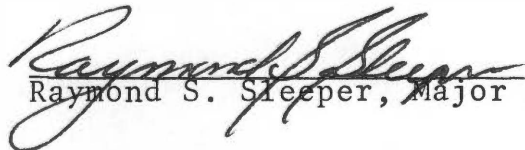
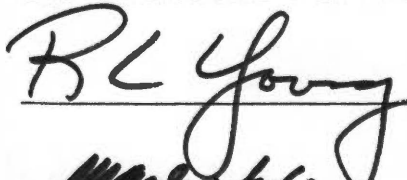


To the Graduate Council:

I am submitting herewith a thesis written by Alfred F. Eaton, Jr. entitled "The Socio-economic Impact of the Airport Upon the Community." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Aviation Systems.


Raymond S. Sleeper, Major Professor

We have read this thesis
and recommend its acceptance:





Accepted for the Council:


Vice Chancellor
Graduate Studies and Research

Thesis
77
E286

THE SOCIO-ECONOMIC IMPACT OF THE AIRPORT
UPON THE COMMUNITY

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Alfred F. Eaton, Jr.

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ABSTRACT

The purpose of this study was to analyze the socio-economic impact that an airport has upon a community and to develop a method of determining that impact suitable for usage by an airport manager.

Data is presented which illustrates the magnitude and scope of the socio-economic impact of an airport. The various methods of analyzing this impact are discussed. Finally, a method of determining the impact, designed for airport managers, is presented.

Some of the main conclusions of the research are as follows: that it is very difficult to measure the total socio-economic impact of an airport upon the community, but a useful estimation of the magnitude can be obtained; that airports, with all factors considered, generally impact upon a community in a favorable manner; that the availability of air service is an important determinant of a community's growth rate; that the primary dis-benefits of an airport are ecological or environmental in nature; and that a good, active public relations program is a necessity.

Finally, it is recommended that airport managers perform impact studies on all airports under their control.

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CHAPTER I

INTRODUCTION

An airport, as defined by Webster's New World Dictionary [1],¹ is:

A place where aircraft can land and take off, usually equipped with hangars, facilities for refueling and repair, various accommodations for passengers, etc.

This definition is technically correct, but somewhat broad. In actuality, an airport may be an unattended, less-than-2,000-foot-long piece of flat ground with no one living or working there or it may be a large geographical area, in fact, a city, the size of Manhattan Island, bisected by two-mile long runways and generating a half-billion dollars in economic impact on the surrounding area.

From one extreme to the other, or any of the hundreds of varieties in between, airports have proven to be of tremendous benefit to the communities they serve. Many of the community's citizens can, directly, or indirectly, trace a small percentage of their income to the airport. Others are benefited by the social, cultural and medical opportunities available because of the airport.

An airport may be like any other business, or even a city; it generates employment, pays salaries, makes

¹Numbers in brackets refer to similarly numbered references in the Bibliography.

expenditures for local goods and services and pays taxes. The airport also has a close relationship with other industries in the community whose level of business activity is partially dependent upon the airport. Hotels, motels, travel agencies, construction firms, wholesalers, and manufacturing industries whose goods reach new markets via the airport, all profit from an airport in their vicinity. More and more, however, airports are acquiring the characteristics of cities--air cities. O'Hare International Airport in Chicago is a good example of such a phenomenon. The airport has become the centroid of importance to the area and this has become the nucleus of an informal city.

Glenn Plymate [2] of the Bechtel Corporation lists four interrelated economic impact levels which should be considered in an analysis of this subject. Briefly, they are:

1. Primary economic impact (airport-specific).
2. Secondary economic impacts (airport-related).
3. Tertiary economic impacts (airport-induced).
4. Other economic impacts.

These four levels will be defined and discussed in later chapters.

The airport of today is a gateway to the world. Highways or railroads require miles and miles of costly right-of-way acquisition. A 100-mile highway or railway linking two cities is of high value to the two cities and to

nearby intervening areas but generally of less or no interest to the rest of the region since it does not connect the rest of the region. An airport, on the other hand, be it large or small, is linked to every other airport in the world, 13,019 of which are in the United States. Most of the airports in the United States are general aviation (GA) airports. Their runway requirements, in many cases, can be thought of as being like a mile of (country) road; in fact, the money used to build one mile of interstate highway would pay the construction cost of six to eight GA airports.

In community after community, people who do not fly are paying the penalties for inadequate airport facilities. Corporate management, in determining plant site location, finds many communities offering comparable advantages and it is often more efficient to locate where the advantage of air travel is most convenient.

There is much more to the airport development than the construction of runways and hangars. Airports have helped some towns fulfill their development plans. These communities have come to realize the potential of an airport and have exploited it.

That aviation is as much a part of modern civilization as is the railroad, steamship and automobile as a means of transportation of both freight and passengers is too obvious for serious discussion. The place which aviation now occupies was envisaged, probably initially, by

Alfred Lord Tennyson in his prophetic dream which is found recorded in his frequently quoted poem, "Locksley Hall," when he wrote [3]:

For I dipt into the future, far as human
eye could see,
Saw the vision of the world, and all the
wonder that would be;
Saw the heavens fill with commerce
argosies of magic sails,
Pilots of the purple twilight, dropping
down with costly bales.

Several modern jurists have depicted in able, cogent style the position which aviation has attained. The late Justice B. N. Cardozo in the case of *Hesse v. Rath*, 249 N.Y. 436, 164 N.E. 342 (1928), wrote [3]:

We think the purpose to be served is both public and municipal. A city acts for city purposes when it builds a dock or a bridge. . . . Its purpose is not different when it builds an airport. . . . Aviation is today an established method of transportation. . . . The city that is without the foresight to build the ports for the new traffic may soon be left behind in the race of competition. . . . The need for vision of the future in the governance of cities has not lessened with the years. The dweller within the gates, even more than the stranger from afar, will pay the price of blindness.

To realize the potential benefits of aviation requires imagination, vision, good planning and a concerted effort by dedicated and informed community leaders. The key to the success of an airport in community development is the understanding of its potential as a development resource and putting it to use. This investigation will assist the reader in understanding these benefits. With this understanding and the information provided in later chapters, the

reader should be able to measure the importance, socio-economically, of the airport to the community. The methodology described herein is designed for the use of airport managers. Armed with the knowledge from this analysis, the reader should then be able to better determine the most appropriate path for airport and community development.

CHAPTER II

WHAT IS GENERAL AVIATION?

Definition

It has been shown that air carrier airports serving the metropolitan areas of this country have a significant impact upon the local economy. Of the 13,251 landing areas [4] in the United States, a breakdown of these landing areas shows: 11,224 airports; 1,524 heliports; 35 STOL ports; and 468 seaplane ports. About 4,600 of the airports are publicly owned with roughly 6,400 airports open to public use [4]. There has been a slight downward trend in the last number since 1971. This reflects problems with financing, encroachment, management, noise, and so forth. It also points to the need for a good socio-economic impact study and an active "good neighbor policy" on the part of airport management.

There are only 653 airports, or about 5%, that are served by scheduled air service [5]. Of the 653, only 402, or about 3%, of the nation's airports are actually served by certified air carriers [6]. Moreover, since 1960, the number of airports served by certified air carriers has decreased by 30% while small community airports have

increased 60% [6]. These small community airports, along with the air carrier airports, are served by general aviation.

One might ask, what is general aviation? In a poll conducted by Opinion Research Corporation, it was found that 59% of the public questioned could not recall hearing the term. Of the 41% who claimed to have heard the term, very few had a clear understanding of its intended meaning. Most people equate the term general aviation with air travel in general, including large scheduled airlines.

General aviation can be thought of as all flying activity except that of the certified air carriers and the military. General aviation can be subdivided into five main categories of flying: personal, business, commercial, instructional, and special purpose. The distribution of general aviation flying hours by category for selected years since 1955 is shown in Table 1. Under Federal Aviation Administration (FAA) classifications, the business category subsumes corporate/executive flight; commercial flying comprises air taxi, aerial application, and industrial flight; and, the instructional class includes training and rental flight.

The Scope of General Aviation

The general aviation fleet represents 98% of the total transportation system [7]. In actual numbers this amounts to about 164,000 aircraft, outnumbering air carriers

Table 1. Estimated Actual Hours Flown in General Aviation
by Type of Flying (Thousands of Hours) [6]

Year	Total Hours	Business, Including Corporate/Executive		Commercial		Instructional		Personal		Other	
		Hours	Percent	Hours	Percent	Hours	Percent	Hours	Percent	Hours	Percent
1955 ^a	9,500	4,300	45	1,950	21	1,275	13	1,975	21	-	-
1960 ^a	13,121	5,699	44	2,365	18	1,828	14	3,172	24	57	(*) ^b
1965 ^c	16,733	5,857	35	3,348	20	3,346	20	4,016	24	166	1
1970 ^d	26,030	7,204	28	4,582	18	6,791	26	6,896	26	577	2
1974 ^d	32,475	9,140	28	6,294	19	7,972	25	8,404	26	665	2

^aNo survey was conducted covering the noted year. Data for 1961 have been revised using a correction factor based on the 1962 survey of aircraft use in general aviation.

^bLess than 0.5%.

^cEstimated from FAA Form 2350.

^dEstimated from AC Form 8050-73.

nearly 70 to 1. By 1980, the general aviation fleet is expected to reach 192,000 [8]. Presently, this fleet accounts for 79% of all aircraft flight time and 71% of all air miles flown. The total number of people carried by general aviation aircraft almost equals that carried by the airlines (about 176 million people to the airlines' 208 million) [7]. General aviation aircraft transport one out of every three U. S. intercity air passengers. These aircraft provide the only air link for more than 19,000 of the nation's incorporated communities [9]. Additionally, general aviation serves 379 cities, with populations varying from 25,000 to 100,000 that do not have any other kind of air service. In doing this, general aviation aircraft accounted for less than 4% of the jet fuel consumed nationwide and only .7% of the total fuel used for all transportation [9].

General Aviation's Role in Business

Business-related flying composes a significant portion of the nation's general aviation activity. The National Business Aircraft Association (NBAA) estimated that over 45,000 aircraft are used for business purposes. Table 2 presents a breakdown by aircraft type of the business and general aviation fleet for 1974.

For several years Aviation Data Service, Inc. (ADS), in Wichita, Kansas, has analyzed the list of the leading 1,000 U. S. industries identified by Fortune. The extent of

Table 2., Number of Business Aircraft by Type, 1974 [8]

Type of Aircraft	Corporate/Executive and Business Flying		All General Aviation Aircraft	
	"Primary Use" Reported	Projected Total	"Primary Use" Reported	Projected Total
Jet	940	1,265	1,086	1,771
Turboprop(H)	214	261	251	352
Turboprop(L)	940	1,299	1,210	1,793
Piston Multi- engine(H)	257	551	651	1,546
Piston Multi- engine(M)	2,610	3,877	3,983	6,350
Piston Multi- engine(L)	5,858	8,197	9,426	13,341
Piston Single Engine	21,118	29,103	100,160	152,878
Helicopter	452	811	2,453	5,440
Total	32,389	45,364	119,220	183,471

Note: Because the primary use (type of flying) was not reported for about 35% of the aircraft registered with the FAA, the total number of business aircraft is a projection.

business aviation involvement by these supercorporations provides some insight as to the attitude of American corporations toward general aviation aircraft as business tools.

As in past years, only 997 of the 1,000 corporations were included in the study. Cessna, Beech, and Piper (ranking 382, 559, and 743, respectively) were eliminated because of the difficulty in distinguishing between product demonstration aircraft and those used for company business. Nevertheless, it is interesting to note that in terms of sales volume, two of the companies, Cessna and Piper, climbed in rank from 444 and 947, respectively, while the other maintained its position. The companies ranked by Fortune are based on sales volume, in this case, for 1973. The Fortune 1,000 are important because they compose a significant portion of America's industry [10].

The 997 industries considered here have 17.5 million employees, \$736 billion in sales, \$608 billion in assets, \$42 billion in after-tax net income, and stockholders' equity of \$310 billion. This group accounts for 72% of the sales of all U. S. industrial corporations, 85% of the employees, and 85% of the total after-tax net income recorded by the nation's industrial establishment [10].

Of the 997 companies, 448 can be identified as owning and/or operating business aircraft as of January 1, 1974 (91% of the top 100 corporations operate aircraft). This represents a 5% increase over the 427 operating

companies from the previous year. Companies operating business aircraft (in the Fortune 1,000 group) had a total of 1,427 airplanes and helicopters. This also was an increase of 6% over the prior year and a 9% increase over the 1972 figure. Although aircraft-operating companies were in the minority, they had 35% greater assets per employee, while sales per employee were 15% higher, and net income was 64% ahead of the non-operating companies [10].

the latter two figures since 1969 is shown in Figs. 1 and 2.

Net income is the final measure for every company. It is the standard which most clearly demonstrates the operating efficiency of a company and determines annual success or failure.

To obtain a more meaningful picture of business aviation, ADS subdivided the 997 industries into blocks of 100, based on sales volume, and compared net income versus gross sales within each block. The results are shown in Table 3. In every instance, aircraft-operating companies outperformed the non-operating companies. Lastly, Fig. 3 presents a quantitative summary comparing aircraft-operating and non-operating companies in the Fortune 1,000. Although only 45% of the companies operate business aircraft, these operating companies average a 59% advantage over non-operating companies in terms of total employees, net sales, assets, stockholders' equity, and net income.

It is interesting to note the manner in which businesses utilize their aircraft. Table 4 illustrates

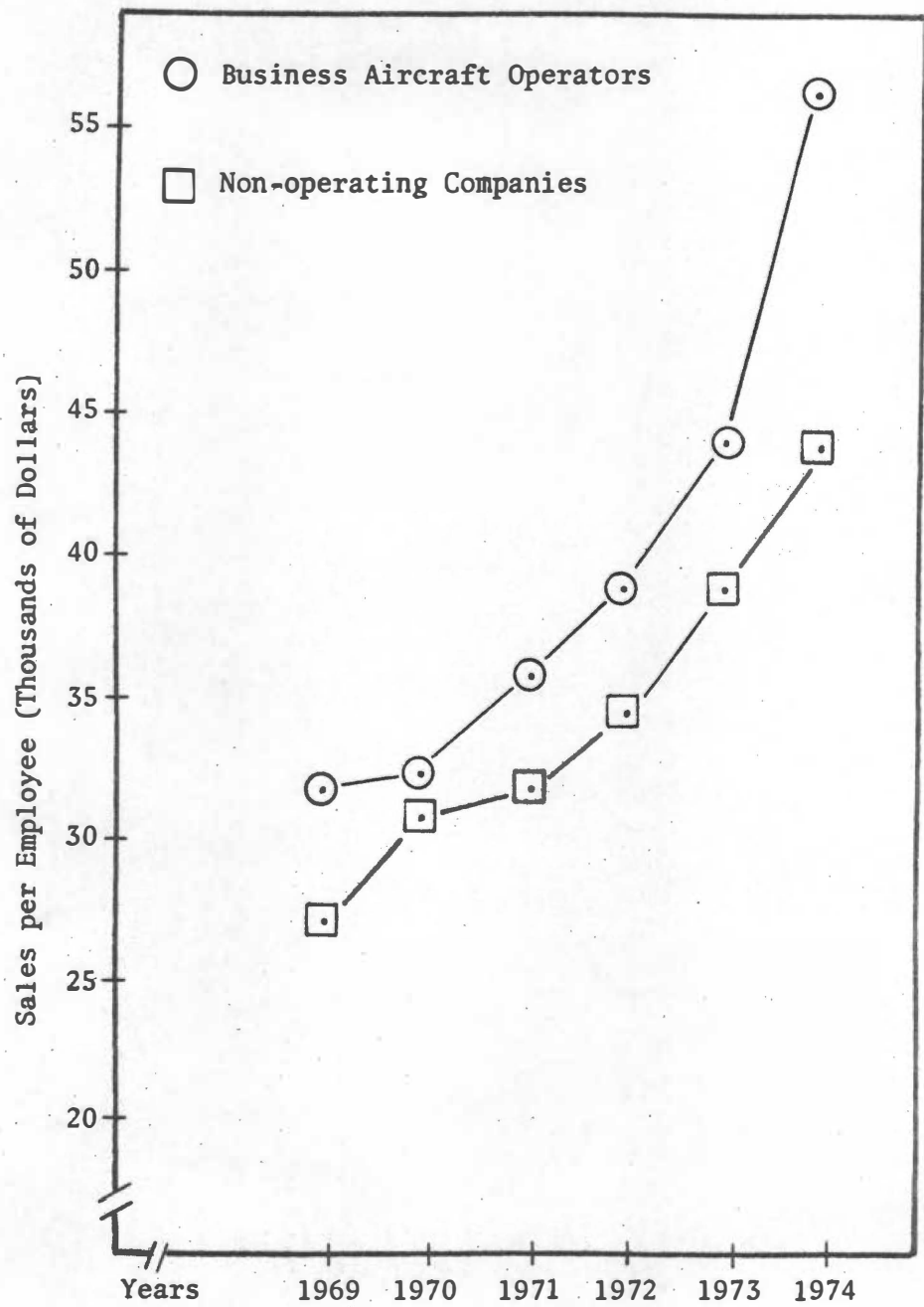


Figure 1. A comparison of sales per employee between business aircraft operating and non-operating companies [10, 11].

