has impact but it does not compare favorably on paper with the new plant. Multipliers need to be explained carefully and the concept proved without a shadow of doubt.
I think a truly great study would be to portray to people what items would not be in their local stores, delivered to their home, delivered by service industries (technical and professional), except for the fact that their local airport exists and/or the nearby regional airport exists.
Well-drafted questionnaire
Airports are inter-connected. Airplane takes off from one place goes to another. As a result, a clearing house of impact studies from all airports open for review would help to see how others are responding.

Consistent and accurate data that stands up over the years and continuity of reports form previous to current years.
Timing the study to be able to use the most up-to-date socioeconomic data available from reliable sources (County Fact Book, Woods & Poole, etc.).
Consultant needs to go into the community and meet face-to-face with airport stakeholders. Solicit their support and empower them to help gather needed data. Talk to chambers of commerce, city hall, Rotary, etc. E-mails/letters cannot convince the value of these studies. It takes one-on-one time.
Careful and thorough gathering of information
Continual updating of the data and documenting the trends established by the data. Forecasting is an important facet in the establishment of goals and objectives but we must be able to support estimates with validated data.
Make certain the people collecting the data from stakeholders understand what an economic impact study is and what it can be used for each agency that is solicited to participate. Make them understand what their role is in providing data and provide them ideas for what they can do with the data within their respective industry—such as car rental agencies, hotels, fixed-base operators, federal agencies, etc.
Use a university that has a significant amount of reliability in the community.
Include your tax impact—especially if you are a non-profit authority
To have the supporting data available for public view
Find a good way to crosswalk assumptions, methodologies, and results with those of prior studies, especially studies conducted by other entities. The public hears a lot of numbers and doesn't usually understand why the numbers appear to be contradictory or inconsistent at times.
Only compare airports that are operated under the same circumstances.
Web-based tool for real-time information
Greater assurance and measures that capture all business partners involved in the airport's periphery and business
Continue to improve economic modeling methods (e.g., input–output models), because economic impact studies are only as valid as the models used to produce them.
Some sort of uniform process/procedure to apply to basic data collection and reporting. An airport may choose to add to this basic information but at least this would allow a person to compare basic numbers from one airport to another.
Do them at set intervals, so the information is always up to date. Describe the methodology in the preparation of the report in layman's terms.
Updates every two and no later than three years
Develop and use a theoretically sound methodology
Update frequently and explain the multiplier
Obtain region-specific input–output model not a derivative of a national model
Development of standards all vendors can use to measure airport impacts
Economic impact studies need to be presented in a format that is believable, readable, and understandable.
Weave the study into more broad policy or strategy development.
Database to be able to continuously update the information
Get airport business buy-in
Better quantitative data
Amplify the direct impact separate from direct costs

20) Please use this space to provide any additional comments regarding airport economic impact studies.

Of the 6 comprehensive economic impact studies I've coordinated for Louisville International Airport and Bowman Field, it has become increasingly difficult each time to identify the appropriate contact within each organization who can provide accurate and timely data and a significant decrease in businesses' willingness to share basic employment, payroll, business expenditures, capital investments, and taxes generated/paid for the database
There are many fine companies out there very capable of doing these studies. A problem exists when a study is done to the satisfaction of the client airport and questionable practices are used in modeling and applying multipliers. Every region is different and variables change . . . when you've seen one airport you've seen . . . one airport.
To use the report, one must be able to believe in the results, and be able to explain to the target audience why they are true and have the actual impact that is stated. Often people distrust the information or believe it to be blown up out of proportion
Great tool . . .
Not applicable to airports for many airports
Try to update them on a regular basis
While I believe they are a valuable tool to understand the potential benefits or potential loss of not doing a project, they must be specific enough to be able to point at some of the findings/recommendations as tangible information.
A very useful and informative tool! Expansion of contents would improve the applicability of its use.
I believe they are, overall, a very valuable tool in justifying the existence of an airport to a community in general. Although some of the indirect benefit is determined by the use of multipliers etc., it is perhaps the only way to put a dollar value on what the airport means to a community.
100% participation in the questionnaire should be a goal. A combination of on site interviews and telephone interviews will supplement a mailing.
Study is only as good as data source(s) allow. User surveys, socioeconomic information, etc., must be current and reliable in order for buy-in to estimated results of airport economic benefit/impact.
It is a useful tool if the results are robust.
Economic impact studies are essential to system wide planning and justification for expenditures. They are, however, only a part of the larger process. The data collected and the presentation of that data must be rock solid and presented in a manner that reaches a very wide audience.
They are great tools that must be updated every 4 or 5 years.
Economic impact studies have been the most useful document we produce in terms of being effective in promoting change; very popular with airport operators.
Our study involved additional facilities beyond just airports. It was agency-wide. (The results were reported by facility, however.)
Although they are costly to conduct, I would recommend an airport conduct an economic impact study to demonstrate to the community the important roles it serves and the economic benefits it has on the community.
The studies have always helped me with promotion of the airport, but I always get questions on their validity. As airport manager, I try to address those questions to the best of my ability but it is hard because I only supply the information, I don't make the report.
Very helpful tool for future development

There is a pressing need to recognize that the methodology currently used in most studies fails to address the real issues that need to be considered and confuses costs and benefits. As a result, most studies have little value from a planning or policy perspective. Hopefully, the ACRP project will initiate a process to establish a theoretically sound methodology and standard of practice.
Be careful with multipliers—Too large could result in lack of community acceptance
Virginia is in the process of scoping an update of the State System Economic Impact Study. We are in the process of developing performance measures that will be incorporated into multi-modal planning efforts.

