

THE AIRPORT MANAGEMENT

PRIMER

2nd EDITION

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Mount Pleasant, South Carolina

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INTRODUCTION

Airport management can be a rewarding profession. It centers around aviation, one of the most exciting technologies of the twentieth century, and it involves complex relationships with many different people and groups of people. It brings involvement in the key economic development issues of the community, region, and, occasionally, the nation. Finally, it is frequently the center of political and media attention, which is sometimes desirable and sometimes not.

Airport management can also be frustrating. This industry is small and well understood by relatively few people. Few resources exist for a professional and uniform system of training the men and women who manage and direct these complex public assets. Even seasoned veterans quickly admit that on-the-job training remains the norm, and every day brings new lessons to be learned. Given these realities, the men and women who work in this industry have developed a tradition of open communication with one another. This open exchange of information is the primary means of industry education for most airport executives.

The Airport Management Primer is intended to be another source of shared information for airport executives in the United States. Its primary focus is the foundational information needed by decision-makers, and the material emphasizes strategic concepts rather than day to day tactics. Stated differently, this textbook more often answers questions that begin with *what* and *why*, rather than *how*. As such, it should be useful for a new mayor, airport authority board member, or aviation executive desiring an industry primer that can be quickly absorbed over a weekend.

Alternately, this book can also be used as an academic introduction to the subject. If so, I highly recommend combining this text with *Planning and Design of Airports* (Horonjeff and McKelvey, 1994) and *Airport Finance* (Ashford and Moore, 1992) to anyone seeking a more thorough introduction to the airport management industry. Taken together, these three books provide more industry information than I received during several years of on-the-job training!

In one sense, airport management can be compared to fishing. Useful textbooks can be found for either topic; however, both are subjects that cannot be taught, they can only be learned. I hope *The Airport Management Primer* is a worthwhile addition to your self-education program.

OVERVIEW

What is an airport? The courts believe it's an appropriate forum for religious groups to display their beliefs. An aircraft owner thinks it's a place to park her airplane, preferably free of charge. The neighbors may think it's a menace and environmentalists call it a nightmare!

An airport is many things to many people, but the single most useful definition is that an airport is one part of an air transportation network; specifically:

$$\begin{array}{r} \text{AIRports} \\ + \quad \text{AIRplanes} \\ + \quad \text{AIRways} \\ \text{-----} \\ = \quad \text{AIR TRANSPORTATION NETWORK} \end{array}$$

Looking at the "equation" above, it's apparent that the three components must work together in harmony. In many other countries, this harmony is achieved by vesting ownership of all three segments in the national government. In the United States, however:

AIRPORTS are usually owned by local units of government

AIRPLANES are privately owned (except military)

AIRWAYS are controlled by the federal government

No one can begin to understand the operation of our public airports until they understand this paradigm. Indeed, much of the day to day work of airport professionals is oriented toward relations with the other components of the air transportation network, components which are outside the direct control of airport managers.

The unequaled success of the U.S. air transportation system is all the more interesting when viewed in this light. These three components of the network are owned and operated by (1) the private sector, (2) the federal government, and (3) various local governments. This air transport network was not consciously planned; rather, it represents the unique response of American society to a radical new technology that grew rapidly in the past century. Other nations have different cultures and different forms of government; consequently, their aviation industries have developed differently.

This three-component system is a very useful model for understanding the function and operation of airports within a larger network; however, some additional descriptions are needed to further define our subject.

A MEANS AND AN END

A capital good is a tool of production, a *means* to an end. A manufacturing plant manager does not purchase a lathe because it's a beautiful machine. The lathe is purchased in order to produce a good that will later be sold to a consumer. Likewise, airline passengers don't visit airports because they wish to appreciate the architects' handiwork. Their travel (including the portion spent at the airport) is merely a means to some other end, such as a business meeting or a family vacation. The airport functions in this example as a capital good.

Some airports, however, also function as a consumer good; the visit to the airport is the *end* product itself. Many aircraft owners enjoy the camaraderie of other pilots along with the sights and sounds to be found at the local airport. It's not unusual for such a person to spend the day washing his airplane and chatting with friends, with only a brief flight at day's end to view the sunset from on high.

To some degree or another, every airport is both a capital good and a consumer good although it's obvious that the larger air carrier airports function almost entirely as capital goods while the smallest general aviation airports are primarily consumer goods. These different requirements produce different viewpoints among the various airport users, differences that sometimes come into conflict.

A MIRROR OF THE COMMUNITY

In many ways, the local airport is a mirror of the community it serves. If the community is home to a large number of corporate headquarters, the airport may lease land for several private hangars housing business jets. If the local economy is primarily based on tourism, the airport may have a large taxicab operation (for visitors) and a relatively small parking lot (for local users). If the local community has no industrial or manufacturing activity, the airport may have a minimal air cargo operation.

Every airport serves a particular community. Since each community is unique, its economy and culture must be studied and understood in order to gain a true appreciation for its local airport. Throughout this primer the reader will find broad descriptions of common features among U.S. airports. This information can be helpful if used in a thoughtful manner. *Every* airport will differ from these norms in some way, just as every town, city, and county varies from the averages computed by the Census Bureau. Once these differences are highlighted, the important question is *why*.

FREQUENT QUESTIONS

Are airports natural monopolies? Airline representatives and aircraft owners will frequently make this claim when faced with an unwelcomed action by airport management. The straight answer is not simple.

Concerning airlines, the local airport may provide the only access to local travelers. If the next nearest airport is 200 miles away, an airline wishing to serve a community may have no choice but to reach an agreement with the local airport management. On the other hand, discount airlines can attract passengers from as far as 300 miles away and can draw passengers by advertising heavily in adjacent communities (this is *not* a hypothetical example). Finally, hub airports serve large populations spread over several states. The hub airport has no monopoly over the many passengers that are merely transferring from one airline flight to another; a competing airline may open a hub operation in a nearby community and serve the same travelers in the region. The local hub airline may feel "trapped" at one airport by virtue of its large investment there; however, this situation arises from a corporate decision, not because the airport is a natural monopoly.

Concerning general aviation, most aircraft owners desire to base their airplanes at a location within 30 minutes driving time of their home. If the local airport is 15 minutes from the community, while the next available alternative requires an hour drive, then the local airport is the only practical choice for *storing* locally-owned airplanes. If the fuel price becomes too high, pilots may complain but still pay unless the next available airport offers a price low enough

to induce them to fly there. Beyond storage and fuel, aircraft owners will fly farther from their home base as the price of the service they seek (maintenance, engine overhaul, aircraft painting) increases. The higher the price of the service involved, the more airports compete for aircraft owners' business.

Are airports public utilities? Public airports are part of our nation's infrastructure. Many operate without the use of tax revenue, instead charging fees to the various people and companies that use the airport. In this sense public airports are similar to utility companies that provide electricity, telephone, water and sewerage service; however, one important difference is noteworthy.

Many electric utility companies are privately owned by investors and specifically chartered as for-profit enterprises. Since they serve a public need and function as natural monopolies, the amount of profit they can earn is regulated. Public airports, on the other hand, are traditionally owned by units of government and not chartered to earn a profit. Even if the airport is fully funded from user fees (rather than tax receipts), the financial objective is to break even.

An important discussion taking place in our industry today concerns the possible privatization of many public airports. If this occurs and public airports are sold to private investors, it is possible that regulatory bodies may be created to oversee airport rate-making in a fashion similar to today's public service commissions.

How many airports are there? In rough terms, the U.S. has slightly less than half of the world's air passenger traffic, half of the world's airline (jet) aircraft, and half of the world's airports. (As the global economy grows, the U.S. portion of worldwide activity continues to decline.) The actual number of U.S. airports varies from document to document, but the top number is usually around 17,000.

If you remove all the grass airstrips from that 17,000 number and only count those public airports that have at least one runway which is lighted and paved, the number falls to around 3,500! Interestingly, this is about equal to the number of counties that exist in the 50 states.

Finally, if you only wish to count those airports which have airline service, the number drops to around 500, and among this group, approximately 30 airports board over two-thirds of all passengers.

The purpose of this numbers exercise is to highlight two truths about our industry. First, airport activity is highly skewed with a handful of airports accounting for the majority of passengers carried, delays encountered, dollars spent, national attention received, etc.

Secondly, because airports are so size-diverse, it's difficult to make generalizations that apply to all. For example, General Motors and a local taco stand can both be classified as private enterprises. Both face the similar challenge of keeping revenue ahead of expenses. Beyond such simple platitudes, the similarities are few. Likewise, LaGuardia and the local county airport are both airports where aircraft take off and land. Beyond that, their differences can be more pronounced than their similarities.

AIRPORT MANAGEMENT

Because each airport is part of a larger transportation network, airport managers have legitimate concerns about the proper operation of other airports and the smooth functioning of the air traffic control system. To illustrate with an extreme example, if all airports in the world closed except for one, it would have no practical utility. Stated differently, every closed airport decreases the usefulness of the local airport; every air traffic delay does likewise (though some with more significance than others).

In contrast to these national concerns, every airport manager has to advocate and promote the local concerns of his facility. Many professional dilemmas are centered around the tension between national policy issues (e.g. airport noise) and the local desire to retain the power to control community development. Given the way our air transportation network is constructed, this tension is built into the system, and airport managers must learn to deal with it rather than hope to avoid it.

From a business perspective, airport managers find themselves between the buyers and sellers of aviation products and services. The local airport provides the marketplace where sellers (airlines, fixed base operators, flight instructors) meet their customers (travelers, aircraft owners, student pilots). Like any good flea market operator, the airport manager must constantly track ongoing changes in both groups in order to determine how the airport can best serve this constantly evolving marketplace.

Think of an airport as a place where federal airspace and local roadways intersect. Think of it as a place where public infrastructure and private investment intersect. Think of an airport as a place where buyers and sellers meet in an open and ever-changing marketplace. In other words, think of it as a place forever caught between different worlds. Consequently, airport management requires a continuous effort to seek a balance among many competing forces.

Airport executives are therefore required to coordinate the activities of various groups with conflicting interests. Accordingly, many of the men and women who enjoy long-term success in this industry are individuals who can be simultaneously strong-willed *and* open-minded. These two traits may sound

contradictory; however, I believe their combination in a single personality is the driving dynamic in many airport leaders who consistently achieve results, yet maintain the human touch so important in a networked industry.

TERMINOLOGY

Before continuing further, it is appropriate to briefly review some common industry terminology. The following terms are listed either because of their common usage, or because they hold more than one meaning which frequently leads to misunderstanding:

Airport Improvement Program (A.I.P.): A grant program administered by the Federal Aviation Administration providing funds to qualified airports for qualified projects. Revenues to support this program are derived from taxes on aviation users, the most significant source being a tax on domestic airline tickets.

Department of Transportation (D.O.T.): The cabinet level department which oversees the affairs of the Federal Aviation Administration. D.O.T. is also charged with certain aviation responsibilities that it carries out directly (example: reviewing airline disputes concerning airport fees and charges).

Hub: This term has alternate meanings. As used by the F.A.A., it refers to a size classification wherein airports are grouped into categories based on the size of the local population served (see *Airport classification* later in this section). As used in most airline circles, the term refers to an airport used by a specific airline as a central transfer point for large volumes of passengers.

Joint-Use airport: This is a term of art that has alternate meanings. Some use the term to refer to any single airport that supports based military aircraft and based civilian aircraft. Some use the term to refer only to such shared locations where the primary runway(s) is owned and controlled by a military entity. Some use the term to refer to any military airfield that permits occasional civilian operations (usually with prior permission).

National Plan of Integrated Airport Systems (N.P.I.A.S.): A D.O.T. document that lists all airports which the federal government considers necessary to provide a safe and efficient national air transportation system (approximately 3200 airports are currently included). An airport must be listed in the N.P.I.A.S. in order to qualify for grant funds administered in the A.I.P.

National Transportation Safety Board (N.T.S.B.): An independent federal agency charged with the investigation of aircraft accidents. The N.T.S.B. can delegate the investigation of some accidents to the F.A.A.; however, it retains ultimate responsibility for these investigations. The primary purpose of these investigations is to determine the probable cause of these accidents and to make recommendations for future safety improvements based on the lessons learned.

Passenger Facility Charge (P.F.C.): A “head tax” that federal law permits airports to place upon airline passengers. The charge is collected by the airlines and remitted to the airport for use on qualified projects. The current maximum is \$4.50 per boarded passenger; however, restrictions apply which tend to reduce full collection of this amount.

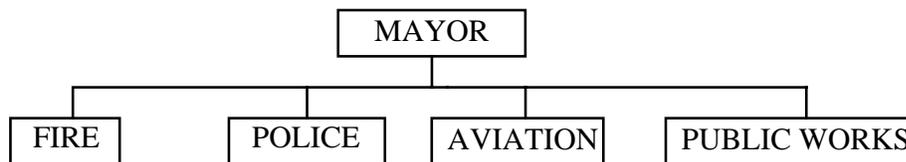
Airport classifications: While several methods are currently in use for classifying public airports in the United States, the most common system is a functional classification method used in the N.P.I.A.S.:

- * *Commercial service airports* receive scheduled airline service and board more than 2500 passengers annually.
- * *Primary airports* are commercial service airports that board more than 10,000 passengers annually.
- * *General aviation airports* include those that may have a small amount of scheduled airline service, but board less than 2500 passengers annually. For planning purposes, this category of airports is further subdivided into categories based on operational characteristics, such as runway length and ability to accommodate all or a portion of the general aviation aircraft fleet.
- * *Reliever airports* are general aviation airports located in large metropolitan areas which are specifically designated to reduce congestion at busy commercial service airports nearby.
- * *The hub classifications* apply to commercial service airports and are based on the airport’s enplanements (boarded passengers) as a percentage of the nation’s total enplanements. Airports are classified as Large Hubs (those which account for 1% or more of total national enplanements), Medium Hubs (0.25% to 0.99%), Small Hubs (0.05% to 0.24%), or Non Hubs (less than 0.05%).

OWNERSHIP

CITY/COUNTY

With the exception of some state-owned facilities, most U.S. public airports are owned by local units of government, the most common being ownership and operation by a city or county government. Such an airport might be operated with civil servants gathered into an Aviation Department which stands apart from other departments, for example:



Alternately, an Airport Division may be established within an existing department, such as Public Works.

The *advantage* of this method of ownership is that the airport has access to the resources of other city/county departments, resources that may far exceed what the airport could justify if it operated on a stand alone basis. Unfortunately, this process works in reverse: those other departments can seek access to the airport's resources, primarily money (a large airport can be a high cashflow business if operated for short-term gain).

The major *disadvantage* of this type of ownership is the diffusion of leadership focus. A Mayor or Council President can only focus so much of her attention on airport matters, especially if they are not high priorities to the electorate. If the airport is not a separate department (but only a division within a department), it lacks direct access to the leadership and may suffer further neglect.

In some instances, the city/county government may create a Commission or Advisory Board to review requests from airport staff and prepare action recommendations for the Mayor or Council. These commissions can be useful; however, their political base is frequently unstable. Eventually the commission may advocate a position the real decision-making body doesn't care to hear.

When the controversy has faded, the commission may be abolished or restaffed with more compliant members.

AUTHORITY

Airport authorities are separate public bodies created by state legislation. A variety of organizational forms exist and the specific powers and responsibilities of any given authority are established in its *enabling legislation*. When reviewing an authority's enabling legislation, a great deal can be learned from answers to these questions:

- * Who controls the appointments to the authority's governing body (one person, one political body, etc.)?
- * Does the authority have total control over its budget, contracts, and personnel practices?
- * Does the authority have the power of eminent domain and/or the power to levy taxes?