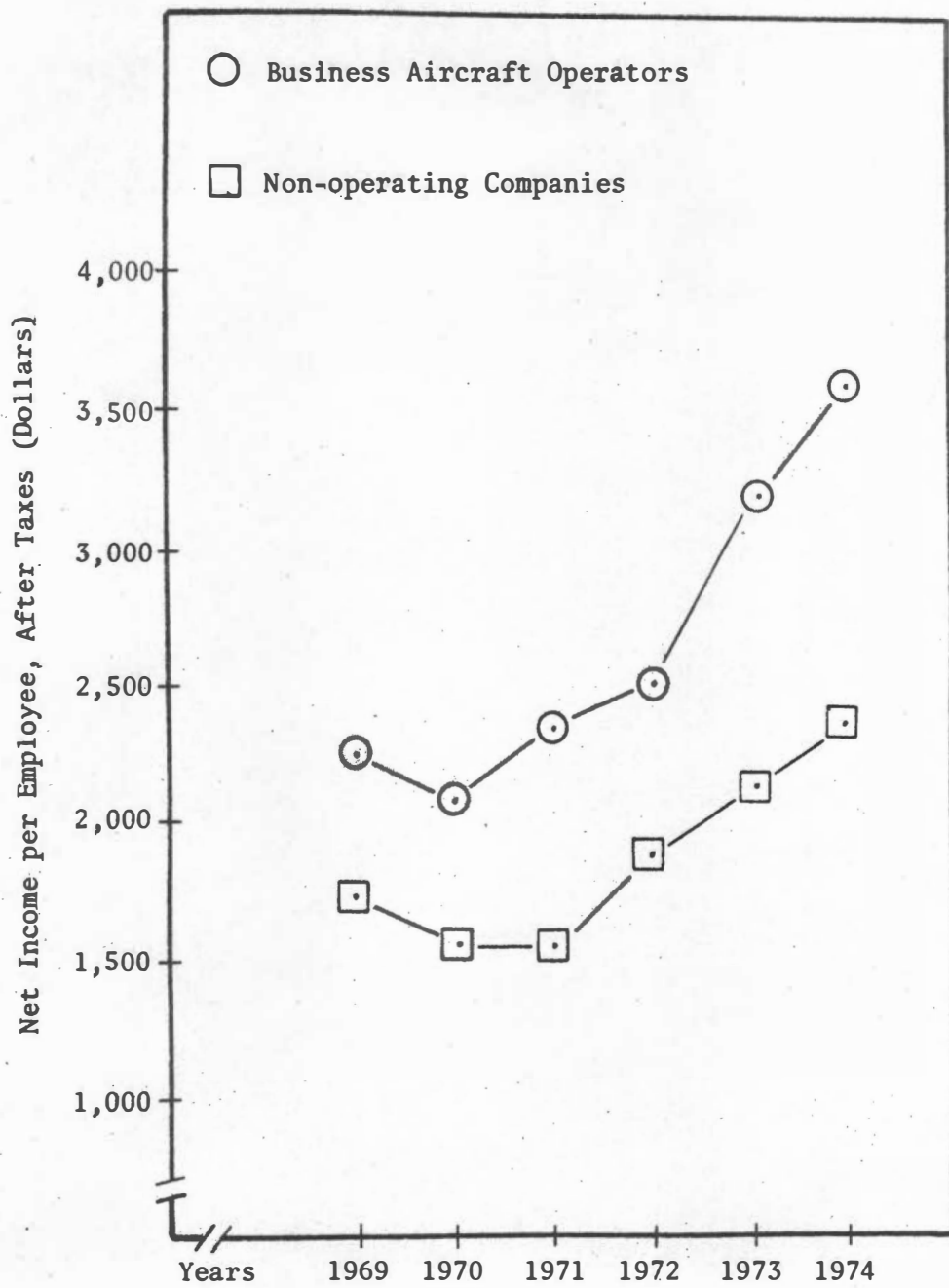


Figure 2. A comparison of net income per employee (after taxes) between business aircraft operating and non-operating companies [11].

Table 3. Net Income as a Percent of Sales
(After Taxes) [10]

Rank in Fortune 1,000	Business Aircraft Operator	Non-operating Companies
1- 100	6.5	4.2
101- 200	5.3	4.9
201- 300	4.9	4.2
301- 400	5.4	4.8
401- 500	4.8	3.9
501- 600	5.5	3.6
601- 700	7.7	3.3
701- 800	5.0	4.3
801- 900	4.7	4.1
900-1,000	5.9	4.5

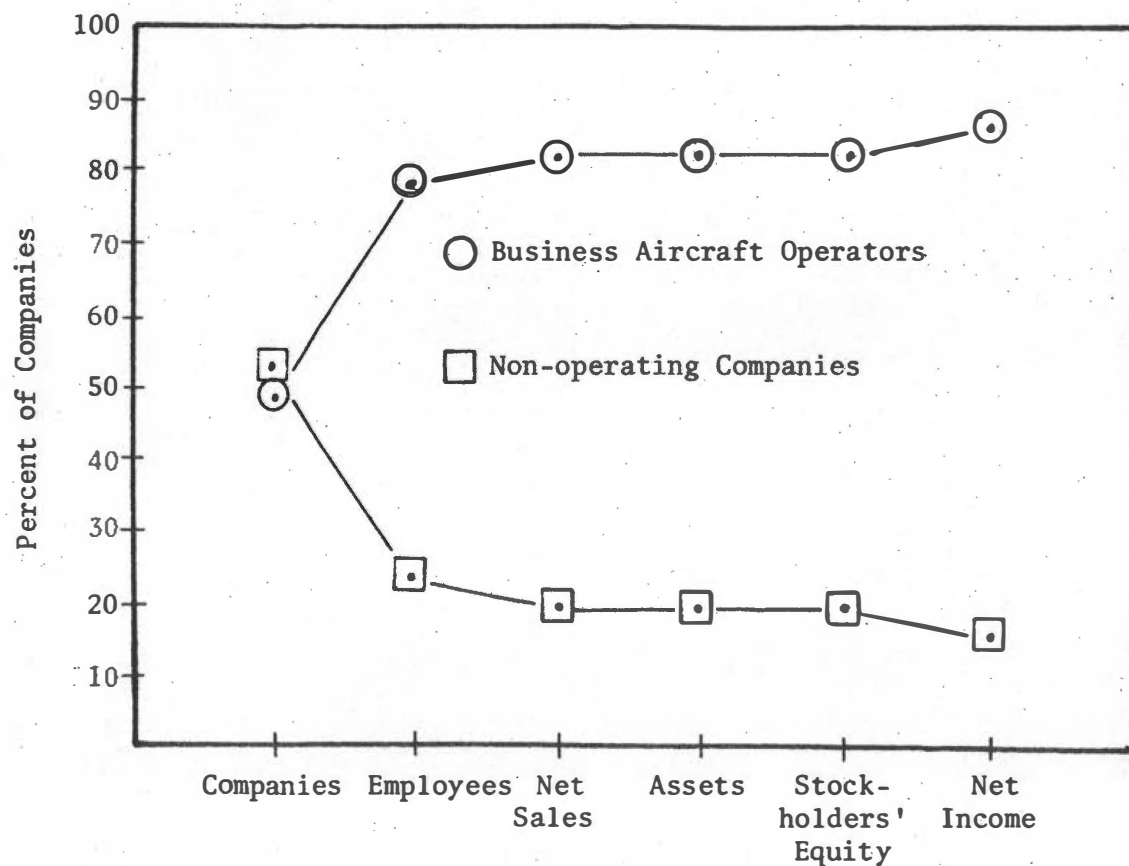


Figure 3. A quantitative summary comparison between business aircraft operating companies and non-operating companies in 1974 [11].

Table 4. Aircraft Use According to Business Function, 1974,
by Percentage^a [12]

Aircraft Type	Sales Devel- opment	Customer Trans- portation	Executive Attendance at Conferences	Managerial Visits to Branch Facilities	Parts and Products Delivery	Public Services	Other Uses	Total
1. Jet	14.6	9.3	30.9	37.9	0.9	1.3	5.1	100.0
2. Turboprop(H)	16.8	14.3	25.0	37.9	1.3	0.9	3.8	100.0
3. Turboprop(L)	17.4	9.9	22.7	43.8	1.5	0.8	3.9	100.0
4. Multi-engine Piston(H)	11.9	15.3	23.4	31.1	2.8	0.9	14.6	100.0
5. Multi-engine Piston(M)	20.8	8.7	25.2	34.0	2.1	0.9	8.3	100.0
6. Multi-engine Piston(L)	29.0	7.7	22.5	24.9	3.7	2.4	9.8	100.0
7. Single Engine Piston	27.9	6.8	19.5	16.8	8.7	3.4	16.9	100.0
8. Rotorcraft	5.3	23.6	11.1	32.3	3.1	1.5	23.1	100.0
Total (Average)	18.1	11.9	22.4	32.3	3.1	1.5	10.7	100.0

^aThe table includes the estimated percent of use of the aircraft for business purposes only, when the aircraft was carrying either passengers or cargo.

aircraft usage according to business function for 1974. The vast majority of business aviation hours are flown to transport passengers. Specifically, business aircraft operators favor managerial visits to branch facilities, executive attendance at conferences, and sales development trips. A survey by NBAA determined that four out of every ten business flights terminate at airports not served by scheduled airlines. One-third of business flights end at airports served by scheduled air carriers for purposes of passenger or cargo exchange with carriers. These figures are shown in Table 5. The NBAA survey also discovered that, on the average, 35% of an aircraft-operating company's sales can be directly or indirectly attributed to the operation of its aircraft. Table 6 presents these figures.

Even with the realization that the responses to this portion of the survey are necessarily subjective, one major conclusion is apparent: business aircraft owners consistently maintain that their aircraft contribute substantially to company sales [12].

There are some other studies which dispute the value of the airport, particularly a general aviation airport, to the community. Typical of these studies is the one done by Old Dominion University [13] entitled, "General Aviation and Community Development." The study expresses a rather negative view of general aviation's importance and contribution to business and community development. There are probably two primary reasons for this view. First, the

Table 5. Estimated Percent of Business Flights
by Airport Category [12]

Aircraft Type	Category A ^a (%)	Category B ^b (%)	Category C ^c (%)	Total (%)
1. Jet	30.6	34.1	35.3	100.0
2. Turboprop(H)	30.5	32.6	36.9	100.0
3. Turboprop(L)	31.5	32.4	36.1	100.0
4. Multi-engine Piston(H)	18.4	42.1	39.5	100.0
5. Multi-engine Piston(M)	28.4	33.9	37.7	100.0
6. Multi-engine Piston(L)	27.8	32.9	39.3	100.0
7. Single Engine Piston	24.8	31.8	43.4	100.0
8. Rotorcraft	33.7	26.3	40.0	100.0
Total (Average)	27.8	32.7	39.5	100.0

^aTo airports/heliports served by scheduled air carriers (international, trunk, regional or commuter) to pick up or deliver passengers or cargo to scheduled air carriers.

^bTo airports/heliports served by scheduled air carriers for other reasons.

^cTo airports/heliports not served by scheduled air carriers.

Table 6. Estimated Aircraft Contribution
to Company Sales [12]

Aircraft Type	Number of Companies Reporting	Percent Value
1. Jet	134	28.9
2. Turboprop(H)	19	50.7
3. Turboprop(L)	74	35.9
4. Multi-engine Piston(H)	10	37.3
5. Multi-engine Piston(M)	113	32.1
6. Multi-engine Piston(L)	267	36.5
7. Single Engine Piston	713	25.7
8. Rotorcraft	21	25.4
Total (Average)	1,351	35.0

study attempts to paint the issues either black or white when they are neither. The second reason is that the staff which prepared the study seems to lack the specific expertise required for this area of study. For these reasons and the fact that the preponderance of evidence seems to contradict the negative position of the aforementioned study, the present investigation will dwell on the more positive aspects of general aviation and its related impacts.

Summary

It has been demonstrated that general aviation aircraft compose the vast majority of the civil aviation fleet and that they contribute considerably toward the country's air transportation needs. More importantly, business flying has a significant impact upon the nation's corporations and the manner in which they do business. The NBAA [9] summarizes the tangible benefits of business aviation quite well in their pamphlet, "The Business Aircraft: Key to Mobility."

Despite these very tangible benefits, there remains a gap of understanding concerning business aviation. For example, in a survey of an entire mid-western high school staff, not one teacher could correctly define the term, "general aviation." There is no way of calculating the time, money, and opportunities lost to the economy because of lack of information.

Executive management utilizes aircraft to communicate efficiently with clients and employees. In customer service (the term is synonymous with sales), the airplane is an incomparable tool. Sales to customers who could not have been acquired or

retained except by air-borne management, constitute the minimum value of a business aircraft. The value of inner-corporate management is the value of management itself. Effective supervision requires face-to-face communication; greater communication frequency means greater control and performance; it is the glue of the individually-owned business or the multi-state, multi-national corporation. Regardless of a company's sales volume, net profit is possible only through effective management.

Additionally, the following less tangible benefits of an aircraft should be recognized:

- *Less executive fatigue.

- *Fringe benefit of effortless travel versus crowded terminals, inconvenient flights, and waiting luggage lines.

- *Fewer nights away from home and family.

- *Availability of a superior travel service for customers whose time is as valuable as any businessman's.

Though sometimes labeled "intangible," the benefits of higher personnel morale, lower frustration and general irritation levels, and, ultimately, lower turnover of a company's most valuable employees have an undoubted if unspecified dollars and cents value. Few things frustrate top grade executives as thoroughly as the lack of tools or resources to do a job.

Safety (accidents) fear can be put to rest as a factor in the decision to use business aircraft. Corporate aircraft, professionally piloted in 1971, had a fatal accident rate about 90% lower than planes flown for personal use and ranked along with commercial carriers having a rate less than one accident per 100,000 hours flown.

CHAPTER III

THE RELATIONSHIP BETWEEN NEW JOBS AND ECONOMIC GROWTH FOR THE COMMUNITY

Introduction

This chapter, as well as the last, is presented for background information. A good comprehension of the material in these two chapters is crucial to an understanding of the economic impact of an airport. The world may be thought of as one great system made up of many sub-systems. It is very rare, indeed, when a sub-system does not in some way exert an influence on other sub-systems. So it is with airports and manufacturing plants. This chapter examines the effects that expanding an old plant or building a new plant have on a community. Rather than differentiating between the building of a new plant or the expansion of an old plant, the two cases will be considered similar. The term "new plant" construction will refer to both.

When a new industry locates in a community, the result is a net addition to income for the area. The new payroll dollars turn over many times (the multiplier effect) as they pass through the local merchants and into the banks. The plant may locally purchase many goods and services, thus helping the local economy to expand. This economic

expansion is usually reflected in increases in population, school enrollment, and other concomitants of general community growth.

Several attempts have been made to measure the quantitative effects of a new industrial payroll upon a community. Exact measurement is very difficult, if not impossible, because many other influences are simultaneously at work in the particular community.

Since 1954, the National Chamber of Commerce's Economic Analysis and Study Group has attempted to measure the effects of industry. Their latest report, published in 1973, studies economic and other changes occurring in ten counties which became industrialized between 1960 and 1970, as contrasted with ten counties which did not industrialize [14]. The study also included 127 standard metropolitan statistical areas (SMSA) having greater employment growth (both manufacturing and non-manufacturing), as contrasted with 127 areas having lesser employment growth. This study also covered the period 1960 to 1970.

The desirability and type of industrial growth is a fundamental question each community must answer. The time has long since passed when communities sought growth at any cost. State and local governments can no longer rely on the optimistic view that all growth is beneficial per se. Today a more sophisticated cost/benefit analysis of industrialization characterizes the industrial development efforts of many communities. This new awareness is found at the

federal level as well, as indicated by recent legislation affecting product quality and safety, environmental quality, and occupational health and safety.

It is unwarranted to infer from this any value judgment on the relative merit of industrial growth. This question is left up to the local community. Some of the factors involved include: the community's present environmental quality; the current unemployment rate; tax base; population and population density; and so forth. Further, the community must decide what trend it would like to see these factors take. From this, the community can examine the types of industry it would prefer to have and types it can afford to have. Obviously, a resort-type community might like to have several small, clean (non-polluting) factories locate in town; but it would probably not want a huge steel mill to move in. The more attractive the community, however (i.e., good airport facilities, well managed industrial parks, ample labor force, good recreational, medical, and educational facilities, favorable tax structure, and a generally favorable environment), the more selective it can be in its industrial recruitment.

Economic growth will still be needed in the future, if only to provide the means of maintaining the quality of life. Growth can also occur as a result of technological progress and more efficient use of resources even if population tapers off. The real issue is not growth or the

absence of growth, but rather the nature of economic growth and the effect it has upon the community's quality of life.

There are several factors to be remembered in this analysis. First, every case of industrial development is unique. Second, no two communities will experience the same effects from a new payroll. Third, the relationship between industrial growth and general community development is a "chicken-and-egg" relationship--it is not possible to have one without the other. Similarly, while industrial growth stimulates the remainder of the local community, the prior existence of the community with its diverse services makes industrial growth possible [13].

Industrialization of Rural Counties

In the 1973 Chamber of Commerce Study, there was a strong connection between the growth of industrial payrolls and changes in other indexes such as bank deposits and retail sales [13].

The ten counties chosen for the analysis met the following criteria:

1. Manufacturing employment in 1970 was more than double that of 1960, with a numerical increase of over 1,000 manufacturing employees.
2. Manufacturing employment was more than 20% of total employment in 1970.
3. The major employment change between 1960 and 1970 was an increase in manufacturing employment.

4. The county was neither a part of, nor adjacent to, a metropolitan area.

5. No more than one county was chosen from any one state.

The following counties were selected for the study: Cullman, Alabama; Benton, Arkansas; Montgomery, Kentucky; McLeod, Minnesota; DeSoto, Mississippi; Hall, Nebraska; Wayne, North Carolina; Florence, South Carolina; Johnson, Tennessee; and Hopkins, Texas. As a matter of interest, each county in the study has at least one airport within its boundaries.

Total employment in 1960 for the ten counties was 25.4% agricultural and 14.8% manufacturing. In 1970, the figures were 14.8% agricultural and 28.1% manufacturing. The manufacturing characteristics of the sample counties are shown in Table 7. These ten counties were compared against ten non-industrialized counties for control purposes [14].

For every 100 additional manufacturing employees, there was an accompanied increase of 68 non-manufacturing employees. The distribution of these employees is shown in Table 8.

The \$565,000 increase in annual retail sales associated with each 100 new manufacturing workers was not computed separately for individual business lines; however, based on total retail sales for the United States, the Chamber of Commerce estimates the distribution as shown in Table 9.

Table 7. Manufacturing Employment, 1960 and 1970. [14]

County/State	Manufacturing Employment		Change in Manufacturing Employment		Percent of Employed Persons in Manufacturing	
	1960	1970	Number	Percent	1960	1970
Cullman, Alabama	2,828	6,028	+3,200	+113	20.1	32.2
Benton, Arkansas	2,725	6,639	+3,914	+144	21.4	35.1
Montgomery, Kentucky	536	1,823	+1,287	+240	12.1	33.2
McLeod, Minnesota	1,579	3,426	+1,847	+117	16.4	31.1
DeSoto, Mississippi	752	3,326	+2,574	+342	10.8	29.0
Hall, Nebraska	1,147	3,471	+2,324	+203	8.7	20.1
Wayne, N. Carolina	3,041	6,271	+3,230	+106	13.5	23.2
Florence, S. Carolina	3,930	8,611	+4,681	+119	14.3	26.2
Johnson, Tennessee	347	1,935	+1,588	+458	12.8	47.9
Hopkins, Texas	922	1,954	+1,032	+112	14.2	24.7
Total	17,807	43,484	+25,677	+144	14.8	28.1
Total for 10 Counties without Industrial Growth	7,876	9,030	+1,154	+15	15.2	18.0

Table 8. Employment Changes in the Non-manufacturing
Section with the Introduction of 100
Additional Manufacturing Jobs [14]

Area	Number of Workers
Manufacturing	+100
Non-manufacturing	
Wholesale and Retail Trade	+21
Professional and Related Services	+17
Transportation, Communication and Other Public Utilities	+11
Finance, Insurance and Real Estate	+6
Business and Personal Services	+5
Construction	+3
Other Industries	+5

Table 9. U. S. Chamber of Commerce Estimate of Additional Retail Sales Volume Distribution Resulting from the Introduction of 100 New Manufacturing Jobs [14]

Area	Amount (\$)
Grocery Stores	119,000
Motor Vehicle Dealers	89,000
Department Stores	59,000
Eating and Drinking Places	43,000
Gasoline Service Stations	41,000
Clothing and Shoe Stores	30,000
Furniture, Home Furnishings and Household Appliance Stores	26,000
Lumber, Building Materials and Hardware Dealers	23,000
Drug Stores	19,000
Other Retail Stores	116,000
Total Increase in Retail Sales	565,000

Finally, Table 10 summarizes the economic changes between 1960 and 1970 for the two groups of counties. The table also shows the changes corresponding to an increase of 100 manufacturing employees.