Survey Results and Analysis

for

S03-3 Survey for Authors of Airport Economic Impact Studies

(Airports and State/Regional Transportation Agencies)

Monday, June 25, 2007

Powered by:

Executive Summary

This report contains a detailed statistical analysis of the results to the survey titled *S03-3 Survey for Authors of Airport Economic Impact Studies* (*Airports and State/Regional Transportation Agencies*). The results analysis includes answers from all respondents who took the survey in the 19-day period from Friday, May 4, 2007 to Tuesday, May 24, 2007. Eleven of the 12 completed responses were received to the survey during this time and one survey was ended at question nine and thus the results of that survey were not used.

Survey Results and Analysis

Survey: S03-3 Survey for Authors of Airport Economic Impact Studies (Airports and State/Regional Transportation Agencies)

Author: Joakim Karlsson, Hoyle, Tanner & Associates and RKG Associates
Responses Received: 11

1) Please indicate the state in which your airport(s) or the airport you studied is located?

Response	Count	Percent
Arizona	1	9.1
Georgia	1	9.1
Kansas	1	9.1
Massachusetts	1	9.1
Minnesota	2	18.2
North Dakota	1	9.1
Pennsylvania	1	9.1
Washington	1	9.1
Other	2	18.2

Other Responses:
- One model was for all states
- Have conducted studies across the U.S. and consultant

2) Please indicate the number of years of experience that you have in the aviation industry:

No. of Respondents	Years of Experience	Percentage
4	0–9	36.4
2	10–19	18.2
4	20–29	36.4
1	30–39	9.1

Mean = 15.64, Min. = 0.00, Max. = 33, Median = 19.00

3) How familiar are you with airport economic impact studies?

No. of Respondents	Familiarity with Economic Impact Studies	Percentage
0	Not Familiar	0.00
1	Somewhat Familiar	9.10
4	Familiar	36.4
6	Very Familiar	54.5

4) How many airport economic impact studies have you been involved with (completed, sponsored, supervised, reviewed, etc.) over the past 10 years?

No. of Respondents	No. of Economic Impact Studies	Percentage
0	None	0.00
8	5 or Less	72.7
0	6 to 10	0.00
0	11 to 20	0.00
3	More than 20	27.3

5) Please indicate the intended audience(s) of the studies you have been involved with (select all that apply):

No. of Respondents	Intended Audiences	Percentage
11	Government Agency	100.0
10	Citizens/Residents	90.9
5	Planning Agency	45.5
5	Fixed Base Operator	45.5
11	Airport Management	100.0
2	Other	18.2

Other Responses:
- Economic development organizations
- Chamber of Commerce
- Private MRO operators (aircraft maintenance/repair/overhaul)

6) Please indicate the reason(s) airport economic impact studies were initiated (select all that apply):

No. of Respondents	Reasons for Economic Impact Studies	Percentage
7	To justify airport investment/expansion	63.9
4	To determine allocation of matching funds	36.4
7	To formulate economic development/planning initiative	63.6
0	It was an academic initiative	0.0
7	To supplement the airport system plan	63.6
6	To measure significance of airport to specific industries	54.5
6	To obtain financial support from other municipalities or from county/region level	54.5
11	To measure significance of the airport(s) to the local community	100
1	Other	9.1

Other Responses:
- Because former source of study was no longer completing it.

7) Please indicate the variables measured or estimated in the airport economic impact studies in which you have been involved (select all that apply).

No. of Respondents	Variables Measured	Percentage
10	Wages	90.9
11	Employment	100.0
4	Cargo/Tonnage	36.4
10	Tourism	90.9
6	Air Traffic Levels	54.5
2	Time Savings	18.2
10	Local/Regional Spending	90.9
6	Military/Emergency Services	54.5
4	Other	36.4

Other Responses:
- University flight training, weather modification, aerial applications
- Off-airport, dependent user impacts
- Sales or output, tax revenues
- Induced economic impacts

8) Please rank the usefulness of the methodologies that were used in the airport economic impact studies.

Methodology	No. of Respondents	Rank the Usefulness of the Economic Impact Studies	Percentage
Economic input–output model [e.g., direct, indirect, induced multiplier or Regional Input–Output Modeling System (RIMS)]	8	Extremely Useful	72.7
	2	Very Useful	18.2
	1	Useful	9.1
	0	Not Very Useful	0.00
	0	Not Used in Study	0.00
	0	Not Applicable	0.00

Qualitative survey (survey of airport users, passengers, etc.)	4	Extremely Useful	36.4
	4	Very Useful	36.4
	1	Useful	9.1
	0	Not Very Useful	0.00
	0	Not Used in Study	0.00
	2	Not Applicable	18.2
Community benefits	1	Extremely Useful	9.1
	2	Very Useful	18.2
	5	Useful	45.5
	1	Not Very Useful	9.1
	1	Not Used in Study	9.1
	1	Not Applicable	9.1
What-if analyses	1	Extremely Useful	9.1
	1	Very Useful	9.1
	1	Useful	9.1
	2	Not Very Useful	18.2
	2	Not Used in Study	18.2
	4	Not Applicable	36.4

Comment Responses:

- Need more description of 8.3 and 8.4

9) Please list the types of data sources that you typically use for developing airport economic impact studies.
   - Primary data collection from airport authority surveys. Government data such as wage rates, employment levels, multipliers, tax rates, etc.
   - Primary data from airport users input–output (IMPLAN) interviews of airport managers and FBOs
   - Airport tenant surveys passenger surveys, job service employment wages, census data and airport job reports
   - Surveys of airport visitors and users surveys of regional business reliance on aviation surveys of aircraft owners, surveys of FBOs and vendor's survey of airport management, Dun & Bradstreet and InfoUSA data, FAA tower statistics, state aircraft registration data
   - Local surveys—businesses in town, plus businesses directly related to airport. Several prior studies at other locations. Some articles on computing direct, indirect and induced impacts
   - IMPLAN, state data sets tourism visitor studies (numbers of travelers and expenditure profiles)
   - Airport operations and based aircraft by type. Annual aircraft flight plans, multiplier models. Discussions with airport manager, FBO, and other local sources. Surveys of airport users and visitors (departing passenger surveys of commercial visitors and pilot surveys of GA visitors)
   - Survey data from airport tenants, secondary data on industries located at the airport (input–output data)
   - Impact model, qualitative surveys, national database, State Economic Impact of Travel study
   - BEA, RIMS data, FAA air traffic activity, BLS wage rates, airport tenant lists and employee counts, census data, government and private-sector economic growth data, airport master plan
   - Tenant/business surveys, passenger/pilot surveys, FAA Instrument Flight Rules database.

For Questions 13–18, please pick a single study which you believe is representative of your experience in the field.

13) Did the study attempt to capture any of the following trends in aviation (select all that apply)?

No. of Respondents	Variables Measured	Percentage
2	Growth of air freight	18.2
3	Development of international gateways	27.3
4	Non-aviation commercial development attracted to the vicinity of the airport	36.4
1	Use of air transportation in supply chains and just-in-time delivery	9.1

4	Reliance on aviation by specific industries, such as R&D, biotech, banking, universities, etc.	36.4
2	Growth in business aviation/emergence of fractional ownership	18.2
1	Consolidation and globalization	9.1
0	Emergence of very light jets	0.00
4	None of the above	36.4
3	Other (please specify)	27.3

Other Responses:
- Economic development
- Aviation manufacturing growth in North Dakota
- Economic impact of airport in the area
- The various studies cover all of these points at one time or another, perhaps a ranking of importance might help.

14) In retrospect, how would you rate the study in terms of the validity of the results and the methodology?

No. of Respondents	Rate Validity	Percentage
0	Not Valid	0.00
2	Somewhat Valid	18.2
8	Valid	72.7
1	Very Valid	9.1

Comment Responses:
- Accomplished by limiting the scope of study
- Issue of off-airport user impacts
- Often qualifications and context get lost in summarization of report results.

15) Was there any follow-up done to the study in terms of on-going assessment or validation?

No. of Respondents	Follow up	Percentage
3	Yes	27.3
8	No	72.7

Comment Responses:
- Phone calls of key missing FBOs
- Typically not, but sometimes
- The airport repeated the study to obtain estimates of impact.

16) If yes, what assessment/validation efforts were undertaken?
- Phone calls to verify data and research Internet for media stories of company to validate data.
- Further study, peer review
- Department of Commerce follow-up/database.

17) How would you rate the studies in terms of impact and utility? (i.e., how successful was it in meeting its objectives?)

No. of Respondents	Rate Utility	Percentage
0	Not Useful	0.00
3	Somewhat Useful	27.3
5	Useful	45.5
3	Very Useful	27.3

Comment Responses:
- The qualitative user surveys were most useful
- Study was the development of an on-line tool local airports could use to evaluate the economic impact of their airport. Impact study developed regional multipliers that were the basis for the online tool.
- Again, this ranges from study to study; some are extremely useful, some are marginal.

18) What methods were used to disseminate the results (select all that apply)?

No. of Respondents	Methods Used to Disseminate Results	Percentage
11	Technical Reports	100.0
11	Summary of Executive Reports	100.0
5	Brochures for Public Distribution	45.5
9	Presentations	81.8
9	Web Based Products	81.8
3	Video	27.3
2	Other	18.2

Other Responses:
- Press releases and media interviews
- Held eight community meetings to present results
- Presentations were to key stakeholders

19) If presentations were used to disseminate the results, please indicate type(s) of audience.
- City/county commission, state legislative committees, chamber of commerce boards, business/professional organizations, airport and other governmental agency boards and staff
- Airport managers, FBOs
- Airport staff, airport boards, city commission, county commission, economic development, tourism, chamber of commerce, newspapers, TV, radio, etc.
- General public, state and local legislators, airport administrations
- City council by request of the chamber of commerce that had authorized the study
- Minnesota Council of Airports annual conference workshop presentation
- Ranges from community to transportation departments to aviation conferences, etc.
- Key stakeholders, city/county/economic development groups
- Consumer and citizen groups
- General public, local elected officials, local decision makers

20) In your opinion, how often are the results of the airport economic impact studies used as a factor in encouraging substantive change (encourage airport investment, change airport policy, suggest land use regulatory changes, etc.)?

No. of Respondents	Results Used as a Factor in Encouraging Change	Percentage
0	Never	0.00
6	Sometimes	54.5
5	Frequently	45.5
0	Always	0.00

21) In your opinion, what are the top three benefits of airport economic impact studies?