Answers to the above will give a quick snapshot of whether or not the particular authority in question was created to operate independently or to share real power with another party(s) operating behind the scenes.

Most airport textbooks state that airport authorities are the preferred method of ownership because (1) the leadership is more focused on airport issues, (2) the airport staff is less subject to political interference, and (3) a metropolitan community can be better represented by the authority's governing body. In the broadest sense, all of these statements are true, although any specific airport organization needs to be examined on its own merits.

Curiously, this list of attributes leads many readers to presume that these are the *reasons* airport authorities are created in the first place. Frankly, the real reason most airport authorities are created is because a city or county wishes to get rid of a liability, such as an airport with a political problem or environmental contamination. Another common reason is the sudden discovery of a need for huge reinvestment after decades of financial neglect. Common sense implies that no one will create an airport authority in order to give up control of an asset that is running smoothly.

In general, the airport authority structure is more appropriate for the duties and responsibilities that are placed upon U.S. airports. Beyond this generalization, the real foundation of any airport's success is its people. Inspired leadership can direct a first-class city-owned airport while poor leaders can ruin a well-organized authority.

CONTRAST TO TRADITIONAL PUBLIC SECTOR

Although most public airports are owned by units of government, they are distinctly different from traditional municipal operations. An airport can operate as a stand alone enterprise because its revenues and expenses are related in a businesslike context; therefore, logical user fees can be charged for services rendered. In typical government administration, centralized tax collection provides the funding for a variety of services which could not practically operate as stand alone entities.

To illustrate what this different focus means to an airport, consider a city-owned aviation department which agrees to build a facility for an airport tenant in hope of receiving a fair return through future rents. It is not uncommon for a city-wide budget reduction (due to depressed tax collections) to block the deal. If the airport staff can work outside of the established system and convince the Mayor to proceed with the project, they may later be disappointed to learn that the new rental revenue is not available to fund later increases in the airport's expense budget.

Unless city/county leaders are willing to treat the airport differently from their other operating departments, the kind of system described above will stifle management initiative. Needless to say, if the airport department *is* treated differently, it will probably suffer strained relations with the other city/county departments.

CONTRAST TO PRIVATE SECTOR

Because airports *can* operate as stand alone enterprises, there is a persistent belief that they can be completely privatized without any significant ill effects. This line of reasoning ignores these issues that are relevant to airport operations in the U.S.:

- * As public sector entities, U.S. airports receive many subsidies including tax-exempt financing, property tax exemption, income tax exemption, and outright grants from federal and state agencies. Some airports even receive direct subsidy from their local community. A privately owned airport would probably lose these subsidies and its cost of operation would rise accordingly.
- * Significant third party effects can be created by the business decisions made at an airport. For example, if the local airport decides to lease all available gate space to a single airline, the potential ripple effect throughout the community (perhaps positive

or negative) is enormous. In our society, citizens feel more comfortable with public control over such a key economic asset.

- * A public sector airport is free to make decisions that maximize community benefit even if the decision is not supported by the simple economic needs of the airport. Airport noise control programs are a good example: these costly actions are intended to produce a social benefit, not a return on investment.

These points are not made to engage an argument about the merits of airport privatization, but rather to point out that U.S. public airports are unusual operations that don't fit neatly into the public sector or the private sector.

Airports are places where the transportation infrastructure of our country is offered directly to the citizens for their use in commerce or pleasure. An airport is one of those interesting places where the public and private sectors are directly woven together, and simple analogies to one or the other are usually inadequate.

ORGANIZATION

THE FOUR INPUTS TO PRODUCTION

The study of economics invariably begins with a description of economic resources: the human, natural, and man-made resources that go into the production of goods and services. Traditionally, the following four categories are listed as the factors of production:

- * LAND
- * LABOR
- * CAPITAL
- * ENTREPRENEURSHIP

These general inputs can be loosely translated into an airport organizational chart along these lines:

- | | |
|-------------------------|-------------------------------------|
| * LAND..... | PLANNING & ENGINEERING |
| * LABOR.... | OPERATIONS & MAINTENANCE |
| * CAPITAL..... | FINANCE & ADMINISTRATION |
| * ENTREPRENEURSHIP..... | MARKETING & BUSINESS
DEVELOPMENT |

The correlation is certainly not perfect, but it illustrates the point that airports must provide the same inputs to production as any other economic enterprise. As already mentioned, most U.S. airports are locally owned and their leaders are free to organize production in any manner they see fit. Some airport organizations divide Operations and Maintenance into different departments; some view Marketing as little more than Public Relations; some simply hire a Director and tell her to get things done. Regardless, in some fashion all of the four basic inputs eventually have to be provided, even if some are ignored in the short run.

VARIATIONS AMONG AIRPORTS

Comparing workforces from different airports is a difficult assignment since each is free to organize according to local needs and dictates. Some of the differences are simply unique to a particular airport. One airport may crosstrain its police and firefighters and call them Public Safety Officers. Another is bound by local Civil Service regulations to use specific job titles common to all local governments. Outside of these individual differences, certain distinctions fall into general patterns:

- * **CONTRACT Vs. IN-HOUSE:** Certain work segments are candidates for contracting to independent parties. Examples include custodial work and landscape maintenance.

When comparing entire airport organizations to one another or to some surveyed average, it is important that these differences be properly accounted for in order to ensure apples are not being compared to oranges.

- * **CITY Vs. AUTHORITY:** As noted earlier, city-owned airports can share the resources of other city departments, especially so with personnel. For example, at a city-owned airport, the airport finance office may only serve as a clerical clearing house for the bulk of the accounting work which is performed at City Hall. As such, this airport finance office might appear extraordinarily small compared to an airport authority's finance office.
- * **LARGE Vs. SMALL AIRPORTS:** Larger airports have adequate resources to staff positions that oversee all requirements of the four economic inputs. Some even include specialty positions, such as Noise Abatement that are specifically required because of local conditions. On the other hand, smaller airports cannot afford such staffs and frequently rely on the airport manager to balance the budget, speak to the Rotary Club, and personally repair broken runway lights.

It's not unusual for a small airport's organization chart to outline a maintenance department that answers to a single airport manager. With a secretary and a bookkeeper the manager is expected to handle all the other factors of production. If he's fortunate, the manager is allowed to hire an assistant to help with the workload.

In the final analysis, there is no optimum organization chart for all airports. Much can be learned from studying similar-sized airports, but since no two cities are entirely alike, no two airports are entirely alike, and therefore no two airport organizations are entirely alike.

BOARD ORGANIZATION

For ease of presentation, this section will refer to the board of directors of an independent airport authority; however, the comments herein are equally applicable to an airport commission, city council, or other public group empowered to exercise ownership and control of a public airport.

A primary responsibility of the board is to provide direction to the employed staff so that their energy is focused on a clear purpose: the staff should understand *what* it is supposed to do. Furthermore, the board must establish guidelines for determining acceptable means to accomplish these goals or *how* to get things done. Human nature being what it is, this direction is best accomplished through written statements; however, the point is well made that all boards communicate this information to their employees even if the communication is informal. A board with no written policies and a habit of making up rules to fit the situation *is* communicating to its staff and can expect its employees to act in a similar manner.

Customarily, the foundational policy documents of an airport board include, but are not limited to:

BYLAWS: The board establishes its internal rules of order and the means for documenting its official acts (e.g. minutes).

PERSONNEL POLICY, JOB DESCRIPTIONS, ORGANIZATION CHART: The board establishes its relationship with its employees.

PROCUREMENT POLICY, PROPERTY MANAGEMENT POLICY, INVESTMENT POLICY: The board directs how property and capital will be acquired and controlled.

RULES AND REGULATIONS: The board establishes its relationship with the users of the airport that are not otherwise bound under terms of a contract with the board or a separate board ordinance.

CONTRACTS AND ORDINANCES: The board establishes its relationship(s) with the various groups that use the airport's facilities.

REQUIRED BY LAW/REGULATION: The board will establish policies required by other government bodies (e.g. code of ethics, affirmative action policy).

Over time, most boards will also establish tactical policies based upon experience (e.g. a resolution establishing conditions for conducting commercial filming operations on airport property). Together, these documents provide the foundation of the airport's organization and should be crafted with care. Most of the board's communication to staff will be oral (either in public meetings or face to face conversation) but the policy documents establish the framework for these oral communications. Well-drafted policies, which are consistently adhered to, send clear signals that a professional attitude and proper behavior are expected of all employees.

After the board communicates *what* the staff is to do and *how* it is to accomplish these goals, the board performs its oversight responsibility to ensure that goals are ultimately completed and that their achievement is accomplished by acceptable methods. Common examples include receiving periodic reports from staff, consultants, and outside auditors.

BOARD/STAFF RELATIONSHIP

Stated bluntly, the board/staff relationship is whatever the board wants it to be. Some boards (or Mayors or Council Transportation Committees) wish to oversee every detail of the airport operation, while others accept periodic reports from staff that describe ongoing conditions. Two extreme examples include: (a) an airport where several board committees meet with the airport manager and staff on a weekly basis to review matters as mundane as the purchase of janitorial supplies, and (b) an airport board that only meets once a year to hear a report from the Chairman.

Somewhere between these extremes is the textbook description of a functional board/staff relationship. The board meets regularly to review and enact policy and execute official documents. Within established guidelines, staff implements policy and reports performance back to the board. The board in turn obtains independent verification of results from outside counsel, auditors, and consultants and then determines if performance is adequate. In general, the board establishes goals and declares through policy the appropriate means of obtaining those goals. Staff performs the work and reports results back to the board. Stated another way, the board establishes vision and strategy but leaves tactics (within certain guidelines) to the discretion of staff.

The real world is never this neat, but it is imperative that board members and their staffs understand the basic format of their relationship. Is the staff

expected to operate independently or are all decisions (substantial or otherwise) to be precleared through the board? Is the staff expected to recommend policy changes to the board or only "speak when spoken to"? Is the airport director to act as the Chief Executive Officer, the Chief Operating Officer, or merely as a working supervisor when the board members are not present? The responsibility for asking these questions rests with the airport director who also acts as the intermediary between the board and its employees.

THE AIRPORT MANAGER'S SPLIT PERSONALITY

In addition to acting as an intermediary between the board and its employees, the airport manager also stands astride two different worlds. On the one hand, she is the plant manager of a complex industrial facility. This is probably the role in which most of her employees view her. If she has risen through the ranks of an airport management career, it may also be the role in which she is most comfortable.

Separately, she is also a community leader who oversees a prime economic asset and potential development tool for the local population. This is the role in which local business and political leaders frequently relate to her. Since each community's economic and political landscape is different, this is also a role for which little training can be provided to a newcomer.

The smaller the airport, the more of the airport manager's time will be occupied with facility management issues, simply because she doesn't have the staff to whom she can delegate this work. At very large airports, the manager may delegate practically all facility management to staff and concentrate on community and economic development issues.

In general terms, if the board looks to the airport manager primarily for technical expertise related to airports, the airport manager should be able to look to the board for guidance and advice about the local community's aspirations and modus operandi. The best board/staff relationships occur when both groups assist the other with their unique knowledge and perspective.

ECONOMIC STRUCTURE

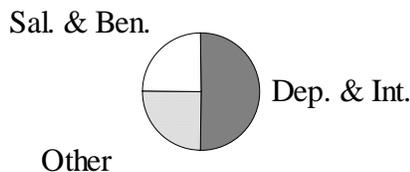
EXPENSE PROFILE

At the risk of overstatement, it must be emphasized that each airport is unique, and the following information is cast in only the most general terms.

Any airport's total expense is composed of (1) operating expense and (2) capital expense, with the major components frequently looking like this:

	Operating Expense:	Salaries & Benefits Other (Utilities, Supplies, etc.) .
+	Capital Expense:	Depreciation Interest
=	Total Expense	

The following pie chart illustrates the customary relationship of these major expense items at a typical medium-sized airport:



This chart represents a reasonably normal situation but should not be interpreted as an optimum model by which any specific airport should be judged. Its real value is its illustration of these important points:

- * Airports are very capital intensive.
- * The largest category of operating cost is usually salaries and benefits.
- * Within the category marked "Other", utility expense (electric power and gas) is frequently the largest single item.

Any particular airport can vary significantly from this model for a variety of reasons, some of which will be outlined later in this chapter.

REVENUE PROFILE

As difficult as it is to describe a typical airport's expense profile, the typical revenue profile is even more difficult to generalize. Total revenue should be sufficient to cover expense; however, there are as many ways of achieving this goal as there are airport managers.

An examination of several airport income statements will reveal that the revenue profile varies significantly by airport size. Larger airports (over 2,000,000 enplanements per year) are able to generate significantly more concession revenue than smaller airports; smaller airports frequently depend on general aviation users for a larger percentage of their revenue stream.

A common thread among many (but not all) airports is dependence on a single aviation market for a significant portion of airport revenue. *Single aviation market* refers to such market segments as:

- * Scheduled domestic airlines
- * Transient, corporate general aviation
- * Charter travel to a significant tourist destination

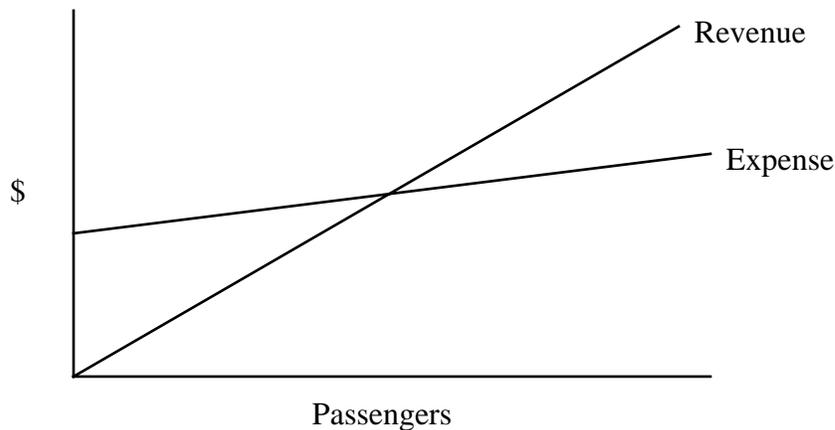
In some instances, the airport's revenue stream may be heavily dependent upon a single aviation *company* as is the case with many airline hubs.

Notice that this chapter is organized by discussing expenses first, then revenues. This is backwards from common business logic wherein an entrepreneur first identifies a market need and estimates the potential *revenue* from a product that serves that need. If the product can be produced for less *expense* than the revenue it produces, the project is worth pursuing.

This backwards organization is deliberate and meant to reinforce the point that many airport owners traditionally determine expense first and then proceed to identify sources of income that will produce a break-even situation. This mindset is typical for a public service entity that provides an infrastructure product. It also explains why revenue profiles vary so much from airport to airport since different management philosophies will profoundly influence how an airport "goes after the money" it needs to recover its expenses.

RELATIONSHIP OF REVENUE AND EXPENSE

If the income statements of all U.S. air carrier airports were summarized on one diagram, it would look something like this:



Notice that revenue starts near zero since presumably no customers equals no income. Expense, on the other hand, begins at a fixed amount whether or not any passengers walk through the front door. It costs a minimum amount of money to build and equip a new airport regardless of the potential market size. Like aircraft carriers or suspension bridges, it is not feasible to build half of an airport.