The Effects of New Jobs in Metropolitan Areas

Sixty-nine percent of the population and 72% of the employment is concentrated in 264 metropolitan areas [14]. Both population and employment increased twice as fast in metropolitan as in non-metropolitan areas between 1960 and 1970.

The 1970 population of the 264 SMSA's ranged from 55,959 to 11.5 million. The ten largest areas were eliminated from the analysis because:

1. These ten areas have a total population of 48 million, or 34% of the population of all 264 areas. Including the ten largest areas would obscure the economic changes of many smaller areas.

2. Bank deposits of the ten largest areas include considerable funds from the rest of the United States and from the rest of the world. Deposits in 1970 averaged \$3,598 per capita in the ten largest areas, but only \$1,889 in the other 254 areas. Bank deposit changes in the ten largest areas are much less representative of local economic changes than in the other 254 areas [14].

Table 10. Changes Between 1960 and 1970 in Counties Which Industrialized and Counties Which did not Industrialize [14]

Item	Changes in Counties Which Industrialized	Changes in Counties Which did not Industrialize ^a	Net Change Between Two Groups of Counties	Net Change per Increase of 100 Manufacturing Employees
Population	+56,796	-23,989	+80,785	+351
Families	+19,642	-2,610	+22,252	+97
School Enrollment	+18,080	-16	+18,096	+79
Personal Income ^b	+\$562,427,000	+\$324,109,000	+\$238,318,000	+\$1,036,000
Retail Establish- ments ^c	+1,372	+158	+214	+1
Retail Sales ^c	+\$241,143,000	+\$111,147,000	+\$129,996,000	+\$565,000
Bank Deposits	+\$276,962,000	+\$164,200,000	+\$112,762,000	+\$490,000
Employment in:				
Manufacturing	+25,677	+2,677	+23,000	+100
Wholesale and Retail Trade	+7,353	+2,485	+4,868	+21
Professional and Related Services	+10,812	+6,870	+3,942	+17
Transportation, Communication and Other Public Utilities	+2,791	+276	+2,515	+11
Finance, Insurance and Real Estate	+1,900	+585	+1,315	+6

Table 10. (Continued)

Item	Changes in Counties Which Industrialized	Changes in Counties Which did not Industrialize ^a	Net Change Between Two Groups of Counties	Net Change per Increase of 100 Manufacturing Employees
Business and Personal Services	+436	-682	+1,118	+5
Construction	+2,428	+1,761	+667	+3
Agriculture, Mining and Industry				
Not Reported	-16,929	-18,210	+1,281	+5
Total, All Industries	+34,468	-4,238	+38,706	+168

^aActual changes in these counties multiplied by 2.32 to compensate for smaller population and employment in the group of counties which did not industrialize.

^bChange in personal income is from 1959 to 1969.

^cChange in retail establishments and retail sales is from 1958 to 1967.

In this analysis, the 254 SMSA's were divided into two groups according to change in total employment between 1960 and 1970. The 127 areas with greater employment growth (ranging from +20.0% to +125.1%) were compared with the 127 areas with lesser growth (ranging from +20.0% to -8.8%). For each group, the 1960 data was subtracted from the 1970 data and the differences attributed to increased employment. Table 11 illustrates the changes during the period 1960 to 1970 in the metropolitan areas with greater and lesser employment growth [14].

Several changes shown in Table 11, resulting from an increase of 100 manufacturing plus non-manufacturing employment, are considerably less than the corresponding changes associated with an increase of 100 manufacturing employees shown on Table 10. This does not necessarily mean non-manufacturing employment has less impact upon the community than manufacturing employment.

When a rural county becomes industrialized, the increased manufacturing workers provide employment for more school teachers, more sales clerks, and other non-manufacturing workers in the immediate area. On Table 10, the total change in the area was associated with increased manufacturing employees.

When non-manufacturing employment increases in an area, more manufactured goods are purchased in the area; but, manufacture of much of the goods (and the resultant increase in employment) occurs in other parts of the United

Table 11. Changes Between 1960 and 1970 in Metropolitan Areas with Greater and Lesser Employment Growth [14]

Item	Metropolitan Areas with Greater Employment Growth	Metropolitan Areas with Lesser Employment Growth ^a	Net Change Between Two Groups of Areas	Net Change per 100 Increase in Employment
Employment				
(Manufacturing and Non-manufacturing)	+5,690,652	+2,000,430	+3,690,222	+100
Population	+12,519,000	+3,461,000	+9,058,000	+245
Families	+3,533,540	+971,171	+2,562,369	+69
School Enrollment	+6,012,287	+3,069,701	+2,942,586	+80
Personal Income ^b	+\$112,598,000,000	+\$80,425,000,000	+\$32,173,000,000	+\$872,000
Retail				
Establishments	+42,969	-31,882	+74,851	+2
Retail Sales ^c	+\$37,193,000,000	+\$22,612,000,000	+\$14,581,000,000	+\$395,000
Bank Deposits	+\$54,984,000,000	+\$37,252,000,000	+\$17,732,000,000	+\$481,000

^aActual change in these areas multiplied by 1.23 to compensate for smaller total 1960 population in the group of areas with lesser employment growth.

^bChange in personal income is from 1959 to 1969.

^cChange in retail establishments and retail sales is from 1958 to 1967.

States. Due to the impossibility of measuring such changes in other areas, the Chamber of Commerce Study measured only changes in the individual metropolitan areas [14].

The Costs of Industrial Growth

The history of this country has been characterized by industrial growth with workers moving from agriculture to higher paying manufacturing and service industry jobs. In past years, industrial development was welcomed without question as it brought a higher standard of living to this country. The higher non-farm incomes provided tax revenues to government, supported retail business and provided markets for service industries.

Recently, however, it has been realized that industrial growth often brings rising social cost. These social costs include such things as smog, water pollution, excessive noise, over-crowding, and urban sprawl. Also, governmental costs increase as school systems, library and recreational facilities, hospitals, transportation, police, fire, waste disposal, and other services must expand to keep pace with growth. These recent developments have caused some communities and counties to re-evaluate their plans for industrial growth. Some have even adopted a "no-growth" policy. In 1970, a cost/benefit analysis of different types of economic activities was performed in Montgomery County, Maryland [15]. Eleven types of economic

activity considered important to the future growth of the county were investigated in the study.

The study considered those costs incurred by the county in providing services to individuals and institutions involved in the specified activities. Tax revenues received by the county from individuals and institutions are considered as benefits.

A benefit/cost ratio was derived for each of the 11 categories studied. A benefit/cost ratio of 1.0 would mean that the county received one dollar in revenue for every dollar it expended in support of a particular type of economic activity and the county residents employed by such an activity. The 11 categories investigated and their associated benefit/cost ratio are shown in Table 12. Due to the difficulty in gathering accurate, up-to-date information, caution should be exercised in treating the benefit/cost ratios in absolute terms. Also to be considered are the interrelationships between the various activities. An example of this is the motel and hotel category and federal government installations categories. Without such federal installations (with a relatively low ratio of 1.587), the ratio for motels and hotels would probably be somewhat lower.

Government decision-makers should consider such benefit/cost analysis when planning for an area's growth and development. In addition to these conventional benefit/cost comparisons, more and more local governments are being forced by public opinion to take into account social costs

Table 12. Benefit/Cost Ratios for Business Activities
in Montgomery County, Maryland [15]

Type of Activity	Benefit/Cost Ratio
1. Large White Collar Activities, Consisting of Private Organizations Employing Several Thousand Personnel and Utilizing Sophisticated Data Processing Equipment	2.337
2. Motels and Hotels	1.587
3. Commercial Recreation, Consisting Largely of Golf Courses, etc.	1.505
4. Medical and Health Care Facilities Owned by Tax-Paying Organizations	1.087
5. Major Shopping Centers	1.061
6. Construction Firms and Associated Building Material Activities	1.028
7. Office Buildings with a Variety of Tenants	0.985
8. Research and Development Activities of Private Tax-Paying Firms	0.963
9. Service Distribution Centers, Including Warehouses and Repair Centers Serving the Metropolitan Area	0.886
10. Light Manufacturing Activities	0.793
11. Federal Government Installations, as Represented by the Larger Research Types	0.687
12. Medical and Health Care Facilities Owned by Non-tax-Paying Activities	0.559
13. Large White Collar Activities, Owned by Non- or Limited-Tax-Paying Activities Other than the Federal Government	0.553

and benefits in evaluating the net benefit of new business firms to the community. Communities are beginning to realize that it is not advantageous to attract new enterprises if the full costs to the community (including social costs) exceed the benefits. If the advantages of industrialization are to be realized fully and without offsetting disadvantages, a community must exercise care in the attraction of new firms.

CHAPTER IV

THE LARGE AND MEDIUM HUB AIRPORTS' SOCIO-ECONOMIC IMPACT UPON THE COMMUNITY: AN OVERVIEW

Introduction

Large and medium hub air carrier airports, such as the ones in Los Angeles, Atlanta, San Francisco, or New York, are very much like cities or big businesses. For the purposes of this analysis, the terms large and medium hub airport are as defined by the Civil Aeronautics Board (CAB). That is, a large hub airport is one which enplanes 1.0% or more of the total number of passengers enplaned by all the CAB certificated air carriers. A medium hub airport is one that enplanes less than 1.0% but more than .24% of the total number of passengers [16]. The revenues and expenses for these airports run into the millions of dollars. More importantly, however, these airports show a net income in the millions of dollars. Obviously, any business which serves over 12 million customers and reports a net income of nine million dollars could be identified as a success. That is exactly what the Atlanta International Airport does. This, in itself, constitutes a considerable socio-economic impact upon the Atlanta area.

Table 13 presents the financial results for airports enplaning over two million passengers. As shown in Table 13,

Table 13. Comparison of 1974 Financial Results--Airports Enplaning Over Two Million Passengers (Amounts in Thousands) [17]

Airport	Passenger Enplane- ments	Operating (\$)			Non-operating (\$)		Operating Income (\$)	Depre- ciation (\$)	Net Income (\$)
		Revenue	Expenses	Profit	Revenue	Expenses			
Atlanta	12,699	25,977	5,122	20,835	208	10,797	10,246	1,265	8,981
Los Angeles	11,927	40,472	17,444	23,028	5,308	6,755	21,581	3,521	18,060
San Francisco	8,614	25,323	10,996	14,327	315	1,910	12,732	3,961	8,771
Miami ^a	6,500	21,999	15,748	6,251	120	552	5,819	-	-
Washington National	5,989	13,460	6,420	7,040	-	698 ^b	6,342	2,182	4,160
Denver	5,751	14,707	4,576	10,131	3,524	2,642	11,013	3,287	7,726
Dallas- Ft. Worth ^c	5,067	26,633	6,111	20,522	2,404	20,618	2,308	-	-
Philadelphia	3,949	13,330	4,853	8,747	297	3,995	5,049	-	-
Detroit	3,830	24,635	12,628	12,007	1,919	7,443	6,483	4,095	2,388
Minneapolis- St. Paul ^d	3,162	14,044	5,527	8,517	2,070	4,169	6,419	4,325	2,093
St. Louis	2,959	8,645	4,489	4,156	1,968	2,120	4,004	2,245	1,759
Houston	2,919	11,909	7,518	4,391	2,760	5,124	2,028	2,455	(427)
Seattle	2,863	27,019	10,862	16,157	-	9,525	6,632	2,568	4,064
Las Vegas	2,861	7,879	3,388	4,491	599	874	4,216	1,413	2,803

Table 13. (Continued)

Airport	Passenger Enplane- ments	Revenue	Expenses	Profit	Non-operating (\$)		Operating Income (\$)	Depre- ciation (\$)	Net Income (\$)
					Revenue	Expenses			
New Orleans	2,224	5,626	2,497	3,129	254	981	2,402	1,005	1,397
Phoenix	2,000	8,061	3,908	4,153	1,369	1,760	3,762	1,660	2,102
Kansas City	1,972	10,344	5,029	5,315	885	2,697	3,503	3,817	(314)

^aRevenues and expenses for some special facilities not included.

^bInterest imputed.

^cJanuary 13 to September 30, 1974.

^d1973 financial data.

there is a wide range in operating and non-operating revenues and expenses between airports with similar enplanement levels. Operating revenues and expenses result from actual operation of the airport while non-operating revenues and expenses consist largely of interest income and expense. Seattle, as an example, with 2.9 million annual enplanements, reports more operating revenues than Atlanta with 12.7 enplanements. This wide variation is the result of large differences in airline landing fees established to meet the airports' debt service costs. Variations in operating expenses are due to a combination of the physical size, age, and condition of airport facilities and the services provided by the airport.

Non-operating revenues and expenses vary depending upon the amount of bond funds invested and debt outstanding. For the 17 airports shown, operating income varies from \$2.3 to \$21.6 million.

Table 14 shows some of the other financial statistics, such as airport investment, debt outstanding, return on investment and uses of funds for airport improvements, and debt retirement.

The financial status of 114 smaller airports is shown in Table 15, and indicates that the operating profit and return on investment of these airports is substantially below that of the larger airports. These results are based on 1969-1971 data and are in 1973 dollars. A more meaningful assessment of the economic viability of these smaller

Table 14. Comparison of 1974 Financial Statistics--Airports Enplaning Over Two Million Passengers (Amounts in Thousands) [17]

Airport	Passenger Enplane- ments	Property, Plant and Equipment			Debt Out- standing (\$)	Return on Invest- ment (\$)	Use of Funds	
		At Cost (\$)	Construction in Progress (\$)	Depre- ciated Value (\$)			Debt Improve- ments (\$)	Debt Retire- ment (\$)
Atlanta ^a	12,699	258,463	32,908	280,371	189,471	7.2	18,008	2,914 ^b
Los Angeles	11,927	392,991	9,399	360,179	232,625	6.4	7,827	6,212 ^b
San Francisco	8,614	159,034	22,968	134,265	111,093	10.7	11,456	5,675
Miami	6,500	250,768	121,472	-	220,196	-	-	3,596
Washington National	5,989	62,302	3,326	30,593	-	22.3	719	-
Denver	5,751	121,494	12,057	99,200	85,140	10.2	11,376	1,034
Dallas- Ft. Worth	5,067	618,879	-	-	558,880	3.3	32,245	720
Detroit	3,830	116,000	49,935	120,477	133,769	10.0	17,581	2,440
Minneapolis- St. Paul ^a	3,162	98,509	43,414	105,158	94,425	8.1	3,827	3,780
St. Louis	2,959	63,324	3,452	46,316	38,060	9.0	2,930	535
Houston	2,919	86,902	905	75,786	97,611	5.8	10,746	425
Seattle	2,863	200,000	3,000	179,760	171,185	9.0	7,604	2,940

Table 14. (Continued)

Airport	Passenger Enplane- ments	Property, Plant and Equipment			Debt Out- standing	Return on Invest- ment (%)	Use of Funds	
		At Cost (\$)	Construction in Progress (\$)	Depre- ciated Value (\$)			Debt Improve- ments (\$)	Retire- ment (\$)
Las Vegas	2,861	31,553	16,138	39,213	28,933	11.5	10,831	1,534
New Orleans	2,224	39,500	23,462	52,147	17,740	6.0	-	585
Kansas City	1,972	96,855	16	90,731	51,004	5.9	3,514	1,120

^a1973 financial data.

^bExcludes payments to local governments.

Table 15. Economic Viability of Air Carrier Airports
(1969-1971 Financial Data in 1973 Dollars) [17]

Annual Enplanement Group	Number of Airports	Passenger Enplanements (000)	Operating Profit (\$000)	Average		Investment
				Airport Investment (\$000)	Debt Outstanding (\$000)	
500,000 to 2 million	30	937	1,233	26,964	16,467	4.6
250,000 to 500,000	10	383	440	12,519	6,095	3.5
125,000 to 250,000	29	181	136	11,192	3,169	1.2
50,000 to 125,000	17	93	97	6,045	1,777	1.6
Under 50,000	28	19	(15)	1,907	270	(0.8)
Total	114	-	-	-	-	-

airports is to examine their ability to meet operating expenses and debt service costs without local government tax support. Results of this examination, shown in Table 16, indicate that the ability of airports to meet these expenses decreases as enplanements decrease. Airports in the last two groups can be seen to be largely unable to meet their debt service costs from operating revenues. The method of financing for airports below 250,000 enplanements also can be seen to be largely through general obligation bonds or loans.

The airport's sphere of economic influence, however, is not restricted to these factors alone. In the area of economic impact, it might be said that net income is only the "tip of the iceberg."

The San Jose, California Airport will be examined as a typical air carrier airport. The San Jose market area referred to in later sections is defined as a geographic area described by a ten-mile radius circle with the airport as its center [2]. The market area is peculiar to each airport and must be determined on a case by case basis depending upon the airport's environment.

Primary Socio-economic Impact (Airport-Specific)

The first level of socio-economic impact an airport has is primary socio-economic impact (airport-specific). Primary socio-economic impact consists of those economic variables that are directly a function of the activities at

Table 16. Ability of Airports to Meet Operating Expenses and Debt Service Costs without Local Government Tax Support (1969-1971 Financial Data) [17]

Annual Enplanement Group	Number of Airports	Operating Expenses	Ability to Meet			
			Revenue Bond ^a		G.O. Bond or Loans ^a	
			Interest	Principal	Interest	Principal
500,000 to 2 million	30	29/30	10/11	10/11	12/14	11/14
250,000 to 500,000	10	10/10	5/5	4/5	8/8	6/8
125,000 to 250,000	29	25/29	3/4	3/4	10/20	7/20
50,000 to 125,000	17	13/17	3/4	3/4	2/11	2/11
Under 50,000	28	8/28	0/3	0/3	1/12	0/13
Total	114	85/114	21/27	20/27	33/66	25/66

^aData not available for all airports. Some airports have both revenue and general obligation bonded indebtedness.

the airport. To evaluate the magnitude of this type of impact, a thorough and detailed collection of data from all business entities, both public and private, specifically located on the airport, is necessary. Surveys and interviews should be conducted with the airlines, concessionaires, car rental firms, airport administration, fixed base operators, and government agencies involved in the operation of the airport. Some of the examples of primary impact are: the number of employees; the gross payroll; expenditures for local goods and services, including advertising; local tax payments, including state sales tax; capital investment expenditures; and annual revenues.

Obviously, large hub airports provide an enormous primary economic impact. The scope of this level of impact, however, has proven to be a surprise to most individuals outside the industry. Airports such as New York City's complex of three airports (Kennedy, Newark, and LaGuardia), or Miami's International Airport, directly employ over 70,000 persons with annual payrolls of \$965 million and \$590 million, respectively. Even smaller airports like Las Vegas employ 1,600 people with a payroll of \$7 million. Table 17 details the number of employees and annual payrolls for some of the nation's air carrier airports. Table 18 illustrates the type of data collected for a determination of primary economic impact.