Helping community understand the role of airports in the larger economy	Demonstrating the return on investment of tax paper investment in infrastructure	Identifying areas of improvement needed
Understanding airport linkages	Community support	Public investment
Public awareness and education	Community support for airport role in city	Justify airport funding
Generate support for local match funding	Provide public understanding of aviation facility benefits	Help airport administrators value the relative importance of various facilities and services
Overall financial benefit to community	Encouraging use of the airport by citizens	Influencing government authorities to invest/fund airport improvements

Educating airport owners (city and county elected officials) about their operations	Economic development opportunity assessment	Validation of investments
Quantitative data on jobs and expenditures	Promotional brochures and other material that presents information in a concise manner	Perspective, both quantitative and qualitative, of the importance of the airport to the region
Provide quantitative data on the economic impact of the airport	Provide useful overall statistics about business at the airport	Provide data useful as a comparison with other impact studies
Funding entity awareness of economic benefits	Funding entity awareness of correlating benefits that are not easily quantified	Public awareness of the range of impacts an airport brings to community
Scale and scope of airport in local economy	Clearer view of airport investment opportunities	Useful in competition for scarce airport improvement dollars
Appropriate allocation of scarce financial resources	Justification for local sponsor financial support	Gain support for needed airport expansion

22) What are the top three constraints or disadvantages of airport economic impact studies?

Limited data	Lack of participation of airport occupants	Ability to quantify impacts such as spillover effects, quality of life impacts, etc.
Difficult for the average person to understand	Not dynamic	Cost of development
Dollars needed to accomplish	Value of time needed by airport survey on industry	Validate accuracy of data
Missing data	Uncooperative tenants and managers	
Figures may not be believable	Accuracy of survey responses may be questionable	Surveys soon are outdated
Economic data unavailability	Age of data when available (time lags)	Lack of information and understanding of airport operations
Do not adequately capture off-airport user impacts	Variance in style, approach between analysts may inhibit comparability between airports	A region's economic development depends on many factors, of which airports play a role. It is difficult to capture the relative importance of airports relative to other major factors (employment and the economy)
Wide-range of methodologies used by various entities	Lack of specific data	No cohesive data set that encompasses all the information needed
Easily misinterpreted and overstated	Results only as good as forecasts and models	Data shortcomings are unclear to readers
FAA often unwilling to fund all or parts of studies	Too many consultants to these reports who use incorrect modeling/methodologies that result in the wrong answer and then all studies get questioned	Results can only adequately reflect a snapshot of current economic performance

23) What one thing would you suggest to improve the reliability or applicability of future airport economic impact studies?
- Increase quality of input data
- Have more support of airport tenants in supplying information and have them understand the value of their response to the overall goal to promote industry
- Need for an updated national guide to measurement of airport economic benefits
- Access to "national" database with appropriate questions, research methods, and help for "local" researchers who may not have expertise in surveying, sorting, and reaching legitimate conclusions on various impacts (for example, a formula used by the FAA for induced impact may not be reflective of actual results . . . need a "Standard" that could be used by researchers so that comparisons would be made among airport economic benefit).
- Consistent collection of key economic activity parameters for baseline data.
- Develop a widely accepted method(s) to address the off-airport user impacts associated with airport operations, which address the value to firms that transport cargo and/or personnel through airports.
- More direct business activity data on tenants
- Set up standards for analyzing various types of impacts, with example studies, for researchers to use in undertaking airport impact studies; for example, templates of surveys (if applicable) or a modeling system that is available for all to access.
- Greater understanding by users of what such studies do and don't mean
- Keep think tanks, universities, and unqualified consultants/individuals from putting out questionable reports that diminish the value of good studies.

APPENDIX C
Annotated Literature Review

Airport Technology and Planning Group, Inc., *The Economic Impact of Aviation in Pennsylvania,* Bureau of Aviation, Pennsylvania Department of Transportation, Harrisburg, n.d.
This study measures the economic benefits of the state's 150 airports within three airport segments—scheduled service airports, general aviation airports, and overall business dependence. Total economic benefits for the state's scheduled service and general aviation airports was measured by total airport-related jobs and aviation-related output or spending (either capital improvements or spending by visitors arriving via an airport). To arrive at a total economic impact, these estimates were multiplied to account for successive waves of benefits. The authors also surveyed businesses to estimate the "value added" benefits of the state's airports based on the number of jobs that rely on the availability (or access) to an airport. Qualitative benefits (such as health, safety, and agricultural) are also provided.

***Analyzing the Economic Impact to the City of Fayetteville from Operations and Capital Improvements at Drake Field,* Center for Business and Economic Research, Sam M. Walton College of Business, University of Arkansas, Fayetteville, 2005.**
This study considered the change in total direct, indirect, and induced economic impact related to the loss of commercial air service at Drake Field in Fayetteville, Arkansas. The authors measured the quantitative economic value of the facility in terms of the employment, economic output (purchases of goods and services in the region resulting from activity at the airport), and the local taxes that the airport and associated businesses produce. They then used an IMPLAN input–output model to determine the three types of impacts (direct, indirect, and induced). Local tax impacts were calculated by generating the local tax burden per employee (total tax revenues/employment base). This estimate was then multiplied by the estimated number of jobs generated by the airport.

***A Study of the Current Economic Impact of the Blue Grass Airport on the Lexington–Central Kentucky Area,* Center for Business and Economic Research, Gatton School of Business and Economics, University of Kentucky, 2001.**
This study comprises a traditional economic impact analysis that examines airport spending, employment and worker incomes, as well as other spending in the region that could be attributed to the airport. Direct on-airport impacts (from employment, payroll, and revenue/sales) were estimated by surveying airport businesses. Indirect impacts were calculated using a Micro IMPLAN model, with the total economic impact being the sum of the direct and indirect effects. The economic effects of passengers (business and leisure) and regional business usage impact were calculated in a similar fashion based on origin, destination, and spending surveys (for airport passengers) and usage surveys for regional business establishments.