Airport revenue increases as passenger traffic increases; however, the expense line rises more slowly due to the relatively fixed nature of airport costs. The two lines cross at the break-even point where revenues match expenses.

The F.A.A. and many independent researchers have attempted to define the expected break-even point for U.S. public airports and their answers range from 200,000 to 1,500,000 annual enplanements. From personal experience, somewhere near the midpoint of these two numbers (500,000 to 800,000) seems reasonable. As with previous generalizations, the reasons a particular airport may vary from this norm are more important than the norm itself.

REASONS FOR VARIANCE

Airports with less than 500,000 annual enplanements have been known to stand on a firm financial footing while some larger airports flounder. Possible reasons for these variations are as follows:

- * **UNION Vs. NON-UNION LABOR** : Some airports have higher personnel costs due to the local workforce culture (remember, personnel costs are a large component of total airport costs).
- * **HIGH CONSTRUCTION COST ENVIRONMENT** : Airports are always building or rebuilding facilities; therefore, poor soil conditions, harsh weather or long distance from raw materials can permanently increase an airport's cost base.
- * **ONE BIG UNUSUAL ITEM** : An airport may have an unusual revenue item (airport controls all fuel sales) or an unusual expense item (empty warehouse built as a speculative venture) that alters the financial profile. Once this item is removed from the analysis, the profile looks normal.
- * **CITY Vs. AUTHORITY** : City-owned airports may move some expenses "offshore" by not detailing the true cost of intergovernmental services such as police and fire. Conversely, airport revenues may be directed to other city departments by contracting out airport concessions to the management of other city departments.
- * **AIRPORT LIFECYCLE** : The financial life of most air carrier airports centers around the terminal building . Since any new terminal is built to serve its citizens for a number of years, it is deliberately overbuilt for conditions on its opening day. Accordingly, expenses will appear high relative to revenue. As passenger traffic (and revenue) increase over time the airport's financial profile will grow into a normal condition. In later years, if the operation continues after the terminal is fully depreciated, total expense may appear low relative to revenues (although an "eyeball examination" of the facility will convince the investigator that a large reinvestment will soon be required).

STRATEGIC IMPLICATIONS

As stated earlier, airports are extremely capital intensive. Comparing the total assets of most U.S. airports (found on their Balance Sheets) to their total annual revenue (found on their Income Statements) produces a ratio that averages near 10:1 (\$10 in assets are required to generate \$1 in annual revenue). For comparison:

- * The Forbes 500 as a group average 2:1
- * Electric utilities as a group average 3:1

Another way to view this issue is to examine total assets to total employees. In this case, the numbers are approximately:

- * U.S. Public Airports : \$1,000,000/employee
- * Electric Utilities : \$ 800,000/employee
- * Forbes 500 : \$ 350,000/employee

On a more human scale, consider that it is not unusual for a small-hub airport to hold \$100,000,000 in total assets on its Balance Sheet. Compare this figure to the total assets of local banks, real estate development companies, or municipal governments and a better understanding of *capital intensive* comes to light. This leads to these important implications:

- * Management of depreciation is extremely important. Many airport professionals concentrate on the management of cash flow; however, depreciation is a real expense even if it doesn't appear so in the short run. Many surplus World War II airports were caught short by collecting only enough revenue to pay for salaries, utilities, and supplies. When the runways and taxiways reached the end of their useful lives, the cost of rehabilitation was astonishing and the local aviation market was simply unprepared to pay the necessary fees and charges to cover this expense. As an additional note, it should be mentioned that inflation is especially ruinous to capital intensive industries.
- * U.S. airports significantly undercharge for the use of their assets. They are able to do so because much of their capital expense is

subsidized, either through outright gifts (F.A.A. grants), exemptions to taxes (e.g. property taxes) or reduced-interest financing (tax-exempt bond market). If U.S. airports were completely privatized and these subsidies were taken away, average airport fees could double or triple, and the assets/income ratio might approach that of electric utility companies.

- * If an airport organization is planning large cuts in its expense base, it has to begin with its capital expense, usually debt service or planned construction. After debt is refinanced and construction rescheduled, the next prime expense to examine is personnel cost (sorry to have to say that). Third comes the power bill and fourth comes everything else. In other words, cutting the travel budget or closing the employee lounge may be useful to establish the tone of management's intent, but it will not significantly impact the bottom line.

USEFUL PARAMETERS

Recently, a study of airport financial statements was conducted in order to define the typical financial structure of U.S. airports. Of the busiest 108 U.S. airports (which collectively board 95% of all passengers), representative samples were selected and their annual financial statements analyzed. Following are median figures for selected financial parameters:

* Current Ratio:	1.7
* Average Age of Accounts Receivable:	27 days
* Long Term Debt per Enplanement:	\$75
* Debt to Equity Ratio:	1.3 to 1
* Total Assets per Employee:	\$1.3M
* Total Assets per Enplanement:	\$140

These results correlate closely with similar data found in government and private industry databases.

CLOSING THOUGHTS

Repeating the introduction, each airport is unique and this discussion of norms and averages should be used only as a base for further analysis. It is useful to compare a specific airport to these norms (or better still, those of similarly-sized airports) so that differences can be spotted and explanations for these differences can be discovered. Discovering the underlying reasons for variance is the real knowledge that any investigator seeks, and the generalizations in this chapter are only a tool for unlocking that knowledge.

STRUCTURE OF RELATIONSHIPS

INTRODUCTION

Most texts approach this subject by focusing on the *vehicle* used by airport administrations to document their relationship to other parties, for example, a contract. This chapter instead focuses on the *relationship itself*, a reality that is not always readily apparent to industry newcomers.

Frequently, we make sense of something new by comparing it to something already known. In the case of airports, we find a large facility wherein portions are leased to various companies; thus a newcomer comes to believe that the airport manager is primarily a landlord, and all other parties at the airport are tenants. Although true to a point, this over-simplification is misleading and can lead decision-makers to consider airport issues in an inappropriate manner.

As a further example, people with a military background will frequently compare an airport to an air force base since they certainly *seem* alike in many respects. Unfortunately, this mental model may lead a newcomer to assume the airport manager commands most of the personnel at the airport. In reality, the airport manager's direct employees account for a minority of the total persons employed at the facility.

Even though his direct workforce is relatively small, the manager is still responsible for the smooth operation of the airport as a whole, and must therefore maintain multiple relationships with the members of the airport population and other segments of the air transportation network. This chapter will overview the key features of the airport manager's relationships with the major airport user groups.

AIRLINES

Recalling the air+air+air equation from the first chapter, it's apparent that airlines are more than just tenants to airports. Airports and airlines are really partners who must work together to produce the final product: air transportation for the customer. In a sense, airports are the wholesalers of ground infrastructure, and airlines use this input to produce the final retail product.

Although the term partner is used when describing this relationship, it must be emphasized that the partnership operates at an arm's length. Airports and airlines are frequently on opposing sides of an issue, and the partnership is often based on mutual needs rather than mutual interests.

Historically, airlines have been the partner that initiates change and airports *react* to these changes. Airlines purchased jets and jumbos and established hub-and-spoke systems; airports responded to these changes by enlarging facilities and reacting to the consequences. Recent discussions about wayports and cargo hubs seek to change this relationship by setting the airport as the initiator of change and expecting the airlines to react favorably. Whether or not these grand plans are workable is yet to be seen.

The most common financial mechanisms used to obtain a revenue stream from airlines include a square footage charge for rented space and a landing fee based on aircraft weight (usually established as an amount per 1000 pounds of Maximum Gross Landing Weight). These amounts may be calculated in such a fashion to (1) recover the airport's specific costs for providing facilities to the airlines, or (2) balance the airport's overall budget after revenues from non-airline sources are subtracted from total expense. This latter method is referred to as the *residual* method and is part of a more tightly-woven contractual relationship between airport and airlines.

Selection of the airline rate-making philosophy is a central feature of an airport's financial strategy. Purely compensatory rate methods leave the airport owner with greater flexibility to control future plans and pursue new opportunities. On the other hand, a residual contract shares decision-making authority with the airlines in return for their commitment to pay adequate fees to balance the airport's budget (in the simplest example, all non-airline revenue is subtracted from total airport expense-this *residual* amount is charged to the airlines; thus, the airport operates at the break-even point).

Both methods are common throughout the industry, and many airports use both by establishing different cost centers and selecting the appropriate method for each. Which strategy best suits an individual airport depends on its financial situation, negotiating posture, and overall management philosophy. In *Northwest Airlines vs. County of Kent* (92-97), the U.S. Supreme Court reaffirmed the right

of airport owners to pursue either ratemaking strategy provided the final calculation produces reasonable airline fees and charges (The U.S. Department of Transportation holds authority to review such fees for reasonableness.).

In any event, in the deregulated era it has become obvious that airport rents and fees from airlines are not guaranteed cash flows. If passengers don't board an airline, the airline leaves town, and the airport doesn't get paid. In this sense, the airline fees received by the airport are best viewed as a percentage of the passenger fare originally paid to the airline. Thinking of the cash stream in this manner helps to overcome the landlord-tenant mentality and focuses attention on the true market viability of the airport's air trade area.

How can airports attract more airline service? Like all businesses, airlines seek to increase their revenues and decrease their costs. Concerning revenue, it is doubtful that airport management can have a meaningful impact on the size of the local market for air travel demand. Any particular airport will serve an air trade area, and this area will have (1) population, (2) disposable income, and (3) an economic profile. For the average U.S. city, these items combine in such a way that the airport will enplane a certain factor times the air trade area's population during a year (1.5 is a common number), and airport management's actions cannot alter this relationship in a significant way.

Concerning airline expenses, labor, fuel, and travel agents' commissions account for approximately two-thirds of the total; payments to U.S. airports usually amount to about 5%. Although some airport managements have attempted to attract new airlines by offering special pricing incentives, airport fees are such a minor cost factor that special incentives have little power to alter the airlines' fortunes in an appreciable way (though it should be noted that some communities have attempted to overcome this impediment by combining incentives on airport fees, labor costs, advertising, and taxes). Airport fees *can* be a deciding factor if an airline must choose between airports that are otherwise judged to have equally attractive markets. A cautionary note is in order at this point: any form of subsidy, whether a fee reduction or outright offer of cash assistance, should be made available to all airlines on an equitable basis, otherwise, an airport sponsor is open to a charge of economic discrimination, an event that can trigger a D.O.T. investigation.

Regardless of these hurdles, an airport's leadership can be proactive by thoroughly studying its own air travel market and communicating useful information to those airline companies that are best positioned to profit from it. If (1) a particular airline is expanding its route system toward an airport and (2) the airport staff has market data indicating the local citizens wish to travel on the new airline's routes, it's not difficult to communicate this information to the airline's management. In doing so, the airport management hasn't attempted to alter the size of the local market nor the expense profile of the airline; rather, it has altered the *timing* of an event that may now take place sooner rather than later.

CONCESSIONAIRES

If you wish to open a restaurant and sell hamburgers, you are free to do so, but if you wish to place golden arches in the front and call your restaurant McDonald's, you must pay a franchise fee for this privilege. Someone else spent a great deal of time and money to create the McDonald's image, and you may not profit from it unless you pay back a return on that investment.

Airports that have spent large sums of money to create an air transport facility have also created a marketplace in the process. If an entrepreneur wishes to enter that market, she owes a *franchise fee* to the airport that initially created this opportunity. This is the correct mental model for understanding an airport's relationship to its concessionaires. Once again, there is a larger dimension to this relationship than the simple landlord-tenant model that meets the eye.

The customary financial mechanisms include a square footage charge for rented space and/or a percentage of gross revenues. Frequently, a contract that specifies a percentage of gross revenue payment to the airport will also establish a minimum annual guarantee to be paid regardless of business conditions.

At larger airports, the airport owner may employ a *master contractor* who operates one of the major concessions (e.g. food and beverage) and subcontracts other business opportunities to other companies. Alternately, some airports have employed the concept of a *master developer* who likewise subleases and oversees all the concession opportunities but is specifically prohibited from operating any itself.

An alternate relationship is established in a *management contract* wherein the airport essentially retains ownership of the concession and contracts with an outside company to provide competent management of the service. With this arrangement, the airport usually retains control over the strategic issues (pricing, product offering, total service hours) while the operator is given latitude to exercise tactical judgment about the actual operation (employee scheduling, product display, etc.) Although financial incentives for the operator may be included in the management contract, risk and reward primarily accrue to the airport.

When should an airport operate a particular concession with its own employees? The simple answer is when (1) the airport has a natural advantage over outside concessionaires and (2) it desires to do so. For example, an airport parking lot will be staffed with employees drawn from the local labor market, and airport management can attract employees from the local area as well as (or better than) a concessionaire whose headquarters is located several states away. If the local airport management already has a competent personnel management

structure and efficient workrules, its leaders may decide to use these strengths to its advantage. Operating the parking lot without a middleman can result in a greater net return to the airport.

On the other hand, if the airport must abide by strict civil service rules or if it is currently engaged in labor troubles, it may be more prudent to recognize that an outside operator can better serve the situation, whether employed as a concessionaire or a management contractor. Each concession opportunity at each airport requires a specific assessment; no generalized answer can be given.

GENERAL AVIATION

General aviation is such a broad category of activity that it is not surprising our airports have developed a wide variety of relationships with this segment of the flying public. To the extent there is a standard, it is to lease ground space to a Fixed Base Operator (FBO), which then builds facilities and offers customer services to the GA public. In a sense, this portion of the airport is routinely privatized, although the airport may require certain product offerings that would not otherwise be supported by strict market economics.

Alternately, the airport may wish to provide these services directly to the flying public without the FBO middleman. This method is less common than the previous and many times exists because of a peculiar situation in the local GA market rather than a preferred strategy by the airport's leaders. A variation of this strategy is to employ an experienced company to provide these services under a management contract, an approach that is gaining popularity.

Finally, at very small airports it is not uncommon to find the FBO actually acting as airport manager. A small county that owns an airport may not have the resources to hire a professional airport manager and staff. The county may then lease airport space to a FBO and further require the FBO to mow the grass, inspect the runway, and otherwise provide some minimum maintenance services in the guise of "airport manager". The potential for conflict of interest is obvious; however, many times there is simply no other economically viable solution.

In all cases, these points must be kept in mind when considering the relationship of airports to general aviation:

- * The airport may not grant one FBO a monopoly; however, the airport owner may grant monopoly status to itself if it provides aeronautical services directly to the flying public. In either case, the FAA will exercise its oversight responsibility to ensure no members of the flying public suffer "unjust economic discrimination".

- * If an airport has two or more FBOs on the field, it must treat them fairly, without unjust discrimination toward any. Easy to state in theory, this is sometimes difficult to apply in real life situations.
- * FAA doesn't have as much regulatory control over general aviation as many of its employees would like. Sometimes the FAA forces the airport to act as a regulator, a role many are not pleased to acquire (Example: Requiring some airports to inspect GA fuel farms; requiring some airports to establish traffic patterns for ultralights).

In all cases, it is prudent for an airport's governing body to understand its local GA market and determine (by policy) its strategy for serving this flying segment. The alternative is to invent a strategy after the fact by negotiating with the various entrepreneurs that pass through the airport manager's office.

Customary financial mechanisms include a square footage charge for space leased (or per acre for raw land leased) and a fuel flowage fee. The fuel flowage fee is usually expressed in terms of cents/gallon although some airports establish it as a percentage of the retail price. A wide variety of other financial mechanisms can be found at different airports around the country; however, fuel is usually the predominant revenue source for an FBO and the fuel flowage fee is frequently the central GA revenue source for the airport.

How can the local general aviation market be quantified? As a starting point, there are approximately 200,000 general aviation aircraft in our country. Dividing this by the total population (280,000,000) yields a ratio of about 1 airplane for each 1400 people; thus, if a particular community has 500,000 citizens and 450 locally-owned aircraft, it has a general aviation market that *appears* to be larger than average. Beyond sheer numbers, it is important to examine the *type* of aircraft. In the example above, if those 450 aircraft were all single-engine piston-powered aircraft (no turbojets, no twin-engine aircraft), this would be unusual and warrant further study. Finally, beyond the market of locally-based aircraft, an airport serves *itinerant* aircraft. A small rural airport may only serve two dozen local owners, yet sell over 250,000 gallons of jet fuel every year to the itinerant aircraft which deliver their owners to a nearby resort.

After measuring the size and composition of the *locally-based* and the *itinerant* markets, it is useful to classify the aircraft operators in these categories:

- * How many aircraft are used to *make money*?

- * How many aircraft are used to *save money*?
- * How many aircraft are used to *spend money*?

Making money (e.g. air ambulance, crop dusting) and saving money (corporate travel) are economically viable uses of an aircraft and produce the majority of positive economic impacts associated with general aviation. Spending money (recreational flying) becomes more and more difficult as the cost of aircraft ownership increases. If a local airport serves a general aviation market that is (1) smaller than average, (2) primarily composed of lighter piston-powered aircraft and (3) serving recreational users entirely, the airport manager has to entertain concerns about the long term viability of the market.

FEDERAL AVIATION ADMINISTRATION

The airport's relationship to the FAA is multifaceted because the FAA, by definition, has multiple personalities. The Federal Aviation Act of 1958 requires the FAA to encourage and develop aviation, to regulate aviation, and to operate the air traffic control system. If this were a football game, FAA would be (1) the cheerleader (encourage aviation), (2) the referee (regulate aviation), and (3) one of the game players (operate the air traffic control system). Any discussion of an airport's relationship to FAA has to be separated into these three component parts.

The Airports District Office (ADO) represents our primary aviation development office and airports will frequently deal with a regional ADO on matters concerning federal grants and the airport's compliance with grant assurances. This is also the office that may investigate a complaint about the airport from the flying public. Remember, FAA's charge is to encourage and develop aviation, not just airports.

Airports deal with different offices on matters of safety and security and are subject to periodic investigations by FAA agents. These regulators receive their direction from Federal Aviation Regulations, primarily Parts 107 (security) and 139 (safety). Note that these regulators may not coordinate their work with one another. Several years ago FAA safety directives required airports to install 6' fences while the security offices were requesting 7' fences (even to the point of demanding that recently installed 6' fences be removed and replaced).

Finally, the FAA that most airport executives work with on a day to day basis are the controllers that occupy the local Air Traffic Control Tower (ATCT). The FAA has done a laudable job of building a nationwide network of consistent air traffic control procedures; however, since each airport is different, every field has customized its operations to some degree. Good working relations between the airport staff and local ATCT are certainly helpful in this regard.

Whenever an airport executive is dealing with the Federal Aviation Administration, it's important to remember "which FAA" she is dealing with. Furthermore, it's just as important to remember that the different FAA offices don't always coordinate their work. In fact, some FAA employees know less about the work of other FAA departments than do many airport executives. Overcoming this structural impediment is a common (though frustrating) part of any airport manager's work.

STATE AERONAUTICS AGENCIES

Due to the interstate nature of air commerce, most government involvement with aviation is focused at the national level; however, practically every state has a bureau, department, or agency that oversees intrastate aeronautics. The size of these agencies and the breadth of their responsibilities varies greatly from small offices offering little more than expert advice to larger organizations involved in financial assistance, accident investigation, airport licensing, and statewide airport system planning. Because of this wide diversity, no clear generalization can be given about the customary relationship between airports and their respective state aeronautics agencies.

CLOSING THOUGHTS

As stated in the opening paragraph, this chapter has *not* focused on the written documents traditionally used to document the relationship between the airport owners and these various parties. These agreements and ordinances document the legal, operational, and financial relationships of the signing parties and can vary from a few pages to several hundred in length. Regardless of the length and complexity of these contracts, it bears remembering that they are never a totally exhaustive description of all aspects of the parties' relationship.

A written contract between the airport and another company is only a summary of their relationship, something like wedding vows summarize (but don't completely define) a marriage. If one party believes the marriage will be an equal partnership while the other plans to domineer the partner, both may speak the vows accurately yet each hears something different. The marriage, of course, is headed for the rocks.

Likewise, an airport's written contract with another party only summarizes a complex relationship wherein risk and reward, authority and responsibility have been apportioned to the two parties in varying degree. With experience, airport managers develop an intuitive sense of how best to balance these relationships, and this professional judgment may be one of the most important assets an airport professional holds in his personal portfolio of skills.

OPERATIONS AND MAINTENANCE

INTRODUCTION

If the airport can be considered as a functioning machine, the prime objective of its operations staff is to *run the machine*; specifically, to strive to keep all of the airport's assets available for safe usage on a full-time basis. This chapter will review airport operations in a menu style by outlining the major subcategories of work and, when appropriate, emphasizing differences between large and small airports. The maintenance function is also reviewed since this task is certainly an important component of the effort required to keep an airport open and available for public use.

Although the following work items are grouped together in this chapter, this does not imply that the related job categories should all be collected in an airport organization chart under a single operations department. There are numerous ways to effectively organize an airport's personnel force to accomplish the workload items listed below. This chapter merely lists the work functions that can be classified as fundamentally *operational* in nature.

INSPECTION PROGRAM

Even the smallest airport is a complex asset composed of several interrelated facilities. In order to maintain a reasonable assurance that the facility is safe and fully functional, qualified employees should conduct an inspection program that continually examines the airport's physical assets. Most commonly performed with pre-established checklists, this process usually involves inspections of varying frequency, for example daily (inspect runways), weekly (count rpm of rotating beacon), and monthly (examine windsock fabric).

At the smallest airports, the procedure may be as simple as a daily inspection of the airfield by the airport manager, along with other inspections included in the routine tasks of the lead maintenance worker. Larger airports commonly employ a staff of operations personnel specifically hired to perform a large schedule of daily, weekly, monthly, and yearly inspections. Additionally, certain critical systems may be monitored on a real-time basis and set to alarm if any anomaly occurs (for example, building fire alarm systems). In all cases, the primary elements for a successful inspection program include:

- * The personnel performing these inspections must be properly trained for their work.
- * The inspection results must be recorded, preferably in a standardized format.
- * If the inspection discovers an anomaly that requires correction, this information must be communicated in a timely manner to the proper party.

As noted in a later chapter, certain U.S. airports are required by federal regulation to maintain an inspection program of specific airfield assets related to the safe operation of aircraft. Regardless of this minimum requirement, many airports usually perform additional routine inspections, whether as mundane as restroom inspections or as serious as police weapons checks. The first priority in establishing a safe and functional airport operation is an inspection program that clearly determines actual conditions and properly communicates the findings.

COMMUNICATIONS

Modern airports cannot function without an adequate telecommunication capability. At smaller airports, a simple telephone system plus a few hand-held radios may be sufficient. As the volume of airport activity increases, the need will arise for a dedicated telephone switchboard which, if economically feasible, may eventually be established as a 24 hour/day operation. The larger airports frequently combine this switchboard function with police dispatch capabilities, real-time safety and security monitoring, and central command consoles for emergency operations. Communications links with off-site facilities (such as hospital emergency rooms) and external databases (such as the FAA's air traffic control information) may also be integrated into the larger airport communications centers.

In the broad sense, the laws of economics determine the appropriate level of communication resources at most airports; however, professional opinions may differ over what assets are necessary at a specific facility.

SECURITY

The airport security function can be subdivided into these three categories:

- * Anti-hijacking activities
- * Traditional police services
- * Plant security

The anti-hijacking activities required of U.S. airports are further detailed in a later chapter and will not be reviewed here. Examples of traditional police services include traffic enforcement, crime response, and criminal investigation; however, the level of services required generally varies with airport size. As an illustration, smaller airports may only experience an occasional act of teenage vandalism, while the largest airports must be prepared to deal with all manner of violent crime and organized criminal activity.

Many airports contract with a local community police agency to provide these services; however, when specifically empowered by law to do so, some airports hire, train, and equip their own in-house police force. Some of these in-house airport police agencies are completely independent, with their own jails, detective divisions, and so forth. Alternately, even an independent airport police force may contract with other local agencies to provide jail service, homicide investigation, and other functions that are not required on a frequent basis at the airport. In either case, all in-house departments must have an external linkage with the judicial system and with the state police accrediting agency.

Any police force deployed for these traditional services can also perform routine security work, such as patrolling the perimeter fence and confirming that secure doors are locked at night. This additional task is appropriate as long as it constitutes an insignificant portion of the average officer's daily workload. Most police officers are highly trained individuals who desire stimulating employment. If an excessive amount of their time is involved in mundane security chores, the force may suffer high turnover rates and lose its more capable personnel.

AIRCRAFT RESCUE AND FIRE FIGHTING

Although aircraft accidents are thankfully rare, they do occur, as do less catastrophic events (usually referred to as incidents). Since the most hazardous period of flight involves the take-off and landing phases, it stands to reason that most aircraft accidents and incidents will occur on or near airports. Furthermore,

it is reasonable to assume that the accident risk increases as (1) the total volume of aircraft operations increases, and (2) more high performance aircraft are operating at a particular airfield. For these reasons, federal regulations establish certain minimum requirements for aircraft rescue and firefighting service (ARFF) at the busier airports which receive scheduled airline service (the relevant regulation is overviewed in a later chapter). At smaller airports not subject to this regulation, no rescue capability is usually provided at the field, and firefighting capabilities are commonly requested from the structural firefighters stationed at the nearest community station.

When ARFF services are provided on a full time basis, the general strategy is to establish a permanent fire station with direct access to the airfield, and equip the station with vehicles and equipment specifically designed for this unique mission. The central piece of equipment is the large foam *pumper*, a bulky vehicle carrying several hundred gallons of water which is internally mixed with a concentrated material to produce fire-suppressing foam. To the untrained eye, this foam appears similar to shaving cream and, when used in large amounts, covers the fire in an blanketing action.

Properly staffed with a trained crew, these large pumpers are fairly self-sufficient machines that provide the necessary rescue resources for most aircraft accidents. Unfortunately, their large size creates a significant weakness; the vehicles usually do not accelerate well from a standing start. Given the rapid speed with which an aircraft fire spreads and reaches high intensity, it is therefore necessary to add another item to the inventory, the rapid intervention vehicle (RIV). The RIV is a lighter-weight vehicle which usually stocks enough fire-fighting agent for one minute of service. If all the ARFF vehicles leave the station at the same time, it is presumed the RIV will arrive on scene first and begin applying agent to the most critical area of the fire. By the time its capacity is depleted, the large pumpers should be on scene to continue the firefighting process. (Recent advances in the design of large foam pumpers have resulted in these vehicles having an adequate response time. At airports where these new vehicles are placed in operation, the RIV can be phased out.)

From this point on, the primary objective of the ARFF crews is to create survivable pathways for the aircraft occupants to escape the fire. Once all reasonable efforts have been made to rescue survivors, the crews remains on scene to completely extinguish the blaze and to guard against its reignition. They may also assist with the grim task of *triage*, the process of sorting survivors by the severity of their injuries so that medical personnel can treat the most critical patients first, and serve those with less critical injuries at a later time.

Two important points should be borne in mind when considering the scenario outlined above. First, each aircraft accident is a unique event and actual events frequently do not unfold in the idealized version just described. An excellent example is a 1983 accident involving a DC-9 that landed at a

midwestern airport with a well-developed fire *inside* the aircraft. Second, many ARFF personnel will spend their careers without having to face a catastrophic accident involving a large loss of life; however, they will still be well employed with many lesser incidents such as collapsed landing gear, cautionary passenger evacuations, and aircraft engine failures.

The aviation industry's excellent safety record is not a reason for complacency. Airports are places where human beings are placed into complex machines and launched skyward at impressive speeds. Such activity will always involve an element of risk, and an ARFF station staffed with a properly trained crew is a reasonable approach to managing this risk at busy airports.

SNOW REMOVAL

Obviously, a snow removal program is not required at all airports; however, at those locations where it is a necessity, the snow removal process can require a very intense effort. In some ways, the process is viewed as a war against nature, and war fighting analogies are common. As in warfare, strategy must be planned and tactics rehearsed prior to action. As in warfare, the best laid plans must frequently be set aside when the "enemy" performs an unexpected maneuver.

The overall snow removal strategies can be described in a written snow removal program. This document should begin with a statement of objectives and priorities (for example, since no airport can provide enough equipment and manpower to counteract the fiercest winter storms, it is important to state beforehand a clear intent to first reopen a particular runway, followed by specific taxiways, and so forth). Additionally, the snow removal program can outline pre-season preparations, the composition of a "snow committee", and defined areas of responsibility for the involved work groups.

Snow removal tactics usually fall into two categories, mechanical removal methods and chemical methods. Mechanical methods usually rely on large snowplows (to move the snow to the pavement edge), snowblowers (to blow the pile of snow into the grass infield), and powered brushes (to clean the remaining patches of snow on the pavement). Except for the powered brushes, the other two equipment items have no other practical use outside of the snow removal program. Chemical removal methods include liquid and dry materials that can be applied to melt frozen participation.

Through experience, snow removal crews acquire an understanding of local weather conditions, and learn the optimum times during a storm to begin a particular removal tactic. Although specific tactics at one airport may not be effective at another, airport snow crews are generally eager to share their

experience with colleagues from other airfields, and this rich source of knowledge should not be overlooked by any airport management team that creates a snow removal plan.

EMERGENCY OPERATIONS

Every airport staff must be prepared to manage emergency situations. Although a large aircraft crash is the primary emergency event that comes to mind, good contingency planning will also consider such possibilities as hostage situations, weather events, crowd control, and building structural fires.

Regardless of the emergency event, the involved airport personnel should carry out their duties with these priorities in mind:

- * The protection and preservation of human life is the foremost priority and must take precedence over the following activities.
- * To the extent possible, property damage should be controlled and minimized.
- * Normal airport operations should be restored as soon as feasible.

An *airport emergency plan* is a practical document that outlines the general actions to be taken by specific individuals and organizations; however, no written document can provide standard answers for all the possible contingencies an airport employee may encounter during an emergency. Even the most exhaustive emergency plan should only be considered a checklist to be used by trained individuals during a stressful time.

The emergency plan also provides a vehicle for confirming (and *reconfirming*) the commitment of various parties that agree to respond to an event. Many types of emergencies require a response from non-airport organizations that are not subject to the direct management control of the airport sponsor. If the emergency plan is reviewed on a regular basis, this action provides a valuable “re-education” of all the parties involved.

During such a review meeting, the airport management may conduct a *tabletop* exercise wherein the responsible parties gather in a conference room setting to study a hypothetical problem and discuss their respective responses. This practise can be a relatively inexpensive way to uncover flaws or miscommunications in the plan. Certain airports that must comply with Federal Aviation Regulation Part 139 (outlined in a later chapter) are required to conduct a full scale exercise of their emergency plan on a regular basis.

There is an old adage that “plans are nothing, but planning is everything”, and this certainly applies to the area of emergency planning. No emergency plan can be considered a total source of answers for the involved personnel; however, if the plan is continually reviewed and updated, it reinforces an attitude of preparation, and encourages the participants to use a methodical, orderly response to an inherently chaotic event.

WILDLIFE MANAGEMENT

Even the smallest airports require several hundred acres of cleared, undeveloped property in order to provide an unobstructed area for airfield operations. As such, it is common for airport property to harbor a variety of wildlife, some of which can interfere with the safe operation of aircraft.

A significant hazard is created by birds flying in the vicinity of landing and departing aircraft. These birds may be flying across the airport on a migratory route, or they may be specifically drawn to the airfield’s grass areas as a source of food or shelter. Certain airfield maintenance practises can be used to diminish its attractiveness to birds; however, none has yet been found to be universally effective. Indeed, some practises that discourage a specific species can actually attract a different species. In addition to airfield maintenance practises, airport employees can use a variety of methods to frighten birds away from the airfield. Consultation with the appropriate wildlife authorities is recommended prior to commencing such actions.

Animals on the ground can also pose a serious hazard to aircraft, especially on runways where aircraft will be operating at high speed. Although smaller creatures (such as rabbits), will normally not cause a serious structural failure when struck, larger animals (such as deer) can cause a catastrophic event if struck at high speed. Even domesticated animals, such as dogs, can find their way onto an airfield and create a potential for harm. Prior to planning for their removal, consultation with the appropriate wildlife officials is again recommended.

MAINTENANCE

Airports have large physical plants that require ongoing maintenance in order to be operationally available to aviation users. Proper maintenance is also necessary to keep these expensive assets in service for their full economic lifespan.

As with any plant maintenance staff, the actual workload will be divided between preventative maintenance and repair work, with repair work ideally constituting the minority of total labor expended. On the airfield, the primary

work items include pavement maintenance, airfield lighting maintenance, and groundskeeping. Within the buildings, primary work items include structural maintenance, systems maintenance and control, and custodial services.

It is important to note the high sophistication of many building systems in large terminal buildings. Modern heating, ventilation, and air conditioning systems (commonly called HVAC), baggage conveyances, and electrical distribution networks are prime examples of intricate, computer-controlled systems that require a high level of skill from their operators. Without an adequate base of training and experience, an airport employee will not be able to effectively maintain these critical assets.

The actual strategy for providing airport maintenance service varies between the extremes of conducting all services with in-house employees to providing all services through contracts with external companies. Many airport organizations use a blend of both, providing core services with an in-house staff, and contracting out specialty work (such as elevator maintenance) to external firms better equipped for such tasks.

The actual organization of an in-house airport maintenance department frequently follows a geographic segmentation (example: building maintenance staff and grounds maintenance staff), and/or a purely functional division (example: HVAC section, electrical section, vehicle maintenance section, etc.). Regardless of these organizational preferences, some critical issues to explore when assessing such a department include:

- * *Manpower* : Is there a sufficient quantity of personnel; do they have the requisite skills; are they efficiently deployed?
- * *Equipment and tools* : Are they appropriate to the needs; are they properly maintained; are they controlled and accounted for?
- * *Training* : Are the employees provided with adequate training on specific systems; is there a proper checkout for workers prior to their use of new equipment; is there general safety training for all employees?
- * *Records* : Are proper manuals, logs, and records being maintained; are they available to those employees that need to access them; are they systematically reviewed and updated?
- * *Integration* : Is the maintenance force comfortably integrated with the other departments, especially operations and communications; do the maintenance employees have a customer service orientation towards the airport's tenants and passengers?

Sadly, a maintenance staff that performs at a high level is frequently little noticed for their effort. Only when an important asset is out of service do they suddenly become “visible”.

CLOSING THOUGHTS

Once again, this chapter is not meant to accurately describe the organization of a specific airport’s operations department; rather, it is only a brief outline of the major categories of work that are required to keep a modern airport operating in a safe and effective manner. Furthermore, no textbook can ever describe all of the events an airport’s operations staff will face during their workshifts.

Accommodating Air Force One, quelling a near riot when a charter flight fails to depart, and chasing alligators off of runways are real life examples of the many unexpected events that airport operations personnel will face as they strive to keep their airports open and available for public use.

MASTER PLANNING

INTRODUCTION

For the purpose of discussing this subject, it is again useful to envision an airport as a machine rather than a place. An airport is a machine that takes people and cargo out of air vehicles and places them into ground vehicles (and vice versa). Conceptually, this machine is composed of four basic parts:

AIRSPACE in the immediate vicinity of the airport

AIRFIELD where airplanes move about on the ground

TERMINALS where airplanes and ground vehicles exchange people and cargo

ROADWAYS that connect the terminals to the local highway system

Thinking of these four parts as connected gears in a machine, one can easily envision how a delay in a single segment can slow the entire machine. For example, an airport with newly-lengthened runways may receive additional airline service and suddenly be constrained by an overloaded terminal building. After the terminal is expanded, the inadequate roadway network becomes the most significant bottleneck, and so on.

A point about the *airspace* segment bears mention. Although the airspace above the ground is controlled by the federal government, airport executives are keenly interested in keeping the airspace near their airports free from obstruction, because obstructions can hinder an airport's ability to accept aircraft for takeoff and landing. Since the airport owns neither the airspace nor the land outside its fence, keeping the local airspace free from obstruction is a difficult exercise.

With this mental model, master planning can be appreciated for what it really is: *master* planning a complex puzzle of interactive parts. Given the

dynamic nature of the aviation industry, this planning is never brought to final completion and many documents are routinely updated at frequent intervals. Traditionally, the process produces an *Airport Layout Plan (ALP)* which indicates the current airport facilities and their expansion capability for the future. This ALP provides a template for (but not a firm commitment to) the ultimate physical buildout of the airport. If the airport owner or *sponsor* has accepted federal funding and signed grant assurances, their ALP must receive approval by the FAA.

PROCEDURE

Although the master planning process can be lengthy and involved, the procedure itself is straightforward:

1. The first step involves an *inventory* of the existing conditions, such as the airport's physical facilities, an economic profile of markets served, air service patterns, current levels of activity and so forth.

2. The *forecast* of future demand is the most difficult, yet most important step in the entire process. Whether based on intuition or detailed statistical analysis, any forecast is ultimately someone's best guess about the future. Needless to say, if the forecast proves wrong, the master plan will not adequately prepare the airport's management for the events that unfold.

3. Once the forecasted level of activity is established, it is *compared* to the inventory to determine which existing facilities will be inadequate for the projected future levels of demand. After these additions/expansions are identified, they are *prioritized* in a logical manner.

4. Any new facilities to be constructed will obviously entail an expense so a brief *financial plan* outlines the probable order of cost for the recommended additions. This plan frequently provides the foundation for a more detailed financial analysis when management actually commits to expansion.

5. Prior to completion, the airport master plan is *coordinated* with other public planning agencies to determine if it is compatible with their future intentions. Though this item is listed last, an airport staff may find it desirable to involve other agencies in the entire planning process, especially if large scale changes are envisioned. If environmental issues may pose an impediment to further construction, this coordination may include the appropriate government agencies that oversee such issues (at least one large airport has created an *environmental* master plan as an adjunct to the original document).

CRITICISMS

The master plan is not a business plan. Most airport master plans are primarily engineering documents, not strategic business plans. A traditional airport master plan does not determine that a facility *will* be built or even that it *should* be built; it only states that it *can* be built as a response to future demand (if the forecast proves accurate). Once the plan is complete and adopted by the airport's leadership, it does not have to be acted upon until conditions warrant. In the meantime, the master plan is not a blueprint for success; rather, it helps management *avoid failure* by showing where space must be reserved for future facilities (in other words, as a reminder not to build a hangar on land reserved for the new runway!).

Many management staffs supplement their master plans with business plans that define goals and objectives after comparing the airport's internal strengths and weaknesses to external threats and opportunities. Conducting this process while the master plan is under review can be a highly productive exercise.

Forecasting is becoming less reliable. Although forecasting has never been a precise science, predicting aviation demand has become even more difficult in an era of airline deregulation and ten-fold reductions in small aircraft manufacturing. To address this situation, many master plans now forecast a *range* of future possibilities describing high, low, and most-probable demand conditions. Additionally, the plan may include consideration of single events (such as airport selection for an airline's hubbing activity) that cannot be forecasted with certainty but are nonetheless prudent to consider. As aviation markets become less predictable, many planners are becoming more creative in their quest to add flexibility to their forecasts.

Financial plans do not account for market realities. Again, because traditional master plans are primarily engineering documents, their financial plans are usually brief listings of probable costs for the various facilities to be required in future years. Whether or not the local aviation market can absorb the additional fees (or local citizens can absorb the taxes) necessary to pay for these facilities is normally not addressed. This weakness further highlights the usefulness of a strategic business plan to supplement the master plan.

FEDERAL RESPONSIBILITIES

INTRODUCTION

Federal Aviation Administration directions to the U.S. airport industry are primarily contained in three types of documents. *FAA Orders* are internal publications that outline procedures to be followed by FAA personnel as they perform various responsibilities. Although these Orders do not address airport employees directly, they clearly state how a particular issue should be interpreted and addressed by the appropriate federal official. *Advisory Circulars* are published to provide useful guidance about a variety of aviation subjects and include an entire section (identified by the prefix number “150”) specifically devoted to airport related matters. As their title indicates, these documents are only advisory in nature; however, airport sponsors must contractually agree to comply with the guidance contained in certain circulars as a result of executing a Grant Assurance (more on this later). The most authoritative form of federal direction is contained in *Federal Aviation Regulations*.

The Federal Aviation Regulations (FARs) are found in Title 14 of the Code of Federal Regulations, Parts 1 through 199. This chapter will summarize the three primary federal aviation regulations which affect the operation of airports, as well as some federal responsibilities that are not contained in the FARs. The listing is not exhaustive and does not review the important non-aviation federal requirements that are becoming increasingly significant to airports (some of which are outlined in the following chapter).

FAR PART 77

This regulation establishes standards for determining obstructions in navigable airspace and applies to any person or company intending to erect a tall structure. Through a series of formulas and descriptive graphs, Part 77 establishes notice requirements for objects above a certain height (note: any

construction on an airport requires such a notice). Once a notice is received (on a standardized form), the FAA will examine the proposal to determine if the object will be:

- * Not an obstruction to air navigation.
- * An obstruction, but not a hazard if certain marking and lighting requirements are met.
- * A hazard to air navigation.

In making this determination, FAA personnel apply specific height tests contained in Part 77; however, they will also seek additional comments from other FAA departments. Sometimes (as in the case of possible electronic interference with FAA equipment), these additional comments can be *subjective* in nature. The point is this: most airport executives can apply the height criteria from FAR Part 77 and determine if a proposed object will fall below the critical limits; however, one cannot then assume that the proposal will receive FAA approval. This can't be known for certain until written confirmation of FAA approval is received.

Two additional points about Part 77 should be mentioned. First, the regulation establishes significant penalties for failure to file a required notice of proposed construction . Otherwise, a private individual or company who files this notice is free to ignore the final determination from FAA. If someone builds an object that has been declared a hazard to air navigation, FAA will act to reroute aircraft away from the hazard, even if this action impairs the efficient functioning of a nearby airport. This makes sense when you consider that FAA's mandate is the safe operation of airspace, not the control of land development. An exception to this rule is found in FCC-licensed antennas since the FCC will not grant their license until FAA declares the proposed object is not a hazard. Sometimes, insurance companies can also be used for leverage since they don't wish to be liable for a structure that has been declared hazardous by a federal agency.

The other point to bear in mind is that compliance with FAR Part 77 does not mean that nearby objects will have no effect on the operations of an airport. A different FAR specifies how high an airline aircraft must clear all obstructions in its flight path. Still another FAA document specifies the height clearances used in the design of flight paths into airports used during inclement weather conditions. A particular airport may have no obstructions identified through the FAR Part 77 process yet still suffer from restrictions to flight operations because something near the airport is "too tall".

FAR PART 107

This regulation is the centerpiece of airport security in the U.S. and provides for the safety of persons and property traveling in air transportation against acts of criminal violence and air piracy. In broad terms, the regulation requires airports to:

- * Secure certain defined areas from unauthorized access. To secure an area means to (1) prevent or deter access in the first place, (2) detect an intrusion if it does occur, and (3) respond to the intrusion in a timely and effective manner.

- * Provide a Law Enforcement Officer (LEO) to support the airlines' passenger screening process. This LEO must be a "real" police officer who has (1) arrest authority, (2) a uniform and badge, (3) a firearm and authorization to use it, and (4) the same training that local jurisdictions require for their police officers. Note that the LEO does not participate in the screening process; rather, the officer responds when summoned by the screening personnel.

The actual procedures implemented at a particular airport will be contained in an FAA-approved Airport Security Manual. In effect, this manual custom-fits FAR Part 107 to a specific airport, and the manual's procedures and requirements have the same effect as the regulation itself.

A separate FAR (Part 108) requires the *airlines* to conduct the passenger screening process and to refuse to transport a person who has possession of a weapon or who refuses to submit to screening. Airports and airlines are expected to coordinate their programs; however, this is easier said than done since airport security procedures have to be customized at each location. These customizations require professional judgment, and different people will routinely disagree over whether or not a certain procedure provides effective security.

This security system was created in the 1970s as a response to the air piracy threat of that time, primarily a deranged individual who desired notoriety or passage to a foreign country. A simple screening device placed in the airport was an effective defense against such a threat. Today's threat environment is complicated by the existence of well armed paramilitary groups who seek to commit air piracy as an act of terror. Additionally, aircraft bombing has become a more pronounced threat and off-airport missile attacks are currently being studied by FAA as a new threat scenario. Although such crimes are targeted at an aircraft, the act itself may be directed against the national interests of a sovereign state.

In many other countries, the national government responds to these acts as crimes against the state. These governments place their national security

personnel in charge of airport security, using national resources to counter a national threat. In the U.S., the existing security apparatus has been retained with only minor adjustments. FAA attempts to provide airports with advance intelligence about potential threats, but airports and airlines are still expected to provide the resources to deter a terrorist act that may be a professional paramilitary operation. There can be little doubt that the security system established by FAR Parts 107 and 108 cannot deter these more serious acts of terror that we face today.

A final note about airport police: although FAR Part 107 requires their presence at airline-served airports, most airport police spend a *minority* of their time and effort on anti-hijacking matters. Airports act like small cities and generate crime, accidents and mishaps which require routine police services. An airport security manual does not constitute a complete statement of the total law enforcement needs of an airport; rather, it only details the anti-hijacking effort. Procedures for traffic enforcement, crime response, facility security and so forth are determined by the airport in conjunction with the local law enforcement community.

FAR PART 139

Just as pilots must demonstrate their competency to receive a pilot certificate, certain airports (but not all) must do likewise in order to receive an airport certificate. This certificate permits an airport to receive airline operations. FAR 139 specifically applies to:

- * Land airports (not *seaplane* airports);
- * Serving airlines that carry passengers;
- * In scheduled or unscheduled operations;
- * Using aircraft with more than 30 seats.

Like the requirements of FAR 107, this regulation requires the airport to create and maintain an Airport Certification Manual which customizes the regulation to a specific airport. Since anything stated in an Airport Certification Manual has the practical effect of being a federal regulation, it is best to incorporate only those items that are specifically required by FAR 139. Any other internal operating procedures should be recorded in a separate document.

Generally speaking, the most costly dictate of FAR Part 139 is the requirement to provide Aircraft Rescue and Firefighting service (ARFF). The regulation specifies:

- * The minimum firefighting equipment necessary.
- * How quickly this equipment must respond to an emergency.
- * The minimum training items for firefighters.

The requirement with the greatest impact on the day to day operation of the airport is the requirement to:

- * Inspect certain facilities on a routine basis;
- * Detect any anomalies in these facilities;
- * Report these anomalies to the flying public;
- * Insure anomalies are corrected in a timely manner.

This process of inspect-detect-report-correct is the core job description of many airport operations personnel. At airports that are not regulated by FAR 139, it is still important for the airport owner to establish a routine whereby a knowledgeable person inspects-detects-reports-corrects.

GRANT ASSURANCES

Federal financial assistance is available to many public airports (and a few privately-owned public-use airports) to acquire property and to construct certain improvements such as runways and taxiways. These funds are managed by the FAA in its Airport Improvement Program (A.I.P.). It's worth noting that these funds originate from federal taxes on the aviation system (e.g. an airline ticket tax, an aircraft registration fee, aviation fuel taxes, etc.).

When an airport accepts a grant of money from the FAA, the airport will execute a Grant Agreement which includes Grant Assurances. In essence, this is a contractual agreement between airport and FAA wherein the airport *takes* federal money and *gives* a promise to abide by certain federal wishes. Most of these assurances are well established and include:

- * Agreement to suitably operate and maintain the airport.
- * Agreement not to grant any private firm an exclusive aeronautical privilege or right.
- * Agreement to take appropriate action to remove hazards to air navigation.
- * Agreement to allow use of the airport by government aircraft (under most conditions at no charge).
- * Agreement to provide land for FAA or related weather service facilities at no charge.

A specific requirement currently under close scrutiny deals with airport revenue. This assurance requires that all revenue generated by the airport be used *by the airport* and not diverted to other purposes. If the federal government invests aviation tax revenue in a particular airport, it is sensible to expect the benefits of that investment accrue to aviation users. Unfortunately, when local

communities suffer a financial crisis, this grant assurance is sometimes forgotten in the search for quick funds to balance a city or county budget. Federal investigators have become more aggressive in their pursuit of violators and there is no reason to suspect this trend will change.

From time to time, new assurances are added, sometimes on an ad hoc basis by a particular FAA official who desires a certain feature at a particular airport; thus, every Grant Assurance document should be reviewed carefully prior to execution.

Certain airports were constructed or expanded by the federal government during World War II and later transferred to the local city or county. These airports are classified as War Surplus airports and retain certain obligations to the federal government by virtue of this status. Although the bulk of the obligations are similar to grant assurances, it is important to note that these obligations are covenants that run with the land, not a simple contractual agreement between two parties.

Additionally, War Surplus airports will find an interesting reversion clause in the title documents. This clause states that the federal government can take possession of the airport and all its improvements during a time of war or national emergency. As a practical matter, this clause should cause little concern; however, conservative lending institutions may be wary of loaning funds for capital construction on such an airport.

CLOSING THOUGHTS

Once again, this chapter is only a fast review of the primary federal responsibilities which impact airport executives on a routine basis. Traditionally, federal laws and regulations have focused on aeronautical matters. Non-aeronautical matters such as procurement, zoning, sunshine laws, etc. are mostly governed by State and local law.

The federal regulatory system is changing as our government moves away from a tradition of regulating entire *industries* with specific federal agencies (i.e. Bureau of Mines, Department of Agriculture, Federal Aviation Administration, etc.). Today, federal regulation is increasingly directed toward a specific *function* that cuts across all affected industries. Thus, EPA regulates environmental matters, OSHA regulates workplace safety, the Corps of Engineers regulates development in wetlands, and so on.

This change not only adds another layer of federal responsibilities, but also brings new frustrations as different federal agencies come into conflict with one another and vie for "regulatory prominence" on specific issues. More importantly, it forces airport executives to deal with regulators who do not

understand the aviation industry and have no vested interest in ensuring its viability. Sadly, there is no reason to believe this trend will reverse in the near term, and airport executives will continue to find their airports providing the actual battleground for many more of these issues.

ENVIRONMENTAL ISSUES

INTRODUCTION

This chapter is organized in a practical manner by outlining the primary environmental issues facing U.S. airports, and describing the general options available for action. Environmental law and environmental science are both evolving rapidly; therefore, current regulations must always be reviewed and specific professional guidance sought prior to initiating action.

AIRPORT NOISE

Airport noise is probably the longest standing environmental concern facing our industry. As a result of decades of research (and litigation), a clear foundation of information is available to any airport owner facing this difficult issue.

What is airport noise? Somewhat like beauty, noise is in the mind of the beholder. Simply stated, noise is sound energy that someone considers undesirable. Obviously, different people will form different judgements about whether or not a particular sound event is undesirable; however, a general agreement exists that the primary features which determine the “irritation factor” are (1) the intensity, or “loudness” of the sound, (2) the pitch, or frequency, of the sound, (3) the duration of the sound event, and (4) the time of day that the event occurs.

What can be done about airport noise? Generally speaking, five practical options exist. First, the aircraft can be made to operate more quietly. Aircraft manufacturers are building less noisy aircraft, and U.S. airlines (motivated by federal regulations) are purchasing these aircraft for their fleets. Secondly, the aircraft can be flown in a manner that places them further from the unhappy people. This action requires the approval of federal air traffic control officials, as well as the flight crews’ concurrence that any new flight procedure is safe.

Thirdly, the people themselves can be moved and the vacated property rezoned for more appropriate development. This expensive option can be highly disruptive to the community; however, in many circumstances it is the only practical course of action. A fourth option providing less community disruption is soundproofing of structures located in noisy areas. Although helpful, this action does not address noise in the outdoor environment. Finally, an airport can consider curfews, or temporary periods during which some or all aircraft operations are curtailed. Because this last action can affect interstate commerce, any proposed curfew is subject to federal scrutiny.

What standard programs exist for airports that plan to address airport noise concerns? National standards to identify airport noise and implement a mitigation program are established in FAR Part 150. This regulation defines an acceptable method to measure noise (in a manner that quantifies the irritants previously mentioned) and then produce a noise exposure map that defines noise contours around an airport map and labels their relative value with a numerical scale. Using this map, an airport sponsor can cooperate with federal air traffic control officials and local community planners to analyze which noise mitigation methods are most likely to reduce the number of people exposed to high airport noise levels. As a result of this work, the airport may choose to create an official noise compatibility program which outlines its intended actions to minimize noise impacts and local land use incompatibility.

If an airport wishes to restrict the operations of certain aircraft, it must comply with the requirements of FAR Part 161. For the purpose of noise regulation, aircraft are classified as Stage 1 (noisiest), Stage 2 (quieter), and Stage 3 (quietest). (At the time of this writing, international aviation authorities are debating the protocols of a possible Stage 4 classification.) When an airport owner plans to restrict operations of Stage 2 aircraft, Part 161 dictates the need for a cost-benefits analysis, and the provision of proper notice to all affected parties. If the airport wishes to impose restrictions on Stage 3 aircraft, its program must be approved by FAA, an action that is far from automatic.

Airport noise control is a complicated procedure which creates an interesting blend of science, politics, and money. Furthermore, even the most reasonable and professionally crafted noise control program cannot address the hidden agendas that sometimes attach to the issue. Accordingly, in many communities where airport noise is perceived as a significant problem, a noise control program is sometimes viewed as a continual process, rather than a discrete solution which will come to an end at some point in time.

HAZARDOUS SUBSTANCES

The operation of a modern airport requires the use of a variety of substances that can be hazardous if used in an improper manner. This section outlines a mental framework for understanding their proper handling from purchase to disposal.

Purchase and control. To assist purchasers in understanding the hazardous nature of specific substances, federal regulations require manufacturers and importers to provide a Material Safety Data Sheet (MSDS) with each of the chemicals they ship. OSHA standards also require employers to have this document for each of the chemicals they use in the workplace. The MSDS lists a variety of information including safe handling procedures and proper response in the event of a spill or inappropriate human contact. All substances that come with an MSDS should be properly inventoried and employees should have timely access to this important safety data.

Usage. Items must be used in accordance with their printed instructions and any supplementary MSDS data. Furthermore, it is important to recognize that a substance which is safe when properly used can become hazardous through improper use. A common example is the excessive use of pesticide which can later drain into the local waterways and pose a threat to human health and wildlife.

Disposal. Items (and their containers) must be disposed of in accordance with their printed instructions and any supplementary MSDS data. Certain items can only be removed from the property by an authorized transportation service and disposed of at an authorized site. The airport owner retains a clear responsibility for ensuring that the transport and disposal services hold the proper permits.

Site clean up. If a portion of the airport property is found to be contaminated by a hazardous substance, the airport sponsor usually retains the ultimate responsibility to properly clean the site, even if the pollution was not caused by its own employees. If a separate company is identified to have caused the contamination, they may be legally liable to the airport sponsor for the clean up effort; however, the airport is ultimately held accountable to the appropriate government officials for ensuring compliance with environmental laws. For certain items, such as asbestos and PCBs, the landowner retains continuous liability, even after the material is finally stored in a proper disposal site.

Accidental spills. For many substances, the accidental spill of a small quantity merely requires a timely clean up and disposal in accordance with printed instructions. If the quantity of the spill is greater than a specified limit, notification to a specific government agency may be required. Some substances

are considered so hazardous that holding them on the property in certain quantities requires the owner to produce and maintain an emergency response plan.

This section provides a cradle to grave overview of the proper strategies for handling hazardous materials. It is important that the airport's management team understand this responsibility and communicate it throughout the organization. Furthermore, the airport's employees must have access to a knowledgeable person (either fellow employee or hired consultant) who can provide professional guidance and answer specific questions concerning hazardous materials.

FUEL TANKS

Airports are required by their function to provide a means of storing and dispensing aircraft and automotive fuels, and the two options available are *above-ground* tanks or *below-ground* tanks. When several tanks are gathered together in a centralized location, they are commonly referred to as a fuel farm.

Underground tanks have the advantage of being less exposed to most fire and explosion potentials. Indeed, at certain locations on an airfield, an underground tank may be the only option a local fire marshall will approve. The primary environmental disadvantage of an underground installation is its potential to leak fuel into the ground without prompt detection. To counteract this disadvantage, a fuel farm operator must keep meticulous inventory records and, if indicted, perform a tightness test wherein the tank is pressurized and monitored for leakage.

Above ground tanks provide the operator with an ability to visually confirm any leakage. Furthermore, when constructed with an effective dike around the fuel farm, any leakage can be contained before it enters the ground. The obvious disadvantage is the fire and explosion potential mentioned previously.

Regardless of the type of installation, proper management of a fuel farm requires the employment of trained personnel to carry out their duties in a responsible manner. In addition to understanding proper handling procedure, it is imperative that these employees understand and comply with all applicable regulations concerning permits, required documentation, and notification procedures. As with any other hazardous substance, an improper fuel discharge places a liability on the airport owner even if the installation is owned and operated by another company. In order to minimize this exposure, some airports have chosen to construct consolidated fuel farms and operate these facilities with their own personnel.

STORMWATER RUNOFF

As stormwater runs across the airport property it washes routine fuel and oil stains from the pavements and carries this and other chemicals into the local waterways. In addition to manmade materials, this drainage can also carry undesirable soil sediments into nearby bodies of water. For these reasons, federal law requires U.S. airports to hold a specific permit for its stormwater runoff, and to maintain a written plan that documents the airport's management practises to reduce this source of pollution.

In addition to this permit addressing the overall operation of the airport, a separate stormwater permit must be obtained for certain types of construction projects. As noted earlier in this chapter, events such an accidental fuel spill or an improper application of pesticide can result in a violation of these stormwater permits and subject the airport owner to additional penalties.

WETLANDS

The U.S. Corps of Engineers (COE) and the Environmental Protection Agency (EPA) are jointly charged with protecting the nation's wetlands. Wetlands serve several important functions including flood storage, sediment trapping, and provision of wildlife habitat. Because wetlands can be defined by their vegetation and soil type, it is important to note that standing water does not have to be present for a parcel of property to be considered jurisdictional wetlands.

Prior to any construction activity, a qualified expert can survey the site to determine if wetlands are present. If so, these can be identified and the identification confirmed by officials from the local COE office. Thereafter, the options available to the airport are (1) avoid construction in these wetlands, or (2) obtain a permit from COE to fill the wetlands. If the wetlands area is smaller than a certain limit, this permit may be issued in a relatively automatic fashion. Above this size limit, the airport may need to develop a mitigation program wherein it (1) designs the project to minimize its impact on wetlands, and (2) agrees to create (or protect) new wetland areas to compensate for those that will be filled.

In some instances, large scale wetland master plans have been accepted wherein the developer and COE agree which wetlands may be filled and which will require mitigation as the property is developed over a period of time. In conjunction with such a plan, an airport sponsor may even purchase an off-site location of wetlands and preserve it from future development as a "wetlands bank" to pay for the airport wetlands that are filled.

Although COE is the approving authority for wetland actions, federal law stipulates their consultation with other interested organizations (such as the U.S. Fish and Wildlife Service), and provides reviewing authority to the Environmental Protection Agency. In some instances these various agencies hold differing views about the appropriate response to an airport's request to build within wetland areas, and the approval process can become unwieldy.

NEW PROJECT PLANNING

Federal law specifies that certain federally-funded projects must be preceded by an *Environmental Impact Statement (EIS)*. The EIS must examine a large variety of issues such as presence of endangered species, areas of historic significance, air pollution, and flood hazards. Furthermore, the EIS study must be conducted in a manner that involves close coordination with external groups that may experience these impacts should the project proceed. For large, controversial projects, such as a new runway at a major metropolitan airport, the EIS process can become a laborious and lengthy affair.

At a different level, projects that will probably produce less severe impacts on the community are required to be preceded by a simpler *Environmental Assessment (EA)*. Examples of proposed projects requiring an EA include a major runway extension, or the installation of a new instrument landing system. The EA will normally conclude (1) with a finding of no significant environmental impact, or (2) that impacts are significant and an EIS is warranted.

In a final category is a listing of projects which the FAA has predetermined to be excluded from these requirements for a formal environmental study. Regardless, the project planners are still expected to explore relevant environmental issues and address them in an appropriate manner.

CLOSING THOUGHTS

For the most part, U.S. airports face the same environmental concerns as other large industrial plants; however, airports also create unique situations with aviation-specific operations such as aircraft deicing and ARFF firefighting training (both of which result in large scale discharges of regulated substances). Although compliance with the myriad environmental regulations is difficult (and frequently confusing), airport staffs must remain involved in these issues and commit their best professional effort to confirm that environmental matters are being addressed in an appropriate manner.

Environmental laws and regulations are constantly evolving, as is the relationship between federal, state, and local agencies that are charged with

oversight and enforcement. Specific issues that are coming under increased scrutiny include air quality, discharges from sewerage systems, and “environmental justice” which examines impacts on different segments of society. Accordingly, this chapter has avoided most references to specific laws and regulations. As stated in the introduction, the purpose of this chapter is to outline a strategic framework for understanding an airport’s environmental responsibilities. Directing the actual effort must be undertaken with professional advice and guidance from experienced sources.

PERFORMANCE MEASUREMENT

INTRODUCTION

Airport management has traditionally been viewed as a process-oriented business, and our industry has a long track record of recording and analyzing activity data. In recent years, airport executives have become more interested in defining and measuring the actual results achieved by their organizations. This chapter overviews the type of strategic data that are routinely used to define overall airport activity and performance. It must be emphasized that the next few pages do not provide a complete insight into the vast inventory of measurements that are employed at U.S. public airports; rather, the following information is intended to outline a general pattern of data collection and analysis.

ADVANTAGES

A well-defined system of measuring and analyzing organization performance provides many advantages, such as:

- * *It maintains a focus on results.* An old joke about rudderless groups offers the punch line "Having lost sight of our goals, we redoubled our efforts"! Human nature being what it is, both supervisors and employees may unduly focus their attention on the actual process of their work if they are not constantly reminded to monitor ultimate outcomes and results.
- * *It improves communication within the organization.* A good system communicates what the management team deems important enough to measure, and allows employees a way to provide feedback. In a healthy corporate environment, this continuing dialogue will grow over time and improve overall communication throughout the company.
- * *It creates learning opportunities.* As supervisors and employees study their collected data, they invariably find patterns that reveal new insights, and unexpected surprises. The healthiest organizations are those that expect their employees' work activities to be a continual learning experience, and a performance measurement system can encourage this objective.

- * *It can provide an early warning of future problems.* It's sometimes said that large problems could have been easily solved when they began as small problems, and certain measurements can be designed to provide appropriate warning signals of developing concerns. For example, many accounting departments track accounts receivable information, and report when a tenant's payments fall outside a specific limit.
- * *It enriches the financial data.* Practically all airport organizations have well developed financial systems that track budget performance, and produce detailed Balance Sheets and Income Statements; however, adding operating information to the financial results can yield much deeper insights. For example, if car rental revenue is increasing while passenger traffic remains stable, it is likely that that passenger demographics are changing.

PITFALLS

On the other hand, performance measurement systems have natural pitfalls that must be actively countered in order to achieve all the advantages listed above:

- * *They can measure the wrong thing.* Many outcomes are difficult to define with simple numbers, and managers must use surrogate measurements instead. A simple example is counting customer complaints and presuming that less complaints equals greater customer satisfaction. When surrogate measures are necessary, it is useful to track several different parameters to provide higher confidence in the data.
- * *People can draw the wrong conclusions from the data.* As an example, airport terminals can be large-scale consumers of electricity, and many managers track their buildings' energy efficiency. One common measurement is total energy cost per square foot; however, a very high number may not necessarily signal a wasteful operating practice. Perhaps the terminal was designed as an architectural signature piece for the community, and its high ceilings and large expanses of glass will forever doom the structure to be an "energy hog". Without a broader knowledge of such conditions, it is easy to misinterpret any cost/square foot number.
- * *Managing to the numbers.* This common dysfunction naturally occurs whenever the management team makes it clear that certain target numbers must be achieved. Once employees perceive that managers believe the number itself is more important than the underlying reality, they will find

ways to give their bosses what they want. A simple example includes hiding the complaint box so that fewer comments will be recorded. While numerical targets can be useful for boosting performance, the actual number should not be perceived as an end unto itself.

- * *Comparing apples and oranges.* The instinct to compare one airport's performance numbers to those of other airports is natural and healthy; however, given that each facility is unique, a shallow listing of different numbers will probably not provide a meaningful insight. A common example includes automobile parking revenue per enplaned passenger. One airport may serve a passenger base that is primarily composed of local citizens who park at the airport and travel outbound. A neighboring airport may serve a resort destination whose passengers are more likely to be arriving tourists with no need for the parking facilities. Comparing Parking Revenue/Enplanement for these two facilities will be meaningless unless this difference is factored into the analysis.
- * *Political manipulation.* U.S. public airports are primarily owned by local public agencies, and operate in the public eye. Sadly, many communities have a social climate that encourages personal attacks on political enemies, and airports frequently provide the battleground for these partisan fights. If the airport board is perceived to be dominated by one political party, it's not uncommon for the opposition to misuse some of the measurements cited above to wrongly imply the airport is not being operated in the public interest. A competent staff may be able to provide the in-depth analysis to counter the charge; however, the public relations damage will have already been done. The general public will tend to remember the scandalous headline, rather than the thoughtful explanation provided later on an obscure back page. Needless to say, once this happens, the airport staff can lose enthusiasm for collecting numbers that may just be used against them.

Overcoming these natural pitfalls requires a deliberate and continuing effort, foremost being the full support of top management to collect the data honestly, and use it in a thoughtful manner. In all candor, employees must trust their leaders to use the information correctly, and not manipulate it to their harm. One way to encourage a healthy attitude toward a performance measurement system is to make the data openly available, and to routinely offer an analysis of the results and lessons learned; however, no system can be made to function properly in an atmosphere of mistrust.

Another useful way to overcome these pitfalls is to emphasize *learning* as the primary goal of performance measurement. A good measurement system will invariably point out poor performers within the organization; however, the data should be used for corporate improvement, rather than individual punishment. In

this regard, one U.S. airport has adopted a clear policy statement that performance measures will be used for learning *before* scorekeeping.

The sections that follow describe several categories of airport activity and performance measurement, and the general value of each to decision-makers. It is again emphasized that this listing is not complete, nor does it include many routine measurements that are commonly useful to all business enterprises.

ACTIVITY MEASURES

As previously stated, activity measures can be used to enrich the airport's financial data. Additionally, activity measures can be (1) collected over time and used to provide trend information, and (2) used in ratios to discover relationships, and their evolution over time.

Routine airline activity measurements include enplanements, deplanements, average weekly flight departures, average daily seat lift, and airline passenger market share. Additional information about the actual cities to which local passengers fly, and the average airfares paid on these routes can be obtained from a database maintained by the federal D.O.T. Since many of the landside activities at an airport terminal are generated by airline service, it is also useful to collect data on cars parked, car rental revenue, taxi trips and total passengers, as well as routine roadway traffic counts.

Routine air cargo activity measurements include enplaned and deplaned freight, enplaned and deplaned airmail, scheduled and charter cargo flight departures, and market share by individual cargo carrier.

Routine general aviation activity measurements include total number of based aircraft (categorized by type), itinerant and local operations, and retail gallons sold of jet fuel and avgas.

ANOMALY MEASURES

Anomaly measurements count those events that are outside the routine expectation of daily operations; nonetheless, some anomalies can be expected as part of the "background noise" at a busy airport complex. For example, if millions of people walk through a terminal building every year, some of them will slip and fall, no matter how well the floors and walkways are maintained. Likewise, busy roadways will invariably experience some automobile accidents regardless of their level of maintenance.

Good police detectives know there is no such thing as "the perfect crime", and one way to unravel a mystery is to look for clues that point to the criminal's

mistakes. Likewise, operational anomalies are those instances where events did not transpire as desired, and these “clues” can provide an important insight into an organization’s true level of performance if a responsible person explores patterns in the data. Using the previous example, a certain number of slip-and-falls can be expected at a busy terminal; however, if they all occur at the same location, and for the same reason (water puddle on floor), a problem is clearly indicated.

A sampling of some strategic anomaly measurements include aircraft accidents and incidents, ARFF responses, ramp accidents, aircraft/wildlife strikes, runway incursions, EMS responses, automobile accidents, slip and fall reports, and customer complaints. Some airport staffs include FAA Notices of Violation, release reports to environmental agencies, and lawsuits as items worth tracking over time. As a cautionary note, any such data collected can and will be used against you in the U.S. legal system. (One aircraft manufacturer made an important safety improvement to its aircraft, only to have a trial attorney use this action to “prove” that all previous models of that aircraft were therefore unsafe!) Accordingly, any data collected by an airport staff can be improperly manipulated; however, anomaly measurements are perhaps the most easily abused.

MARKET AFFORDIBILITY

Most U.S. public airports charge user fees to recover the expense of the facilities and services they provide. In some foreign locations, the nationally owned airport follows this logic to an extreme, and charges user fees that are simply not affordable by the companies and individuals that use the facility. Over time, traffic declines, the airport raises fees still higher, and a downward spiral ensues.

Most U.S. public airports have injected a businesslike discipline into their operations by comparing local fees and charges to those of similar facilities. While this activity does not provide the stronger discipline of purely competitive market forces, it does accomplish many of the same benefits.

Some routine market affordability measurements include total airline fees collected per enplanement, automobile parking rates, taxi customer charges, concession prices, and general aviation fuel flowage fees. In all cases, it is important to compare the local airport’s numbers to some other relevant operation. For example, it is probably unwise to compare the taxi fares at a small Montana airport to those of New Jersey’s Newark Airport.

HUMAN RESOURCES

Most human resource measurements that are collected by other businesses are relevant to airport operations, provided that appropriate corrections are made for the unique demands of airport operations. A common example includes percent of payroll spent on overtime. Most airports operate 24/7/365, and this must be taken into account when examining overtime needs (furthermore, police staffs have additional demands that frequently drive this measurement higher still). Many good sources exist for a complete listing of human resource measurements, and only a few are listed here.

Some common human resource measurements include percent annual turnover (and percent involuntary), number of worker accidents and total days missed due to injury, average length of service, percent of payroll spent on training, and worker's compensation experience factor.

OTHER MEASUREMENTS

One practical system of collecting further performance measurements is to classify them according to the airport's different operating departments. For example, the Police Department may also track arrests, tickets issued, percent of court cases found not guilty, and so forth. The Parking Lot Department may count average length of stay, nightly inventory count, and percent of transactions performed manually. The Finance Department may analyze the financial statements and track the measurements noted at the end of Chapter 5, as well as count the number of audit adjustments to the general ledger, auditor statements of exception, and so forth.

This chapter is not sufficient to recount all the measurements that can be useful; however, it does outline a logical way to sort and organize the information, and important tips to avoid the common pitfalls that can easily bedevil such a system. Once an inventory of reliable data has been collected and organized, it is only natural that managers will wish to compare their results to those of other airports.

BENCHMARKING

Benchmarking is the process of comparing the performance of one airport to that of others, or an accepted industry average. As noted in the opening chapter, airport size variations are very pronounced, and comparisons are most relevant with similarly sized facilities. A useful benchmark group can be constructed by selecting ten airports, five of which have slightly more passenger activity, and five with slightly less. If possible, the airports that compose this

group should be roughly similar in (1) local cost-of-living, (2) general weather climate, (3) terminal building age, and (4) aviation markets served. While it's unlikely to find the perfect match among ten such airports, it's important to avoid comparing a large general aviation airport in the desert southwest to a small air carrier airport in Maine!

When comparing the local airport's performance numbers to those of the group, these points should be kept in mind:

- * Be certain the numbers collected are reliable and well defined. Some airport staffs compose their numbers in different ways, and measures are not always comparable. It's important to communicate with an informed person at the other airports, and confirm the data collected is relevant.
- * Compare the local airport's numbers to the group's *median*, not the average. Doing so will help to eliminate the influence of extreme numbers in the sample.
- * Look beyond the numbers, and inquire about *best practices* if the local airport's performance appears to trail that of the group. Once again, a good performance measurement system is ultimately a learning tool, and discovering better operating methods from other airports is one of the best outcomes of any system.

In addition to direct calls to other airports, general industry information can be obtained from A.A.A.E., the Airports Council International-North America, the Federal Aviation Administration, and aviation industry insurance companies.

From time to time, useful benchmark data can also be obtained from non-airport operations. Disney World, for instance, is highly respected for its customer service practices, and some U.S. airports have improved their operations by studying this well-known American institution. When making comparisons to other businesses, it is again important to allow for the unique nature of airport operations. For example, janitorial costs of airport terminals are frequently higher than similarly-sized shopping malls because airports (1) operate 24 hours/day, and (2) experience distinct surges in customer activity throughout the day.

CLOSING THOUGHTS

Our fellow citizens are becoming more vocal in their demands for accountability from all public agencies, and public airports are no exception to

this growing trend. A good performance measurement system that tracks both inputs and outcomes is one practical tool for explaining an airport's performance to its citizens.

In any performance measurement system, the numbers themselves are not as important as the reality they represent. Men and women who develop their ability to see this deeper reality are sometimes said to have "a feel for the numbers", and it is common to see such people become good decision-makers.

Equally important is the wisdom to know what things cannot be reduced to numbers. Matters such as corporate culture, human group dynamics, and hard lessons learned from mistakes are not easily reduced to a column of numbers. Leaders in any organization are well advised to remember the Korean proverb that teaches decision-makers to use a cold mind *and* a warm heart.

COMPARISON TO FOREIGN AIRPORTS

INTRODUCTION

A fuller appreciation of the domestic airport system can be obtained by reviewing airport operations in other developed nations. Doing so requires a knowledge of the basic differences between the U.S. methods of ownership and operation and those of other countries. This chapter will summarize the more significant structural differences; however, a single chapter cannot adequately capture the variety of airport operations in over 160 countries of the world.

DIFFERENT AVIATION CULTURES

Laissez faire. Best exemplified by the United States since airline deregulation, this aviation culture provides for private ownership of airline companies and favors open competition with minimum economic regulation. As a result, airline companies exhibit a financial orientation and are highly profit-motivated. In the U.S. this paradigm has produced an airline system that operates with great financial efficiency, but is not always perceived to serve the public interest. A spirited debate continues about the long term viability of an air transportation system whose primary driving force is short-term profit.

Government ownership. As typified in France, this culture establishes state ownership for airline companies and provides strong regulation in order to preserve the government's investment. The airline companies are employee-oriented and motivated to cooperate with other government enterprises to produce high quality infrastructure and technology development. As expected, this culture produces a very high level of employment, although its ability to bear the continuing cost of this policy is coming under question.

Combination. Somewhere between the two cultures listed above, a combination model favors partial government investment in private airline companies. As featured in the German example, this system is competitive within certain guidelines and seeks to balance social issues (e.g. employment) with capital creation. Whether this model is a wise blend of the other two cultures or an inefficient attempt at partial competition is yet to be proven.

DIFFERENT GOVERNMENT INVOLVEMENT

Central planning and control. Public airports in the United States are predominantly owned by local units of government whereas many foreign airports are owned by national governments. Control by a single central government brings certain benefits (e.g. consistent airport regulations) as well as the customary disadvantages of control by a distant bureaucracy preoccupied with many unrelated issues.

Security. There is no uniform airport security system in place throughout the world. As previously mentioned, many foreign governments perceive air piracy and terrorism as acts of aggression directed against the nation, rather than crimes directed against an airline. In many instances, federal police agents (or even soldiers) intervene in the passenger boarding process and conduct security interviews and searches. Needless to say, this method slows the passenger boarding process, but can produce a higher level of security than the U.S. approach which assigns a major portion of the security responsibility to the airlines. On the other extreme, some countries (especially the less industrialized ones) lack the resources to properly enact aviation security measures and operate their airports with minimal perimeter fencing and poorly trained security personnel.

Military implications. All civilian aviation assets have military value and it is desirable that they be available in time of national emergency. In our country, the federal government (1) requires war surplus airports to revert to federal control if so directed by the President, (2) requires the FAA to support the Department of Defense's airspace needs, and (3) enters into voluntary contracts with private airlines to provide passenger and cargo lift during wartime (the Civil Reserve Air Fleet). In many foreign nations, the military value of these civilian assets is considered so significant that civilian airports are always under the control or quasi-control of a military agency. Alternately, a civilian agency may be traditionally headed by a high-ranking military officer. Needless to say, if all airports are owned by the central government, this structure is easy to implement.

DIFFERENT DEFINITIONS OF AIRPORT

The opening chapter defined an airport as one part of the airplane + airway + airport network. In countries around the world, the dividing line between these segments is not always found in the same location, for example:

Between airport and airway. In the United States, the federal government provides all air traffic control service on the runways, taxiways and in the airspace above the ground (though in some instances it does so by contracting with a local airport to provide operating personnel). In some countries, the airport management employs controllers to provide control services on the ground (ground control) as well as take-off and landing clearances and control in the immediate airspace environs (local control). Beyond a certain altitude, the airport controller will hand off an aircraft to a federal controller as it enters his airspace.

Between airport and airline. Traditionally, U.S. airports lease space to airlines which then conduct their operations with their own employees. In some European airports, the airport management provides aircraft groundhandling service (e.g. parking, loading, fueling, etc.) and/or passenger processing service (e.g. check in, ticketing, etc.) In some airports, all of these services are provided exclusively by the airport management; the airline has no freedom to use its own employees to handle its own aircraft. A lively debate continues as many airlines claim this system produces monopoly pricing and provides methods for the nationally-owned airports to discriminate in favor of the national airline. While many airports in our country are exploring the feasibility of providing groundhandling services to airlines, such an offering must be optional since current federal law protects an airline's ability to service its aircraft with its own employees.

DIFFERENT MARKETS SERVED

International vs. domestic. In the U.S. over 90% of all air travel is domestic in nature; in most other countries, international traffic is a much larger portion of the total (frequently the majority component). This condition exists for a variety of reasons, for instance, many countries are relatively small and domestic destinations can be easily accessed by ground vehicles. Further, some industrialized regions have well developed mass transit systems for internal travel. Serving a large market of international passengers affects the financial profile of an airport since international travelers spend more time in the terminal and can be offered duty-free products. (The duty free concession can be very profitable.)

Propensity to travel. Dividing a country's total enplanements by its population produces a number frequently referred to as the passenger index. Worldwide, the index is approximately 0.2 while in the United States (530M

passengers/280M population) the number hovers around 1.9, the world's highest. Propensity to travel can also be measured in *revenue passenger miles* per capita. Again, North America is the clear leader, generating RPMs per capita approximately 300% greater than second-place Europe. While there are many reasons why Americans exhibit a greater demand for air travel and a greater ability to pay its cost, these profound differences in passenger indices also support the argument that the U.S. has a mature air travel market while other world regions have greater growth potential.

Charter airline traffic. In some regions of the world, charter airline operations constitute a more significant portion of the total air travel market. This is particularly true in Europe where almost two-thirds of all charter flying occurs. Two reasons for this condition: (1) deregulation of the U.S. airline industry has significantly lowered leisure airfares, reducing the attractiveness of using charter travel, and (2) the European leisure market, and the preferences of its customers, is noticeably different (Europeans enjoy more generous vacation benefits and are generally more comfortable with group travel situations).

General aviation. The GA market in other countries can simply be said to be much smaller than our domestic market. The U.S., with less than 7% of the world's population, is home to almost 70% of all registered private aircraft. Although roughly half of all general aviation flying in the U.S. is conducted for personal reasons, the GA fleet in most other countries is primarily focused on business and commercial uses. Recreational uses are expensive and subject to strict government (sometimes military) oversight. In response, well organized flying clubs frequently offer an affordable method for civilian pilots to engage in personal flying. In some instances, these clubs even own a small airstrip as well as a fleet of aircraft.

INTERNATIONAL REGULATIONS

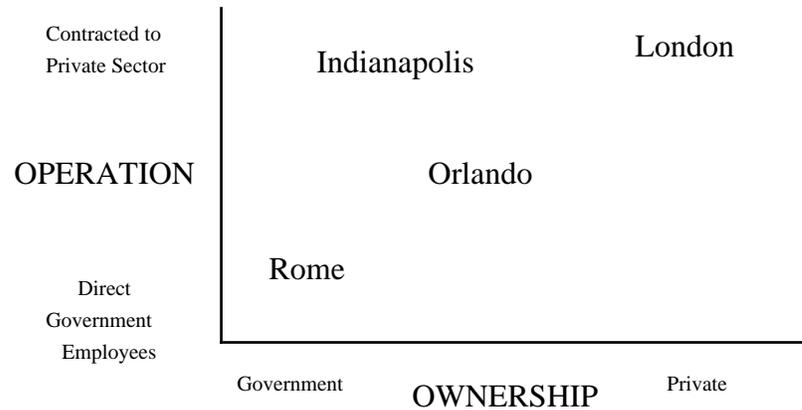
In 1944, representatives from 52 nations met at Chicago to create a framework for civil aviation. This conference provided the basis by which nations have been able to establish international air routes through bilateral negotiations. An additional achievement of this conference is the International Civil Aviation Organization, a U.N. body which recommends standards and practices for aviation. Today, over 160 nations are members of ICAO which has developed 18 technical annexes dealing with issues from meteorology to security to accident investigation. Although ICAO cannot enforce these standards by imposing sanctions on a violating state, they have greatly assisted the development of technical uniformity throughout world aviation.

ICAO annex 14 is the technical document addressing aerodromes and covers a broad range of topics in airport planning, design, operation, and equipment. In order to continually improve these standards, ICAO provides a

global forum through periodic meetings of national representatives where these annexes can be discussed and updated.

CLOSING THOUGHTS

Combining these global differences into a summary is a difficult exercise; however, the following chart provides a useful model for viewing certain airport management paradigms in relation to one another:



Throughout the world, airport ownership and operation can be viewed as a continuum that ranges from strong government control and operation to private ownership and operation. Somewhere in between these endpoints are *corporatized* operations (private companies whose stock is wholly or partially government owned), and *special-purpose governments* (such as independent authorities in the U.S.) Given the variety of different national cultures, government controls, and aviation markets, it should not be surprising that no single method of operation predominates.

Finally, it is worth noting that many of the world's regions with the highest growth potential are outside of North America. Although the forecasts differ, most show northeast and southeast Asia with the highest long-term potential, with Europe and Latin America showing the next highest potential. While the U.S. domestic market appears relatively mature, strong growth in overseas markets will eventually include increased routes to and from our shores, a prospect that can only be viewed as beneficial.

FUTURE DIRECTIONS

This booklet began by exploring the question *What is an airport?* Let us close by reexamining this question in light of the changing conditions in our industry and our world. Among these many changes, there are three significant trends that will shape the future of the air transport industry.

REMOVAL OF GOVERNMENT SUBSIDY

Beginning officially in 1926, our airline industry received massive subsidies from the public sector. Some of these subsidies were direct and intentional, for example:

- * Economic regulation protected inefficient carriers from outright failure (or directed comfortable mergers of those that did).
- * Air mail contracts were padded as a means of paying airlines to fly to small (unprofitable) cities.
- * Airline companies were offered favorable tax treatment to offset the cost of expensive aircraft.

Even more significant were the subsidies which were indirect or unintentional, such as:

- * Air Force purchases of civilian aircraft for military transportation effectively subsidized the manufacturing base (e.g. DC-3 = C-47, B-707 = KC-135, etc.)
- * The requirement to train pilots for three wars created a skilled cadre (almost 1,000,000) trained at no cost to the airlines who traditionally hired two-thirds of all their pilots from this group.
- * Until 1970, the Federal Government used general fund tax dollars to operate the air traffic control system and to provide construction grants to airports.

During the past 20 years, this large wave of subsidy has been slowly removed from the commercial aviation system. The airlines are no longer economically protected; air mail contracts are no longer padded; tax law changes have been mostly unfavorable; the Air Force and Navy want their own specially-designed transports (produced on separate production lines); and airline passengers are now taxed to pay for most of the government's cost to operate the Airway and Airport System.

In addition to the removal of subsidy, the airline industry has absorbed the imposition of new costs, including the airport/airline security system, environmental dictates on everything from aircraft noise to airplane de-icing, and a tax law that even requires payment from unprofitable companies.

Even the industry's cost of capital has increased as investors no longer perceive airline stock to be a "safe" investment protected by government intervention. Accordingly, successful airlines have doubled (or tripled) their historic profit margins in order to compete successfully on the stock exchanges.

This point is critical to understanding the true significance of airline deregulation: to recreate the system that existed prior to 1978 would require the re-establishment of government subsidies, not the simple writing of new regulations.

At this point in time, it is not probable that the federal government will return to large scale subsidization. Barring outright purchase by foreign governments, it can only be assumed that no subsidy will be reinserted into the air transport system. In the future, airline passengers will have to pay a fare that covers the true cost of the service they receive, something they have never previously been required to do.

MATURING AIRCRAFT TECHNOLOGY

When jet aircraft were introduced in the late-1950s, their high purchase cost was offset by a significant productivity gain. Stated simply, they carried many more passengers and flew faster. The introduction of jumbo aircraft in the 1970s likewise produced a productivity gain (twice the seats) to offset their higher purchase price.

Unfortunately, the sticker shock from today's new airliners is not offset by similar gains in productivity. Modern aircraft are safe, beautiful, and environmentally sensitive, but they carry the same number of people at the same speed as the old planes they replace. Their marginal improvements in fuel and labor efficiencies don't fully offset the increased purchase price.

A crude analogy can be drawn with pocket calculators. When this technology was new, advances came so quickly that people frequently replaced their calculators with new models that provided far more capability. After time, this technology matured and sales of pocket calculators leveled off, though the device remains firmly entrenched in everyday life.

From the dawn of the aviation era until the 1990s, the average cost to move an airline seat through the air steadily *declined*, mostly due to advances in aircraft technology. Beginning in the 1990s the cost has been increasing and diminished increases in aircraft productivity is a significant reason why this is so. Whether aviation technology has matured or the current state of affairs represents a temporary aberration is not yet certain.

NEW ALTERNATIVES TO AIR TRAVEL

Traditionally, business travel has accounted for 50% of total air travel. More importantly, business travelers tend to pay full fare; therefore, any reduction in this component of passenger traffic can quickly change the air transportation industry's fortunes.

In years past, air transport was the only realistic option for many business contacts; however, the future may offer new alternatives. At the same time that air transportation may become *more* expensive to the customer, electronic communication will become *less* expensive. More importantly, instant communication linked with computing capability is providing exciting new services that previously did not exist.

Although certain business contacts must be made face to face, many gatherings (such as training sessions) can be conducted by communication link for much less cost. Current technology can allow these training sessions to be of *better* quality than most face to face seminars. Imagine an aircraft firefighting training session in which the trainer "voices over" actual video of an aircraft accident while a window on the viewer's screen depicts a graphic of the airport layout plan with notations indicating the position of all pieces of firefighting equipment. If students can talk back to the trainer from their respective locations, this method of conferencing can be far more effective than traveling to another city in order to simply sit in a room and listen to someone speak from a podium. Technology is no longer the issue; the real issue is changing personal habits.

Although more time is needed to discover how videoconferencing and other communication technologies can be made more effective, it is reasonable to assume that people will eventually alter their habits to make good use of these resources. Remember, people were initially reluctant to travel by air. In time, improved technology and reduced price combined to change people's habits. The same process should work for this new utility invented by the combination of instant communication with computing power.

PUTTING IT ALL TOGETHER

There are certainly other trends worth watching; however, the three just noted affect the industry's cost structure, technology base, and product alternatives. Taken together, they can be summarized thus:

- * In the past, many opportunities in the air transportation industry were established by (1) government policies, and (2) technology advances from pure aviation research.

- * In the future, most opportunities will be defined by (1) market forces, and (2) technology advances from *outside* the traditional aviation sphere.

Some airports will benefit from these changes, while others will be placed at a disadvantage; yet all will face brighter futures if their long-range planning is based on this important strategic assumption.

LOOKING FORWARD

What sort of future does this portend for aviation? The honest answer is that no one knows! A pessimist will see short term problems:

- * Higher passenger fares (or reduced service) decreasing the number of passengers in the system;

- * Communication alternatives reducing the number of air passengers and air cargo still more;

- * Mature aircraft technology offering no more excitement than modern day railroading.

An optimist will see long term promise:

- * An unregulated industry having the vibrancy to restructure itself to be as efficient as possible;
- * Improved communication increasing the velocity of business which in turn creates more business, more travel, more spending power, etc.;
- * Increases in international passenger traffic exceeding any declines in domestic traffic.

What can be said with certainty is that the fundamental underpinnings of this industry (cost, technology, and product alternatives) are changing; therefore, the future will be *different* from the past. What does this mean to airports? Remember that airports are:

- * Dependent upon and *reactive* to the commercial air transportation business;
- * Very capital intensive with long lead times required for facility planning and construction;
- * Specialized facilities with limited opportunities for effective re-use.

Proper management of an airport in these uncertain times is an enormous challenge and success requires advance preparation for a variety of possible outcomes. An airport master plan which simply details the ultimate possible buildout of facilities is not a substitute for a sound strategic plan. Forward-looking executives will use such plans to establish strategies which:

- * Make *flexibility* the prime objective by maintaining options as long as possible and subjecting all plans to “what-if” scenarios;
- * Strive to *lower costs* in order to achieve financial flexibility; and
- * *Diversify* into new revenue opportunities, with a special emphasis on non-aviation markets.

WHAT IS AN AIRPORT?

This brief handbook provides some answers to that question; however, what our airports become in the future has yet to be seen. In large part, that question will be answered by today's leaders who are inventing new rules while the game is being played. The future we create will depend on whether our thinking remains confined to the traditions of the past or displays a willingness to think outside previous assumptions.

Approaching the future with an open mind continues the best traditions of the aviation business, one that has been dominated by men and women who embraced change and created opportunity where none existed before. I wish you success, and hope you find your contribution to this industry both rewarding and exciting.

APPENDIX

Following are several useful sources of information:

FEDERAL AVIATION ADMINISTRATION

- A. Guide to Federal Aviation Publications
FAA-APA-PG-94-1
Call: FAA Public Inquiry Section @ 202-267-3484
- B. FAA Advisory Circulars
(The *150 Series* deal with airport matters)
Call: Your local FAA-ADO and ask for a copy of the Advisory Circular Checklist, AC-00.

FINANCIAL INFORMATION

- A. Airport Official Statements
An airport that has recently issued bonds will have likely published an Official Statement.
Call: A fellow airport manager and ask for a copy.
- B. Moody's on Airports
Notes industry trends and highlights specific data from a select group of recent airport financing events.
Call: Moody's Investor Services @ 212-553-0470
- C. A.A.A.E. Rates and Charges Survey
Published every two years.
Call: 703-824-0504

TEXTBOOKS

- A. Planning and Design of Airports
Horonjeff and McKelvey, 1995
- B. Airport Finance
Ashford and Moore, 1992
- C. Airport Engineering
Ashford and Wright, 1984
- D. Airline Economics
James, 1982

TRADE MAGAZINES

- A. Airport Magazine
A.A.A.E.
Call: 703-824-0504
- B. Aviation Week and Space Technology
Call: 800-525-5003
- C. Aviation Daily
Call: 800-752-4959
- D. Air Transport World
Call: 202-659-1475
- E. Airport Forum
Call: +49 931 4182 548
- F. Airport Business
Call: 920-563-1747

AVIATION ASSOCIATIONS

- A.A.A.E. American Association of Airport Executives: A professional association of men and women actively employed in airport management.
- A.C.I.-NA Airports Council International (North America): An international association of airports. *Note:* membership is composed of airports rather than individuals.
- A.L.P.A. Airline Pilots Association: The oldest professional pilots' union; however, membership in competitor unions is growing.
- A.T.A. Air Transport Association: Represents the major U.S. airlines.
- G.A.M.A. General Aviation Manufacturers Association: Represents the companies that produce general aviation aircraft.
- I.C.A.O. International Civil Aviation Association: A unit of the United Nations that establishes standards for international aviation operations.
- N.A.T.A. National Air Transport Association: Represents Fixed Base Operators and Air Taxi Operators.
- N.B.A.A. National Business Aircraft Association: Represents companies that operate aircraft for corporate purposes.