Table 17. Direct Employment and Annual Payroll of Air Carrier Airports

Airport	Employees	Annual Payroll Dollars
New York - New Jersey (Kennedy, Newark, and LaGuardia)	77,800	965,000,000
Miami	73,000	590,000,000
Los Angeles	37,076	447,600,000
San Francisco	29,418	322,004,000
Atlanta	17,541	209,236,712
Minneapolis	15,340	188,325,000
Seattle	15,200	161,000,000
Boston	10,000	98,000,000
Houston	6,300	76,000,000
Nashville	7,446	65,826,387
St. Louis	5,200	48,190,000
New Orleans	4,000	33,568,000
Cincinnati	1,900	17,900,000
Hartford	1,500	17,400,000
Las Vegas	1,594	13,691,750
Rhode Island	718	7,121,124

Table 18. Primary Economic Impact of the San Jose Airport
on the Market Area in FY 1972 [2]

Economic Variable	Air Carriers ^a	Concession- aires	Aircraft Services ^b	Government Agency ^c	Total
Total Entities	11	9	10	5	35
Total Responding to Survey	10	9	9	5	33
Number of Employees	198	193	116	144	651
Annual Gross Payroll	\$2,090,500	\$1,211,000	\$1,105,000	\$ 1,696,700	\$ 6,022,200
Expenditures (G&S)	1,056,900	1,163,900	737,000	1,625,000	4,582,800
Tax Payments	498,800	440,000	175,000	11,700	1,126,400
Capital Expenditures	150,000	41,000	74,000	708,700	973,700
Total FY 1972	\$3,715,200	\$2,856,800	\$2,091,000	\$ 4,040,100	\$12,705,100
Planned Capital Expenditures to FY 1978 ^d	\$ 205,000	\$1,050,000	\$ 625,000	\$26,575,000	\$28,500,000

^aThere are 16 air carriers in total operating out of the San Jose Municipal Airport; however, only 11 are relevant to the study; i.e., Air California handles Golden West business, Continental handles Swift Aire, United handles Golden Pacific, and Valley handles Trans Sierra.

^bFixed base operators.

^cAirport Administration, Government (FAA), and Customs.

^dNine out of 11 air carriers did not know, or more likely did not wish to reveal, what planned expenditures were for 1973-1978.

Secondary Socio-economic Impacts (Airport-Related)

Secondary socio-economic impacts are those traceable to airport-related businesses such as hotels, motels, and travel agencies, along with the proportion of their activities which are airport-generated. There is generally a substantial economic impact on the market area resulting from those industries which are highly dependent upon air travelers using the airport. This is especially true of hotels, motels, travel agencies, and their related construction.

The hotel/motel industry is more highly dependent on proximity to the airport for impacts than other businesses in the market area. Due to this characteristic, the radius of the hotel/motel impacted area is generally restricted (to a radius of four miles in the case of San Jose). In the San Jose, California area, 477 people with an annual payroll of \$2,063,000 were employed in the hotel/motel trade within a four-mile radius of the airport [2].

There are approximately 63 travel agencies in the San Jose market area. These agencies, on the average, provided employment for five people each, with the total number of employees being 315 persons in 1972. Surveys indicate that approximately 30% of the total business involved air transportation. In this case, four out of five tickets were for trips through the San Francisco Airport. If considering only the travel generated by the San Jose Airport, the

travel agencies constituted a secondary economic impact of 19 people with a gross payroll of \$171,000 for 1972 [2].

Tertiary Socio-economic Impacts (Airport-Induced)

The previously discussed economic impacts which result from the primary and secondary levels provide the stimulus to propagate economic waves which affect the entire market area. Referred to as the tertiary level of economic impacts, these induced impacts consist of stimuli to employment and payroll.

Each employee in a primary impact level (airlines, concessions, government agencies, and airport-specific contracting firms) and in the secondary impact level (hotels, motels, travel agencies, and their respective construction activities) cause tertiary or induced employment in wholesale and retail trade, government, banking and finance, and others. This induced employment is known as the employment multiplier effect, a well-known phenomenon and principle of economics.

The size of the multiplier effect varies with geographic location and industry. The value of the multiplier is generally in the range of two to four [18]. The multiplier for the San Jose market area is 3.0 [2]. This means that for each employee in the primary or secondary level of the airport industry, an induced employment for two additional workers within the market area is generated.

Another example of the multiplier effect is seen in Cincinnati. At the greater Cincinnati Airport there are 1,900 people directly employed in aviation activity. The total number of people, however, in the greater Cincinnati-northern Kentucky area directly or indirectly employed in aviation and by firms providing support and services to the industry and travel-related businesses reaches 25,000 [19].

Alternately, there is an income multiplier effect. In this case, each payroll dollar of income from the primary or secondary airport industry employment generates additional dollars in induced tertiary employment. For the San Jose market area, the income multiplier value is estimated to be 3.5 [2]. Likewise, in Houston, the \$76 million annual aviation payroll results in the direct and indirect purchase of nearly \$200 million in goods and services [19]. This multiplier effect operates in all cities as aviation dollars are channeled throughout the community.

Other Socio-economic Impacts

There are many other socio-economic impacts which are equally important, but they tend to be obscure because in most cases they are very difficult to quantify and evaluate in a statistically meaningful manner. Some of the more important of these rather subtle factors are impacts from broadened markets: the benefits occurring from the

ability to export local goods and services; impacts on land values; and of very substantial magnitude, air visitor expenditures.

Transit air travelers to the market area, whether for business or pleasure, are an important element in the composition of the metro economy. Obviously, the degree to which this type of impact affects the community varies considerably between regions and even between areas within a region. San Jose is a good example of this. Due to San Jose's close proximity to San Francisco, it is reasonable to assume that it is not a big tourist destination area. In other communities, however, tourism and convention related businesses inject a considerable amount of money into the area's economy. Table 19 illustrates the level of annual income derived from these activities.

In most cases, the non-resident business air traveler spends only the time required to transact his business in the market area. A study done by Stanford Research Institute shows that about 32% of all deplaning passengers at San Jose were non-resident business air travelers. The business transient stays an average of 1.5 days in the market area and spends about \$45 per day for food, lodging, transportation, entertainment, and miscellaneous items [2].

A characteristic of commercial and industrial property located around major airports is that as the proximity of the property to the airport increases, the

Table 19. Representative Figures for Income Derived
from Convention and Tourism Business [19]

City	Annual Monetary Impact (\$)
New York	1,201,500,000
Chicago	838,800,000
Las Vegas	187,000,000
St. Paul-Minneapolis	184,000,000
Denver	105,000,000
Atlanta	84,000,000
St. Louis	71,000,000
New Orleans	55,700,000
Boston	40,000,000
Seattle	29,000,000
Cincinnati	18,000,000

value of the property increases. This is also true of residential property. In a Florida case [3], the judge held for the defendant, Miami International Airport. The case involved the homeowners of Grapeland Heights, a Miami suburb near the airport, who were suing the airport for damages. The airport, they claimed, had reduced the value of their homes. Judge Goodhart [3] in ruling for the defendant, had this to say:

Regardless of what the (state) Constitution provides, i.e., taking, damages or destroying, the test of damages in inverse condemnation is still the reduction of fair market value.

We are thus confronted with a legal anomaly. Although some damage has been proven as stated above, and there has been some infringement upon the use and enjoyment of the Plaintiffs' land, the testimony conclusively shows that any one of the individual Plaintiffs could now sell their property at an increase of anywhere between 200-300% of the original purchase price. Inflated real estate values and general appreciation of real estate in this state, and particularly in Dade County, undoubtedly accounts for this increase. . . . Therefore, no diminution of property values exists and thus no substantial damages can be proved by the 841 Plaintiffs as required by the case law in this state and other states.

According to William Gibbs [20], Assistant County Attorney for Dade County, a survey of property values in the county was performed in preparation for the case. Thirty-eight suburbs comparable to Grapeland Heights and well away from the airport were selected for the study. The Grapeland Heights properties are zoned residential with the majority of the properties being single-family dwellings. The value of approximately 9,000 properties, half of which were in

Grapeland Heights, was traced from the original date of purchase to the present. On the alleged date of taking, January 17, 1972, the average market value of properties in Grapeland Heights had increased 263% while properties in the other areas had increased on an average of 253%. Since then, the differential in property value has increased even more. The average market value of properties in Grapeland Heights in 1973 increased to 306% greater than the original purchase price while comparable properties increased only 282% in value. Gibbs [20] summed up the situation when he stated:

The rate of appreciation in the Grapeland Heights was measurably greater than the rest of Dade County on comparable property.

Another good example of land value appreciation in proximity to major airports is the property surrounding Chicago's O'Hare International Airport. Property which sold for no more than \$800 per acre in the 1950's has a current market value of over \$100,000 per acre. Near Phoenix Sky Harbor Airport, commercial land value has risen from \$26,000 per acre in 1961 to a high of \$130,000 per acre today. Finally, property near the Louisville, Kentucky Airport which sold for \$4,000 per acre in 1959 now sells for \$18,000 per acre [19]. These are just a few examples of the increasing value of property which is in proximity to the nation's airports.

Table 20 summarizes the San Jose Airport economic impacts at the various levels. The estimates, and the following impact factors which are not as identifiable in

Table 20. A Summary of the Economic Impact by the
San Jose Airport Upon the
Market Area [2]

Employment and Payroll (Millions in 1972 Dollars)		
	FY 1971-1972: Employment	Payroll
Primary Impact Level		
Airport-Specific	651	\$ 6.022
Secondary Impact Level		
Airport-Related	496	2.235
Construction Activity		
Primary	20	.277
Secondary	-	-
Tertiary Impact Level	2,334	21.333
Subtotal	3,501	\$29.867
Other Economic Factors (Millions in 1972 Dollars)		
Primary Impact Level		
Expenditures for G&S		\$ 4.583
Tax Payments		1.126
Construction Materials		.280
Secondary Impact Level		
Hotel/Motel Construction		-
Materials		-
Tax Payments		N.A.
Other Impact Level		
Air Visitor Expenditures		9.113
Subtotal		15.102
Total		\$44.969

absolute terms but nevertheless are very significant, are hotel/motel tax payments, travel agency tax payments, airport-related labor content of travel agency construction, value of time saved by the airport, and impact on commercial and industrial land values. Additionally and most importantly, there are incremental revenues gained by local merchants, manufacturers, and traders who have significantly broadened the market available for their products via the airport. This means incremental additions of employees and payrolls, tax payments, and local purchases of other goods and services. It is difficult to estimate accurately the potential magnitude of this impact on the market area economy.

An interesting example of an airport being the economic pivotal point for a community is found in Bangor, Maine. This city of 40,000 received a severe shock in 1964 when then Defense Secretary Robert McNamara announced that nearby Dow Air Force Base would be shut down. Bangor, already designated a poverty area, would now lose another 5,000 jobs and a \$20 million payroll with the closing of Dow [21]. Many of the townspeople believed McNamara had signed their city's death warrant. The people of Bangor soon realized, however, that the former Air Force base could be turned into an asset. The base hospital soon became the new city hospital, and military housing areas were turned into low-income housing projects. The 11 industrial buildings on the base were turned into an

industrial park. It took community leaders some time, though, to decide what to do with Dow's biggest asset--a runway 300 feet wide and 11,440 feet long. In 1968, Norman Kay, a New York real estate developer, finally figured out how to use the airport. He developed Bangor's new airfield into a diversion base for the congested airports on the east coast, principally New York's. When Kay provided the three essential services--a U. S. Customs Office, food catering facilities, and the tax-free bonded fuel used by international air carriers--Pan Am designated Bangor as its prime alternate to Kennedy International Airport [21]. Fifty other foreign and domestic airlines followed Pan Am's lead. In 1973, Bangor handled over 400,000 passengers, making it the sixth busiest entry point into the United States [21].

The result of all this activity is a boom to Bangor. Over 2,000 people attribute their employment to the new enterprise. The city of Bangor receives landing fees from the airport, a percentage of the customs collection, and a penny tax on each gallon of jet fuel sold. About 600 new motel rooms have been built [21]. What could have been a real disaster for Bangor has turned into a real opportunity.

CHAPTER V

THE SOCIO-ECONOMIC IMPACT OF SMALL, NON-HUB, AND GENERAL AVIATION AIRPORTS

Introduction

The socio-economic impact of the major airports at New York, Chicago, or Los Angeles is readily apparent to most people. Closing one of these airports for even a few hours can cause serious repercussions throughout the nation's transportation system. Likewise, injecting 70,000 additional people into the job market of these cities would have a serious effect upon the local economy.

The importance of these airports is easy to envision. But, what about the small air carrier or general aviation airport serving many of this nation's communities? The socio-economic impacts of these airports are, at best, more difficult to determine accurately [22].

The lack of scholarly attention to general aviation is rather surprising when one considers its importance. This importance is substantiated by any conceivable measure one cares to make, whether number of aircraft, mileage or hours flown, passengers carried, landings or takeoffs, or rate of growth.

There are several reasons for this circumstance. First, since the operation of these airports is on a much smaller scale, the quantifiable items are much smaller and more difficult to determine. Second, these small airports

usually do not have the funds necessary to carry out the extensive surveys and analyses of data required for an in-depth evaluation of economic impact. This does not imply, however, that some effort should not be taken to evaluate the economic impact of the airport. On the contrary, every effort should be made, within the budgetary limits, to evaluate the impact. Finally, the primary, secondary, and tertiary socio-economic impacts of these smaller airports tend to be small, although not insignificant. The primary importance of these community airports may well lie in the area of "other impacts." As stated previously, these "other impacts" can be obscured because in most cases they are very difficult to quantify and evaluate in a statistically meaningful manner.

This chapter, with the aid of Chapters II and III as background, will present data to help answer the question: What is the socio-economic impact of a small community airport?

Primary Socio-economic Impact (Airport-Specific)

General aviation airports vary greatly in size. On the top end of the scale are those such as Van Nuys or Torrance, California, and Opa-locka, Florida, which have 400,000+ operations annually and rank among the ten busiest airports in the country [5]. The majority of general aviation airports, however, are the type with 20,000 to 80,000 operations per year. For the purposes of this

analysis, the terms small and non-hub airport are as defined by the Civil Aeronautics Board (CAB). That is, a small hub airport is one which enplanes no more than .24% but not less than .05% of the total number of passengers enplaned by all the CAB certificated air carriers. A non-hub airport is one that enplanes less than .05% of the total number of passengers [16]. Conversely, these airports may employ from two or three persons up to 200 or 300 persons.

Airport employees may include such people as the fixed base operator (FBO), servicemen who maintain the runways and electronic equipment, FAA personnel, airline personnel, secretaries, and an airport manager. An FBO is a retail firm that sells general aviation products or services at an airport. The size and services offered by FBO's vary about as much as the size and activity of airports. Some of the services an FBO might provide include aircraft airframe, engine and/or avionics repairs, flight training, air taxi service and charter flights, aircraft sales, fuel and parts, aircraft storage, and aircraft exterior and/or interior modifications. To provide these services requires the skills of aviation mechanics, flight instructors, and aircraft salesmen.

Some airports maintain concessions at the terminal. These may include restaurants, newsstands, gift and book shops, and car rental agencies.

Regardless of its size, most airports employ some of these types of people. These individuals all make

contributions to the local economy. More importantly, many of these people with their specialized skills may not have settled in the community had it not been for the airport. These employees and their families are injecting money into the community's economy.

Also included in the primary impact of the community airport are local tax and sales tax payments and capital investment expenditures. Finally, like any other business in the community, the airport must purchase local goods and services (such as janitorial services). This, too, aids the economy.

Secondary Socio-economic Impacts (Airport-Related)

Small community airports have a secondary level of impact upon the community just as the major airports, but on a smaller scale. Here again, businesses such as hotels, motels, travel agencies, and their related construction activities owe some of their business to airports. This level of impact is of particular significance in resort locations where there are a considerable number of transit air travelers. An example of this would be the impact of the airport at Walt Disney World in Florida.

Tertiary Socio-economic Impacts (Airport-Induced)

As with the larger air carrier airports, the small community airports also provide a tertiary impact. This is the resultant of primary and secondary impact stimulation of

recurring waves of economic impact. These induced impacts consist of stimuli to employment and payroll. Each employee in the primary or secondary impact levels causes induced employment and payroll dollars in the wholesale and retail trade, finance and banking, government, and so forth. As previously noted, these phenomena are called the employment and income multiplier effects.

Other Socio-economic Impacts

Attraction of New Industry and Expansion of Present Industry

While none of the first three levels of impact may be very large for the smaller airports, neither are the communities these airports serve. The major impact of a small general aviation airport is not the primary, secondary, or tertiary level, but rather the category of "other impacts." This is the area which is most difficult to quantify; however, it is a very significant and vital area which must be considered.

Probably the most significant contribution an airport can make to a community is the attraction of industry. American businesses own or operate more than 45,000 aircraft [8]. There is one major reason for a company to operate an airplane--it helps the company be more productive and competitive. It only stands to reason that any company which operates an aircraft would be inclined to locate its facilities near an airport.

Leonard Wheat from the Economic Development Administration, U. S. Department of Commerce, has extensively researched the causal factors for economic growth [23, 24, 25]. Primarily, his work has focused on cities of 10,000 to 50,000 population. Of 23 local factors Wheat investigated, 16 were significantly related to growth in the southeast and southwest--the "sunbelt." Causal factors are those factors which, at least in part, cause fast or slow growth. Non-causal factors are those factors which act chiefly, if not exclusively, as proxies for something else, but are nevertheless useful. Wheat lists eight causal and eight non-causal factors [24]. The causal factors are:

1. Manufacturing can help or hinder growth:

A. High levels of capital-intensive manufacturing stimulate growth in the southeast, probably because such industry is generally fast growing.

B. High levels of labor-intensive manufacturing inhibit growth in the southeast, mainly because labor market competition deters new growth--and because this industry has slow growth.

C. Ultra-low levels of manufacturing stimulate growth in both subregions because of low wages, non-competitive labor markets, opportunities for community influence, and lack of resistance from existing manufacturing.

2. Air service, especially at an airport located within 25 or 30 miles (but helpful out to 50 miles), helps growth more than any other factor--by facilitating contact between branch plants and headquarters and with other businesses.

3. Interstate system highways, if located within about eight miles, help growth--mainly in the southeast--by offering freight savings to new manufacturing.

4. Colleges practically guarantee fast growing--due to climbing enrollments--but non-college cities are not necessarily slow.

5. Wages, if low, attract manufacturing and thereby help growth but mainly in the southeast (labor-intensive manufacturing).

6. Property taxes, if low, attract manufacturing and thereby help growth but mainly in the southwest (capital-intensive manufacturing).

7. Non-white population percentages, if low, attract manufacturing and thereby help growth, especially in the deep south where the highest non-white percentages generally exceed 20%.

8. Unemployment rates, if low, help growth--mainly in the southeast--because low unemployment attracts job seekers and high unemployment leads to outmigration.

The non-causal factors are:

1. Business importance goes with low growth in the southeast primarily because non-manufacturing cities tend to

have low business importance, but perhaps also because business, like manufacturing, contributes to the labor market competition.