Beyers, B. and S. J. Hyde, *King County International Airport/ Boeing Field: 2003 Economic Impact Study,* Airport Division, King County Department of Transportation, Seattle, 2003.
This analysis used traditional methods to estimate sales, employment, labor income, and regional purchases by tenants at the King County International airport and was collected through tenant surveys. To calculate indirect and induced economic impacts, direct estimates of sales, employment, and labor income were inputted into an input–output model. One non-traditional method employed estimated the amount of "new money" (non-local demand for airport goods or services that could not be satisfied if the airport were not there) activity generated by the facility. Estimated "new money" economic activity was generated through data collected via tenant surveys.

Breitenbach Weiss and Martin Associates, *The Local and Regional Economic Impacts of Milwaukee County's General Mitchell International Airport 2005,* Milwaukee County, Wis., 2005.
This report is unique in its assessment of the economic impact of the General Mitchell International Airport in that its assumption that the impact of an airport on the local, regional, or national economy cannot be reduced to a single number. Furthermore, in order to provide the most credible measurements of the facility's impact, only direct measurement (i.e., no input/output models used) were incorporated. Instead, airport activity creates several impacts including revenue impact, employment impact, personal income impact, and tax impact, with these impacts not being additive. To measure the impacts, the methodology was based on interviews, local economic data, and airport statistics.

Bunting, D., et al., *The Economic Impact of Spokane International Airport,* The Board of Spokane International Airport, Washington, 2006.
To estimate the economic impact of the Spokane International Airport on the regional economy (Spokane and Kootenai counties), the authors looked at five components of airport activity:

- Visitors
- Facility tenants
- Business park tenants
- Capital spending
- Internal operations

The authors used intercept surveys (conducted at three separate times) of visitors departing the airport to estimate visitor spending. Surveys were also distributed to businesses at the airport, as well as firms in the airport's business park. Interestingly, the study did not attempt to quantify the value of the airport to locally based businesses (besides airport tenants) or residents traveling for personal reasons.

As with many input–output studies, this study provides three measures of the economic size of the airport—output (sales), wage income, and jobs. Additionally, the study estimated the amount of federal, state, and local taxes generated by the facility based on the total impact of the airport.

Center for Economic Development and Business Research, *Economic Impact of Salina Municipal Airport and Salina Airport Industrial Park,* Salina Airport Authority, Salina, Kans., 2007.
This relatively simple study examines both the economic and fiscal impacts (for the current year, and forecasted over ten years) associated

with the Salina Municipal Airport and Salina Airport Industrial Center. The Salina Airport Authority provided business, employment, payroll, and tax data paid by airport businesses used in the study. The authors based their analysis on many assumptions including average passenger overnight stays, proportion of airport employees living in Salina, and proportion of employee payroll spent on taxable retail goods—all of which have no source. Total current year economic impacts were calculated by multiplying direct airport employment and payroll figures by RIMS II multipliers. The total economic impact estimates were then simply multiplied by ten in order to calculate the forecasted ten-year impact.

The net fiscal impact was calculated by subtracting public service costs from the estimated tax (sales, income, property taxes, and other sources) revenues generated by the airport. It was unclear as to how the authors attributed the cost of providing public services to the airport. Direct and indirect impacts from visitor spending and airport operations (airport fuel sales, capital expenditures, and payroll) were estimated based on passenger and business surveys and airport data.

Cooper, A. and P. Smith, *The Economic Catalytic Effects of Air Transport in Europe, Eurocontrol,* 2002.
Although most airport economic impact studies concentrate on the direct, indirect, and induced contributions of airports, the authors suggest that economic catalytic (or spillover) impacts have received relatively little attention and not been quantified. This study develops a methodology for quantifying the catalytic effects of Europe's airports to 2005, and projected to 2025. Catalytic effects are defined as the net economic effects (e.g., on employment, incomes, government finances, etc.) resulting from the contribution of air transport to tourism and trade and the long-run contribution to productivity and gross domestic product (GDP) of growth in air transport usage. The authors further distinguish these effects into demand-side (through the transportation of tourists and goods) and supply-side (long-term contribution to productivity and GDP growth) catalytic effects from air transport.

The authors conclude that the historical demand-side effects of air transport in Europe have been minimal. However, the supply-side catalytic effects have been significant in Europe, and are likely to continue to contribute significantly into the future.

Eclat Consulting, *Economic Impact Study,* Newport News/Williamsburg International Airport, Newport News, Va., 2006.
The methodology used in this study to calculate the economic impact of the Newport News/Williamsburg International Airport is unlike any other study reviewed in this analysis. In calculating the direct on- and off-airport economic impact, the authors used an anticipated spending estimate per passenger multiplied by the number of passengers using the facility. The estimated number of jobs created by the airport was calculated in a similar way based on a correlation between the number of jobs and passengers using the facility (jobs per one million passengers). The report provides an estimate as to the amount of state and local taxes generated by the airport; however, the methodology used to calculate this tax revenue estimate was not provided.