2. Trade importance goes with low growth in the southeast for the same reasons.

3. Schooling, which apparently is a proxy for rural-urban factors, has opposing relationships to growth in the two subregions:

A. Low percentages of children (ages 14-17) in school go with high growth in the southeast where manufacturing is labor-intensive and prefers rural locations (low wages).

B. High percentages go with high growth in the southwest where manufacturing is capital-intensive and prefers urban places.

4. Distance to nearest major SMSA (250,000 or more), apparently a proxy for wages in the southeast, but for regional assets in the southwest, also has opposing relationships to growth.

5. Population of nearest major SMSA is linked to growth in the southwest--high population, high growth--probably because of common causation: regional markets and resources stimulate both the SMSA and surrounding non-metropolitan cities.

6. Growth rate of nearest major SMSA is linked to non-metropolitan growth in the southwest, again through common causation.

7. Prior growth (1950-60) is linked to subsequent (1960-70) growth--strongly in the southwest and weakly in the southeast--through hidden factors affecting growth in both periods.

8. Prior net migration (1950-60) is similarly linked to subsequent growth in the southwest.

Wheat ranks his 16 significant factors in an estimated order of importance. This is shown in Table 21. It is interesting to note that air service heads the list as the most important factor related to growth.

Decentralization is a characterization of American business today. Department of Commerce figures indicate that since 1954, 90% of the new plant sites have been located outside of the country's 22 major metropolitan centers [26]. Furthermore, since 1970, employment in all major industries except government has grown at a faster pace in rural counties, which includes towns and small cities, than in large urban areas [27]. The Fantus Company, a New York consulting firm, believes that these rural areas of the south and west will account for 55 to 60% of the new manufacturing employment in 1976 [27]. Leonard Yaseen, Chairman of the Fantus Company, expects this trend to accelerate as plants in the central states and the northeast become more and more antiquated and management must decide where to build the company's new facilities [27].

The decentralization of business has a combined cause-and-effect relationship with the increased use of

Table 21. Comparative Ratings for Factors
Related to Growth [24]

Rank	Factor	Southeast	Southwest	South	Total
(1)	Air Service	26	18	23	67
(2)	Unemployment Rate	25	1	25	51
(3)	Prior Growth	4	18	22	44
(4)	Property Taxes	11	18	13	42
(5)	Manufacturing, Negative Side	10	14	15	39
(6)	Interstate Highway System	24	3	11	38
(7)	Colleges	7	14	16	37
(8)	Distance to Major SMSA	0	21	12	33
(9)	Wages	8	7	9	24
(10)	Racial Mix	7	7	6	20
(11)	Prior Migration	0	8	4	12
(12)	High School Percentage	3	2	4	9
(13)	Manufacturing, Positive Side	5	0	4	9
(14)	Percent in School	4	4	0	8
(15)	Business and Trade	7	1	0	8
(16)	SMSA Population and Growth	0	5	0	5

business aircraft. The increasing availability and effectiveness of business aircraft have helped make the shift away from metropolitan areas feasible.

One problem resulting from decentralization is communication. Even with all of today's electronic tele-communications systems, business still relies heavily on face-to-face management communications. If the company's facilities are widely dispersed, face-to-face communication can involve a great deal of executive travel time. This is where air transportation, particularly that provided by general aviation aircraft, enters the picture. In the world of business and commerce, time is money. By utilizing air transportation, travel time can be significantly reduced. In some cases, general aviation aircraft can deliver the executives right to the plant's front door. As shown in Table 4, page 17, managerial visits to branch facilities normally constitutes the major usage of the corporate aircraft. On the average, business aircraft are used for these managerial visits 32.3% of the time [12]. Two other areas of business aircraft usage, which are closely related to the first, executive attendance at conferences and sales development trips, compose 22.4% and 18.1% usage, respectively [12].

The importance that corporations place on their executives' time is seen in the fact that the corporate aircraft is used 72.8% of the time to transport these executives [12]. The remaining time is used for customer

transportation, parts and products delivery, public service, and miscellaneous uses.

Many plants have kept their assembly lines open by flying in critically needed raw materials, such as Tennessee Apparel Company did. The airport and airplane have come to the rescue on two separate occasions for the Tennessee Apparel Company in Tullahoma, Tennessee [28]. The first instance occurred when the company had difficulty in obtaining a specific type of thread from the producer in North Carolina. Because the thread was to be used in the manufacture of military uniforms, no substitutions were allowed. Tennessee Apparel was, therefore, faced with a work stoppage if a new shipment of thread did not arrive before their present stock was depleted. The company's primary supplier (who uses his own aircraft extensively in his business) flew from Nashville to North Carolina to pick up the thread at the factory and then flew it directly to the plant in Tullahoma. The supplier and thread arrived in the "nick-of-time" as the plant would have had to close down less than one hour later.

The second instance occurred when Tennessee Apparel ran low on zippers. The zippers were normally brought in a truck from Long Island City, New York, but in this case, there was not enough time for this method of shipment. The zippers were shipped by air freight to Nashville where the supplier picked them up and flew them to Tullahoma. Again, this occurred at the eleventh hour.

This, of course, was a benefit to the Tennessee Apparel Company, but it also indirectly benefited the community. Had the company closed down due to a lack of materials, the employees would, of course, be laid off. This would mean smaller paychecks, thus less disposable income to be spent in the community.

For a hypothetical case, consider a plant employing 400 people, paid an hourly wage of \$3.50. For a plant this size the overhead could average \$5,000 per day and (depending on the product and demand level) the profit loss may also average \$5,000 per day. It is readily apparent, under these circumstances, why a plant manager would like to be close to an airport. The per-day wage loss in this same case would be \$11,200. A two-day plant closing would reduce the payroll by \$22,400. If the economic multiplier for the community were 1.5 to 2.0, the total effect would be \$33,600 to \$44,800, respectively. That's \$44,800 less to spend at the local grocery store, shoe store, movie theater, hardware store, or department store. This same circumstance could occur if a vital piece of machinery broke down which would close the plant. Aircraft have been used many times to fly in needed parts and technicians.

Companies have also used their aircraft to bring in technicians and parts to repair vital machinery. In this way the company can reduce the down-time of their plant. These are just a few reasons companies use aircraft in their business activities.

Some of the findings from the Federal Aviation Administration's report, "The Airport--Its Influence on the Community Economy," illustrate further the relationship between aviation and business [29]. In the report, they stated, "The existence of an adequate airport was a strong factor in attracting new industries to each of the communities surveyed." Community leaders and many company executives stated that the availability of air transportation was a strong factor in decisions to locate in the surveyed areas. Furthermore, it was discovered that the availability of a modern airport was essential to the retention of many of the existing industrial establishments. The study found that through the years, air transportation has become increasingly more important to such companies by helping them to retain and improve their competitive positions in local, national, and international markets. Finally, the FAA study identified the airport as a valuable asset to local industries' maintenance programs. The study concluded that:

Air transportation has made it possible for key industries to keep equipment down-time to a minimum by rapid replacement of supplies and parts, thus reducing the need for a large parts inventory.

The small west Texas community of Hereford is a good example of the influence an airport can exert [29]:

The airport was the factor that "tipped the scales" in Hereford's being chosen over similar locations in west Texas for construction of a Holly Sugar plant.

The Hereford area was growing at a rapid rate. The development of a community airport was just one natural step in a comprehensive community program. Alone, development of the airport might not have had much impact on the community economy; however, combined with other actions taken by the community to expand its economy, the airport has proven of great value by increasing income, employment opportunities, and diversity to the community's economic structure. The same general conclusions can be drawn about the other communities surveyed by the FAA study. The cities included in the study were Sumter, South Carolina; Hayward, California; Frederick, Maryland; and Fairmont, Minnesota.

The General Aviation Manufacturers' Association (GAMA) has compiled a list of brief case histories which demonstrate the influence airports and air transportation have on a business. The case histories cover 16 representable communities across the country and are shown in Ref. [7].

The small community airport serves as a catalyst and a nucleus for commercial, industrial, and residential expansion in the surrounding area. Attracting new business and industrial development to a community, however, is a very difficult and complex task. Successful industrial recruitment usually requires an intensive promotional program possibly extending over several years. Community officials should consider provisions for an airport in the early stages of a community's development program so that

the facility will be ready when needed. This will also help insure the airport's compatibility with surrounding areas and help reduce the possibility of dis-benefits arising from the airport.

Airports can become the focus for a large planned industrial development area. Business and industrial concentrations can locate within a few minutes drive to the airport. In small communities, the relatively short ground travel distance to all points in the local area may make it unnecessary to develop industrial areas next to the airports; but, history indicates that industry does tend to locate in the airport vicinity. Larger communities, however, can benefit by developing planned industrial districts on and about their airports. Airport-community accessibility was considered an important planning element by each of the communities in the FAA survey [29]. The speed and convenience of air transportation can be fully realized only when the airport is made directly accessible to business and industrial areas.

The ability of the airport to concentrate and retain specific types of economic activities in a limited geographic space has led to a beneficial economic environment on the airport and in the near vicinity of the airport boundaries. An aspect of the economic activity in the area has been that certain industries owned and managed by people who fly may tend to gravitate toward an airport location as a convenient way to maintain business contacts.

When the benefits to industry and commerce near an airport are considered, the development of airport industrial parks becomes increasingly more desirable [29].

The future development of most general aviation airports should be financed from future airport surpluses; this will require the adoption of airport policies and pricing principles that will ultimately generate such surpluses. Organizing and administering airports as systems will make it possible to achieve conditions of financial self-sufficiency.

If the airport is to be operated without a deficit and obtain the said financial self-sufficiency, the regular cost of operation and maintenance must be met by taking full advantage of all possible sources of revenue that would be available from an airport industrial park in combination with regular airport commercial activities. The industrial park could be located on airport land that is in excess of current needs. There are a number of industrial and commercial activities which are attracted to and are compatible with airports. Such activities could include: aircraft and aircraft parts manufacturers; air freight terminals, trucking freight terminals, and other allied uses; aviation schools; aircraft repair shops; warehouses, aerial survey, and other similar companies; aviation research and testing laboratories; airline schools; auto storage areas; parking lots; airport motels and hotels; restaurants; taxi and bus terminals; wholesale distribution centers; gas station and auto washing facilities; rental of office space; consultant services and firms; military production of

equipment and parts; commodities such as shipping flowers, perishable foods, cattle, pharmaceuticals, electronics, high value items, and so forth; and concessions that relate to aviation activities.

The integration of a properly planned and organized industrial development in conjunction with an airport serves a dual purpose. It can bring long term economic benefits to the community and to the airport which serves it and also bring relief to the pressing problems of airport zoning and compatible land use in the airport environs.

Robert Boley in, "Industrial Districts - Principles in Practice," cites six related factors influencing the development of industry in proximity to airports [30]:

1. High quality, high capacity highway access provided to serve the airport also provides direct and efficient access to nearby industrial facilities.
2. Open land beyond the intensely developed sections of the urban areas served by the airports provides the required space for modern, horizontal-type industrial facilities.
3. Flat terrain required for airport development meets the needs of modern, large-scale industrial site development.
4. Utilities installed to serve airports can also serve nearby industrial facilities.
5. Availability of air transportation, including commercial, air cargo, and privately owned business aircraft, is a bonus which results from air-field proximity, especially for selected industries.
6. Prestige location results from the architecturally distinguished surroundings often found in major airport facilities.

Boley makes the valid observation that airport-oriented districts are not equally appealing to all industries because of environmental characteristics such as noise, vibration, and electrical disturbances, as well as

height limitations imposed on structures in the vicinity of the airport.

The FAA Eastern Region's study on, "General Aviation and Its Relationship to Industry and the Community," resulted in the following findings [31]:

1. Firms such as those surveyed or otherwise included in this study, contribute largely to the economy of the areas in which they are located. Therefore, it is concluded that the aircraft, being necessary to business, is indirectly an economic asset to the community. It follows that the airport itself is a direct economic asset.

2. There are documented cases where the existence or non-existence of adequate airport facilities has been the controlling factor in industry decisions to move into or out of a community. There are numerous other cases where it was an important contributing factor.

3. The lack of attention to the industrial influence on airport planning results in a serious shortcoming in achieving optimum individual airport development as well as adequate overall transportation planning.

The resultant economic impact of an industry moving into a community was shown previously in Chapter III.

Industrial growth will produce several other beneficial and adverse economic effects within the community. The adverse impacts will be dealt with in a later section. Other beneficial impacts include such things as capital investment in plant and equipment, construction outlays for industrial facilities, commercial supporting facilities, residences, and increased career opportunities in non-farm occupations.

As pointed out previously, an airport is not the panacea for the community seeking economic growth and development. There are many other criteria which influence

plant site location. These include traditional factors such as the existence and accessibility of markets, utilities, raw materials, labor, and transportation; institutional factors such as the type of government and tax rates; community factors such as attitudes, population size and density, and amenities (cultural and recreational facilities and natural environmental conditions); personal preferences such as the desires of management and the residence of the owners; and site factors such as land and buildings. There are many communities which offer similar, if not equal, advantages to a company desiring to locate a new plant. The decision will probably go to the community with a small competitive edge. This "edge" could very well be a strong, healthy airport or air industrial park. It has been shown that many companies do consider the availability of an airport important to their livelihood. It appears that any community failing to acquire access to an airport and the nation's air transportation system could very well stagnate. A similar opinion was voiced by the American Academy of Political and Social Science in 1930, when it said [32]:

Every community must have an airport if it is to have a share in the rapidly expanding commerce of the skies. It needs an airport today for exactly the same reason that it first needed a railroad station 60 to 70 years ago. And, if the aviation industry is unable to handle the heavy burden of furnishing ground facilities which cannot be expected to pay for themselves in the immediate future, then cities must assume the responsibility.

Joseph Foster re-enforces this in his paper, "The Airport - A Center of Economic Gravity," when he states [32]:

At the same time as the airport has been progressively hemmed in by these demographic factors, it has also become an economic center of gravity within the community which it serves. The airport has become vital to the growth of business and industry in a community by providing air access for companies which must meet the demand of supply, competition, and expansion of marketing areas. There is now little doubt that communities without airports may be placing limitations on their capacity for economic growth.

Finally, an official of the State of North Carolina in a recent newspaper interview focused on the importance of the community airport when he said [32]:

Many states, counties, and municipalities simply do not understand the role that airports play in their economic and industrial future. They do not realize that availability of air transport is shaping up as a significant factor in determining which communities will grow and prosper.

The airport might be called the front door to a community and the business aircraft the key which can unlock the door and expose the community to a great many opportunities.

Land Value Appreciation in Proximity to Airports

Land value on property in proximity to airports generally increases. The same phenomenon which occurs around large and medium hub airports also occurs around the smaller airports, although not to the same astronomical level. An example of land value appreciation around a general aviation airport is Delaware, Ohio. Here, land adjacent to the new municipal airport rose in value from

\$400 per acre in 1965 to \$7,000 per acre in 1969 [33].

Logic would seem to dictate that land values would increase, such as they have, when the property is located in proximity to an airport. Throughout civilization, man has settled along lines of transportation. This happened with waterways, then railways, next highways, and now airports. There is only a limited amount of land around an airport, and the economic "Law of Supply and Demand" requires that the price increase as the demand becomes greater.

Unfortunately, the appreciation of property values in proximity to airports has worked to the detriment of some airports. All too frequently, community officials have failed to recognize that the airport and the business it generates is an economic asset that should be afforded every protection possible to assist in maintaining the economic flexibility of the community which it serves. Regardless of the airport's ownership (public or private), the contribution which it makes to the economy of the community deserves strong consideration in planning community development. Failure to recognize the value of the airport and the property around it by community officials can and has resulted in the loss of airport facilities. It is paradoxical that the airport should cause the property surrounding it to become so prized that it threatens the airport's own existence. This can happen in several ways. In some cases, city officials have sacrificed the airport in the name of industrial development. At other times, they

have simply failed to protect the airport from encroachment, thus making flight operations hazardous and expansion to meet growing demand, impossible. Finally, there is the case where land is available for expansion but it is so expensive as to make purchase impractical. In essence, the community leaders are "killing the goose that laid the golden egg." With adequate planning and forethought these situations can be minimized if not turned to the advantage of the airport. As mentioned previously, air industrial parks serve two purposes: providing compatible land use, thus minimizing unwanted encroachment; and providing added revenue to support airport operations.

Miscellaneous Benefits Provided by the Community Airport

The community airport provides many other services to the citizens within its sphere of influence. Many of these services are difficult, if not impossible, to quantify. Just because a benefit (or for that matter, a dis-benefit) cannot be quantified is no reason to disregard it in the consideration of impact.

What value can you put on the services of a physician such as a radiologist, cardiologist, or pathologist? Some communities, like Neligh, Nebraska, depend upon their airport for the invaluable services of these medical specialists. In other cases, critically ill patients may need to be air-evacuated to a large metropolitan hospital with special facilities. How can a value

be placed on the life that might be saved or the suffering that might be reduced? Today, a physician, just as the corporate executive, cannot afford to waste his valuable time in driving from town to town.

The air delivery for radioactive isotopes for radiology and radiation therapy and diagnosis has made this technology available to some of the nation's more rural hospitals. Since many of these materials have a half-life of about 72 hours, none of this would be possible, or at least feasible, without air transportation.

Another way in which the airport benefits the community is by broadening the tax base. Obviously, industrial development with the accompanying population and per capita income growth, will increase property, sales, and income tax collections. Increased population will also mean greater federal revenue sharing funds. Increased land value leads to increased property tax collections if the community maintains a current appraisal of the property. Many communities collect property tax on the aircraft based at the airport. The value of these aircraft may vary anywhere from \$5,000 to \$3,000,000 or more each.

The community airport and associated general aviation aircraft are used extensively in pipeline patrol, aerial crop dusting, large ranch patrolling, highway traffic control, and in increasing policing activities. Just as the assimilation of the computer into the business world helped many industries, the airplane has increased the frequency,

effectiveness, and efficiency in all these areas [34]. This, in turn, benefits the community and the nation by making the country more productive.

More obscure in the minds of many people is the justification of the use of general aviation for recreational purposes. The community airport is much like the community golf course, swimming pool, or tennis court for the people who like to fly for the fun of it. Many people make hunting and fishing trips into areas not served by air carrier airports while others use the private airplane to visit other recreational areas not served by the airlines. Still others simply prefer the flexibility of the private aircraft. This benefit works in two ways; it provides people in small communities more flexibility in their travel plans and offers more potential to resort areas. Surely, Walt Disney World must have recognized the increased opportunities provided by an airport when it decided to build an airport in the park. Again, the airport and the airplane offer the benefits of mobility, flexibility, and recreation to the populace.

The provision for emergency services is another activity that is a potential use of the airport. In areas like southern California with a high potential for devastating, region-wide brush and forest fires, the airport offers landing facilities for airborne fire-fighting equipment. It also offers facilities for the basing and supporting of personnel used in dealing with potential civil

disturbances. After a great natural disaster, the community airport may be the only feasible point of contact with the outside world. Emergency supplies and disaster relief teams can be quickly flown into the area. This was the case in Managua, Nicaragua, after the earthquake and the Mississippi gulf coast in the wake of hurricane Camille. Hopefully, this type of benefit would never be needed by a community; but, if it is, it could mean the saving of lives.

The nation's system of airports is also a factor in national defense. A network of airports helps to encourage the geographic dispersal of the population. This, in turn, reduces the nation's vulnerability to nuclear attack. At the same time, the airport network could provide a valuable communication and transportation link at a time when no other may exist. If a full-scale war did develop, the commercial airline fleet would be pressed into military service and civilian airfields used as dispersal bases for military aircraft. In this event, it is believed that the availability of a substantial private aircraft fleet (164,000 aircraft strong) would be most valuable in the movement of persons, supplies, doctors, nurses, and so forth, from one area subject to contamination or fall-out to another area where survival would be possible.

The airport performs in one other area of emergency service. This is a base of operations for the Civil Air Patrol. The services of this organization, involving non-military aircraft, are frequently involved in search,

rescue or disaster missions. Unfortunately, the services of the Civil Air Patrol and the possible emergency applications of the community airport are too frequently overlooked until they are needed.

The airport system and a small company called Midwest Air are important to the nation's banking system. Every night, Midwest's aircraft fly about the country transferring checks through the Federal Reserve Bank system. Speed is of the utmost importance in the banking system. Obviously, the less time the checks spend in transit, the faster banks can process them. This is vital to the nation's economy because of what the Federal Reserve calls the "float." The float is the sum of all checks in transit. Its size is one of the major uncertainties which the Federal Reserve must face in trying to control the nation's money supply [35]. Midwest Air helps reduce that uncertainty by reducing the float.

The community airport can also help expand the market area for local industry. Highly perishable goods, such as fresh shrimp, crab, lobster, fruits, vegetables, and so forth, can be shipped much farther by air than by surface transportation, thus expanding the merchants' marketing area. This has the potential for increasing the size of the local industry, its employment requirements, and its profitability. Conversely, the airport may expose the community to new products which were unavailable prior to the airport's existence.

All of the preceding factors mentioned benefit the community; yet, to quantify the benefits is an almost impossible task. As stated previously, the inability to quantify benefits in no way renders them insignificant. These benefits do enhance man's style of life, standard of living, and the nation's productivity.

The Ohio County Airport Program

Probably the most frequently cited example of how airports can benefit a community, and collectively a state, is shown in the Ohio County Airport experience. In 1965, realizing that modern air facilities were becoming increasingly strategic to the attraction of new industry and the stimulation of economic development, Ohio instituted a massive county airport development program. The Ohio General Assembly approved a program to provide for the allocation of \$100,000 to each of 50 Ohio counties for building or upgrading general aviation airports. An additional \$1.2 million was later allocated by the legislature, enabling a total of 64 counties to participate in the program [36].

The basic concept of the Ohio Airport Program is rather unique. Most other airport construction programs, particularly those sponsored by the FAA, have appropriated funds only to those areas with a proven need in advance. The Ohio program, however, was based on the premise that increasing air traffic will flow from the increased economic

activity created by each new airport [36]. An example of this is seen in Madison County, Ohio. In 1964, there was only one airplane registered in the county; but, by 1974, there were 52 based at the county airport [36].

The county airport authorities solicited land, funds, labor, and equipment from local organizations and citizens to construct a county airport facility. After a great deal of effort on the part of Norman Crabtree, Director of the Ohio Division of Aviation, local civic organizations began to support the program heavily. In some counties, door-to-door campaigns were conducted by civic groups, thereby acquiring funds to match the \$100,000 state allocation and to initiate construction [36].

In order to participate in the airport program, the county had to own the requisite land necessary for a new airport, provide all the necessary engineering, be responsible for all construction, and enter into a grant agreement with the state of Ohio that the airport will be operated and maintained for public use for 20 years.

One of the prime objectives of this program was to stimulate industrial development in rural Ohio. From 1966 (when the first airport was dedicated) to 1970, 58 airports with paved runways of 3,500 feet or longer were built [33]. Today, there are 62 airports in the county system. To determine the economic impact of the airport program, several indicators of economic development were considered. They were: business and commercial use of airports;

employment and income; industrial development and capital investment; and land values.

To determine business and commercial airport use, a random sampling of 20 of the county airports was taken during 1969 [33]. Findings indicated that nearly half of all takeoffs and landings at these airports were performed by corporate aircraft or commercial air cargo aircraft. Another random survey [33] of 150 Ohio manufacturing firms found that a majority of all firms surveyed used air transportation facilities frequently. Approximately half of the firms responding view the Ohio Airport Program as, "likely to have an influence on their future expansion decisions."

Employment and payroll figures for 13 participating counties were compared to those of seven non-participating counties. It was found that the participating counties averaged a 3% higher rate of payroll increase and a 5% higher rate of employment increase than non-participating counties [33]. It was estimated that the County Airport Program, in four years, netted Ohio \$250 million in added personal income and created 60,000 new jobs. Based on the U. S. Department of Labor consumer dollar expenditure breakdown, the new jobs and incomes created over \$150 million in new retail trade which was enough revenue to support 200 new retail firms [33].

Another interesting statistic is found in the level of industrial development which occurred before and after construction of the airport. The median number of new and

expanded industries in counties participating in the program amounted to 6% per year before airport installation and 13% per year after airport dedication. The state of Ohio estimated that nearly 1,500 new or expanded industries and \$1 billion in industrial capital investment were created by the airport program [33].

The market value of properties adjacent to the new county airports was compared to value of the same property prior to the airport dedication. Over 90% of the counties investigated experienced property value increases of more than 100% of original value within one year following airport dedication [33]. Increases in property value as high as 500% were recorded in some areas such as Delaware County, Ohio [33].

The Ohio County Airport Program runs contrary to, in some instances, the Federal Airport Development Program. The primary difference is Ohio provided money to build county airports without a predetermined need being established--essentially taking the position that if an airport is built, aviation demand will develop to utilize the airport. The FAA requires more justification (as to demand) before they will commit funds to the project.

In 1974, the FAA contracted for a study of airports built with and without federal aid [37]. The Burns and McDonnell study found that state programs were able to construct airports faster and at lower costs than the federal programs. The state programs were also able to

produce airports with quality equivalent to that of federal programs. The study concluded that the sponsor is more of a determinant of the quality of the airport than the program. Finally, the study seems to confirm the idea that state programs, like Ohio's County Airport Program, may be more productive in developing airports than the Federal Airport Development Program.

Michael Hobson, Director of the Ohio Development Department, summarized the economic impact of airports in the county program in this way [36]:

An analysis of 15 counties which participated in the Ohio Airport Development Program strongly indicates that the installation of airports, capable of accommodating large business aircraft, is likely to generate an improved economic base to the communities which surround each new facility.

An analysis of the employment data utilized in the study indicates that, after installation of a new airport, surrounding communities are likely to experience both increased total employment and decreases in unemployment.

Business activity in an area which has recently acquired a new airport facility tends to expand and is reflected in total payroll increases.

It is probable that the expansion of existing manufacturing firms and the attraction of new manufacturers will be associated with a new airport facility. In addition, capital investments by new and expanded firms are likely to be substantially augmented.

Increased real estate values in each of the 15 counties included in the study tend to reinforce each of the above-stated indicators of economic growth. Taxable real estate value increased in these counties, following the acquisition of new airports, by a yearly average of 4.5%.

It appears from these figures that the citizens of Ohio received a very good return on the investment of their tax dollars in the County Airport Program.

A Review of Some of the Dis-benefits of Airports

In today's complex society there are benefits and dis-benefits to almost every facet of daily activities. Airports are no exception. There are some who remain unconvinced as to the significant role an airport plays within a community. Still others argue that the dis-benefits outweigh the benefits of an airport. Another argument against airports is that they do not generate any additional national wealth, but merely divert it from other areas.

Gary Lantner, in his thesis on "Community Opposition to Airport Development," lists three categories of airport opposition by citizens' groups [38]. The first category of public opposition will appear in communities that will have to be relocated by the acquisition of additional airport lands. Not only those persons actually moved, but those who become closer to noise and other adverse environmental effects, may express discontent with airport development plans. The second category is composed of the abutters, or those who will be in the immediate neighborhood of the airport. Finally, a third category of opposition may develop at a regional or national level. This is usually in the name of protecting "the national public interest."

The opposition from these groups is usually over environmental factors. Airports do cause adverse

environmental effects, but this alone is no reason to halt airport development, because there may be mitigating circumstances. For most small general aviation airports, the adverse environmental impacts are minimal. For larger airports, the impact may become severe. This fact must be recognized and dealt with. Hopefully, technology will eventually remove these problems; but, until then, long-range planning, compatible land development, flight restrictions, and a good public relations program will help reduce opposition.

A concept that should be understood by everyone is that airports don't cause noise; aircraft cause noise. About the only thing an airport manager can do is try to reduce the air and noise pollution to an acceptable level and work to improve community understanding.

CHAPTER VI

MEASURING THE SOCIO-ECONOMIC IMPACT OF AN AIRPORT UPON THE COMMUNITY

Introduction

In the previous chapters, the various levels and types of socio-economic impact an airport may exert upon a community have been discussed. The next logical step is to establish a methodology for measuring the magnitude of this impact. This leads to a very difficult and, unfortunately, little explored area. Unfortunate because a rigorous methodology for the determination of the socio-economic impact of an airport upon the community might answer many more questions about an airport's value to the community. This might also lead to a more refined benefit/cost ratio for planners. As with most things, however, the costs of such a study should not exceed the benefits derived from the study.

There are several reasons why this evaluation task is so complex. First, some airports impact upon a broad region in a variety of ways which do not have a direct connection to the airport. An example of this might be the influence that Nashville Metropolitan Airport exerts upon Tullahoma, Tennessee, which is 70 miles away, or Los Angeles International Airport upon Bakersfield, California, 114

miles away. Second, many of the benefits are not quantifiable. It is very difficult to assign a value to the lives which were saved and the reduced suffering which resulted from medical air evacuations. Gary Fromm in, "Civil Aviation Expenditures," calculated the average value of a life lost in a general aviation accident to be \$442,000 [39]. It might well be argued that an airport costing \$300,000 to \$400,000 would more than pay for itself if, over the period of its existence, the airport resulted in the net saving of just one life. This area needs a great deal of additional study since it could account for a high portion of an airport's total benefit. The problem is conceptually manageable, however, only if one is willing to make tenuous assumptions about the value of human life and suffering.

Finally, like individuals, airports have a "personality." They vary widely in their individual characteristics and each must be carefully scrutinized to determine what meaningful impacts they cause. There is no such thing as an average airport any more than there is an average individual. Airports, in fact, may be defined more by their differences than by their similarities. Some characteristics may appear similar, but when examined in depth, there are vast disparities. Glenn Plymate of the Bechtel Corporation illustrates this point with the following three examples [2]:

1. General Aviation Aircraft in Relation to Population - In a recent study completed for the FAA, the relationship between numbers of aircraft and population was examined. But, the study seems to show more of a non-relationship than it does a relationship between these elements. Standard Metropolitan Statistical Areas of 50,000 and up were surveyed in terms of population versus registered aircraft. A median was determined to be 6.5 aircraft per 10,000 population. Only seven areas in the country, out of 227 surveyed, are close to "average," these being: Beaumont, Texas; Provo, Utah; Tacoma, Washington; Battle Creek, Michigan; Springfield, Illinois; Gadsden, Alabama; and Nashua, New Hampshire.

Note the wide distribution of these "average" areas through all parts of the country. There seems to be little opportunity to relate these areas one to another.

The other 220 areas range from as little as .5 aircraft per 10,000 population to as many as 34.6, a very wide spectrum considering the "average." It would be folly to establish a norm, based on these data, and apply it to a specific area and expect meaningful results. Individual factors which consider the "personality" of the area must be analyzed.

2. Per Capita Income Variables - Closer to the subject of economics, a recent Airport System Plan completed by Bechtel for Stanislaus County indicated a per capita income substantially different from the average of the state of California, based on an analysis of local conditions. This was somewhat surprising since it was not initially thought there should be a wide disparity between the local situation and the "average" which included all counties in the state, many with seemingly quite similar characteristics.

3. Parking Lot Revenue "Averages" - Closer yet to the subject of economic impact is an example of an extremely misleading "average" I discovered while Manager of the Oakland International Airport. Revenue reports from airports all around the country, including Oakland and "similar airports," many in California, were used to establish an "average" revenue factor for parking lots relative to enplaning passengers. If the "average" had been applied at Oakland, these impacts from autos using the airport would have been sadly understated. It was found on detailed analysis that Oakland generated parking revenues nearly five times that of the national average.

It is far beyond the scope or intent of this study, however, to develop such a methodology. As stated previously, the methodology described in this chapter is intended for the use of the airport managers with little time or money to undertake an involved statistical analysis and develop a complex econometric model. According to Stanford Research Institute [40],

It is not possible to measure an airport's total economic benefits to the community in absolute terms, but certain specific types of benefits can be identified and perhaps quantified.

This is probably an accurate statement, but present methods of economic impact analysis could be upgraded to improve their credibility.

A Review of the Methods Used in Socio-economic Impact Evaluation

A traditional method for determining the impact of economic activity on a region or community has been to use a jobs and income ratio [41]. This usually involves the application of data such as that in the U. S. Chamber of Commerce study cited in Chapter III [13]. Another procedure is to use a standard income and employment multiplier of two to four. When applied to airport activity, it results in an estimate of impact upon the local area.

Another method [41] used in determining the value of an economic activity in a region is sometimes referred to as a "reputational type." This procedure depends upon the

surveying of businesses and economic leaders in the area and asking their opinion as to the benefit to be gained or lost with the introduction or elimination of a particular activity in the region. This method of analysis was used in the FAA 1967 report [29], "The Airport - Its Influence on the Community Economy," and Lee B. Zink's 1967 study [42], "The Economic Impact of Airports."

There is also the method used by Glenn Plymate [2] which was discussed at some length in earlier chapters. Basically, Plymate's method calls for the canvassing of the airport and the immediate impacted area. Added to this are a few basic laws of economics (the multiplier effect) and then the impact is computed.

Nevins Baxter [43] uses the techniques of benefit/cost analysis with equations which he develops in his study, "Public Investment in General Aviation Airports: An Application of Cost-Benefit Economics."

The socio-economic impact of an airport may also be evaluated by developing a scenario of the region without an airport. This can provide valuable insights into the impact of an airport. This usually supplements other types of studies and may prove very useful as an easily understood summary of what the airport really means to the community.

Discounted cash flow analysis, which is normally a good method for evaluating financial projects, is not sufficient in measuring the economic effects of a new or expanded airport upon the surrounding community. The reason

for the method's insufficiency is that a number of the economic benefits and dis-benefits arise regardless of whether the airport is commercially profitable or not.

Rudzinski [44] names three factors which have diminished the effectiveness of classical methods such as discounted cash flow analysis in judging the worth of airport investment projects. He lists these as: the high rates of interest; the fast growth of traffic; and, most importantly, the impact of airports on the economy and environment.

Rudzinski points to the fact that public funding is usually necessary for major airport construction projects because excess airport revenues are insufficient and debt funding such as revenue bonds are limited by the total capitalization of assets.

The principal benefits, as defined by Rudzinski, are the value of time savings to passengers and freight, the generation of employment, and the value of defense [44]. He defines the principal dis-benefits as the economic effects of noise, the losses to recreational facilities, agricultural production, to surface access operators, and to competing forms of transportation.

One of the primary functions of economic research is the recommendation of policies designed to attain an efficient allocation of resources.

By applying cost/benefit analysis, the relative orders of magnitude of these costs and benefits should be measured. Cost/benefit analysis will also provide guidance

on questions of finance and pricing because it indicates, on balance, who might be willing to pay for additional services received and, in particular, helps in deciding whether an airport should be subsidized [44].

A list of principal costs and benefits considered by Rudzinski in airport planning is shown in Table 22. He points out that the listing shown in Table 22 is not exhaustive. Rudzinski suggests that the loss of agricultural land will have an effect on the suppliers or on the clients of the farming industry, such as millers and bakers. He defines this as a secondary dis-benefit. The decision on inclusion in the cost/benefit analysis of such dis-benefits should be based upon the existence of a formal market for the goods or services involved [44]. Should a formal market exist, as in the case with bread, the change in the supply of wheat will, under the conditions of optimal management, leave the bakers' net income unaltered because they will not be expected to vary their efficiency. A price increase will maintain the net income. There is no market, however, for intangibles such as time.

The last column of Rudzinski's table (shown in Table 22) gives a broad indication of the methods used in measuring benefits and dis-benefits. Rudzinski describes the basic principles of his procedure this way [44]:

The underlying principle is that the benefits can only be considered by the difference it makes to have a certain airport project carried out or, alternatively, put into abeyance. This is because aircraft are useless without airports and airports

Table 22. Principal Costs and Benefits to be Considered in Airport Planning [44]

Type of Cost of Benefit	Type of Market	Main Payee or Beneficiary	Key Determinant	Projects in Which Applicable	Main Means of Estimation
Reduction of Trip Times for Existing Traffic	Intangibles	Passengers and Airlines	Distance Differentials	New Airports	Market Survey
Reduction of Trip Times for Diverted Traffic	Intangibles	Passengers and Airlines	Unit Values of Business and Leisure Time	New Airports and Siting	Gravity Models
Generated Traffic	Regulated	Airlines, Airports	Population	New Airports and Siting	Gravity Models
Reduction of Delays	Intangibles	Airlines, Airports	Fleet Size	Extensions	Analysis of Operation
Extra Airport Profit (Loss)	Free	Airport	Capital Cost	All	Quantity Survey
Noise Costs	Intangibles	Residents	Removal Costs	All Except in Deserted Areas	Fall in Property Values
Safety	Intangibles	Passengers	Value of Human Life	Siting	Fog Record, Bird Strike Records
Defense Costs	Collective	Community	Removal Costs	Extensions	Cost of New Defense Facility
Defense Benefits	Collective	Community	Common Facility	New Airports	Operational Savings

Table 22. (Continued)

Type of Cost of Benefit	Type of Market	Main Payee or Beneficiary	Key Determinant	Projects in Which Applicable	Main Means of Estimation
Agriculture	Subsidied	Farmers	Land Affected	All Except in Deserted Areas	Valuing Average Profit per Acre
Loss in Profits of Other Airports	Free	Airports	Loss of Traffic	All Multi- airport	Analysis of Operation
Extra Ground Access Costs	Free	Passengers	Distance	New Airports	Gravity Models
Extra Urbanization Costs	Free	Community	Topography	New Airports and Siting	Search for Extra Costs
Tourism Income	Free	Industry	Proportion of Tourists	All	Foreign Tourist Expenditure per Head
Amenities and Recreation	Intangibles	Community	Density of Historic and Amenity Sites	All Except in Deserted Areas	Insurance Values, Travel Expenditure
Use of Underemployed Resources (Labor, etc.)	Regulated	Community	Wage Rates	Developing Countries	Degree of Under- utilization
Net Change in Profits	Free	Industry	Number of Firms Affected	New Airports and Siting	Market Survey

cannot do without aircraft. Forecasts of traffic volumes and of aircraft size are thus necessary in the estimation of virtually all the items. The methods of estimation vary from one item to another. In general, they are empirical techniques based on deduction. The approximate values people attach to unspoiled rural surroundings, to peace and quiet and to saving time can be deduced from observing their behavior, for example the expenditure people incur to visit the countryside at weekends.