Economic Development Research Group, Inc., *Logan International Airport's Evolving Role in the New England Economy,* The New England Council, Boston, Mass., 2001.
As one of the most comprehensive airport economic impact studies reviewed, this report provides a vast array of economic facts which link Boston's Logan Airport to the New England economy. Provided mostly by secondary sources, the study provides exceptional amounts of quantitative information on the economic significance of Logan's cargo and passenger customer base. Additionally, the report provides qualitative assessments in the form of testimonials from interviews of representatives of local companies that utilize Logan in their firms' operations. More traditionally, estimates are provided as to the contribution of the airport to the economy relating to on-airport activities (and related spin-off activities), as well as off-airport visitor activities (and related spin-off activities). Although the report is an excellent example of how to quantify the link between an airport and the economy, it falls short on providing insights as to the methodology used to generate or formulate its conclusions.

Economic Development Research Group, and Mead and Hunt, *Economic Impact Study: Preliminary Final Report,* Capital Region Airport Authority, Lansing, Mich., 2004.
This comprehensive report quantified the economic impact of the Capital City Airport on each of three counties in the Tri-County Region, as well as the combined region. Like many studies, surveys were relied upon in order to collect wage, employment, and spending data. In this study, surveys were distributed to airport managers and tenants, airport travelers (both residents and visitors), and, regional businesses and institutions. This report is comprehensive in that it measured six types of business activities that comprised the airport's total economic impact including:

- Airport-based economic activities, including airlines and terminal services
- Off-airport businesses serving airport travelers
- Airport-dependent businesses that rely on the airport to transport personnel and cargo
- Off-airport businesses that provide goods and services to the airport, airlines, other on-airport agencies, and airport-dependent businesses
- Off-airport businesses that provide goods and services to employees who earn their income on the airport
- Tax revenues generated for the local economy by all of these types of businesses activities.

Although some airport economic impact studies do not aggregate each of the individual economic measures (in this case the six types of business activities), in this case, this study aggregated the total of each measure as an overall airport economic impact estimate.

Economics Research Associates, *Economic Impacts, Costs and Benefits of Contra Costa County Airports,* Contra Costa County, Calif., 2000.
This comprehensive report determined the economic impact of Contra Costa County's two airports—Buchanan Field Airport and Byron Airport. The report had four purposes including estimating the direct, indirect, and induced economic and employment impacts of the airports on the county economy; projecting future impacts based on hypothetical development scenarios at each airport; identifying other qualitative and quantitative benefits and costs of the airports; and estimating the impact of the airports on surrounding property values. The authors measured five mechanisms through which the airports directly impact the Contra Costa economy:

- Operating expenditures by airport businesses
- County operating expenditures on airport administration and operations
- Visitor expenditures (student pilots, pilots, passengers, business visitors, etc.)
- Property taxes
- County and airport business expenditures on construction and capital improvements.

The report provides an estimate of the total economic impact of the airports including direct, indirect, and induced jobs created by the facilities.

Flint Communications, *Economic Impact of Aviation in North Dakota,* North Dakota Aeronautics Commission, Bismarck, 2004.
Since 1994 and at intervals of every five years, the North Dakota Aeronautics Commission has completed an examination of the aviation industry's economic impact on the state. The methodology used in the study involved surveying aviation industry groups including:

- Commercial service airport tenants
- General aviation management
- Agricultural sprayers
- Fixed-base operators (FBOs)
- Air travel visitors
- Commercial service airports
- Travel agencies
- Hotels/motels
- Aviation manufacturing establishments.

Although most studies include direct, indirect, and induced impacts, this study measured only the direct and induced economic impacts related to employment, and aviation-related expenditures.

Harrah, J., et al., *Wichita Mid-Continent Airport Economic Impact,* Wichita State University, Wichita, Kans., 2003.
Created more as a summary collection of economic and fiscal benefits, this report provides an examination of the economic impact of the Wichita Mid-Continent Airport. The study calculates direct economic impact based on total airport employment and payroll, to which total impact is estimated by using RIMS II multipliers. Net fiscal benefits are also provided for the airport based on estimated local revenue (property taxes, etc.) compared to estimated local costs to provided services and infrastructure to the airport.

HNTB, *The Economic Impact of Airports in Colorado,* Division of Aeronautics, Colorado Department of Transportation, Denver, 2003.
This report quantifies the economic impact of Colorado's public use airports on the state economy. The methodology used measures the on-airport impacts, visitor spending and spin-off impacts in terms of three indicators: total jobs, wages and business sales. The study also suggests that Colorado's airports provide qualitative benefits that add to the residents' quality of life in terms of public safety, air medical transport, and recreation to name a few.

Kaskie, S., *Twin County Airport Economic Impact Analysis—Detailed Report,* Marinette County UW–Extension, Menominee, Mich., Mar. 2007.
This simple and understandable study examines the economic impact and fiscal benefits associated with the Twin County Airport in Menominee, Michigan. The author employs a traditional direct–indirect approach to examining the impact associated with the facility, but prefers to use "initial" and "multiplier" impact terminology. Like most studies, airport businesses were surveyed to generate on-site employment, wage, and spending estimates (initial impact). These estimates were multiplied using a Social Accounting Matrix model (multiplier impact). The total economic impact was calculated by the sum of both the initial and multiplier impacts. Interestingly, the study does not include the economic impact of capital improvement spending and related construction employment in the total economic impact figure, but provides an estimate of the fiscal benefits from the facility attributed to property and personal property taxes.

Martin Associates, *The Local and Regional Economic Impacts of Hartsfield Atlanta International Airport,* Atlanta Department of Aviation, Atlanta, Ga., 1997.
Similar in methodology to the economic impact study of General Mitchell International Airport (prepared by Breitenbach Weiss and Martin Associates) this study starts with the premise that the economic impact of an airport on the local, regional, or national economy cannot be reduced to a single number, and only uses direct measurement (i.e., no input/output models used). The model used to examine Hartsfield Atlanta International Airport analyzes several impact categories including revenue impact, employment impact, personal income impact, and tax impact with these impacts not being additive. To measure the impacts, the methodology was based on interviews, passenger surveys, local economic data, and airport statistics.