When estimating the effects on the utilization of resources, such as for instance the generation of new employment, it is important to check whether resources are in fact under-utilized. At times of full employment, this type of benefit is worth to the country far less than could be expected a priori.

In fact, the interesting thing about the estimation of these items is that they do not invariably result in net benefits or in net costs in a way one would expect "a priori." Thus, when as a result of congestion, a new runway is constructed at an existing airport, the airlines will usually be perfectly willing to incur additional landing charges because of the benefits of time savings. Similarly, benefits to passengers. The marginal value of time savings to passengers will for some categories of the population be more than the extra fares, bus fees, or airport taxes to be paid; an aircraft delay may result in a loss of time not only to a businessman but also to his colleagues, contractors, clients, etc., who await him for a meeting. Methods of analyzing passengers by category have been evolved to deal with this problem.

Thirdly, the benefits to airports. Contrary to widespread belief, for an airport, size does not warrant profitability. Site characteristics may in fact reduce traffic and increase construction costs. This is because the economies of scale of operation, which may take a one-runway airport profitable when the number of movements nears its capacity, do not apply. Each additional runway has its own economies of scale but growth of traffic has to be "spread" over the existing runways and the economies of scale are that much slower to come.

Fourthly, the benefits to the residents. In industrial countries the net effect (not counting passengers) can be negative. The nuisance "benefit" of aircraft noise is often the largest of such items. The method of measuring this dis-benefit for a single household should be based on either the total removal costs or on the "cost" of enduring the noise, whichever is the lower.

Most of these criteria have an economic bearing. The use of a single criterion in an airport investment decision may result in the discarding of a project which is worthwhile or worse, because not reversible, in the construction of an airport which should not be there.

Cost/benefit analysis should be considered as only an aid to decision making. The monetary calculations provided by cost/benefit analysis can prove to be a valuable tool, but it does not always dictate the final solution to a problem. It is entirely possible that a project providing the greatest net dollar benefit could be rejected on distributional grounds or that a project's implying dollar cost greater than dollar benefits could be accepted because of desirable distributional effects [43].

Nevins Baxter [43] has also developed some cost/benefit analysis techniques for airports. He defines private costs and benefits as, "those which are experienced by a single individual and which do not affect the happiness of any other individuals in the society." Social costs and benefits are consumed by all individuals, regardless of whether or not they make particular money outlays. Baxter's analysis of private benefits and costs assumes a perfectly competitive, full employment economy.

Baxter [43] further defines private benefits as, "the cost of time and money saved in the transportation of recreational and business flyers and freight to the new airport rather than the next most convenient travel facility." This cost savings results in a decrease in the

price of flying which adds to the welfare of most airport users. To evaluate the level of increased welfare, a dollar estimate is developed by estimating the average time and money saving per user and multiplying this by the predicted number of annual users.

One of the most difficult conceptual problems is attaching a monetary value to time saved. In Baxter's analysis [43], it is assumed that leisure time used traveling to and from the airport is wasted and that the marginal cost of a leisure hour wasted is assumed to be equal to the hourly wage rate. The same could be said for business hours lost in transit. It is this way the benefits of using air travel versus some other mode for business purposes can be evaluated.

Baxter separates the private benefits into those which accrue to the local area about the airport and those which accrue to other areas. Under full employment conditions, some local benefits will be matched by costs elsewhere.

Baxter's analysis first considers only purely local benefits in a Region A where there is no unemployment. All new jobs generated by the airport are taken by workers who were previously employed in Region A. The benefit created by the airport is measured by the increase in productivity associated with the airport as defined by:

$$\Delta Y_A = w_n J - w_o J , \quad (1)$$

where

ΔY_A = change in aggregate income in Region A,

w_n = average wage received in the new
airport-related jobs,

w_o = average wage received previously by
people who moved to new jobs,

J = new employment (in man-years),

and the per capita income by

$$\frac{\Delta Y_A}{E} ,$$

where E is the total labor force in Region A.

If, due to full employment, some of the new jobs are filled by workers who moved from Region B to Region A, a new increase in aggregate income is given by:

$$\begin{aligned} \Delta Y_A &= a(w_n J - w_o J) + (1 - a) (w_n J) \\ &= w_n J - a w_o J , \end{aligned} \quad (2)$$

where "a" is the proportion of the airport-related jobs filled by residents of Region A. Since $w_o < w_n$ and $a \leq 1$, the change in aggregate income is clearly positive.

It is unclear, however, as to whether the residents of Region A are always better off as a result of the new

jobs. It is possible that per capita income will fall since the labor force has been enlarged by $(1 - a)J$ workers who must share the increased income [43]. In the special case where $a = 0$, per capita income will decline if w_n is less than the average wage for Region A before the airport was constructed.

For the case where unemployment exists, the local benefits are expected to be greater. If unemployment does exist in Region A, there will usually be much less immigration from Region B. In this case, the increase in aggregate income in Region A can be written as:

$$\Delta Y_A = a(w_n J) - e w_o J + (1 - a)(w_n J), \quad (3)$$

and the per capita income change as:

$$\frac{\Delta Y_A}{(1 - a)J + E} = \frac{w_n J - a e w_o J + a w_o E - (1 - a)(w_o J)}{(1 - a)J + E}, \quad (4)$$

where e is the proportion of workers taking the new jobs who were previously employed. At $e = 0$, the local benefit is equal to the entire payroll; and in the other extreme case where $e = 1$, the benefit is identical to that in the full employment case [43]. If transfer payments to the unemployed workers are considered, the local benefit to Region A, where $e = 0$ and $a = 1$, is:

$$\Delta Y_A = w_n J - (1 - \gamma)w_s J, \quad (5)$$

where γ is the proportion of transfers to unemployed workers paid by Region A; and w_s is the wage subsidy paid to unemployed workers in Region A. As γ approaches unity, the local benefit will become greater. Equation (5) is clearly positive $w_A - w_s > 0$ when $\gamma = 0$, the benefit is smallest and equivalent to the difference between the wage and the transfer payment received by unemployed workers [43].

Another underlying assumption of this procedure is that government aims at a target rate of unemployment. An airport construction project may become an instrument to achieve that level. This is one of many alternatives to achieving the desired goal; and, therefore, the money wage of labor is a good indication of its social value.

Another method of determining the impact of an airport is to develop a scenario for the area without the airport. The Aviation Development Council of New Jersey-New York Metropolitan Region had a study conducted in 1966 to determine the probable consequences of the imposition of a curfew on nighttime operations [45]. The following are some of the findings.

1. The United States Post Office informed that a midnight to 7 a.m. curfew would be disastrous to the movement of mail by air out of and into the Metropolitan Region. It would mean (a) second-day delivery to a majority of those points which are now receiving next-morning delivery, (b) diversion of some mail to surface transportation, (c) the economy of the New York area would suffer by not being able to communicate or ship parcels for next-morning delivery, and (d) since, generally, mail moves at night and passengers in the daytime, serious overloads and traffic congestion would result.

With an outgoing volume about equal to incoming mail, about one billion letters a year would be seriously delayed because of a curfew.

It is obvious that a curfew on nighttime operations at the airports would seriously impede the movement of mail and make overnight delivery impossible.

2. Specific firms and specific industries would experience a serious dislocation to their normal operation with consequent financial loss. Cited were one major manufacturer of ophthalmic products, another of electronic products, the New York fur industry, automobile parts, fresh strawberries, Chinese vegetables, and newspapers.

The delays in the shipment of air cargo caused by a curfew would increase considerably the costs of doing business for innumerable industries because of increased investment in inventories, greater losses through increased spoilage and higher costs from increased handling. Increased costs of doing business, in turn, detrimentally affect the number of jobs available.

3. A curfew would cost New York banks \$34,870,000 a year in lost interest, so extensive is the financial industry's use of consolidated air express shipments on night flights for daily transactions, according to the Federal Reserve Bank and the New York Clearing House.

4. The loss of nighttime services would cost the Department of Defense an additional \$7,750,000 annually for the transportation of personnel. The DOD is a large user of night fares for the movement of military personnel. A curfew on nighttime operations, of course, would remove these opportunities, requiring all movements to be made during the daytime operations at the higher rates.

5. In summary, the Metropolitan Region would lose about 42% of its air cargo capability, resulting in far reaching and deleterious effects upon industry and business in the region, as well as throughout the nation.

It is important to remember that these were just the projected effects resulting from a curfew, not a complete closing of the region's airports. It is difficult to statistically analyze the effects of the lack of an airport upon a large metropolitan area. This is because there are no major metropolitan areas in the United States lacking air

transportation facilities with which comparisons could be made. Airports have become so important to metropolitan America that to consider such a region without such services is absurd. To some extent, the same situation, although less obvious to the layman, is developing in the smaller communities of this country.

Although this type of analysis is very individualized, valuable insights as to the worth of the airport to the community can be gained from this type of analysis.

A Method of Impact Analysis for Airport Managers

As stated previously, the primary objective of this chapter is to demonstrate a method of impact measurement which is reasonably accurate and relatively straightforward. Investigations would seem to indicate that a combination of methods best suits the above stated goal. This combination of methods should include surveys of employees and employers, cost/benefit analyses, economic profiles, and hypothetical scenarios. Of course, specific airports may call for some alteration or modification of the stated method. Any method of analysis will require a great deal of objectivity on the airport manager's part if it is to have any credibility.

An empirical analysis, using the four levels of impact discussed in Plymate's concepts, seems to be the most feasible method for developing a foundation for the airport manager to use in determining the socio-economic impact of

his airport. The mainstay of this type of analysis is the survey. It must be applied objectively and logically.

The first step in performing an economic impact assessment is to develop a socio-economic profile of the community, county, and preferably the state, along with a brief history of the facility and historical economic data for trend analysis. By obtaining the required information for Tables 23 through 29, the airport manager will be able to construct a profile of the area and history of the airport. If the information is collected over a period of time, then a development trend could be established.

A good foundation from which to build a series of survey forms is the Air Transport Association's (ATA) publication [46], "Aviation and the Economy: How to Measure the Impact of Aviation on the Local Economy." This document was originally designed for air carrier airports, but it can be usefully applied to general aviation airports. At non-air carrier airports, the ATA survey may be conducted by the sponsor. At air carrier airports, however, the ATA requests that the survey be conducted through them and that the sponsor obtain airline agreement to participate in the survey before sending out questionnaires. Because some of the information must come from airline corporate headquarters, this agreement cannot usually be given by local airline station managers, but must instead come from airline headquarters.

Table 23. Background Census Information

	City	County	State
Total Population			
Number of Households			
Average Household Size			
Number of Families			
Average Family Size			
Per Capita Income			
Median Family Income			

Table 24. Personal Income by Major Sources
(Percent of Total Personal Income)

	County	State
Total Personal Income		
Total Wage and Salary		
Disbursements		
Other Labor Income		
Proprietor's Income		
Farm Proprietor's Income		
Non-farm Proprietor's Income		
Property Income		
Transfer Payments		
Less: Personal Contributions for Social Insurance		
Total Earnings		
Farm Earnings		
Total Non-farm Earnings		
Government Earnings		
Total Federal		
Federal Civilian		
Military		
State and Local		
Private Non-farm Earnings		
Manufacturing		
Mining		
Contract Construction		
Transportation, Communications and Public Utilities		
Wholesale and Retail Trade		
Finance, Insurance and Real Estate		
Services		
Other		

Table 25. Employment Distribution by Industrial Sector

	County	State
Work Force		
Unemployment		
Total Employment		
Non-agricultural Wage/Salary		
Manufacturing		
Mining		
Contract Construction		
Transportation and Public Utilities		
Wholesale and Retail Trade		
Finance, Insurance and Real Estate		
Services and Miscellaneous		
Government		
All Other Non-agricultural		
Agricultural		

Table 26. General Airport Data

Distance from Airport to CBD

Ownership of Airport

Number of Based Aircraft

 Private Business

Number of Daily Flights (Average)

 Scheduled Commercial

 Itinerant

 Local

Major Users (Business Sector)

Attitude of Community
 Toward Airport

Type of Maintenance Services
 Available

Aircraft Dealer or Representative

Charter Service Available

Flight Instruction Available

Runway(s)

 Number (Length, Width)

 Surface, Lighting

 Instrumentation

Table 27. Tax Loss Calculations, Unimproved Land
(Based on Present Tax Rate and
Assessed Value)

Airport Size (Acres)
Estimated Value per Acre
Total Value of Land
Levy per \$1,000 Assessed Value ^a
Per-Acre Property Tax Loss
County Property Tax Loss
City Property Tax Loss
School District Property Tax Loss
State Property Tax Loss
Property Tax Loss per Year
Total Value of Taxable Aircraft Based at Airport
Levy per \$1,000 Assessed Value ^a
Less Tax Revenues Derived from Property Tax on Aircraft per Year
Total Property Tax Gain or (Loss) per Year

^aDepends upon location of airport (i.e., inside or outside of city's limits).

Table 28. Questionnaire for Additional Airport Data

-
1. When was the airport established?
 2. What was the initial cost of each property acquisition?
 3. If the property was a gift or grant, what was the estimated value?
 4. What is the size of the airport in acres?
 5. What is the present value of the lands?
 6. What is the value per acre of vacant land around the airport?
 7. Type, date, cost, time of improvements--runways, hangars, lighting and other buildings--State, Federal, and local
 8. How much is spent on airport operation and maintenance per year--
labor costs and non-labor costs?

Labor	Non-labor
-------	-----------
 9. Fuel supplier(s)
 10. Number of tie-downs
 11. Tie-down daily rental fee
 12. Number of public T-hangars
 13. Monthly rental fee of T-hangars
 Number of other public hangars and capacity
 Monthly rental fee of these hangars per unit
 Number of private hangars and capacity
-

Table 28. (Continued)

14. Nearest city with scheduled
air service

From that city, which cities can
be reached by direct, non-stop
commercial air service?

15. Nearest FAA service station

Table 29. Per Capita Income and Percentage Distribution for Families

Per Capita Income	Income Distribution for Families		
	City	County	State
Less than \$ 1,000			
\$ 1,000 to 1,999			
2,000 to 2,999			
3,000 to 3,999			
4,000 to 4,999			
5,000 to 5,999			
6,000 to 6,999			
7,000 to 7,999			
8,000 to 8,999			
9,000 to 9,999			
10,000 to 11,999			
12,000 to 14,999			
15,000 to 24,999			
25,000 to 49,999			
50,000 or more			
Total			

This procedure at air carrier airports is necessary if an accurate study is to be conducted. The ATA position is explained below by William Osmun of the ATA [47]:

The procedure that we follow is to conduct surveys only at those airports where the air carriers request it and are willing to do the local survey work. Since some of the information requested from the airlines is privileged data, we have an agreement not to divulge the specific data from any airline but just to consolidate into a grand total. On this basis, the airlines are willing to provide us with this information. Where the survey is conducted under the auspices of the ATA, it is always a joint venture with the airlines and the airport manager.

It is suggested that airport managers contact the ATA and request a copy of the survey forms. The airport manager should also perform an origin-destination study to determine the time and distance saved by users who would be forced to use the next closest alternate. This will provide an insight as to the value of the airport to air passengers. There is a good deal of debate about the value of time to the traveler. As stated earlier, one common method of assessing the value of time is to assign it the same value as a person's normal productive time. In other words, if a person normally earns \$10 per hour, then the value of his travel time should be computed at that rate. This seems to be a valid and acceptable assumption, therefore, that will be the case for the purpose of this study.

The value of a community's air carrier airport to the airline users (in terms of time and money saved by not having to drive to a more distant airport) is defined as V_{AC} ,

where:

$$V_{AC} = P_1 [C_1 + (C_2 (T_1 - T_2)) - F_1 (JF)] , \quad (6)$$

where:

P_1 = the total number of origin and destination passengers on CAB certificated inter-state and state certificated intra-state air carriers,

C_1 = the cost of driving to the next closest airport with scheduled air carrier service (fuel cost, roadway tolls, parking fees, etc.), one way,

C_2 = the community median income divided by 2,080, the average annual number of hours worked by full-time employee, all multiplied by a Z factor,

Z = a factor which biases C_2 more closely to the median income of the air passenger; Z will normally be greater than one ($Z > 1$); for simplification or the lack of data, it can be assumed to be equal to one ($Z = 1$),

T_1 = the average time for someone in the community to drive to another suitable air carrier airport,

T_2 = the average time for a passenger to drive to the community airport plus the flight time to the alternate airport,

F_1 = the air fare to fly from the community airport to the next suitable airport where the passenger could catch a flight to his final destination,

JF = a joint fare factor--that percentage of the tickets sold in the community on a joint fare basis which reduces $F_1 - 1$; assume this percentage holds true for origin and destination passengers alike.

In calculating C_1 , 17¢ per mile is assumed to be the cost of operating an automobile. The airport manager will have to do a little empirical analysis to determine average trip length and parking fees at the alternative airport and then subtract the community airport's parking fees to determine the difference. Any road tolls or other miscellaneous airport fees which the average air traveler might encounter should be included in C_1 .

$$C_1 = T + .17 D + (AS/2)(PF_2 - PF_1) + MF, \quad (7)$$

where:

T = road tolls,

D = one-way mileage to alternate airport,

AS = length of average stay in days (note: this figure is divided by two since C_1 is one-way cost),

PF_1 = parking fee per day at community airport (note: this figure should be adjusted for the percentage of people who have someone else drive them to the airport and do not park a car,

PF_2 = parking fee per day at alternative airport; make no adjustment to this figure--assume cost of driving back to community offsets saving of not paying for parking,

MF = miscellaneous airport fees--fees such as tolls for people movers or trams.

Equation (6) assumes that all air travelers who would use the community's airport would also use the alternative airport. Further, it assumes that all air passengers act individually (i.e., no family or groups of passengers which would use a car pool to the alternative airport).

The first assumption greatly simplifies Eq. (6). For the airport manager who wishes to develop a more "real world" answer, the following line of thought is given. Figure 4 shows the traveler's alternatives. He can either proceed to his destination directly (route Y) via surface transportation or private aircraft (assuming a general

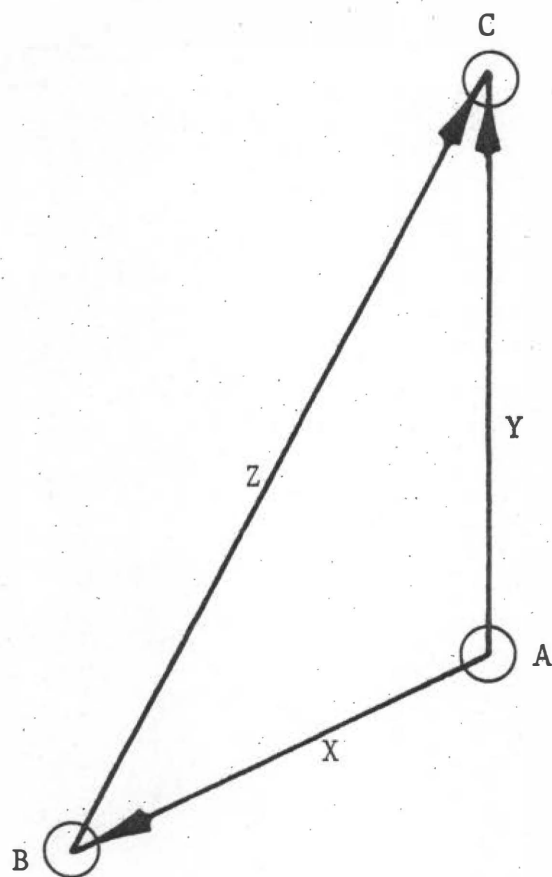


Figure 4. Traveler's route alternatives.

The traveler departing the origin community (A) has two alternative routes to the destination community (C); either via the alternative community airport (B) along route X + Z or directly to the destination along route Y.

aviation airport is convenient--in this case assume none is), or he may choose to take surface transportation to the alternative airport and then fly to his destination (route $X + Z$).

At this point, the manager must remember that there are two different, basic groups which fly--the pleasure traveler and the business traveler. Each group is affected differently by cost and time required for each alternative.

The average tourist will probably take the cheapest (monetarily) alternative, but only to a point. As the time for route Y increases, route $X + Z$ becomes more and more attractive. A fairly sound assumption, to simplify this matter, is that most tourists who originally choose air transportation for their vacation travels would continue to do so and choose the $X + Z$ route. The limiting factor in this assumption is that as the $X + Z$ time (T_{XZ}) approaches the Y time (T_Y), more people will choose the option of surface transportation. Therefore, if $X + Z$ cost $<$ Y cost, then traveler takes $X + Z$ option and flies. If $X + Z$ cost $>$ Y cost, then traveler compares time option. If $T_Y > 2(T_{XY})$ but not less than eight hours, then traveler takes $X + Z$ alternative. If $T_Y < 2(T_{XZ})$ or $T_Y < 8$ hours, then traveler takes Y alternative.

The airport manager should establish a profile of the passengers moving through the community's air terminal. Armed with this information, he can determine more realistically the values of the above-mentioned factors.

In assessing the alternatives of the business traveler, it must be remembered that time is very important to businessmen. Assume then, that the business traveler will take the option which requires the least time to get to the destination.

If the next suitable air carrier airport is also the next suitable commuter airport, then Eq. (6) can be rewritten to cover commuter services also. Equation (6) would then be written as:

$$V_{ss} = (P_1 + P_2) C_1 + (C_2 (T_1 - T_2)) - F_1 (JF), \quad (8)$$

where:

V_{ss} = value of scheduled air service (air carrier plus commuter service),

P_2 = the total number of origin and destination passengers on commuter service aircraft.

Of course, if this is not the case, then a separate equation similar to Eq. (6) can be set up for the commuter impact and also for general aviation impact. One other note of caution: this equation considers only originating and terminating passengers--at small airports, this is usually all there is. At large airports, such as Atlanta, however, the transitory passenger (that is a passenger who is at the airport to change from one aircraft to another) may compose as much as 70% or more of the total enplanement. These passengers must be discounted in the equation. They

will have an impact on the retail sales at the airport which can be tallied later; but, to include transitory passengers in Eq. (6), would be to overstate this impact. Finally, Eq. (6) assumes that every passenger drives separately to the alternate airport. Again, through a passenger survey, the airport manager could determine a good approximation of the number of people who would drive to the alternate airport and the average number of airline passengers per car. Armed with these two estimates, the airport manager can then adjust Eq. (6) accordingly.

To illustrate how Eqs. (6) and (7) may be applied, Bakersfield, California, is used as an example. In 1976, Bakersfield moved 221,726 passengers on certificated air carriers through its facility at Meadows Field. Approximately 59% of the passengers were business travelers [48]. Because of the nature of the Bakersfield market most of those passengers now choosing commercial air transportation as their mode of travel would probably still choose that mode. If Bakersfield did not have airline service they would drive to Los Angeles. If it were assumed that all the passengers drove to Los Angeles individually and then boarded an aircraft for their destination, the additional expense to the community (the negative impact of having to drive to Los Angeles or the positive impact of having an air carrier airport at Bakersfield) would be calculated as follows:

where:

$$P_1 = 221,726 \text{ passengers,}$$

$$D = 110 \text{ miles,}$$

$$Z = 1,$$

$$T_1 = 2.44 \text{ hours,}$$

$$T_2 = 0.62 \text{ hours,}$$

$$F_1 = \$18.25,$$

$$JF = (1 - .80) = 0.20,$$

$$AS = 4 \text{ days,}$$

$$PF_1 = \$0.00,$$

$$PF_2 = \$4.00,$$

$$MF = \$0.25,$$

$$C_2 = \$14,500/2,080 = \$6.97 \text{ per hour;}$$

and using Eq. (7):

$$C_1 = 0 + .17(110) + (4/2)(4.00 - 0) + .25,$$

$$C_1 = \$18.70 + \$8.00 + \$0.25,$$

$$C_1 = \$26.95;$$

therefore, V_{AC} equals:

$$V_{AC} = 221,726 [26.95 + (6.97(2.44 - .62)) - 18.25(.20)] ,$$

$$V_{AC} = 221,726 [35.98] ,$$

$$V_{AC} = \$7,678,898.$$

The average traveling party size at Bakersfield is 1.55 passengers per trip [48]; therefore, V_{AC} would have a value of:

$$V_{AC} = (221,726/1.55) [35.98] ,$$

$$V_{AC} = \$5,146,904.$$

It can be concluded from this analysis that if Bakersfield did not have an air carrier airport at Meadows Field and all passengers had to drive to Los Angeles International Airport, it would cost the community approximately \$5 million per year in additional travel expenses. This same general method of analysis can be applied for communities and general aviation services.

In developing a no-airport scenario, the airport manager should contact local businesses, hospitals, law enforcement agencies, or any other airport users, and to determine the impact of an airport closure. This may very easily become a reality if the airport has only one runway which must be closed for reconstruction. The airport manager may find that it is cheaper in the long run to pay a premium for night work on a construction project rather than close the airport for a period of time.

It would also be wise for the airport manager to pay a visit to the local tax assessor's office to determine the taxes generated by the airport. In the case of Meadows Field in Bakersfield, California, this meant over \$300,000

for the general tax fund of Kern County for 1975 [48]. This figure does not include the federal or state aviation taxes collected because of Meadows Field's operations.

The two major dis-benefits to an airport are air and noise pollution. Information on airport environmental factors affecting the community can be found in the airport's latest Master Plan or Environmental Impact Assessment. If these are outdated or unavailable, it is suggested that the airport manager contact the local health department or environmental agency for assistance.

Once all the data has been collected, it should be set up much like a balance sheet with columns for the benefits and dis-benefits. These columns should then be summed and the resultant displayed at the bottom.

CHAPTER VII

THE ROLE OF A PUBLIC RELATIONS PROGRAM

Introduction

This chapter could actually be summed up in one sentence. A good public relations program is vital to an airport. An airport exists to serve people; without the support of the community, it cannot long survive. An active, positive, public relations program is necessary if the airport manager is to gain public support. Although everything may be "smooth sailing" right now, at some point in the future a crisis will develop. Forget about starting a public relations program then--it's too late. A public relations program is a lot like fire insurance; it's great protection against fires but one has to take the policy out before the fire starts.

The Role

If a community already has an airport then it also has a public relations program. The question is, "What kind of public relations program is it?"

If the airport and the community it serves are in conflict, the basic problem can usually be traced to a lack of knowledge and understanding of the goals and objectives of the airport and the community. In most cases where these

goals and objectives are well defined, they are also compatible. When there is a lack of understanding, the cause can usually be traced to airport management and public officials neglecting to publicize the goals and objectives of the community or the airport.

A public relations program should keep the community informed about every aspect of the airport. This can take the form of guided tours for anyone from school children to senior citizens; coloring books; public meetings; speakers for service clubs; and press releases. An excellent element of a public relations program which many airports use is the Chamber of Commerce Aviation Committee. The key to a successful public relations program is getting the community involved. It is important that the public be kept informed as to what is happening at the airport and how it is benefiting the community. Many people feel the airport is only for people who own airplanes or fly, in short, the "rich people." As it has been shown, this is not true. The airport does benefit the entire community and this fact must be publicized. Unfortunately, too many airport sponsors do not publicize their contributions to the community.

Charles Spence, Vice President for Public Relations of the Aircraft Owners and Pilots Association, lists seven guidelines for airport public relations [49]. These can be summarized as follows:

1. Always be honest and straightforward in communications. Never try to cover up or develop cosmetic public relations programs or, as a group, decide on a "party line" for the airport.

2. One person should be responsible for heading up communications and coordination of information distribution. Ideally, this person should have experience in public relations or communications. This person would provide source material on aviation and the airport for speeches, press releases, meetings, and so forth.

3. Identify the problem areas; explain the situation to the public and let them know what is being done to correct the situation. If the problems cannot be rectified immediately, explain why. There should be a free flow of information so as to provide for an atmosphere of discussion.

4. Get the community involved with the airport. Some airports have done this by building softball diamonds and sponsoring teams. Show the public that the airport is an integral part of the community.

5. Keep the community advised on who uses the airport and why. Publicize such facts as an industry's attraction to the community because of the airport. Conduct a survey (such as the ATA survey) to determine the economic impact of the airport and use this to show the airport's contribution to the community. Show the public, factually, how the airport benefits the entire community, not just a small segment.

6. Develop a scenario of the community without an airport. Point out the alternatives and secondary effects of the situation. Many people may take the airport for granted.

7. Identify one's allies. It is much better to have a third party to champion the cause. There are many groups such as the chamber of commerce, labor unions, service groups, or homeowner associations who may support the cause.

Some of these points are redundant, having already been stated, but they bear repeating because they are so important.

Another important aspect of a good public relations program is that of educating the airport users, principally the airport tenants, aircraft owners, and pilots. No longer can the aviation community hold the attitude that "the airport was here first--why can't the subdivision move." These airport users must understand the community's problems and cooperate with airport management in establishing a good neighbor policy.

Summary

Most airport/community conflicts result from one of two problems. Either airport management disregards the community's needs and desires or there is a lack of good communication between the two factions, leading to a misunderstanding. Most professional airport managers recognize

the value of a good neighbor policy and seek to satisfy the community's needs and desires. This then leaves the second alternative. A good, active public relations program should establish a communication link with the community and reduce or eliminate the possibility of an airport/community conflict.

One final aspect of a public relations program is that there is no point in determining the economic impact of an airport if one is not going to publicize the findings. A good, objective socio-economic impact study of the airport can form the cornerstone of a public relations program. A study such as this should be used to help the public better understand the importance of the community airport.

Edwin Thurmond of the Phoenix, Arizona, Aviation Department summed it up best when he said [50]:

Public relations--public affairs--public image! That's what you're really striving to do; improve your public image. Remember, the successful public relations man is the fellow who looks like he's leading the band in the parade when he's really being run out of town.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

When this project was first entered into, it was thought that the subject and the subsequent analysis would be relatively straightforward. Such was not the case. This is due primarily to the fact that an airport impacts upon a very broad spectrum of the community.

While the statement by Stanford Research Institute about the impossibility of measuring total impact, may not be an absolute truth, it comes very close [40]. One conclusion upon completion of this project is: that it is very difficult to measure the total socio-economic impact of an airport upon the community, but a useful estimation of the magnitude can be obtained. With most subjects, the level of analysis can be tailored to the need. Such is the case with the socio-economic impact of an airport. As stated previously, a practical method of analysis for airport managers was sought. It is believed that such a method has been found.

Most previous methods of analysis utilized one primary method of analysis and concentrated in one area of impact. For example, previous methods dealt solely with cost/benefit analysis, surveying, or profile averaging.

These methods were usually limited in their scope such as job creation, time saved, quality of life improvement, and so forth. The impact of an airport is very broad in nature; therefore, the analysis should be broad.

If the airport manager follows the analysis, as outlined in Chapter VI, he will develop a broad analysis of his airport's socio-economic impact upon the community. One additional word to the airport manager, however. He should always stay alert to some new impact to his airport. It is entirely possible that a particular airport impacts a community in a way which is totally unique. This should be recognized and considered in the analysis.

Another conclusion reached from this analysis is that airports generally impact upon the community in a favorable manner. At the larger airports such as Los Angeles International or Chicago's O'Hare where noise presents a significant problem, the benefits still outweigh the dis-benefits. Who could even conceive of Los Angeles, or for that matter, southern California, without Los Angeles International? True, several thousand people may be adversely affected by the noise produced by the aircraft using the airport, but millions of people are served by the airport. Los Angeles International Airport represents a \$20.3 million per day impact to the city of Los Angeles [51]. To close an airport because of its adverse impacts on a few while benefiting many would be to "throw the baby out with the bath water."

Smaller airports, particularly those with scheduled air service, also have a positive impact upon the community. The airport may well be the most significant factor influencing industrial development of the community. This assumes that the community desires growth and development. While the question of growth or no-growth is a value judgment question to be answered by the individual community, it is believed that the no-growth alternative is a very poor choice. The future should prove that this alternative will lead to a degeneration of the quality of life and a stagnation of the local culture. On the other hand, a growth philosophy, one of controlled selective growth, can help a community remain vital and dynamic.

The primary dis-benefits of an airport are ecological or environmental in nature. The airport usually does not directly cause these dis-benefits, rather the airport more often acts as a catalyst or an indirect cause. Airports do not generate noise or air pollution, the activities and related development around the airport cause these problems. Regardless of the source, the airport is usually held responsible so the airport manager should devote his best efforts to reducing these dis-benefits.

Two justices of the Florida court have this to say about an airport, its role in the community, and its dis-benefits [3]:

In the case of *Stengel v. Crandon*, 156 Fla. 592, 23 So. 2d 835, 838, 161 A.L.R. 1228, Mr. Justice Thomas, in an opinion on the subject of aviation's place in modern affairs, stated:

In any metropolitan center of America the droning of airplane motors is almost constant and obviously aircraft bearing passengers, mail, and freight in and out of cities could not operate were their approaches and departures confined to territory uninhabited and untraversed by roads and highways. In almost every town of any consequence . . . the sound of airplanes has been almost incessant as men trained in them for the very purpose of safeguarding the constitutional guarantees, including the one that a person may not be deprived of property without due process of law, by warding off the attacks of enemies advocating the ideologies which were the very antitheses of the American system of government. These airplanes are not mere noisy nuisances, nor are they vehicles still in the experimental stage, but they represent the latest means of transportation; and certainly if we are to progress, the establishment of airports to accommodate them should be encouraged.

Mr. Justice Terrell in the case of *State of Florida v. County of Dade*, 27 So. 2d 283, 285, made the following appropriate observations:

The act in question deals with airports and accessories, but this Court knows that air transportation is one of the great innovations of the age. . . . It is quite true that there were no Jules Verns or Wright Brothers in the Constitutional Convention to portend the marvelous changes the future had in store, but it was not intended by those present that the dead hand of the past should shape the destiny of the future. Constitutional mandates are wise in proportion to the manner in which they respond to the public welfare and should be construed to effectuate that purpose when possible. The law does not look with favor on social or progressive stalemates.

Another conclusion is that an airport is an important element of a community's quality of life and development plans. Whether a community is large or small, it needs good access to the nation's air transportation system if it is to grow and prosper. It is believed that Wheat's analysis is factual and valid [23, 24, 25]. Another

conclusion, therefore, is that for communities with populations of 10,000 to 50,000, air service is the most important factor influencing growth in a community. It is suspected that this holds true for all communities, but the analysis becomes too complex for cities over 50,000 population. An airport should also help place a community in an advantageous position when it comes to industrial recruitment. As stated previously, a community with a great deal to offer in the form of good airport facilities, good connections with other transportation networks, an ample labor force, an air industrial park, good education, medical and recreational facilities, a favorable tax structure, and a generally favorable environment, can afford to be selective about the type of industry and the extent of industrialization it desires. The airport plays a key (but not solo) role in establishing the community's attractiveness to industry.

The airport offers many opportunities which are nearly impossible to measure quantitatively. Some of these benefits include the servicing of agricultural aircraft, emergency medical services, disaster relief, pipeline patrol, bank check transfers, better mail and package service, and an overall improvement in the quality of life.

Finally, a good public relations program is a necessity. Without such a program, the airport manager is inviting disaster. Moreover, the community has a right to know what goes on at their airport. If an airport manager

did everything else right but neglected a community relations program, all of his actions may go for naught.

Recommendations

The following brief recommendations are made for the reader's edification:

1. The FAA should again become involved in the study of an airport's impact upon the community. The Eastern Region of the FAA produced a good report on the subject [31], but it needs to be updated and expanded. The FAA seems to have abandoned this area of study. Apparently, the FAA was subjected to criticism for delving into an area which some thought inappropriate for the agency. Whatever the reasons, the current situation calls for the FAA to institute a new series of investigations in the area of the socio-economic impact of the airport upon the community.

2. The FAA should require a more comprehensive economic impact analysis for airport master plans. The economic impact analysis done for most master plans is inadequate. A possible side benefit to this is that it may help place environmental considerations in their proper perspective. For example, the search for the "Mojave Squirrel" held up a \$750 million airport project at Palmdale, California. The airport would eventually provide employment for about 30,000 people.

3. An Economic Impact Statement (EIS) should be required for all publically owned airports and eligible for Federal Airport Trust Funds under the Planning Grant Program of the Airport and Airways Development Act. This would encourage the development of EIS's.

4. That all airports have an EIS performed. This will allow the community to see what the airport activity means to the area. It is hoped that this would put the community and its elected officials in a better position to make decisions about the airport.

5. That every airport establish a positive and active public relations program. The community must know what is happening at the airport.

Concluding Remarks

The airports and the associated air transportation of this country have become a vital element of the United States. In some respects, the airport has become like the electric light switch. It is extremely important to our quality of life, expected to operate perfectly on demand, almost crucial to the American culture; and yet the airport is frequently taken for granted by many people.

It is up to airport management to insure that the community's airport is a healthy, viable one. Management should strive to put the airport on a self-sustaining, user pays basis. Management would also do well to maintain a good neighbor policy. Many airports have been closed

because they antagonized the community due to a lack of understanding between the two. It is believed that the basic issue in the majority of cases is the pocketbook. If the community understands the economics of the situation, that is the monetary impact upon the whole community, the community may be more tolerant of some of the dis-benefits. This does not reduce the obligation of airport management, however, to strive to make the airport a good neighbor to the community. Frequently, the cultural advantages, emergency aspects, and so forth, are simply more "icing on the cake."

Mobility has become the byword of the American culture, and the airport system is integral to this mobility. If this country is to continue to grow and prosper, so must its airport system. Consider what would happen to American business if air transportation were not available. In all probability, this country would be much less productive.

The airport should be viewed by its community as a transportation link with every other airport in the world, an important employment center, a valuable tool for attracting new industry and jobs, an additional source of tax revenue, and a stimulus for increased local sales and general business activity.

An often used, but very appropriate quotation by the famous aviation pioneer, Billy Mitchell [52], sums it up. He said, "If you would measure the heartbeat of a city . . . take the pulse of her airport."

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