PA Consulting Services, Inc., and Economic Development Research Group, *The Economic Role of Nashville International Airport,* Metropolitan Nashville Airport Authority, Nashville, Tenn., 2001.
The methodology used to estimate the economic impact of the Nashville International Airport is similar to many studies and was comprised of three methods. First, the authors reviewed data and information from previously completed reports. Second, wage, employment, spending, and origin and destination visitor data were collected through surveys of airport management, visiting passengers, airport tenants, and airport-reliant businesses. Finally, induced impacts were estimated using the IMPLAN model. The report summarizes the total economic impact of the airport in terms of jobs, sales, and wages. Separately, the report provides a summary of the airport's economic contribution (sales, jobs, and wages) related to capital spending at the facility.

Ricondo and Associates, Inc., *Economic Impact Study: Southwest Florida International Airport and Page Field General Aviation Airport,* Lee County Port Authority, Fort Myers, Fla., 2006.
This report analyzes the economic impact related to two airports (Southwest Florida International Airport and Page Field) in southwest Florida (Lee County). The economic impacts associated with the airports were classified into two impact types: direct (economic activities that would not have occurred in the absence of the airport) and induced (multiplier effects of the direct impacts).

Typical of most studies, three separate components of economic impact were measured including:

- Output: annual gross sales, taxes, capital expenditures, visitor spending, and airport management/government payroll
- Payroll: the annual gross salary paid to all workers
- Employment: full-time equivalent employment positions.

Unlike many studies, this report clearly states that output and employment impacts should not be summed because the elements of economic benefit related to payroll are also contained to some extent in the output measure. As such, the reader is informed that each of the three impact categories (output, payroll, and employment) stands alone as a measure of the airport's total economic impact.

SH&E, *The Economic Impact of Aviation in Arizona,* Aeronautics Division, Arizona Department of Transportation, Phoenix, n.d.
To calculate the economic contribution of the aviation industry in Arizona, the authors used three indicators including payroll, employment, and economic activity. The first two indicators, payroll (wages and benefits of all persons whose jobs are directly and indirectly supported by aviation) and employment (total full-time equivalent jobs that are directly or indirectly supported by aviation) are common economic indicators.

However, economic activity indicator, as defined, is very broad and includes "the value of all goods, services, and capital expenditures that can be linked to aviation . . . measured as sales for

businesses, operating budgets for government agencies, and spending by air visitors."

Shoening, N., *Economic Impact Study: Port of Huntsville 2003,* Port of Huntsville, 2003.
Data for this economic impact study came from several different sources including:

- Surveys of 91 airport tenants and government offices and 132 businesses located within two miles of the airport
- Other tenant data from previous surveys.

The surveys generated data on the number of employees, total payroll, the county of residency of their employees, and total capital investments made in 2002. These data were then used to estimate the direct economic impact of the facility. Indirect impacts were calculated using RIMS II multipliers supplied by BEA. This study could be considered a traditional example of an economic impact analysis for an airport, with the only exception being that passenger visitor spending was not factored into the study.

Sparks Bureau of Business and Economic Research, *The Economic Impact of Memphis International Airport,* Center for Manpower Studies, University of Memphis, Memphis, Tenn., 2005.
This analysis measures the dollar benefits that result from aviation-related activities at the Memphis International Airport—the country's largest airport cargo airport (by volume) and Memphis' largest employer. The scope of this analysis is wide in order to cover the many functions of the airport, including cargo and passenger (domestic and international) operations, airport tenants, capital improvements and airport businesses that use or are affected by airport activities and services. The explanation of the methodology used in this analysis is brief, indicating that it "involves estimating the direct and indirect economic impact . . . primarily through the use of U.S. Bureau of Economic Analysis RIMS II output, earnings, and employment for the Memphis MSA." There was a wide range of data sources used within this study although some of the sources were unclear (total cargo volume and revenue per passenger mile, for example). Data sources included financial and enplanement data provided by the airport, U.S. DOT passenger origin and destination surveys, and surveys of local businesses.

***Teterboro Airport Economic Impact Study: Greater than the Sum of its Parts,* Port Authority of New York and New Jersey, New York, N.Y., 2005.**
This study evaluates the direct, indirect, and induced effects of aviation services on the Bergen County economy by looking at four major activities:

- Operational impact: Assesses the impact of on- and off-airport firms that provide a range of services to airport users.
- Investment impact: Assesses the economic benefits from investment in the airport infrastructure.
- Visitor impact: Evaluates the contribution made by visitors/business people who come to the region by air.
- Airport-dependent industries impact: Explores the indirect impact of businesses that do not provide airport services but are located in the neighborhood specifically because of the airport.

This study is unique in that not only does it provide an estimate of the economic impact of the airport, but it provides examples and/or testimonials of (non-aviation-related) businesses that depend on the airport within their business operation. These businesses include financial institutions, lodging facilities, dry cleaners, and restaurants.

***Estimating the Regional Economic Significance of Airports,* U.S. Department of Transportation, Federal Aviation Administration, Washington, D.C., 1992.**
Written primarily for airport managers and planners of small- to medium-sized public use airports whose budget or time constraints require an in-house economic impact analysis, this report provides advice on how to measure the importance of an airport to the economy of the surrounding area. With general methodologies emphasized rather than specific instructions, the procedures provided in the report evaluate the economic significance of an existing or proposed airport. Two indicators are provided to measure an airport's importance—economic impact (employment and payroll) and its transportation benefit (time saved, travel cost, business stimulation, recreation, and access to the national airport system).

***The Economic Impact of a Major Airport,* Urban Land Institute, Washington, D.C., 1993.**
Rather than examining the economic impact of an existing airport, this study was written as a primer for forecasting the number of jobs that may be generated due to the construction of a new airport, or expansion of an existing airport. This study's methodology is based on six parts (which move from simple to the most complex):

- A model to forecast the number of direct jobs at an airport (airline jobs, airport and cargo jobs, etc.).
- A methodology to forecast the number of indirect jobs (jobs created by air visitors to the region such as hotels, restaurants, etc.).
- An input–output model to forecast the number of induced jobs (multiplier jobs).
- A method to forecast the number of catalytic jobs (jobs attracted to the region for reasons on proximity).
- A method to determine the residential distribution of job holders throughout the region.
- A generally accepted formula within the construction industry to estimate construction jobs.

The study promotes methods based on complex statistical relationships of enplanements, visitor expenditures, and input–output models to forecast and geographically allocate jobs, as well as development activity.

Virginia, Commonwealth of, 2004 *Virginia Airport System Economic Impact Study: Final Technical Report,* Virginia Department of Aviation, Richmond, 2004.
Using a base year of 2001, this study quantifies the economic impacts of the public use airports in Virginia, and describes the relationship between the airports and Commonwealth's economy. Although most studies analyze two or three impact categories, this study differs in that it quantifies total economic impacts based on four impact categories, rather than the usual three:

- On-airport direct impacts: Impacts that would not occur if the airport did not exist (e.g., airlines and FBOs).
- Off-airport direct impacts: Financial transactions that occur primarily off-site and are associated with visitor spending (lodging, food, entertainment, etc.).
- Airport-dependent impacts: Businesses that are dependent on an airport and would relocate or suffer substantial loss if the airport were not available
- Spin-off impacts: Calculated using impact multipliers which are used to estimate the recycling of dollars through the economy.

Each of the four impact types was measured in three ways: jobs, wages, and economic activity (measured as business sales, annual

budget, or visitor expenditures). Data were obtained via surveys of the following groups:

- Airport managers
- Airport tenants
- Airport-dependent businesses
- Corporate-based aircraft owners
- Air carrier visitors
- General aviation visitors.

Wilbur Smith Associates, Inc., *The Economic Impact of Kansas City International Airport,* Kansas City Aviation Department, Kansas City, Kans., 2001.
This study examines the economic contribution of the Kansas City International Airport and, like most studies, quantifies the impacts relative to employment, payroll, and output (i.e., spending). Impacts were measured for two aviation-dependent groups, including on-airport tenants and visitors traveling to the Kansas City region via commercial service airlines. Data for the study were obtained through airport tenant and passenger surveys. Again, like most studies, economic contributions were calculated using an input–output model which examined first round (direct and indirect), second round (induced), and total (sum of first and second round) impacts.

Wilbur Smith Associates, Inc., *Alabama Airports: Gateway to Economic Growth,* Alabama Department of Transportation, Aeronautics Bureau, Montgomery, n.d.
Similar to other statewide airport system impact studies, the estimation of the economic benefit of Alabama's airport system is measured by three indicators including employment (number of jobs in the aviation industry and the share of those employed in sectors that support aviation or aviation use), payroll, and output. This study is unique in that, for employment indicators, it equitably uses only *a share* of those sectors that support aviation or aviation use.

Wisconsin, State of, *Economic Impact: Austin Straubel International Airport* (*GRB*), *Green Bay, Wis.,* Bureau of Aeronautics, Wisconsin Department of Transportation, Madison, n.d.
This study of the economic impact of the Austin Straubel International Airport in Green Bay, Wisconsin, is an example one in the series of impact studies completed by the Wisconsin DOT, Bureau of Aeronautics for airports in the state. Each of the studies was completed using a similar format which included:

- Airport location, service profile, current facilities, and activity trends;
- County economic profile;
- Economic impact methodology outline;
- Summary of economic impacts; and
- Summary of other airport benefits.

For each airport, the direct impact of the airport, the direct impact of airport users, and the multiplier impact were estimated expressed in terms of their effect on economic output (sales), employment (jobs), and wage income. To estimate the multiplier effect, the study used IMPLAN (model) multipliers to consider the economic activity from local suppliers of goods and services to the airport, as well as businesses that host air travelers. As well, the model also analyzed the "re-spending" of payroll both from the airport itself, and businesses serving airport travelers. Data used in each of the studies included airport activity and business (jobs, income, and sales) survey data, U.S. BEA employment, wage and sales data, and IMPLAN multipliers.

Wyoming, State of, *2004 Wyoming Economic Impacts of Aviation,* Aeronautics Division, Wyoming Department of Transportation, Cheyenne, 2004.
Wyoming's study examined the economic impact of employment and spending from four segments related to the state's 33 publicly owned, public-use airports. These segments included:

- Airport-related businesses, airport management, FBOs, car rental services, airlines, FAA offices, and other businesses located on airports;
- Local businesses;
- Spending from visiting general aviation aircraft operators; and,
- Spending from non-resident airline passengers.

The total economic impact was measured as the sum of the direct, indirect, and induced impacts. Non-economic qualitative benefits (such as medical services) were also discussed.

Abbreviations used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation