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I am submitting herewith a thesis written by L. Thomas Lindquist entitled "Air Cargo Planning for Small / Medium Hub Airports." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Civil Engineering.

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AIR CARGO PLANNING

FOR SMALL / MEDIUM

HUB AIRPORTS

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

L. Thomas Lindquist
May 2001

DEDICATION

This thesis is dedicated to my family: my parents who instilled the value of education, my wife, Lyla, who has endured the time commitment and was invaluable help in compiling this paper, and our children who may recognize the importance of life long education.

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ABSTRACT

This study reviews the domestic air cargo industry, how it has developed and how it is influenced by other modes of transportation, in particular the important relationship with the trucking industry. Individual airports were surveyed to develop an understanding how they planned and prepared for air cargo growth. Air cargo planning studies were obtained for several airports. In addition, a survey was mailed to eleven airports requesting information on their approach to forecasting, development on a speculative basis and marketing. Enplaned passenger, air cargo and mail data was obtained from the U. S. Department of Transportation, Bureau of Transportation Statistics for selected years from 1977 to 1998. This data was analyzed for growth trends.

The findings of the study revealed the air cargo industry in the United States is still developing and growing at a rate faster than the gross domestic product. The small and medium hub airports are gaining market share from the large hub airports, unlike passenger service. Forecasting future air cargo demand for individual airports is difficult due to the lack of available detailed data on shipments. This is compounded by the close relationship between the trucking and air modes. With decreasing prices, the integrated express carriers are forced to rely on trucking to a greater degree.

Air cargo has influenced industry on their methods of operation and decisions on where to locate. Growth of air cargo is a complex phenomenon depending on the interaction of location of the airport, economic growth, competition from other modes, facility constraints, and many other factors. Airports need to be as proactive and flexible as possible within their environment to maximize their growth potential in the cargo market. It is important for local airport management to be aware of the needs of the cargo airlines and the needs of their community to be able to tailor their facilities to meet the needs of both parties.

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Chapter 1

Introduction

Air cargo service has been provided to the public since the invention of the airplane. In the last twenty to thirty years air cargo has had an increasing influence on life in the United States. It consists of express packages, scheduled freight, chartered freight and mail. While most cargo is transported on dedicated cargo aircraft, some of the cargo is transported in the belly of passenger airliners.

Air cargo has experienced dramatic growth, attracting the attention of many in and associated with the aviation industry. Boeing reports domestic air cargo grew 56 percent to nearly 21.7 billion revenue-tonne-killometers in the ten year period from 1989 to 1999. During the first half of the 1990's, the express cargo market growth averaged more than ten percent per year and in some years exceeded thirty percent. The express market continues to increase its dominance of the domestic market with a 62.6 percent market share. Scheduled freight with a 20 percent market share, is followed by mail and finally charter freight. Growth during 1999 was 3.1 percent following a 0.7 percent growth in 1998. This is minimal growth compared to previous years and below the 3.8 percent growth in the U.S. economy during 1999. Historically, cargo has grown at a rate faster than the economy. This may be partially attributed to the increase in competition from the trucking sector and

increasing popularity of the more economical time-deferred service. This competition increases the pressure on declining yields ("charges measured in units of weight and distance") and profits. With the increasing popularity of time-deferred service, the trucking industry is in a better position to offer competing service to the cargo airlines. In addition, the express carriers are using trucks for line-haul shipments within 300 to 400 miles. Boeing estimates traffic by surface mode increased 8.5 percent during 1999 to approximately 2.2 billion revenue-tonne-killometers. Boeing estimates the U.S. economy will grow at 2.3 percent annually from 1999 to 2009 and potentially continue at that rate through 2019. During the 20 year period from 1999 to 2019, Boeing predicts the U.S. domestic air cargo market will grow an average of 4.8 percent annually with a high estimate of 5.6 percent annually and low estimate of 3.4 percent annually. This translates to an average 60 percent increase with a range of 40 to 72 percent increase in volume in ten years. To meet this demand, facility providers will need to plan and develop significant aviation infrastructure improvements.

The purpose of this thesis is to take a closer look at air cargo and develop a better understanding of the components of air cargo and how the different components influence airports. Also, it reviews emerging trends on how the air cargo mode is influenced by the other modes of transportation, in particular, the relationship with the trucking industry.

The focus of the thesis is directed to medium and small hub airports. The FAA defines a medium hub airport an airport enplaning at least 0.25 percent of the annual enplanements but less than 1.00 percent. Small hub airports enplane at least 0.05 percent but less than 0.25 percent of the annual total. FAA records show 5,352 public use airports in 1998. Of these, 816 airports are certificated under Federal Air Regulations Part 139, to conduct scheduled air carrier operations. Air carrier airports are classified as large, medium, small, and non-hub airports based on the percentage of the total annual enplaned passenger traffic as noted in Table 1-1.

Medium and small hub airports were selected because these airports have less resources for extensive planning and these airports may only be beginning to see the impact of increased use of airfreight as a result of the changing world economy. The focus of the study is domestic freight industry.

It is important for airport managers to do an effective job in planning for air cargo in order to meet the basic community service role airports play in their area. In addition, commercial service airports are expected to be self-sustaining and the additional revenue from increased freight operations must contribute to that goal.

Table 1-1
Airport Hub Classification

Airport Classification	Percentage of Total Annual Enplaned Passengers	Number of Airports in Classification
Large Hub	1.00% or more	77
Medium Hub	At least 0.25%	53
Small Hub	0.05%	73
Non-Hub	More than 10,000 passengers	613*

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1998.

Chapter 2

Literature Review

History

Transportation improvements have fostered changes in development throughout human history. Initially, cities developed around seaports and trade routes. During the industrial revolution, canals and rivers provided power for industry and shipping. Railroads provided access to develop landlocked resources. Highway construction fostered personal transportation and metropolitan growth. Today, industry is transforming to a global market place with intermodal transportation options, including air, and improved communication (20). In addition, customer's desires and demands are changing at a faster rate today than at anytime in the past. When this is coupled with the pace of technological development, industries have less time to deliver their products to the market and recover their development cost. Today, firms are shifting manufacturing methods to incorporate just-in-time delivery of raw materials and finished products, tighter inventory controls and more frequent production schedules with smaller batches, reducing the time to deliver the product to the customer. The intermodality revolution has spawned small-package air express, transportation supermarkets, piggy-back, micro-bridge, hub-and-spoke systems, center loading, and double stack rail cars. Industry has focused on transportation improvements as the cost of carrying inventories of raw materials and finished goods has become a larger

percentage of the total cost of producing and distributing products. Commercial revolutions that support each other are intermodality, deregulation of the transportation industry, containerization, computerization, and mechanization. Buyers of transportation services are using airfreight on an increasing basis because they perceive it to be a better value (6). The 1993 Commodity Flow Survey by the Bureau of Transportation Statistics, U.S. Department of Transportation reports 11.5 percent of the total value of merchandise shipped is by air, while 0.2 percent of the total tonnage is moved by air. Boeing estimates that cargo with a value of $16.00 per Kilogram ($35.27 per pound) is likely to be transported by air (4).

Gompertz identified three phases of industry growth and development based on his study of the railroad industry in the U.S as noted in Figure 2-1. Initially growth during the experimental and predevelopment phase is slow. This is followed by the rapid growth phase and finally, maturity and market saturation. Gompertz determined the railroad industry reached maturity in 80 years. If the air cargo industry follows a similar development schedule, it should reach maturity after 2015 (9). It is interesting to note that the major integrated air express carriers have recently developed secondary sort locations due to the maximum capacity of the their national sort hub. This can be interpreted to mean the industry is still maturing and developing.

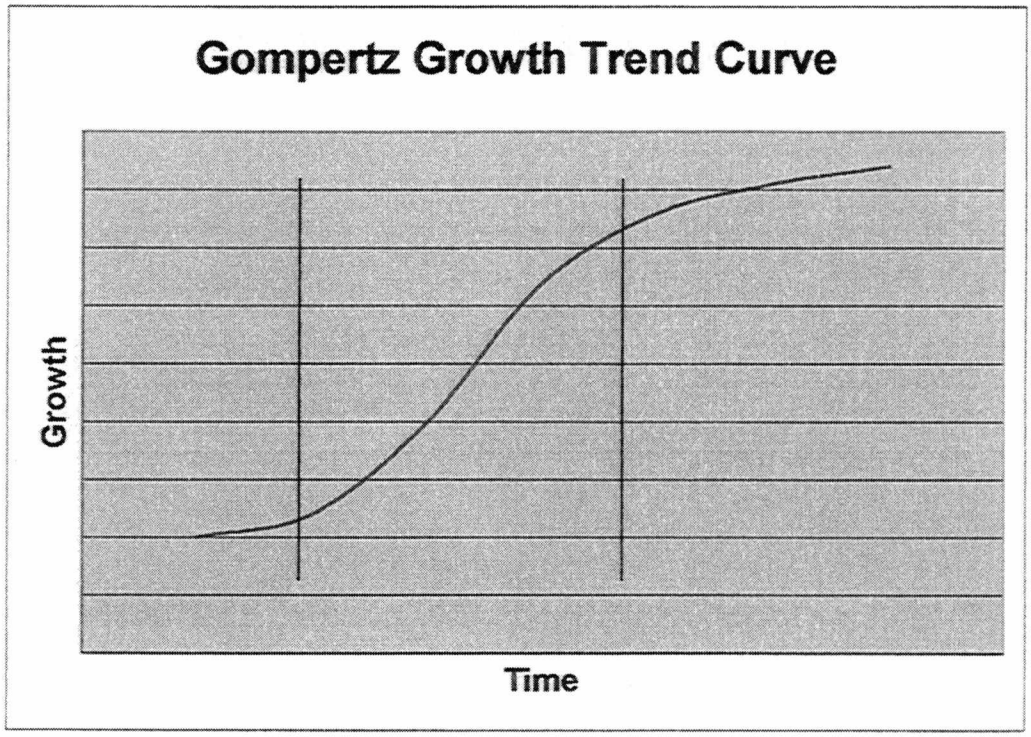


Figure 2-1
Growth Trend Curve

Source: Howard, G.P., ed. Airport Economic Planning, Cambridge: MIT P, 1974.

In the early years, all cargo airlines dominated the domestic air cargo business. In the 1950's, passenger airlines began competing in the air cargo business by purchasing all cargo and quick-change aircraft fleets. In the late 1960's to mid 1970's, the all-cargo airlines were loosing money and domestic all cargo service was reduced by fifty percent due in part to the Civil Aeronautics Board's control of rates and rising fuel prices. During the same period, passenger airlines began purchasing wide-body aircraft, increasing their cargo capacity (21). Today, the passenger airlines are replacing the wide-body aircraft on some domestic service with narrow-body and regional jet aircraft, therefore reducing their cargo capacity (11). This is compounded by the airlines effort to control the number and size of carry-on baggage, increasing the passenger's checked baggage and reducing the capacity for cargo. This creates a challenge and unique opportunity for the all cargo and express carriers to meet the demand.

Cargo Industry

The cargo industry provides transportation services in three basic product lines; time-indefinite, time-definite (expedited cargo) and time-critical. Time-indefinite means the shipment is delivered when it arrives there is no guarantee or statement regarding the anticipated date for delivery. Common examples of this service are the standard UPS package delivery product and the United States Postal Service Parcel Post. This product comprises the majority of the less-than-truck (LTL) load shipments within the United States. The time-definite

product guarantees delivery within specified number of days or by a specific date. Time-critical means delivery as soon as possible. All time-critical deliveries are time-definite; however, not all time-definite deliveries are time-critical. Time-critical is typically thought of as the FedEx or UPS overnight letter. FedEx introduced the time-critical product to the transportation industry in 1973 when they began the overnight letter delivery service though their hub in Memphis, Tennessee.

Since its introduction in 1969 by DHL, expedited transportation service has experienced many changes in product offerings and technology. Initially, DHL provided express service between San Francisco and Honolulu. By 1973, DHL offered service to the Philippines, Japan, Hong Kong, Singapore, Australia and Europe. In 1973, FedEx initiated domestic priority overnight shipment of letters and small packages. Today, they and their competitors offer 8:00 AM delivery the next business day, deferred delivery options and weekend delivery. In addition, heavy weight and hazardous commodities are accepted. These changes are summed up by the change in the advertising slogan used by FedEx from "Absolutely, Positively Overnight" to "The World On Time." The time-definite product is increasing in the market share both from diversion from time-critical and in particular diversion from time-indefinite products.

The express package delivery industry is less constrained in the location of their hubs since they operate their own vehicles, provide door-to-door service, and

do not connect with other carriers (14). The integrated cargo carriers are freer to choose or relocate the airports they operate from since they are not dependent on other companies as are the non-integrated carriers (21). In addition, air cargo has permitted industry to develop in smaller and rural communities (21). An innovation pioneered by air cargo and express airlines includes advanced package tracking, on-call pick-up service, weekend service, residential service, money-back guarantees, and automated billing (21).

Just-In-Time

The just-in-time revolution in the manufacturing industry concentrates on reducing inventories and manufacturing time by carefully scheduling parts delivery so they arrive when needed (14). The time-based corporate strategy refers to the total time required to deliver a product to the customer, including distribution (2). Time-based competition is an extension of just-in-time concepts to all phases of the business (2). Time compression relies on partnerships from suppliers to customers; electronic exchange of point of sale information with all members of the manufacturing team, including suppliers; compressed manufacturing cycles; smaller more frequent ordering and production runs; and the philosophy that time saved in the distribution system is important (2). Fred Smith, CEO of FedEx, is quoted as saying "Any business that ignores this market place dictum (efficiency and quality made possible by time management) will almost certainly find that its customers have gone elsewhere. Perhaps more importantly, any government that ignores this new trend will find

that the standard of living of its people will stagnate or even decline" (2). "The Total Cost Concept" in calculating relative cost of transportation includes value of speed, financing, marketing, warehousing, production scheduling, and other factors relating to success and profitability (14).

The cargo industry uses a variety of modes to accomplish their task. With this paper, the focus is on air shipment; however, this is increasingly intertwined with truck delivery. Boeing reports the industry trend is away from mode specific transportation (4). Shippers in today's market purchase "transportation" rather than shipment by a specific mode. Shippers base their purchasing decision on:

- Price
- Delivery Time
- Reliability
- Security of Shipment
- Shipment Tracking

Price is involved not only for the cost of the transportation but includes "the total cost concept". This takes into account the value of the speed of delivery, cost of financing, marketing advantages, warehousing cost, and advantages in production scheduling afforded by expedited delivery (14).

Yield ("charges measured in units of weight and distance") for the cargo industry has been declining since 1970 (4). During 1999, yield for scheduled

freight carriers decreased 2.3 percent after inflation adjustment. This is slightly less than recent trends (4). This reflects productivity gains, technical improvements, and intensifying competition. Customers are sensitive to cost, which emphasizes low cost transportation. The Internet also impacts yield by diverting high value express letter business. As security and dependability of the Internet improves, this will have an increasing impact (4) and the Internet potentially may further reduce yield. On the positive side, the Internet may stimulate the express package volume with improved electronic shopping. Business to consumer shipments involve "commodities and higher value" consumer goods. This market segment is time and price sensitive, therefore estimating the impact on air cargo is difficult (4). The Internet is having a greater impact on business to business commerce and less of an impact on how goods are moved (4). It is interesting to note that although the second and third day air products offered by FedEx and UPS use the term "air" in their name, the package may not be transported in an aircraft. If the origin and destination are within 1,000 highway miles of each other, the package may be transported by truck. Currently, FedEx operates one truck per day, each way between McGhee Tyson Airport at Knoxville, Tennessee and Atlanta, Georgia; Cincinnati, Ohio; Indianapolis, Indiana; and Nashville, Tennessee; plus two trucks per day to Memphis, Tennessee. The shipper is unaware of these routing decisions and is concerned only with the safe delivery of the package at the guaranteed time.

It is possible to see how different modes can compete with one another. It is possible for a trucking company to offer competitive service even with time-definite delivery. In fact, United Parcel Service began as a trucking company, adding aircraft to their business plan recently. Another firm, LandAir, is a trucking company exclusively and does not employ aircraft. Although aircraft are not involved, LandAir uses tight time schedules with a hub-and-spoke operation providing time-definite delivery and shipment tracking.

Expedited Carriers

Expedited carriers can be one of four types of organization:

- Integrated express carrier
- Non-integrated forwarder
- Airline-direct
- Expedited motor carrier

Integrated express carriers (FedEx, UPS) own or control all of the assets used to deliver a shipment. This includes the vehicles used for pick-up and delivery at the origin and destination, line-haul, and shipment tracking. They sell their service on a retail basis to the shipper and provide all aspects of the transportation to the final destination. Non-integrated forwarders (BAX Global, Barthco International, V Alexander & Co.) sell transportation service directly to the customer and then aggregate the shipments and arrange for line-haul transportation from independent carriers. Finally, pick-up and delivery at the destination may be arranged with a third party company. Airline direct

companies (American, Delta, United) provide the line-haul service to non-integrated forwarders. They do not provide pick-up and delivery service at either the origin or destination; or their service is limited to airport to airport movement. Expedited motor carriers (LandAir) can be integrated or non-integrated as in the cargo airline industry. The integrated motor carriers function similarly to the integrated airline express carriers and provide complete transportation service from origin to destination. The non-integrated motor carriers concentrate on local pick-up and delivery or line haul functions, contracting for the remaining service. The distribution and routing structure of the expedited cargo industry is presented in Figure 2-2.

The integrated carriers dominate the domestic market. They provide a higher level of service, competitive pricing and more sophisticated logistics. This dominance is increased because the passenger airlines are reducing their cargo capacity as wide-bodied aircraft are being replaced with narrow-bodied aircraft. As the integrated carriers increase their product offerings for deferred delivery at a lower price compared to the more lucrative time-critical product, their dependence on trucking is increasing. Trucks are more economical to operate than aircraft. Plus, as their national air hubs approach capacity, it is necessary to add system capacity by constructing regional hubs and transporting as much freight as possible by direct truck. The shift to trucking is taking place in both the short haul time-critical products plus the longer haul

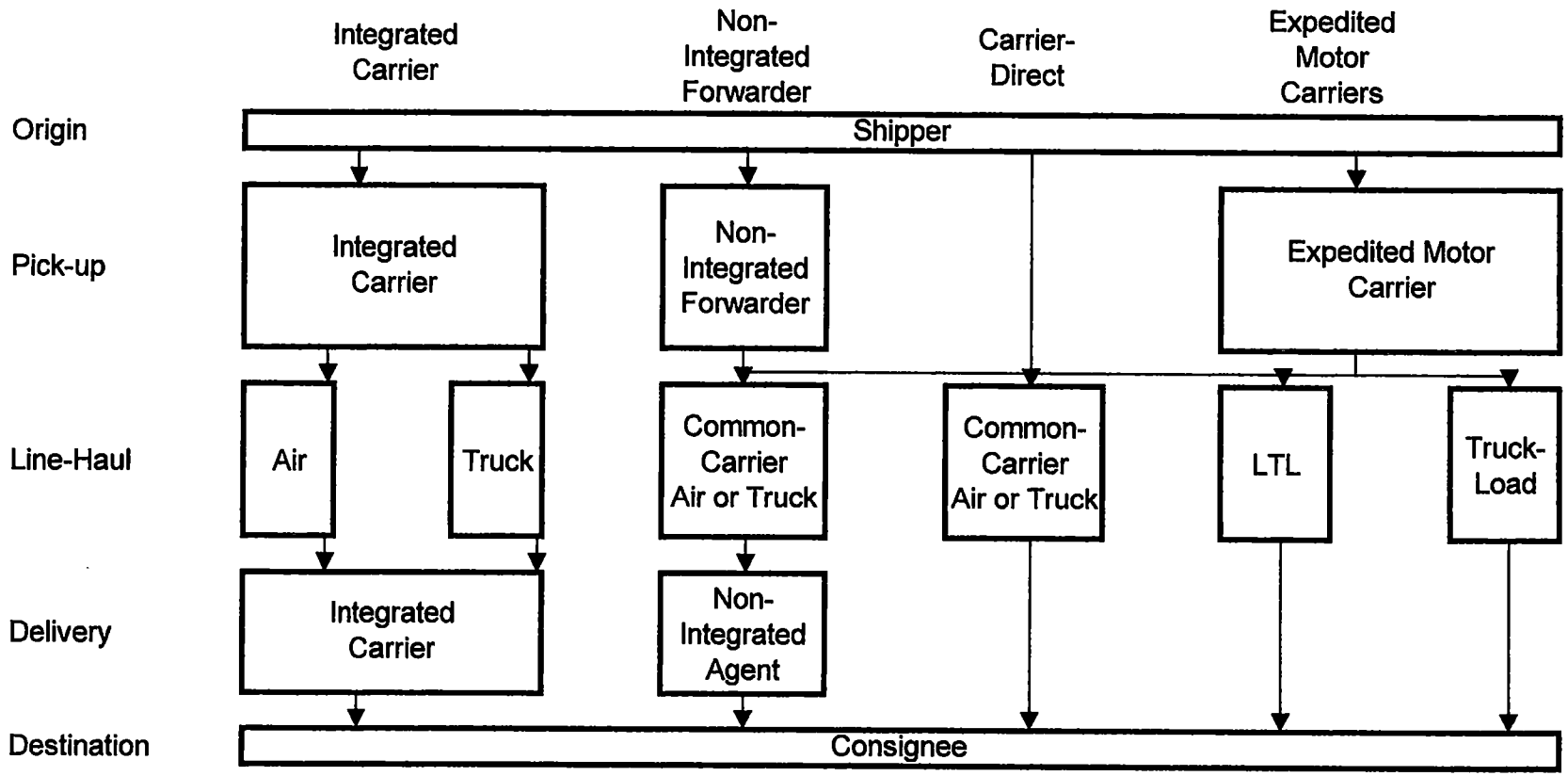


Figure 2-2
Distribution Routing Structure
Expedited Cargo Industry

Source Data: MergeGlobal, Inc. and Mosby Engineering Associates, Inc. City of Ocala: Ocala Regional Airport Cargo Feasibility Study, Final Report. N.p.: n.p., Feb. 2000.

time-definite service. The segmentation of the cargo industry is presented in Figure 2-3.

Planning and Forecasting

Preparation of reliable forecasts is a challenging procedure due to the extent of the historical data available. Aviation data typically collected is enplaned passengers and the weight of enplaned freight reported to the Bureau of Transportation Statistics on Form 41, Schedules T-100 and T-3. Freight origin and destination data is available on a limited basis through the Commodity Flow Survey prepared by the U.S. Department of Commerce, Bureau of the Census. This survey is conducted at five-year intervals since 1967 and on an irregular basis since the early 1800s. For the 1993 survey, questionnaires were submitted to approximately 800,0000 firms tracking commodities using Standard Industrial Codes. John Wiley, in Airport Administration, expresses the opinion"... the forecasting of freight movements by all modes, including air, is currently in its infancy, reflecting the great scarcity of historical data at a necessary level of detail" (27). In their book Airport Engineering, Norman Ashford and Paul H. Wright note that historical data is limited, therefore aggregated national projections are easier to make than disaggregated projections based on city pairs (1). The FAA and the Boeing Commercial Airplane Group produce annual freight, mail, and aircraft fleet predictions for the air cargo industry.

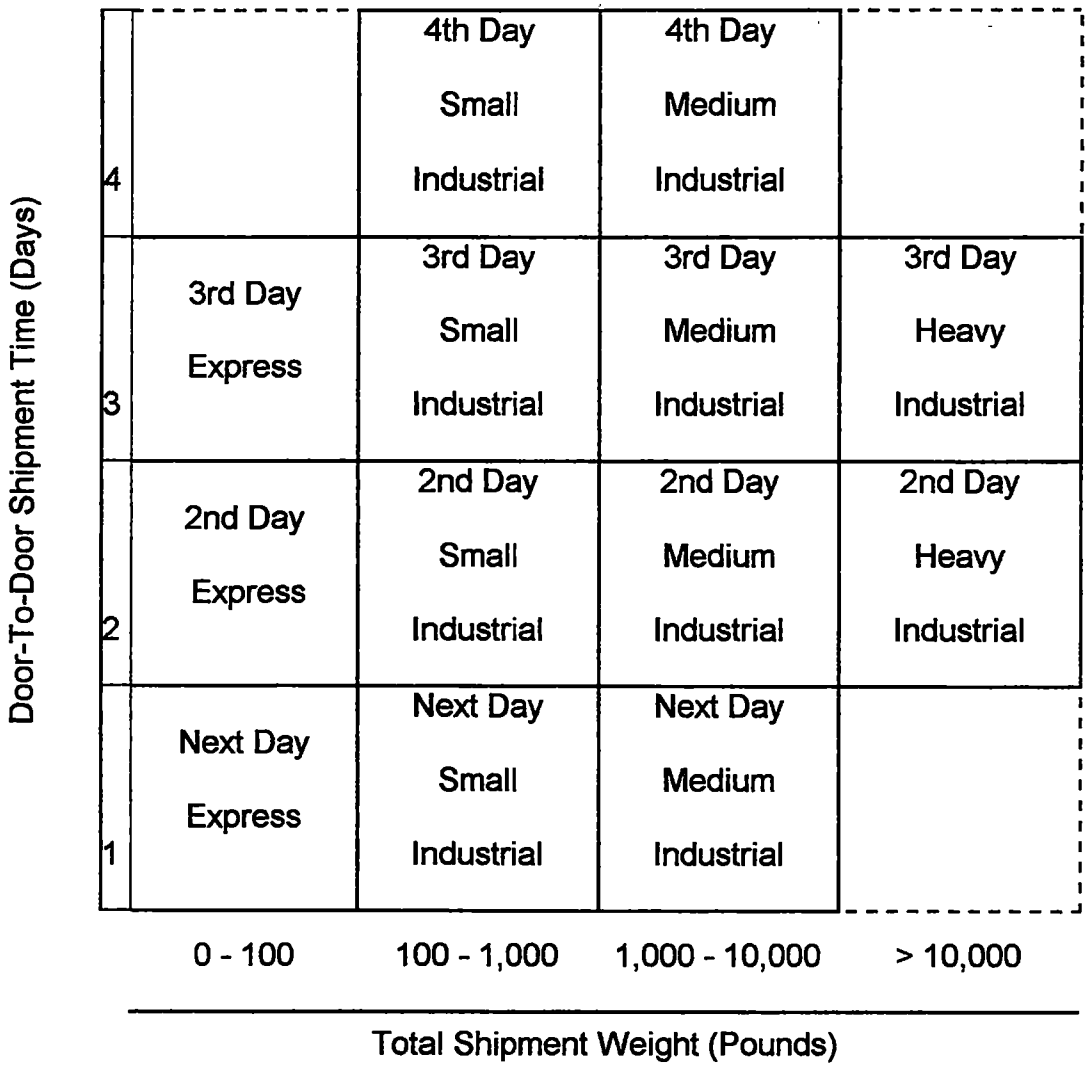


Figure 2-3
Product Segmentation
Expedited Cargo Industry

Source: MergeGlobal, Inc. and Mosby Engineering Associates, Inc. City of Ocala: Ocala Regional Airport Cargo Feasibility Study, Final Report. Washington, D.C., August 1995.

In their 1998/1999 forecast report, Boeing identifies four applicable forecasting techniques: economic modeling, judgmental, trend analysis, and potential analysis. Boeing prefers economic modeling for "medium-range forecasts of regional markets" (3). The regions Boeing included in their report were on the scale of North America, Latin America and North America, and Europe and North America. Therefore their region may be significantly larger than a "region" considered by a planner working for a specific airport. Boeing states demand for air freight depends on economic activity in an "importing" region. This is tempered by the cost of transportation, exchange rates, and relative pricing. As with any model, the predictions are conditioned on the fact that parameters not included in the model have the same impact and that transportation supply is available (4). Wiley identifies four methods of forecasting: trend analysis, regional projections, regression analysis, and input-output analysis. Ashford and Wright identify regression analysis and input-output analysis as two methods applicable to freight forecasting. Ashford and Wright report limited success with regression analysis due to lack of data, movements may be correlated to commodity supply and demand that is not well known, and "surrogate" variables have not provided reliable correlation with air freight movements (1). G.P. Howard, in Airport Economic Planning, expresses the opinion that trend projections tempered with management judgment is an acceptable technique for small hub airports (9). Input-output analysis is a

model of industrial supply and demand to predict airfreight movement between city pairs. Ashford and Wright feel this model is in the developmental stages.

Typically, airports employ trend analysis to forecast future air cargo demand. Sometimes, the trend analyses were adjusted for local conditions and in others, the mathematical trend was used without modification. If the local growth follows the Gompertz growth curve, trend analysis will predict unsatisfactory results in the transition years between the experimental / predevelopment and rapid growth phases or between the rapid growth and maturity phases. For example, in the 1985 master plan for Capital Regional Airport Authority in Lansing, Michigan, the present enplaned air cargo volume of 750 tons was projected to grow by 3.0 percent per year to 1,373 tons by the year 2005. When the master plan was updated in 1993, the 1992 enplaned cargo volume was 10,300 tons, a 33.8 percent increase. United Parcel Service established a hub in Lansing in 1986. The possibility of this dynamic growth and opportunity for Lansing may have been predicted by a more in depth study of cargo and its potential. McGhee Tyson, Knoxville, Tennessee; Columbia Metropolitan, Columbia, South Carolina; Austin-Bergstrom, Austin, Texas; Capital Regional, Lancing, Michigan; Springfield-Branson Regional, Springfield, Missouri; Norfolk International, Norfolk, VA; and Terre Haute International, Terre Haute, Indiana employed trend analysis to predict future cargo activity. Typically, this was done in the master plan rather than in a study specifically directed to cargo. An airport master plan is a twenty-year plan for overall airport growth and

development. Individual areas of interest are not developed at the level of detail required to implement a specific improvement. To obtain additional information on specific forecasting techniques, a questionnaire was designed and sent to eleven airports. These findings are reviewed in chapter 4. Current growth rates are discussed in chapter 3.

Chapter 3

Air Cargo Trends

General Trends

Enplaned freight at the airports in the United States has grown at 6.57 percent annually from 1977 through 1998. This includes all airports regardless of size and airports providing service to a hub operation for an express carrier. During the five year period from 1993 through 1998, enplaned freight increased at 12.85 percent annually. Enplaned mail increased 4.32 percent annually since 1977 and 5.05 percent annually in the five year period from 1993 to 1998. This compares to a 3.06 percent annual growth in the Gross Domestic Product from 1977 through 1998 and a 3.76 percent annual growth from 1993 through 1998. Boeing Commercial Aircraft Group reports air cargo volume has increased at a rate 2.5 times faster than GDP since 1970 (4). Boeing forecasts North American GDP to increase an average of 2.4 percent annually through 2019 (4). This is influenced by lower budget deficits, increased productivity and increased saving rates. A second comparison is with enplaned passengers. From 1977 through 1998, enplaned passenger traffic increased at 5.05 percent annually; For the five year period from 1993 to 1998, traffic increased at 4.82 percent annually. Although passenger traffic increased at a rate faster than the gross domestic product, cargo traffic increased at a substantially higher rate, particularly for the last five years.

The growth rate for the airports serving as a hub for the express package airlines (see Table 3-1 and Figure 3-1) is substantially higher at 14.16 and 17.65 percent annual rate for the same periods. As a whole, airports not serving as a hub for a cargo airline grew at 3.77 and 9.11 annual percentage rate. Of more interest are the medium and small hub airports not serving as a hub to the express cargo airlines. Collectively, they grew at 8.49 and 14.00 annual percentage rates for the 21 and 5 year periods. The medium hub airports freight volume grew at 8.06 and 14.48 annual percentage rates while the small hub airports freight volume grew at 10.22 and 12.53 annual percent.

Regional Trends

Regionally, the FAA's Southern Region (see Figure 3-2) records the largest freight volume at 35.35 percent of the total, while the Western Pacific Region is second at 18.67 percent. The percentage share of the total freight volume in the Southern Region has been increasing since 1977, with the exception of 1997 to 1998. In addition, the percentage of the total freight being handled by medium and small hub airports that do not serve as a hub for an express cargo carrier has been increasing. Conversely, the percentage of the total annual volume of freight handled at large hub airports not serving as a hub for a cargo express carrier has decreased consistently since 1977. From 1977 to 1998, the compound annual percentage reduction is 1.40 percent.

Table 3-1
Express Package Hub Airports

Location ID	Description	Airport	City	St	Hub Notes	Type Hub
AFW	FORT WORTH ALLIANCE	FORT WORTH ALLIA	DALLAS /FT WORT	TX	FedEx & USPS	Regional
ANC	ANCHORAGE INTL	ANCHORAGE INTL	ANCHORAGE	AK	FedEx	Regional
ATL	WILLIAM B HARTSFIELD ATLANTA INTL	THE WILLIAM B HA	ATLANTA	GA	UPS	Regional
CAE	COLUMBIA METROPOLITAN	COLUMBIA METROPO	COLUMBIA	SC	UPS	Regional
CVG	CINCINNATI/NORTHERN KENTUCKY INTL.	CINCINNATI / NOR	COVINGTON	KY	DHL	National
DAY	JAMES M COX DAYTON INTL	AMES M COX DAYTO	DAYTON	OH	Emery	National
EWR	NEWARK INTL	NEWARK INTL	NEWARK	NJ	FedEx	Regional
IND	INDIANAPOLIS INTL	INDIANAPOLIS INT	INDIANAPOLIS	IN	FedEx & USPS	National & Regional
MEM	MEMPHIS INTL	MEMPHIS INTL	MEMPHIS	TN	FedEx	National
MIA	MIAMI INTL	MIAMI INTL	MIAMI	FL	FedEx	Regional
OAK	METROPOLITAN OAKLAND INTL	METROPOLITAN OAK	OAKLAND	CA	FedEx	Regional
ONT	ONTARIO INTL	ONTARIO INTL	ONTARIO	CA	UPS	Regional
PHL	PHILADELPHIA INTL	PHILADELPHIA INT	PHILADELPHIA	PA	UPS	Regional
RFD	GREATER ROCKFORD	GREATER ROCKFORD	ROCKFORD	IL	UPS	Regional
SDF	LOUISVILLE INTL	LOUISVILLE INTL-	LOUISVILLE	KY	UPS	National
TOL	TOLEDO EXPRESS	TOLEDO EXPRESS	TOLEDO	OH	Burlington	National

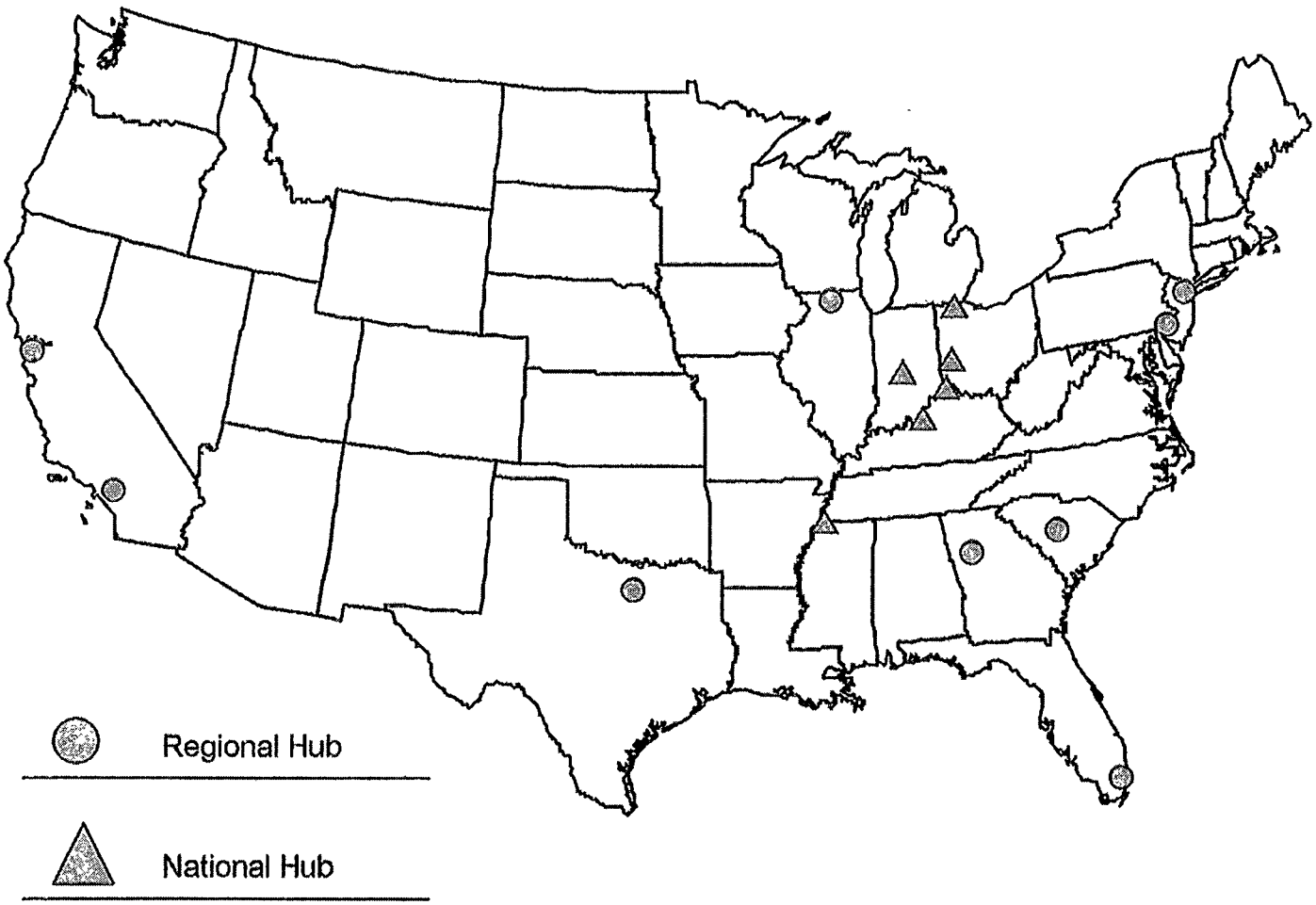
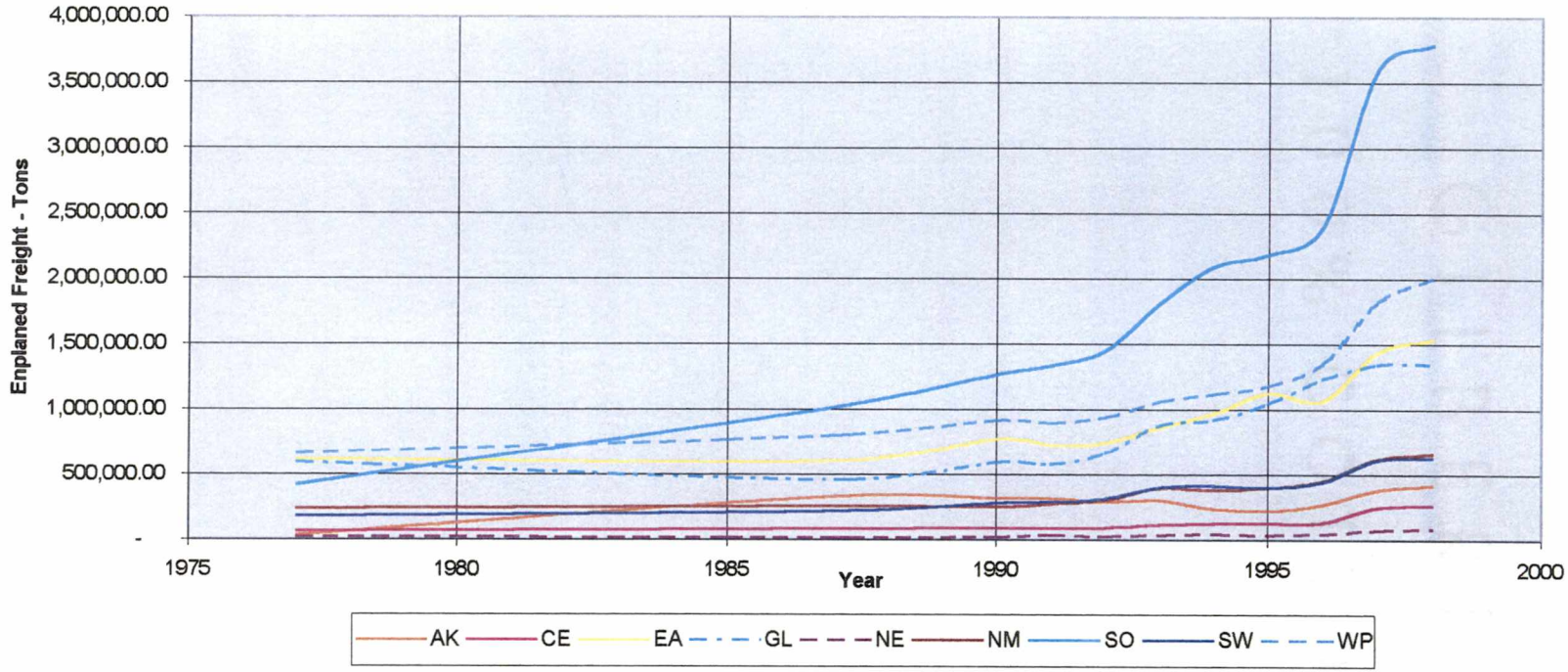


Figure 3-1
Hub Locations



FAA Region Names: AK - Alaska, CE - Central, EA - Eastern, GL - Great Lakes,
NE - New England, NM - Northwest Mountain, SO - Southern,
SW - Southwest, WE - Western Pacific

Figure 3-2
Enplaned Freight - Total by FAA Region

United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

For the five year period from 1993 to 1998 the large hub share of the total has decreased 2.22 percent. Conversely, the medium and small hub airports percentage share has increased to 4.13 and 4.92 percent for the medium hub and 6.22 and 3.13 percent for the small hub airports for the same periods. Comparing this to the growth in the share of passenger traffic, medium hub airports annual percentage growth is 0.66 percent and 0.09 percent, while the small hub airports growth percentages are 0.94 percent and –0.29 percent. Medium and small hub airports are increasing their percentage of the total annual freight traffic at the expense of the larger airports, while the passenger traffic distribution based on airport size is remaining constant. Table 3-2 summarizes these growth rates. The detailed statistical tables are contained in Appendix B.

Summary

The growth rates for air cargo and the shift from large hub to medium and small hub airports signal the need for smaller airports to be cognizant of their potential in this market area and plan for its development. Not every airport will become a major cargo center; however, development of this opportunity will increase activity at their airport and will provide better service to the business community in their area. Growth is currently prevalent in the southeast portion of the United States and the need to emphasize freight planning is most significant at these airports.

Table 3-2
Air Cargo Growth Rates

Category	Annual Percentage Growth Rate 1977 to 1998	1993 to 1998
Overall Growth in Freight	6.57%	12.85%
Overall Growth in Mail	4.32%	5.05%
Airports serving as a hub for cargo airline growth in Freight	14.16%	17.65%
Airports not serving as a hub for cargo airline growth in Freight	3.77%	9.11%
Medium and Small Hub Airports – Freight	8.49%	14.00%
Medium Hub Airports – Freight	8.06%	14.48%
Small Hub Airports – Freight	10.22%	12.53%
Medium and Small Hub Airports not serving as a hub for cargo airline growth in Mail	5.17%	2.63%
Medium Hub Airports – Mail	5.20%	3.15%
Small Hub Airports – Mail	5.07%	0.60%
Gross Domestic Product	3.06%	3.76%
Large Hub Airports not serving as a hub for a cargo airline – Percentage of Total Freight	-1.40%	-2.22%
Medium Hub Airports not serving as a hub for a cargo airline – Percentage of Total Freight	4.13%	4.92%
Small Hub Airports not serving as a hub for a cargo airline – Percentage of Total Freight	6.22%	3.13%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1077, 1987, 1990-1998.

Chapter 4

Forecasting

State of the Art Procedures

Three of the airports responding to a follow-up questionnaire have prepared detailed studies for development of airfreight at their airports. They are Ocala Regional Airport, Ocala, Florida; Hernando County Airport, Brooksville, Florida; and Kent County International Airport, Grand Rapids, Michigan.

As examples of the state of the art of practice, three airports that provided cargo studies for their area were examined in more detail. The reports are an Air Freight Study dated October 1994, for Kent County International Airport in Grand Rapids, Michigan prepared by HNTB Corporation, Merge Global, Inc. and Infrastructure Management Group, Inc.; Cargo Feasibility Study dated August 1995 for Ocala Regional Airport in Ocala, Florida prepared by Mosby Engineering Associates, Inc. (now MEA Group, Inc.) and Merge Global, Inc.; and Air Cargo Feasibility Study dated February 2000 for Hernando County Airport in Brooksville, Florida prepared by MEA Group, Inc. and Merge Global, Inc. Each study followed the same general outline. The general approach was to examine the national trends, the existing regional market and potential regional market by personal interviews, questionnaires, and analysis of socio-economic data, then to make forecasts of volume. Boeing states "potential analysis" is a forecasting tool to employ "during early stages of market

development." They recommend analyzing the market for products having a value of $16.00 per kilogram as potential products for shipment by air (4).

Merge Global identified five steps to prepare cargo forecasts. Initially, air cargo market trends are reviewed and macro level forecasts made. Step two is to prepare baseline volume for the airport. Third, develop alternative scenarios for development. Fourth, prepare operational parameters for alternative forecast scenarios. Finally, develop probabilities for each forecast scenario (8). The initial step in the Grand Rapids study was to review the status of the domestic and international air cargo markets. They examined historical traffic and established ratios to independent economic variables employed in the forecasting models. Forecasts were developed for domestic and worldwide demand. For the domestic market, the integrated, all-cargo, and combination (passenger) carriers were analyzed. Each carrier group's strengths, weaknesses, and corporate strategies were discussed and taken into account in the forecasts. Corporate strengths considered were aircraft fleet changes planned, staffing levels, and primary focus of the airline in the case of passenger airlines.

Merge Global used a "demand-pull" approach to develop air cargo growth forecasts, where the demand for air cargo is dependent upon an "underlying economic transaction". For example, specific manufacturing areas identified by standard industrial code use air cargo for time critical supplies and repair parts

as part of their normal supply operations. Therefore, individual forecasts were prepared for each identified standard industrial code identified for inbound and outbound freight and mail. To prepare these forecasts, local industries were examined for their potential to use air shipment and forecasts were developed for each air oriented category. Alternative forecast scenarios were developed using a sensitivity analysis. Factors leading to growth above and below the baseline forecasts were identified. The factors Merge Global identified for Grand Rapids included a new cargo airline entering the local market, air oriented industries accelerating or slowing their use of air shipments, diversion of air traffic to truck, and adjustment of pricing strategies by the airlines. Alternative forecasts were then developed when these factors were varied. The alternative scenarios were then examined to determine the most probable growth forecast. This included examining current industry trends with each group of assumptions. After determining the most probable forecast, the facilities at the airport were studied to determine their adequacy and predict development needs.

To analyze the adequacy of the existing airside facilities, the load factors on the aircraft serving Grand Rapids were converted to specific aircraft frequencies based on the fleets operated by the airlines. These operations were then used to analyze runway, taxiway, and ramp area requirements. The tonnage of air freight was used to size the building, landside parking, and truck access needs.

The demands were then compared to the existing facilities and a development plan recommended.

Increasingly, shippers are purchasing transportation rather than a specific mode of transportation. The cargo industry is experiencing significant changes as the overnight package market matures. Boeing states the U.S. domestic express cargo market is maturing and the growth rate has slowed in recent years (4). Merge Global predicts the small packages shipped by air will increase by 4.9 percent per year through 2004 (17). Customers are also requesting additional options for time-definite deferred delivery. As trucking companies become more sophisticated, they are able to offer express delivery over short distances that are as reliable and competitive with the integrated cargo airlines. This increases the opportunity for trucking companies to compete with the integrated cargo airlines.

Role of Trucking

To maintain their profitability, the integrated carriers are using trucks to transport an increasing volume of freight. Not only the deferred delivery time packages are moving by truck but also some of the express packages that can be transported by truck if the final destination is within 500 miles. Boeing estimated the surface mode would grow 8.5 percent in 1999 (4). This reduces cost since trucks are significantly less expensive to operate than aircraft. Thus, the volume of packages handled by the air hub may be reduced. The capacity

of the primary national hub is precipitating further changes in the industry. As the national hubs have reached a maximum practical capacity, the integrated cargo airlines have established regional hubs to accommodate the volume. By retaining some of the volume in the same region, this increases the opportunity to use trucks for express packages. Coupled with globalization of the world economy and the customer's demand for one organization to manage all modes of transportation for their shipments and postal privatization, the cargo industry is striving to restructure and offer competitive products to meet the customer's demands (17). The integrated carriers like FedEx and UPS dominate the domestic airfreight market in the U.S. The non-integrated freight forwarders focus on heavy weight and large volume industrial shipments. These predominantly are international shipments since trucking is competitive within the continental U.S., even for time-definite and expedited truck shipments.

The challenge of air cargo and the resulting implications for forecasting airport air cargo facilities must include the following trends:

1. Trucking companies becoming more competitive with time-definite, expedited, and overnight products (speed and reliability).
2. Integrated cargo airlines expanding their truck fleet and establishing trucking hubs to remain competitive with expedited cargo.
3. Integrated cargo airlines national hubs nearing practical maximum capacity and they are developing regional hubs.

4. Globalization of the world economy.
5. Shippers demanding lower cost option than overnight express products.
6. Shippers preferring one stop shopping for transportation needs.
7. Pressure on companies to reduce inventory, requiring smaller more frequent shipments of raw materials and finished goods.
8. Pressure on companies to deliver products to customer faster, increasing need for expedited and time definite transportation.
9. E-commerce increasing the use of airfreight to deliver products to the end user. In some cases this is from warehouses managed by the transportation company.

Summary of Procedures

To develop a better understanding how airports prepare and plan for air cargo growth, ten small hub and one medium hub airports were contacted. The following questionnaire was developed to identify the techniques used and if they adopted a proactive or reactive approach to cargo growth.

Questions for airport survey:

1. You were selected for this interview because your airport has shown significant growth in air cargo in the last five years. Would you describe your airport's role in this development as proactive or reactive?
2. Identify the cargo tenants at your airport.
    a. Express package delivery.
    b. Heavy weight freight.

c. Freight forwarder.

d. Warehouse operation using express delivery.

e. Number of flights per day (week) for each airline.

3. Briefly describe the facilities available.

    a. Does the airport or city own the buildings and ramp?

    b. Number of tenants?

        i. Express carriers

        ii. Heavy weight freight

    c. Number and size of buildings?

    d. Ramp area?

    e. Is the ramp shared with passenger airlines or general aviation?

4. Have you constructed cargo facilities prior to having a tenant or do you build to suit based on a specific tenant's needs?

    a. If a facility is developed prior to securing a tenant, what are the sizes and types of facilities constructed?

    b. How are the spec facilities funded?

    c. Has readily available space or a prepared site played a key role in attracting a tenant to your airport?

5. Do you have a marketing program to attract cargo business to your airport?

    a. Do you know the major industries using air cargo in your area?

    b. Do you call on local businesses to inform them of the cargo service available at your airport?

c. Do you call on out-of-town businesses who may ship to your area?

6. Do you have a cargo study developed specifically for your airport?
    a. Have you done forecasting for future cargo demand?
    b. How have you predicted future demand?
        i. Linear regression of historical volume?
        ii. Prediction of future volume based on a study of local cargo customers?
        iii. Prediction based on a demographic measure of the population in your area?
        iv. Other
    c. How accurate have your predictions been?
        i. If the predictions have been low what part of the demand was not accounted for in the estimates?
        ii. If the predictions were high, what anticipated demand did not materialize?

Airports Included in Survey

The eleven airports identified in Table 4-1, were selected based on their growth over the five year period from 1993 to 1998, the most recent nationwide data available. The "Airport Activity Statistics of Certified Air Carriers Summary Tables" published annually by the U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information was obtained to develop

Table 4-1
Survey Airports

LocID	Airport	City	State	Hub Size
ALB	ALBANY COUNTY	ALBANY	NY	Small
BHM	BIRMINGHAM INTL	BIRMINGHAM	AL	Medium
BOI	BOISE AIR TERMINAL/COWEN FLD	BOISE	ID	Small
BUF	GREATER BUFFALO INTL	BUFFALO	NY	Medium
BUR	HOLLYWOOD-BURBANK	HOLLYWOOD/BURBANK	CA	Small
CID	THE EASTERN IOWA AIRPORT	CEDAR RAPIDS	IA	Small
DSM	DES MOINES INTL	DES MOINES	IA	Small
JAN	JACKSON INTERNATIONAL AIRPORT	JACKSON	MS	Small
MDT	HARRISBURG INTL	HARRISBURG	PA	Small
PWM	PORTLAND INTL JETPORT	PORTLAND	ME	Small
RIC	RICHMOND INTL (RICHARD E BYRD FLYING FIELD)	RICHMOND	VA	Small

this report. This report lists percentage of annual enplanements, total aircraft departures performed and scheduled, number of passengers enplaned, the tons of freight enplaned, and the tons of mail enplaned at large, medium and small hub airports. The percentage increase in freight tonnage, the ratio of the 1998 to 1993 volume, and the annual compound growth rate were calculated for each airport in the nation. Two reports were generated, table 4-2, listing only medium hub airports and table 4-3, listing only the small hub airports. Each report was sorted in descending order of the compound growth rate for the five year period. Airports were selected that had a minimum of ten percent annual growth rate in air cargo for the five year period and that handled a significant volume of air cargo annually. The airport's 1998 enplaned cargo ranged from 6,666 tons at Portland, Maine to 64,669 tons at Des Moines, Iowa. Passenger enplanements ranged from 412,617 at Cedar Rapids, Iowa to 2,360,157 at Birmingham, Alabama. Six of the nine FAA regions are represented with four airports from the Eastern Region, two each from the Southern and Central Regions, and one each from the Northwest Mountain, Western Pacific and New England Regions. The Alaskan, Great Lakes and Southwest Regions are not represented. Annual cargo growth rates ranged from 11.05 percent at Cedar Rapids, Iowa to 54.89 percent at Des Moines, Iowa, averaging 25.05 percent annually. Passenger enplanements growth ranged from a decline of 0.37 percent at Portland Maine to a 10.72 percent increase annually at Jackson, Mississippi, averaging 4.28 percent annually. The passenger and

Table 4-2
Medium Hub Airports
Enplaned Cargo Data and Growth Rate

Region	LocID	1977 Enp Frt	1993 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998	Airports Selected for Survey
WP	LIH	1,754.00	844.45	5,419.99	209.01%	541.84%	3.090	5.52%	6.418	45.04%	
SW	SAT	4,517.14	15,556.55	83,773.47	1754.57%	438.51%	18.546	14.92%	5.385	40.04%	
SO	PBI	1,867.09	3,294.94	13,418.21	618.67%	307.24%	7.187	9.85%	4.072	32.42%	
SO	JAX	2,452.29	6,724.60	22,720.39	826.50%	237.87%	9.265	11.18%	3.379	27.57%	
EA	BUF	11,981.52	7,360.38	23,277.56	94.28%	216.25%	1.943	3.21%	3.163	25.89%	*
WP	HTO	22,359.19	5,119.20	15,001.42	-32.91%	193.04%	0.671	-1.88%	2.930	23.99%	
WP	TUS	2,330.08	3,475.55	9,653.93	314.32%	177.77%	4.143	7.00%	2.778	22.67%	
SO	BHM	2,433.36	6,701.97	18,470.28	659.04%	175.59%	7.590	10.13%	2.756	22.48%	*
NE	BDL	13,887.85	25,329.35	68,410.12	392.59%	170.08%	4.926	7.89%	2.701	21.98%	
CE	OMA	5,124.85	12,251.01	31,010.59	505.10%	153.13%	6.051	8.95%	2.531	20.41%	
SO	MCO	14,926.61	49,054.90	123,495.58	727.35%	151.75%	8.274	10.59%	2.517	20.28%	
SW	ABQ	3,529.14	17,785.54	43,566.71	1134.49%	144.96%	12.345	12.71%	2.450	19.62%	
NM	PDX	21,669.59	63,343.66	153,100.49	606.52%	141.70%	7.065	9.76%	2.417	19.30%	
SW	TUL	6,323.73	9,765.43	23,335.34	269.01%	138.96%	3.690	6.41%	2.390	19.03%	
EA	SYR	3,854.17	11,742.12	27,630.84	616.91%	135.31%	7.169	9.83%	2.353	18.67%	
GL	MKE	11,514.45	20,788.17	48,105.44	317.78%	131.41%	4.178	7.05%	2.314	18.27%	
SW	ELP	6,924.75	13,163.46	27,864.12	302.38%	111.68%	4.024	6.85%	2.117	16.18%	
EA	BWI	16,683.24	22,236.79	46,237.41	177.15%	107.93%	2.771	4.97%	2.079	15.77%	

Source Data: United States. Department of Transportation. Aviation Activity Statistics of Certified Air Carriers Summary Table. N.p.: n.p. 1977, 1987, 1990-1998.

Table 4-2 (continued)

Region	LocID	1977 Enp Frt	1993 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998	Airports Selected for Survey
SO	RDU	3,933.06	18,249.90	37,782.01	860.63%	107.03%	9.606	11.38%	2.070	15.67%	
NM	SLC	9,871.72	52,595.43	107,977.14	993.80%	105.30%	10.938	12.07%	2.053	15.47%	
WP	OGG	3,239.78	11,190.79	22,254.07	586.90%	98.86%	6.869	9.61%	1.989	14.74%	
WP	SAN	9,305.59	24,046.21	46,937.34	404.40%	95.20%	5.044	8.01%	1.952	14.31%	
SO	FLL	5,494.92	47,903.53	79,854.49	1353.24%	66.70%	14.532	13.59%	1.667	10.76%	
NM	GEG	2,890.68	27,997.60	42,980.51	1386.87%	53.51%	14.869	13.72%	1.535	8.95%	
EA	IAD	11,542.03	66,329.64	97,147.13	741.68%	46.46%	8.417	10.68%	1.465	7.93%	
EA	ORF	1,828.51	5,273.41	7,628.63	317.20%	44.66%	4.172	7.04%	1.447	7.66%	
WP	RNO	1,406.44	15,233.62	18,699.58	1229.57%	22.75%	13.296	13.11%	1.228	4.19%	
SW	OKC	3,763.06	13,224.47	15,880.67	322.01%	20.09%	4.220	7.10%	1.201	3.73%	
SO	CLT	14,293.97	47,620.59	53,902.11	277.10%	13.19%	3.771	6.52%	1.132	2.51%	
SO	SJU	42,627.11	78,019.88	87,612.64	105.53%	12.30%	2.055	3.49%	1.123	2.35%	
SO	BNA	7,775.13	10,087.38	10,264.40	32.02%	1.75%	1.320	1.33%	1.018	0.35%	
GL	CMH	6,154.18	7,985.11	2,791.40	-54.64%	-65.04%	0.454	-3.69%	0.350	-18.96%	

Source Data: United States. Department of Transportation. Aviation Activity Statistics of Certified Air Carriers Summary Table. N.p.: n.p. 1977, 1987, 1990-1998.

Table 4-3
Small Hub Airports
Enplaned Cargo Data and Growth Rate

Region	LocID	1977 Enp Frt	1993 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998	Airports Selected for Survey
CE	DSM	2,284.94	7,254.43	64,669.12	2730.23%	791.44%	28.302	17.26%	8.914	54.89%	*
SO	JAN	2,085.53	1,882.83	12,888.13	517.98%	584.51%	6.180	9.06%	6.845	46.92%	*
NM	COS	1,493.82	1,241.59	6,325.34	323.43%	409.45%	4.234	7.11%	5.095	38.49%	
SW	LIT	2,658.05	1,365.30	6,621.20	149.10%	384.96%	2.491	4.44%	4.850	37.13%	
WP	SNA	610.48	3,698.03	14,540.41	2281.80%	293.19%	23.818	16.30%	3.932	31.50%	
EA	ALB	1,025.02	2,848.86	8,358.96	715.49%	193.41%	8.155	10.51%	2.934	24.02%	*
SO	GSP	1,307.45	3,690.39	10,528.17	705.24%	185.29%	8.052	10.44%	2.853	23.33%	
GL	SBN	967.84	2,550.33	7,243.21	648.39%	184.01%	7.484	10.06%	2.840	23.22%	
NM	BOI	869.80	4,980.16	13,757.19	1481.65%	176.24%	15.816	14.05%	2.762	22.53%	*
EA	MDT	1,105.49	8,857.00	22,644.27	1948.35%	155.67%	20.483	15.46%	2.557	20.65%	*
NE	PVD	2,492.21	2,726.94	6,847.23	174.75%	151.10%	2.747	4.93%	2.511	20.22%	
WP	BUR	2,221.30	7,142.43	17,651.05	694.63%	147.13%	7.946	10.37%	2.471	19.84%	*
WP	SJC	3,491.31	27,191.39	60,351.58	1628.62%	121.95%	17.286	14.53%	2.220	17.29%	
EA	RIC	1,278.17	14,037.35	30,356.34	2274.98%	116.25%	23.750	16.28%	2.163	16.68%	*
NE	PWM	670.29	3,233.22	6,666.85	894.62%	106.20%	9.946	11.56%	2.062	15.57%	*
CE	CID	1,868.77	12,930.20	21,835.62	1068.45%	68.87%	11.684	12.42%	1.689	11.05%	*
SO	GSO	4,056.38	22,499.64	35,209.98	768.01%	56.49%	8.680	10.84%	1.565	9.37%	
CE	ICT	2,747.09	11,628.98	18,022.62	556.06%	54.98%	6.561	9.37%	1.550	9.16%	
SW	MAF	1,316.87	695.30	1,045.77	-20.59%	50.41%	0.794	-1.09%	1.504	8.51%	
SO	TYS	2,621.84	12,586.28	17,039.94	549.92%	35.39%	6.499	9.32%	1.354	6.25%	

Source: United States Department of Transportation. Aviation Activity Statistics of Certified Air Carriers Summary Table. N.p.: n.p. 1977, 1987, 1990-1998.

Table 4-3 (continued)

Region	LocID	1977 Enp Frt	1993 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998	Airports Selected for Survey
WP	KOA	2,154.42	9,095.16	12,101.52	461.71%	33.05%	5.617	8.57%	1.331	5.88%	
GL	GRR	1,667.81	7,604.04	9,896.91	493.41%	30.15%	5.934	8.85%	1.302	5.41%	
GL	MSN	2,229.87	2,807.81	3,490.93	56.55%	24.33%	1.566	2.16%	1.243	4.45%	
EA	ABE	307.42	5,096.73	5,109.19	1561.96%	0.24%	16.620	14.32%	1.002	0.05%	
SO	SAV	571.23	1,787.51	1,730.92	203.02%	-3.17%	3.030	5.42%	0.968	-0.64%	
SW	LBB	1,775.44	7,703.67	7,341.55	313.51%	-4.70%	4.135	6.99%	0.953	-0.96%	
SO	LEX	1,788.20	392.51	359.48	-79.90%	-8.42%	0.201	-7.36%	0.916	-1.74%	
SW	CRP	464.92	313.42	285.29	-38.64%	-8.98%	0.614	-2.30%	0.910	-1.86%	
SO	SRQ	824.76	564.80	449.43	-45.51%	-20.43%	0.545	-2.85%	0.796	-4.47%	
SO	HSV	1,142.98	6,686.92	5,105.16	346.65%	-23.65%	4.467	7.39%	0.763	-5.25%	
WP	PSP	185.61	97.69	62.03	-66.58%	-36.50%	0.334	-5.09%	0.635	-8.68%	
SW	BTR	548.49	503.60	267.41	-51.25%	-46.90%	0.488	-3.36%	0.531	-11.89%	
SO	DAB	740.66	400.86	187.43	-74.69%	-53.24%	0.253	-6.33%	0.468	-14.10%	
SO	PNS	421.46	1,032.02	410.15	-2.68%	-60.26%	0.973	-0.13%	0.397	-16.85%	
SW	AUS	1,485.89	19,425.50	5,421.59	264.87%	-72.09%	3.649	6.36%	0.279	-22.53%	
NM	EUG	522.70	3,818.30	831.31	59.04%	-78.23%	1.590	2.23%	0.218	-26.28%	
SO	BFM	801.35	5,329.92	356.22	-55.55%	-93.32%	0.445	-3.79%	0.067	-41.79%	
SO	CHS	1,272.27	16,338.45	898.05	-29.41%	-94.50%	0.706	-1.65%	0.055	-44.02%	

Source: United States Department of Transportation. Aviation Activity Statistics of Certified Air Carriers Summary Table. N.p.: n.p. 1977. 1987, 1990-1998.

cargo data for the eleven airports with growth rate calculations is presented in Table 4-4.

Survey responses were received from eight of the eleven airports, including Greater Buffalo International Airport, Buffalo, New York; Hollywood-Burbank Airport, Burbank, California; The Eastern Iowa Airport, Cedar Rapids, Iowa; Des Moines International Airport, Des Moines, Iowa; Jackson International Airport, Jackson, Mississippi; Harrisburg International Airport, Harrisburg, Pennsylvania; Portland International Jetport, Portland, Maine and Richmond International Airport, Richmond, Virginia. The detailed responses to the surveys are contained in Appendix C.

Findings

Three of the airports had development plans specifically tailored to air cargo. The Harrisburg's plan is in draft form, therefore the plan was not available to the airport managers to assist in the survey. In fact, Harrisburg's cargo volume decreased 8.89 percent in 1998. Des Moines, Iowa indicated that their plan is five years old. The plan prepared by Richmond was an area-wide cargo study sponsored by the Airport Authority through the local metropolitan planning organization. This study was funded through the Federal Highway Administration. The Eastern Iowa Airport in Cedar Rapids and Richmond International knew the local industries who were potential air cargo customers and had an organized program through their normal marketing efforts to call on

Table 4-4
Survey Airports
Enplaned Passenger and Cargo Data

LocID	Hub Size	1993 Enp Passengers	1994 Enp Passengers	1995 Enp Passengers	1995 Enp Passengers	1997 Enp Passengers	1998 Enp Passengers	% Increase 1993 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1993 to 1998
ALB	S	843,224	857,113	840,147	810,130	844,458	934,883	10.87%	1.109	2.09%
BHM	M	992,333	1,045,671	1,159,354	1,312,897	1,303,489	1,330,212	34.05%	1.340	6.04%
BOI	S	752,046	901,538	1,041,205	1,213,021	1,208,048	1,236,471	64.41%	1.644	10.46%
BUF	M	1,463,025	1,693,321	1,415,496	1,390,689	1,403,274	1,520,303	3.92%	1.039	0.77%
BUR	S	2,117,643	2,362,948	2,436,402	2,364,071	2,323,759	2,360,157	11.45%	1.115	2.19%
CID	S	352,456	341,720	328,282	335,247	382,764	412,617	17.07%	1.171	3.20%
DSM	S	527,445	608,554	710,535	800,024	698,650	698,490	32.43%	1.324	5.78%
JAN	S	349,637	320,470	351,955	375,604	423,435	581,829	66.41%	1.664	10.72%
MDT	S	517,900	520,913	493,393	457,578	571,870	557,350	7.62%	1.076	1.48%
PWM	S	472,996	460,596	500,941	433,473	439,674	464,402	-1.82%	0.982	-0.37%
RIC	S	928,769	1,025,179	998,742	992,861	1,092,130	1,172,149	26.20%	1.262	4.76%

LocID	Hub Size	1993 Enp Freight	1994 Enp Freight	1995 Enp Freight	1996 Enp Freight	1997 Enp Freight	1998 Enp Freight	% Increase 1993 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1993 to 1998
ALB	S	2,848.86	2,848.44	2,899.27	3,992.14	8,476.59	8,358.96	193.41%	2.934	24.02%
BHM	M	6,701.97	9,551.45	10,603.55	11,748.74	20,285.13	18,470.28	175.59%	2.756	22.48%
BOI	S	4,980.16	10,265.70	12,563.65	10,604.52	12,775.49	13,757.19	176.24%	2.762	22.53%
BUF	M	7,360.38	15,229.84	7,956.38	6,136.54	24,097.63	23,277.56	216.25%	3.163	25.89%
BUR	S	7,142.43	8,008.00	10,744.74	12,328.06	17,119.14	17,651.05	147.13%	2.471	19.84%
CID	S	12,930.20	13,253.24	10,734.33	11,864.21	26,295.48	21,835.62	68.87%	1.689	11.05%
DSM	S	7,254.43	9,522.85	12,481.78	11,803.17	60,755.02	64,669.12	791.44%	8.914	54.89%
JAN	S	1,882.83	4,169.16	2,299.87	5,651.09	14,159.91	12,888.13	584.51%	6.845	46.92%
MDT	S	8,857.00	12,440.57	12,639.85	14,721.35	23,470.49	22,644.27	155.67%	2.557	20.65%
PWM	S	3,233.22	3,653.46	4,222.06	3,923.30	6,248.13	6,666.85	106.20%	2.062	15.57%
RIC	S	14,037.35	16,421.08	16,002.69	17,194.24	26,036.17	30,356.34	116.25%	2.163	16.68%

Source Data: United States. Department of Transportation. Aviation Activity Statictics of Certifiicated Air Carriers Summary Table. N.p.: n.p. 1977, 1987, 1990-1998.

them. Des Moines reported they are trying to contact their local industries. Harrisburg reported they are aware of the local industries; however, they did not have a marketing program to call on the customers. Again, only Cedar Rapids and Richmond indicated they had a program to call on potential out-of-town customers to make them aware of the cargo service available.

All of the respondents indicated that the aircraft ramp available to the cargo operators was an exclusive use ramp with the exception of Hollywood-Burbank where the ramp is for joint use with the general aviation operations. Cargo buildings varied from 4,400 square feet at Des Moines to 400,000 square feet at Richmond. Development and ownership of the air cargo buildings is a broad range, and not uniform at individual airports. Hollywood-Burbank, Cedar Rapids, Des Moines, and Jackson reported they owned all of the cargo buildings at their respective airports. Buffalo and Harrisburg have exclusively used third party developers to construct cargo buildings at their airports. Portland has buildings constructed by third party developers and a local FBO. Richmond reported the broadest range of options with Authority ownership, third party developers, ,and one airline constructing a building on a land lease.

Cedar Rapids, Des Moines, and Richmond reported constructing cargo buildings on speculation in hopes of attracting a tenant. Cedar Rapids and Richmond reported it was important to have space available to attract tenants. Des Moines, although they constructed space in advance of having a tenant,

they did not feel this provided an advantage. Cedar Rapids funded their speculative construction with general obligation bonds backed by the city, plus cash reserves provided by the airport. Des Moines and Richmond both used airport revenue bonds.

Jackson, Des Moines, and Richmond reported that they had specific cargo studies prepared for their airport. However, at another point in the response provided by Des Moines, they indicated the cargo forecasts were part of the master plan. Harrisburg reported they were in the process of preparing a cargo study. Cedar Rapids, Jackson, and Richmond reported preparing forecasts of future cargo activity. Cedar Rapids reported mixed results using linear regression of historical volumes. Jackson used linear regression also. Their predictions were high since one of the airlines began trucking cargo rather than shipping by aircraft. Richmond was the only airport to report using information from customers to adjust the prediction derived from regression of historical volumes. They reported good accuracy with actual volumes for a short term period of three years.

Summary of Experiences

A proactive approach, not surprisingly, was a trait most of the high growth airports expressed. Paying attention to opportunities is an important element to improving possibility of success. The understanding of how to be "proactive" is not as clear-cut. Financially the most aggressive approach to being proactive is

the construction of physical facilities on a speculative basis. Only two of the respondents, Cedar Rapids and Richmond reported constructing facilities with public funds prior to securing a tenant. Mr. Tod Schiller, a former employee of the Richmond International Airport, expressed the opinion that this was a difficult step for the airport authority board to take. Based on personal experience with the airport authority board at McGhee Tyson Airport, this does not appear to be an approach with wide spread applicability for public agencies. Therefore, it appears airport authorities need to improve their ability to react to a cargo company's needs when an opportunity is available. Mr. Schiller expressed the opinion that air cargo firms are "accustomed" to dealing with developers and the airport authorities need to try to "play" that role. He also expressed the opinion that airport authorities need to try to perceive the future needs of the cargo industry. Four of the eight respondents reported they had some type of ongoing marketing program. Only two, Cedar Rapids and Richmond, made an effort to contact local and out-of-town customers directly. The third party developer in Buffalo reported that they placed advertisements in industry publications. There does not appear to be a direct correlation between direct cargo customer marketing on the part of an airport operator and success in developing the cargo market. Mr. Schiller from Richmond reported the Authority worked with the cargo airlines to develop the inbound freight volume. This is a critical element since airlines do not like to fly an empty aircraft.

Relating to the projection of future demand, only three airports reported making forecasts. They all used historical volume. Richmond was the only airport to adjust historical trend prediction based on interview information from carriers. Cedar Rapids reported mixed results and Jackson reported their predictions were high since one of the carriers switched to a trucking rather than flying operation. Richmond's predictions were having good agreement with actual volumes in the short term.

Chapter 5

Conclusions

Air cargo's development has definitely influenced industry in their decisions on how they operate and where they choose to locate. Air cargo provides greater flexibility to business owners to choose virtually any location in the country and still be able to deliver products the next business day. They are no longer required to be located in large urban centers or adjacent to their prime customers. The trend that small and medium hub airports are gaining market share from the large hub airports is something airport management staff needs to be aware of to maximize the opportunities available to their airports.

The integrated express carriers have significant flexibility on where they locate their consolidation facilities, since they own all of the assets used in their business and do not depend on contract transportation with other airlines or trucking companies. Their decisions on where to locate their facilities are based on a cost minimization model and maximization of hours of service to their customers. It is important for airport management staff to understand how these decisions are made to be in a position to present the advantages of their airport to the cargo airlines. It is also important to understand these concepts in order to have realistic expectations for growth of their airports. Not every airport is located geographically to become a major cargo hub. Approximately half of the airports responding to the survey indicated they knew the major industries in

the area using air cargo and had a marketing program to contact them. The other half of the respondents allows the strength of their location to work for them and respond to demand when it presents itself. It would seem that being proactive would reduce the obstacles to develop any project. It was interesting to note that only two airports out of the number sampled made any attempt to address marketing inbound freight and they both reported marginal results. One of the airports teamed with the cargo airlines serving their area in contacting the out of town shippers.

This difficulty highlights a major problem with planning for the air cargo industry. This is the lack of readily available data. The Bureau of Transportation Statistics collects data on enplaned (outbound) cargo and mail only. They do not have information on deplaned (inbound) cargo or mail. Also missing is a breakdown between express cargo and heavy weight palletized freight. Another significant element of missing data is origin and destination information. Finally with the integration of air and trucking modes, total segregation of these data does not provide a complete picture of transportation needs. The airports responding to the survey who had forecasts for cargo growth indicated they relied on historical volume to predict future growth. Depending on the maturity of the market and the nature of products moving in and out of the region this may or may not provide reliable results. However, without reliable data this may be the best method available. Commodity flow information would show the volume of high value, low weight product being shipped. Origin and destination

coupled with this would provide an excellent guide to the potential market in the area. As Boeing reports, there is a direct correlation between economic growth in general and growth in the air cargo industry. If the best method available is prediction based on historic volumes, they could be tempered with national or regional economic growth predictions. Figure 5-1 summarizes the forces expanding and constraining the growth of air cargo (4). Also, one airport reported adjusting their predictions based on discussions with their tenants regarding their future predictions.

Regarding the facility development aspects of the air cargo industry, four of the eight airports responded they had constructed facilities prior to having a specific tenant. The speculative development at one of these airports was constructed by a third party developer. It is very easy to understand why a governmental body would have difficulty accepting the risk of building facilities on speculation. It would seem that a good compromise would be to prepare site grading, with main utilities to the area and taxiway access reasonably at hand. This preparation needs to be as generic as possible with infrastructure developed around the perimeter without precluding any layout options. Each company has different and very specific operating characteristics. The more able an airport is to address these specifics, the more attractive they become. The Airport Authority at McGhee Tyson Airport designed and constructed three buildings tailored to the specific standards for three express package delivery companies.

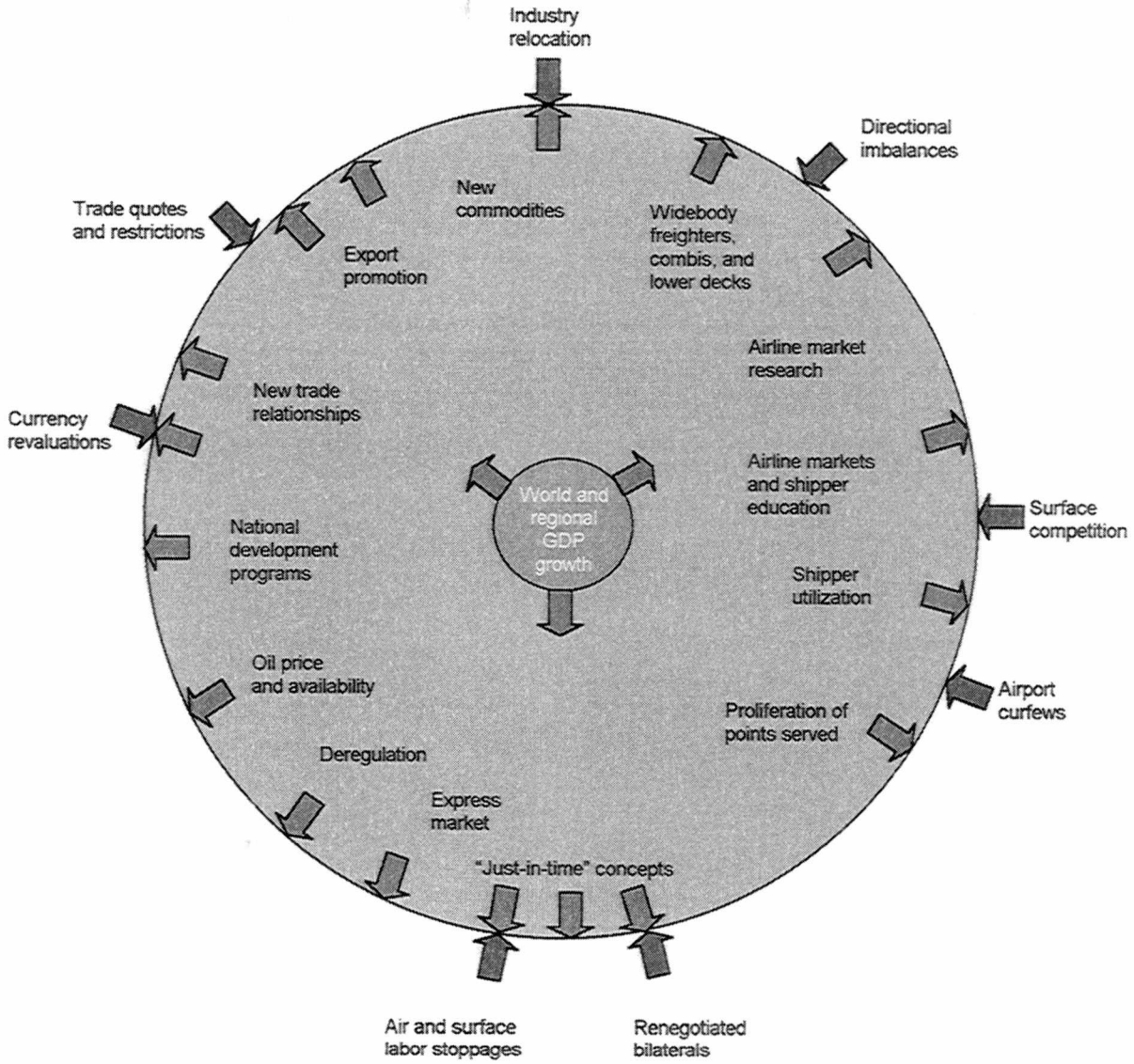


Figure 5-1
Forces and Constraints for Air Cargo Growth

Source Data: Boeing Commercial Airplane Group. World Air Cargo Forecast 2000\2001. Seattle: n.p., 2000.

Even though they are all in the same type of business, the three buildings are very different and the method of operation within the buildings very different.

If the airport is not in a position to commit capital to site development prior to having a potential customer, at a minimum some detailed planning should be completed to determine the areas available for development. This should include tentative layouts for building, airside and landside access, preliminary quantities, and estimates for the construction and a financing plan. This plan should identify available sources of funding and what the responsibility of the Authority and tenant would be. This would be a useful document to show prospective tenants when calling on them. Finally, it is easy for airport engineers and planners to focus on the airside improvements related to a cargo development and more challenging to focus on the landside, in particular the roadway system off the airport. This requires coordination with the area planning agencies and local highway departments. In today's air cargo business, trucking plays a vital role. Not only must the local delivery vans have safe efficient ingress and egress but long distance trucking using semi-trailer trucks is a key element of the business. Obviously, the large trucks are not as maneuverable as the city delivery vehicles and it is important to take this into account when planning the connection from the local highway system to the cargo complex. It is not unreasonable to anticipate that fifty percent of the cargo volume passing through an express package facility at an airport will

move exclusively by truck for the line-haul portion of the trip. This will impact the growth of airside facilities in relation to landside trucking facilities.

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APPENDICES

Table A-1
Airport Location ID & Hub Size

LocID	AIRPORT	CITY	ST	Hub Size
ABE	ALLENTOWN-BETHLEHEM-EASTON	ALLENTOWN	PA	Small
ABQ	ALBUQUERQUE INTL SUNPORT	ALBUQUERQUE	NM	Medium
ABY	SOUTHWEST GEORGIA REGIONAL	ALBANY	GA	Non-Hub
ACY	NAFEC ATLANTIC CITY/POMONA	ATLANTIC CITY	NJ	Small
AFW	FORT WORTH ALLIANCE	DALLAS FT. WORTH	TX	Non-Hub
AGS	BUSH FIELD	AUGUSTA	GA	Small
ALB	ALBANY COUNTY	ALBANY	NY	Small
ALO	WATERLOO MUNI	WATERLOO	IA	Small
AME	AMARILLO AIR TERMINAL	AMARILLO	TX	Small
ANC	ANCHORAGE INTL	ANCHORAGE	AK	Medium
ATL	THE WILLIAM B HARTS FIELD ATLANTA	ATLANTA	GA	Large
AUS	ROBERT MUELLER MUNICIPAL	AUSTIN	TX	Small
AVL	ASHVILLE MUNI	ASHVILLE	NC	Small
AVP	WILKES-BARRE-SCRANTON	SCRANTON WILKES-0BARRE	PA	Small
AZO	KALAMAZOO MUNI	KALAMAZOO BATTLE CREEK	MI	Small
BDL	BRADLEY INTL	WINDSOR LOCKS	CT	Medium
BFI	BOEING FIELD / KING COUNTY INTL	SEATTLE	WA	Non-Hub
BFL	MEADOWS FIELD	BAKERSFIELD	CA	Small
BFM	BATES FIELD	MOBILE	AL	Small
BGR	BANGOR INTL	BANGER	ME	Small
BHM	BIRMINGHAM INTL	BIRMINGHAM	AL	Medium
BIL	LOGAN FIELD	BILLINGS	MT	Small

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
BIS	BISMARCK MUNI	BISMARCK MANDAN	ND	Small
BKL	BURKE LAKEFRONT	CLEVELAND	OH	Small
BNA	NASHVILLE INTERNA	NASHVILLE	TN	Medium
BOI	BOISE AIR TERMINAL/COWEN FLD	BOISE	ID	Small
BOS	GENERAL EDWARD LAWRENCE LOGAN	BOSTON	MA	Large
BQN	RAFAEL HERNANDEZ	AGUADILLA	PR	Non-Hub
BRO	BROWNSVILLE / SOUTH PADRE ISLAND	BROWNSVILLE	TX	Non-Hub
BTR	RYAN	RATON ROUGE	LA	Small
BTV	BURLINGTON INTL	BURLINGTON	VT	Small
BUF	GREATER BUFFALO INTL	BUFFALO	NY	Medium
BUR	HOLLYWOOD-BURBANK	HOLLYWOOD BURBANK	CA	Small
BWI	BALTIMORE-WASHINGTON INTL	BALTIMORE	MD	Medium
CAE	COLUMBIA METROPOLITAN	COLUMBIA	SC	Small
CAK	AKRON-CANTON	AKRON-CONTON	OH	Small
CCR	BUCHANAN FIELD	SAN FRANCISCO OAKLAND	CA	Non-Hub
CGX	MEIGS FIELD	CHICAGO	IL	Non-Hub
CHA	LOVELL FIELD	CHATTANOOGA	TN	Small
CHS	CHARLESTON AFB / INTL	CHARLESTON	SC	Small
CID	THE EASTERN IOWA AIRPORT	CEDAR RAPIDS	IA	Small
CLE	CLEVELAND-HOPKINS INTL	CLEVELAND	OH	Large
CLT	CHARLOTTE / DOUGLAS INTL	CHARLOTTE	NC	Medium
CMH	PORT COLUMBUS INTL	COLUMBUS	OH	Medium

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
CMI	UNIVERSITY OF IL-WILLARD	CHAMPAIGN URBANA	IL	Small
COS	PETERSON FIELD	COLORADO SPRINGS	CO	Small
CRG	CRAIG MUNI	JACKSONVILLE	FL	Non-Hub
CRP	CORPUS CHRISTI INTL	CORPUS CHRISTI	TX	Small
CRW	KANAWHA	CHARLESTON DUNBAR	WV	Small
CSG	COLUMBUS METRO	COLUMBUS	GA	Small
CVG	CINCINNATI / NORTHERN KENTUCKY (GREATER CINCINNATI)	COVINGTON	KY	Medium
DAB	DAYTONA BEACH REG	DAYTONA BEACH	FL	Small
DAL	LOVE FIELD	DALLAS	TX	Non-Hub
DAY	AMES M COX DAYTON INTL	DAYTON	OH	Medium
DCA	WASHINGTON NATIONAL	WASHINGTON	DC	Large
DEN	DENVER INTL	DENVER	CO	Large
DFW	DALLAS/FORT WORT INTL	DALLAS FORT WORTH	TX	Large
DLH	DULUTH INTL	DULUTH SUPERIOR	WI	Small
DSM	DES MOINES INTL	DES MOINES	IA	Small
DTT	DETROIT CITY	DETROIT ANN ARBOR	MI	Non-Hub
DTW	DETROIT METROPOLITAN WAYNE COUNTY	DETROIT	MI	Large
EFD	ELLINGTON FIELD	HOUSTON	TX	Non-Hub
ELP	EL PASO INTL	EL PASO	TX	Medium
ERI	ERIE INTL	ERIE	PA	Small
EUG	MAHON SWEET FIELD	EUGENE	OR	Small
EVV	EVANSVILLE DRESS REGIONAL	EVANSVILLE	IN	Small
EWR	NEWARK INTL	NEWARK	NJ	Large

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
FAI	FAIRBANKS INTL	FAIRBANKS	AK	Small
FAR	HECTOR FIELD	FARGO MOORHEAD	ND/MN	Small
FAT	FRESNO YOSEMITE INTL	FRESNO	CA	Small
FAY	FAYETTEVILLE MUNI/GRANNIS FLD	FAYETTEVILLE	NC	Small
FLL	FORT LAUDERDALE / HOLLYWOOD INTL	FORT LAUDERDALE	FL	Medium
FMY	PAGE FIELD	FORT MYERS	FL	Small
FNT	BISHOP INTL	FLINT	MI	Small
FSD	JOE FOSS FIELD	SIOUX FALLS	SD	Small
FWA	FORT WAYNE INTL	FORT WAYNE	IN	Small
GEG	SPOKANE INTL	SPOKANE	WA	Medium
GJT	WALKER FIELD	FRAND JUNCTION	CO	Small
GMU	GREENVILLE DOWNTOWN	GREENVILLE SPARTANBURG	SC	Non-Hub
GNV	GAINESVILLE MUNI	GAINESVILLE	FL	Small
GRB	AUSTIN-STRAUBEL FIELD	GREEN BAY CLINTONVILLE	WI	Small
GRR	KENT COUNTY INTL	GRAND RAPIDS	MI	Small
GSN	SAIPAN INTL	SAIPAN MARIANA ISLANDS	M IS	Small
GSO	PIEDMONT TRIAD INTL (GREENBORO-HIGH PT-WINSTON REG)	GREENSBORO	NC	Small
GSP	GREENVILLE-SPARTANBURG	GREENVILLE SPARTANBURG	SC	Small
GTF	GREAT FALLS INTL	GREAT FALLS	MT	Small
GUM	AGANA FIELD	AGANA	GM	Small
HNL	HONOLULU INTL	HONOLULU	HI	Large
HOU	WILLIAM P HOBBY	HOUSTON	TX	Non-Hub

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
HPN	WESTCHESTER COUNTY	WHITE PLAINS	NY	Small
HRL	HARLINGEN INDUSTRIAL AIRPARK	BROWSVILLE HRLGN SAN BNTO	TX	Small
HSV	HUNTSVILLE INTL-CARL T JONES-MADISON COUNTY	HUNTSVILLE	AL	Small
HTO	GENERAL LYMAN FIELD	HILO	HI	Medium
HTS	TRI-STATE/WALKER-LONG FIELD	ASHLAND HUNTINGTON	NC WV	Small
HUF	HULMAN REGIONAL	TERRE HAUTE	IN	Non-Hub
IAD	WASHINGTON DULLES INTL	LOUDON	VA	Medium
IAG	NIAGARA FALLS INTL	NIAGARA FALLS	NY	Non-Hub
IAH	HOUSTON INTERCONTINTAL	HOUSTON	TX	Large
ICT	WICHITA MID-CONTINENT	WICHITA	KS	Small
IND	INDIANAPOLIS INTL	INDIANAPOLIS	IN	Medium
INT	SMITH-REYNOLDS	GREENSBORO HIGH PT/WINSTN	NC	Non-Hub
ISP	LONG ISLAND-MACARTHUR	LONG ISLAND	NY	Small
ITO	HILO INTERNATIONAL	HILO	HI	Small
JAN	JACKSON INTL	JACKSON	MS	Small
JAX	JACKSONVILLE INTL	JACKSONVILE	FL	Medium
JFK	JOHN F KENNEDY INTL	NEW YORK	NY	Large
JNU	JUNEAU MUNICIPAL	JUNEAU	AK	Small
KOA	KEAHOLE-KONA INTL	KAILUA / KONA	HI	Small
LAN	CAPITAL CITY	LANSING	MI	Small
LAS	MC CARRAN INTL	LAS VEGAS	NV	Large
LAX	LOS ANGELES INTL	LOS ANGELES	CA	Large

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
LBB	LUBBOCK INTL	LUBBOCK	TX	Small
LCK	RICKENBACKER INTL	COLUMBUS	OH	Non-Hub
LEX	BLUE GRASS	LEXINGTON FRANKFORT	KY	Small
LGA	LA GUARDIA	NEW YORK	NY	Large
LGB	LONG BEACH	LONG BEACH	CA	Small
LIH	LIHUE	LIHUE	HI	Medium
LIT	ADAMS FIELD	LITTLE ROCK	AR	Small
LNK	LINCOLN MUNI	LINCOLM	NE	Small
LRD	LAREDO INTL	LAREDO	TX	Non-Hub
MAF	MIDLAND/ODESSA REGL	MIDLALND ODESSA	TX	Small
MBS	TRI CITY	SAGINAW / BAY CITY / MIDLAND	MI	Small
MCI	KANSAS CITY INTL	KANSAS CITY	MO	Large
MCO	ORLANDO INTL	ORLANDO	FL	Medium
MDT	HARRISBURG INTL	HARRISBURG	PA	Small
MDW	MIDWAY	CHICAGO	IL	Non-Hub
MEM	MEMPHIS INTL	MEMPHIS	TN	Medium
MFE	MILLER INTERNATIONAL	MISSION MCALLEN EDINBURG	TX	Small
MGM	DANNELLY FIELD	MONTGOMERY	AL	Small
MHT	MANCHESTER MUNICIPAL	MANCHESTER	NH	Small
MIA	MIAMI INTL	MIAMI	FL	Large
MKC	KANSAS CITY MUNI	KANSAS CITY	MO	Non-Hub
MKE	GENERAL MITCHELL INTL	MILWAUKEE	WI	Medium

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
MLB	CAPE KENNEDY REGIONAL	MELBOURNE	FL	Small
MLE	MILLARD	OMAHA	NE	Non-Hub
MLI	QUAD-CITY	MOLINE	IL	Small
MOB	MOBILE REGIONAL	MOBILE	AL	Non-Hub
MRY	PENINSULA	SALINAS MONTEREY	CA	Small
MSN	TRUAX FIELD	MADISON	WI	Small
MSP	MINNEAPOLIS-ST PAUL INTL	MINNEAPOLIS	MN	Large
MSY	NEW ORLEANS INTL / MOISANT FIELD	NEW ORLEANS	LA	Large
MYF	MONTGOMERY FIELD	SAN DIEGO	CA	Non-Hub
MYR	MYRTLE BEACH	MYRTLE BEACH	SC	Small
OAK	METROPOLITAN OAKLAND INTL	OAKLAND	CA	Small
OGG	KAHULUI	KAHULUI	HI	Medium
OKC	WILL ROGERS WORLD	OKLAHOMA CITY	OK	Medium
OMA	EPPLEY AIRFIELD	OMAHA	NE	Medium
ONT	ONTARIO INTL	ONTARIO	CA	Small
ORD	CHICAGO O'HARE INTL	CHICAGO	IL	Large
ORF	NORFOLK INTL	NORFOLK	VA	Medium
PBI	PALM BEACH INTERNATIONAL	WEST PALM BEACH	FL	Medium
PDX	PORTLAND INTL	PORTLAND	OR	Medium
PHF	PATRICK HENRY	NEWPT NEW/HAMPTN WILLIAMSBURG	VA	Small
PHL	PHILADELPHIA INTL	PHILADELPHIA	PA	Large
PHX	PHOENIX SKY HARBOR INTL	PHOENIX	AZ	Large

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
PIA	GREATER PEORIA REGIONAL	PEORIA	IL	Small
PIE	ST. PETERSBURG/CLWTR INTL	ST. PETERSBURG	FL	Non-Hub
PIT	PITTSBURGH INTL	PITTSBURGH	PA	Large
PNS	PENSACOLA REGIONAL	PENSACOLA	FL	Small
PSM	PEASE INTL	PORTSMOUTH	NH	Non-Hub
PSP	PALM SPRINGS MUNI	INDIO PALM SPRINGS	CA	Small
PVD	THEODORE FRANCIS GREEN STATE	PROVIDENCE	RI	Small
PWM	PORTLAND INTL JEGPORT	PORTLAND	ME	Small
RAP	RAPID CITY REGIONAL	RAPID CITY	SD	Small
RDU	RALEIGH-DURHAM INTL	RALEIGH / DURHAM	NC	Medium
RFD	GREATER ROCKFORD	ROCKFORD	IL	Non-Hub
RIC	RICHMOND INTL (RICHARD E BYRD FLYING FIELD)	RICHMOND	VA	Small
RNO	RENO / TAHOE INTL	RENO	NV	Medium
ROA	ROANOKE REGIONAL / WOODRUM FIELD	ROANOKE	VA	Small
ROC	GREATER ROCHESTER INTL (ROCHESTER-MONROE COUNTY)	ROCHESTER	NY	Medium
RST	ROCHESTER MUNI	ROCHESTER	MN	Small
RSW	SOUTHWEST FLORIDA	FORT MYERS	FL	Medium
SAC	SACRAMENTO METRO	SACRAMENTO	CA	Small
SAN	SAN DIEGO INTL - LIDBERGH FIELD	SAN DIEGO	CA	Medium
SAT	SAN ANTONIO INTL	SAN ANTONIO	TX	Medium
SAV	SAVANNAH INTL	SAVANNAH	GA	Small
SBA	SANTA BARBARA	SANTA BARBARA	CA	Small

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
SBN	MICHIANA REGIONAL	SOUTH BEND	IN	Small
SDF	LOUISVILLE INTL-STANDFORD FIELD	LOUISVILLE	KY	Medium
SEA	SEATTLE-TACOMA INTL	SEATTLE	WA	Large
SFF	FELTS FIELD	SPOKANE	WA	Non-Hub
SFO	SAN FRANCISCO INTL	SAN FRANCISCO	CA	Large
SGF	SPRINGFIELD-BRANSON REGIONAL	SPRINGFIELD	MO	Small
SHV	SHREVEPORT REGIONAL	SHREVEPORT	LA	Small
SJC	SAN JOSE INTL	SAN JOSE	CA	Small
SJU	LUIS MUNOZ MARIN INTL	SAN JUAN	PR	Medium
SLC	SALT LAKE CITY INTL	SALT LAKE CITY	UT	Medium
SMF	SACRAMENTO METRO	SACRAMENTO	CA	Medium
SMX	SANTA MARIA PUBLIC	SANTA BARBARA	CA	Non-Hub
SNA	ORANGE COUNTY	LOS ANGELES	CA	Small
SPI	CAPITAL	SPRINGFIELD	IL	Small
SRQ	SARASOTA-BRADENTON	SARASOTA BRADENTON	FL	Small
STL	LAMBERT-ST LOUIS INTL	ST LOUIS	MO	Large
STP	ST PAUL DOWNTOWN	ST PAUL	MN	Non-Hub
STT	HARRY S TRUMAN	CHARLOTTE AMALIE	VI	Small
SWF	STEWART INTL	NEWBURGH	NY	Small
SYR	SYRACUSE HANCOCK INTL	SYRACUSE	NY	Medium
TLH	TALLAHASSEE MUNI	TALLAHASSEE	FL	Small
TOL	TOLEDO EXPRESS	TOLEDO	OH	Small

Table A-1 (continued)

LocID	AIRPORT	CITY	ST	Hub Size
TPA	TAMPA INTL	TAMPA	FL	Large
TRI	TIR CITY	BRISTOL KNGSPRT JHNSN CTY	TN	Small
TUL	TULSA INTL	TULSA	OK	Medium
TUS	TUCSON INTL	TUCSON	AZ	Medium
TYS	MC GHEE TYSON	KNOXVILLE	TN	Small
YIP	WILLOW RUN	DETROIT	MI	Non-Hub
YNG	YONGSTOWN MUNI	YOUNGSTOWN	OH	Small

Table B-1
Total Annual Enplaned Freight

	1977	1987	1990	1991	1992	1993	1994	1995
Total	2,812,876.96	3,775,291.49	4,499,664.61	4,533,259.94	4,811,478.03	5,845,703.52	6,291,775.34	6,707,059.55

1996	1997	1998	% Increase 1977 to 1998	% Increase 1993 to 1998	1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
7,377,604.65	10,130,235.41	10,701,138.74	280.43%	83.06%	3.804	6.57%	1.831	12.85%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987,1990-1998.

Table B-2
Annual Enplaned Mail
By FAA Region

Region	1977 Enplaned Mail	1987 Enplaned Mail	1990 Enplaned Mail	1991 Enplaned Mail	1992 Enplaned Mail	1993 Enplaned Mail
AK	16,790.81	60,993.57	62,566.44	91,393.47	58,485.75	60,816.03
CE	48,112.32	90,790.21	82,673.44	69,137.16	96,008.47	103,784.23
EA	225,050.17	300,482.24	300,642.44	283,567.01	323,338.13	346,145.51
GL	175,114.87	264,535.34	269,345.47	259,988.29	286,892.18	312,657.17
NE	9,233.28	18,769.43	19,281.52	23,039.59	19,715.16	20,619.20
NM	58,795.86	122,083.29	108,590.96	105,663.20	116,681.88	136,602.41
SO	156,191.79	273,361.42	264,407.31	260,661.90	293,623.88	318,530.07
SW	82,628.47	134,807.90	152,696.84	147,320.11	166,108.38	179,578.99
WP	141,057.25	185,862.03	221,436.33	208,285.29	234,697.03	254,014.82
Total	**912,974.82**	**1,451,685.43**	**1,481,640.74**	**1,449,056.02**	**1,595,550.86**	**1,732,748.42**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-2 (continued)

Region	1994 Enplaned Mail	1995 Enplaned Mail	1996 Enplaned Mail	1997 Enplaned Mail	1998 Enplaned Mail	% Increase 1977 to 1998
AK	61,071.51	56,736.10	56,329.77	54,512.40	53,922.82	221.14%
CE	119,610.89	129,503.23	136,244.65	115,115.83	100,183.39	108.23%
EA	343,140.62	381,604.82	394,446.57	403,330.67	374,281.14	66.31%
GL	319,875.66	431,526.56	465,429.16	471,528.19	490,029.34	179.83%
NE	19,379.67	21,744.54	22,458.39	22,740.60	25,198.48	172.91%
NM	156,806.34	173,066.75	190,479.82	212,549.26	219,765.51	273.78%
SO	330,038.19	369,530.67	391,401.50	406,443.04	360,881.88	131.05%
SW	180,682.56	198,918.68	209,175.39	213,553.17	212,301.27	156.93%
WP	291,062.10	298,580.33	322,446.91	358,360.01	380,468.75	169.73%
Total	**1,821,667.54**	**2,061,211.68**	**2,188,412.16**	**2,258,133.17**	**2,217,032.58**	**142.84%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-2 (continued)

Region	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
AK	-11.33%	3.211	5.71%	0.887	-2.38%
CE	-3.47%	2.082	3.55%	0.965	-0.70%
EA	8.13%	1.663	2.45%	1.081	1.58%
GL	56.73%	2.798	5.02%	1.567	9.40%
NE	22.21%	2.729	4.90%	1.222	4.09%
NM	60.88%	3.738	6.48%	1.609	9.98%
SO	13.30%	2.311	4.07%	1.133	2.53%
SW	18.22%	2.569	4.60%	1.182	3.40%
WP	49.78%	2.697	4.84%	1.498	8.42%
Total	**27.95%**	**2.428**	**4.32%**	**1.279**	**5.05%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-3
U.S. Gross Domestic Product and Enplaned Freight Comparison

Year	U.S. Gross Domestic Product (billion chained (1996) dollars)	% Growth GDP	Enplaned Freight	% Growth Cargo	Cargo Growth / GDP Growth	US Population	% US Population Growth
1989	6,591.80					246.8	
1990	6,707.90	1.76%	4,499,664.61			248.8	0.80%
1991	6,676.40	-0.47%	4,533,259.94	0.75%	-1.59	252.2	1.35%
1992	6,880.00	3.05%	4,811,478.03	6.14%	2.01	255.0	1.10%
1993	7,062.60	2.65%	5,845,703.52	21.49%	8.10	257.8	1.09%
1994	7,347.70	4.04%	6,291,775.34	7.63%	1.89	260.3	0.96%
1995	7,543.80	2.67%	6,707,059.55	6.60%	2.47	262.8	0.95%
1996	7,813.20	3.57%	7,377,604.65	10.00%	2.80	265.2	0.90%
1997	8,144.80	4.24%	10,130,235.41	37.31%	8.79	267.8	0.97%
1998	8,495.70	4.31%	10,701,138.74	5.33%	1.24	270.2	0.89%
Average		2.87%		11.91%	4.15		

Source Data: United States Dept. of Energy - Gross Domestic Product and Implict Price Deflator: U.S. and World Population. 1999. http://www.eia.doe.gov/pub/energy.overview/aer1999/txt.

Table B-4
Annual Enplaned Passengers
Summarized by FAA Region

Region	1977 Enp Passengers	1987 Enp Passengers	1990 Enp Passengers	1991 Enp Passengers	1992 Enp Passengers	1993 Enp Passengers	1994 Enp Passengers	1995 Enp Passengers
AK Total	888,004	1,005,785	1,362,282	1,321,269	1,363,849	1,391,119	1,514,265	1,519,340
CE Total	8,351,578	17,059,723	15,245,532	15,255,454	16,448,489	16,149,139	18,500,450	20,374,775
EA Total	38,431,596	73,775,614	70,156,463	65,210,913	66,600,835	68,543,321	74,459,321	74,990,184
GL Total	34,898,890	58,301,255	61,071,161	59,732,165	63,524,354	66,985,383	72,501,445	74,863,465
NE Total	1,874,258	3,706,077	3,845,567	3,511,464	3,555,352	3,610,185	3,738,046	3,879,931
NM Total	14,665,780	32,288,244	29,811,696	30,850,818	33,426,814	37,653,885	40,701,253	42,990,332
SO Total	40,778,330	82,733,713	87,157,624	81,428,995	86,082,254	90,051,237	100,574,421	101,777,829
SW Total	20,234,759	50,445,226	55,794,148	54,805,087	58,181,888	59,744,680	63,300,513	65,380,338
WP Total	35,893,373	78,999,140	84,990,190	87,057,501	87,936,370	91,514,524	100,161,168	105,563,915
Grand Total	**196,016,568**	**398,314,777**	**409,434,663**	**399,173,666**	**417,120,205**	**435,643,473**	**475,450,882**	**491,340,109**

Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume
AK Total	0.45%	0.25%	0.33%	0.33%	0.33%	0.32%	0.32%	0.31%
CE Total	4.26%	4.28%	3.72%	3.82%	3.94%	3.71%	3.89%	4.15%
EA Total	19.61%	18.52%	17.13%	16.34%	15.97%	15.73%	15.66%	15.26%
GL Total	17.80%	14.64%	14.92%	14.96%	15.23%	15.38%	15.25%	15.24%
NE Total	0.96%	0.93%	0.94%	0.88%	0.85%	0.83%	0.79%	0.79%
NM Total	7.48%	8.11%	7.28%	7.73%	8.01%	8.64%	8.56%	8.75%
SO Total	20.80%	20.77%	21.29%	20.40%	20.64%	20.67%	21.15%	20.71%
SW Total	10.32%	12.66%	13.63%	13.73%	13.95%	13.71%	13.31%	13.31%
WP Total	18.31%	19.83%	20.76%	21.81%	21.08%	21.01%	21.07%	21.48%
Grand Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-4 (continued)

Region	1996 Enp Passengers	1997 Enp Passengers	1998 Enp Passengers	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1993 to 1998
AK Total	1,645,978	1,634,249	1,626,402	83.15%	16.91%	1.832	2.92%	1.169	3.17%
CE Total	21,846,546	22,435,454	22,879,074	173.95%	41.67%	2.739	4.92%	1.417	21.17%
EA Total	77,548,165	80,501,762	83,600,688	117.53%	21.97%	2.175	3.77%	1.220	13.21%
GL Total	78,403,820	81,521,063	84,229,315	141.35%	25.74%	2.414	4.28%	1.257	24.23%
NE Total	4,111,825	4,867,051	5,243,958	179.79%	45.25%	2.798	5.02%	1.453	16.56%
NM Total	47,874,480	48,487,391	48,629,024	231.58%	29.15%	3.316	5.87%	1.291	50.68%
SO Total	110,170,749	116,380,219	120,046,502	194.39%	33.31%	2.944	5.28%	1.333	15.70%
SW Total	68,292,171	69,408,196	71,343,080	252.58%	19.41%	3.526	6.18%	1.194	10.67%
WP Total	112,865,884	113,099,809	113,526,446	216.29%	24.05%	3.163	5.64%	1.241	4.41%
Grand Total	**522,759,618**	**538,335,194**	**551,124,489**	**181.16%**	**26.51%**	**2.812**	**5.05%**	**1.265**	**4.82%**

Region	% of 1996 Volume	% of 1997 Volume	% of 1998 Volume	% Increase 1977 to 1998	% Increase 1993 to 1998	1998% / 1977%	Compound Growth Rate Share 1977 to 1998	1998% / 1993%	Compound Growth Rate Share 1993 to 1998
AK Total	0.31%	0.30%	0.30%	-34.86%	-7.58%	65.14%	-2.02%	92.42%	-1.57%
CE Total	4.18%	4.17%	4.15%	-2.57%	11.99%	97.43%	-0.12%	111.99%	2.29%
EA Total	14.83%	14.95%	15.17%	-22.63%	-3.59%	77.37%	-1.21%	96.41%	-0.73%
GL Total	15.00%	15.14%	15.28%	-14.16%	-0.60%	85.84%	-0.72%	99.40%	-0.12%
NE Total	0.79%	0.90%	0.95%	-0.49%	14.82%	99.51%	-0.02%	114.82%	2.80%
NM Total	9.16%	9.01%	8.82%	17.93%	2.09%	117.93%	0.79%	102.09%	0.41%
SO Total	21.07%	21.62%	21.78%	4.70%	5.38%	104.70%	0.22%	105.38%	1.05%
SW Total	13.06%	12.89%	12.95%	25.40%	-5.61%	125.40%	1.08%	94.39%	-1.15%
WP Total	21.59%	21.01%	20.60%	12.49%	-1.94%	112.49%	0.56%	98.06%	-0.39%
Grand Total	**100.00%**	**100.00%**	**100.00%**						

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-5
Annual Enplaned Freight
for Airports Serving as a Hub to an Express Cargo Carrier
Summarized by FAA Region

Region	Hub Size	LocID	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp Frt
AK	M	ANC	34,650.01	333,942.70	318,663.23	316,717.34	289,192.80	300,915.17	235,832.21	219,614.72
AK Total			**34,650.01**	**333,942.70**	**318,663.23**	**316,717.34**	**289,192.80**	**300,915.17**	**235,832.21**	**219,614.72**
EA	L	EWR	46,299.11	129,362.35	163,211.63	161,155.82	176,991.22	229,743.49	286,675.08	324,127.48
EA	L	PHL	52,321.99	49,810.91	49,572.70	51,676.92	53,345.28	55,453.33	73,998.26	89,190.13
EA Total			**98,621.10**	**179,173.26**	**212,784.33**	**212,832.74**	**230,336.50**	**285,196.82**	**360,673.34**	**413,317.61**
GL	M	DAY	14,677.20	14,405.48	20,922.76	10,931.37	11,623.57	121,528.02	97,933.75	208,913.82
GL	M	IND	16,769.82	11,838.53	110,350.63	108,272.93	143,498.45	204,508.70	210,154.97	193,431.65
GL Total			**31,447.02**	**26,244.01**	**131,273.39**	**119,204.30**	**155,122.02**	**326,036.72**	**308,088.72**	**402,345.47**
SO	L	MIA	123,866.63	136,301.86	187,247.24	201,093.89	184,075.94	336,634.50	432,221.25	465,507.85
SO	M	CVG	10,826.26	11,385.72	16,808.48	19,677.03	21,095.65	96,929.69	111,470.92	133,166.27
SO	M	MEM	19,022.88	513,305.28	614,223.60	682,015.38	781,828.03	806,427.37	923,994.40	951,052.07
SO	M	SDF	6,053.51	8,747.83	8,725.05	9,810.23	7,891.18	19,318.82	18,740.05	24,235.06
SO	S	CAE	1,288.46	425.69	6,554.20	6,446.09	4,827.10	6,628.95	9,431.69	10,049.11
SO Total			**161,057.74**	**670,166.38**	**833,558.57**	**919,042.62**	**999,717.90**	**1,265,939.33**	**1,495,858.31**	**1,584,010.36**
WP	S	OAK	754.89	49,913.76	69,875.80	84,345.74	103,735.02	145,018.39	150,855.66	178,374.30
WP	S	ONT	1,566.73	8,111.17	8,488.64	11,528.25	11,078.59	25,222.94	25,537.28	36,865.26
WP Total			**2,321.62**	**58,024.93**	**78,364.44**	**95,873.99**	**114,813.61**	**170,241.33**	**176,392.94**	**215,239.56**
Grand Total			**328,097.49**	**1,267,551.28**	**1,574,643.96**	**1,663,670.99**	**1,789,182.83**	**2,348,329.37**	**2,576,845.52**	**2,834,527.72**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-5 (continued)

Region	Hub Size	LocID	1996 Enp Frt	1997 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
AK	M	ANC	267,595.92	378,092.37	419,503.46	1110.69%	39.41%	12.107	12.61%	1.394	6.87%
AK Total			**267,595.92**	**378,092.37**	**419,503.46**	**1110.69%**	**39.41%**	**12.107**	**12.61%**	**1.394**	**6.87%**
EA	L	EWR	349,072.55	438,446.79	456,516.81	886.02%	98.71%	9.860	11.51%	1.987	14.72%
EA	L	PHL	97,458.82	244,119.66	286,676.92	447.91%	416.97%	5.479	8.44%	5.170	38.90%
EA Total			**446,531.37**	**682,566.45**	**743,193.73**	**653.58%**	**160.59%**	**7.536**	**10.10%**	**2.606**	**21.11%**
GL	M	DAY	377,599.49	316,666.05	327,003.86	2127.97%	169.08%	22.280	15.93%	2.691	21.89%
GL	M	IND	230,387.03	267,633.43	278,547.74	1561.01%	36.20%	16.610	14.32%	1.362	6.37%
GL Total			**607,986.52**	**584,299.48**	**605,551.60**	**1825.62%**	**85.73%**	**19.256**	**15.13%**	**1.857**	**13.18%**
SO	L	MIA	538,071.38	608,714.21	668,434.16	439.64%	98.56%	5.396	8.36%	1.986	14.70%
SO	M	CVG	160,946.89	169,428.64	163,729.99	1412.34%	68.92%	15.123	13.81%	1.689	11.05%
SO	M	MEM	1,009,344.97	1,204,941.06	1,252,364.76	6483.47%	55.30%	65.835	22.07%	1.553	9.20%
SO	M	SDF	22,443.15	734,423.13	749,967.20	12288.96%	3782.05%	123.890	25.80%	38.621	107.88%
SO	S	CAE	12,514.66	83,167.19	92,978.60	7116.26%	1302.61%	72.163	22.60%	14.026	69.59%
SO Total			**1,743,321.05**	**2,800,674.23**	**2,927,474.71**	**1717.66%**	**131.25%**	**18.177**	**14.81%**	**2.312**	**18.25%**
WP	S	OAK	219,359.40	313,045.99	341,438.01	45130.17%	135.44%	452.302	33.80%	2.354	18.68%
WP	S	ONT	47,168.68	239,664.99	255,764.40	16224.73%	914.02%	163.247	27.46%	10.140	58.93%
WP Total			**266,528.08**	**552,710.98**	**597,202.41**	**25623.52%**	**250.80%**	**257.236**	**30.25%**	**3.508**	**28.53%**
Grand Total			**3,331,962.94**	**4,998,343.51**	**5,292,925.91**	**1513.22%**	**125.39%**	**16.132**	**14.16%**	**2.254**	**17.65%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-6
Annual Enplaned Freight
for Airports Not Serving as a Hub to an Express Cargo Carrier
Summarized by FAA Region

Region	Hub Size	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp frt	1996 Enp Frt
CE	L	49,443.12	60,008.77	67,404.52	61,019.50	65,894.34	69,811.20	79,533.35	83,108.98	87,134.05
CE	M	5,124.85	3,329.69	5,701.22	6,910.55	7,001.53	12,251.01	12,405.85	11,255.78	10,665.36
CE	S	6,900.80	16,715.64	14,547.90	17,057.98	20,522.75	31,813.61	33,543.94	32,598.74	33,963.01
CE Total		**61,468.77**	**80,054.10**	**87,653.64**	**84,988.03**	**93,418.62**	**113,875.82**	**125,483.14**	**126,963.50**	**131,762.42**
EA	L	469,234.72	335,929.44	448,568.62	408,680.89	393,257.94	430,079.24	442,715.34	544,588.21	446,112.16
EA	M	45,889.47	80,004.41	96,771.82	93,921.89	98,753.00	112,942.34	129,868.30	128,196.05	135,402.11
EA	S	3,716.10	13,010.37	15,299.58	14,951.21	20,630.14	30,839.94	37,846.53	39,340.99	40,420.32
EA Total		**518,840.29**	**428,944.22**	**560,640.02**	**517,553.99**	**512,641.08**	**573,861.52**	**610,430.17**	**712,125.25**	**621,934.59**
GL	L	539,288.12	411,656.18	430,807.48	424,450.79	471,977.67	503,971.14	553,287.28	586,332.17	565,732.38
GL	M	17,668.63	9,453.68	15,155.47	20,897.29	23,603.39	28,773.28	35,720.79	32,202.76	34,174.60
GL	S	4,865.52	7,604.00	9,881.66	9,160.34	10,159.99	12,962.18	18,650.79	18,734.59	18,661.22
GL	Non-Hub	16.25	433.79	4,494.78	5,304.03	2,252.04	3,253.37	3,358.37	4,075.01	4,803.53
GL Total		**561,838.52**	**429,147.65**	**460,339.39**	**459,812.45**	**507,993.09**	**548,959.97**	**611,017.23**	**641,344.53**	**623,371.73**
NE	M	13,887.85	9,890.93	14,432.08	26,147.69	15,852.43	25,329.35	36,817.56	25,765.13	34,414.71
NE	S	3,162.50	5,272.45	4,899.86	5,104.90	6,167.97	5,960.16	6,669.83	7,440.22	7,360.05
NE Total		**17,050.35**	**15,163.38**	**19,331.94**	**31,252.59**	**22,020.40**	**31,289.51**	**43,487.39**	**33,205.35**	**41,774.76**
NM	L	196,221.07	163,670.53	170,755.60	184,825.85	203,758.52	239,617.81	237,886.06	238,620.25	254,971.71
NM	M	34,431.99	71,219.35	76,809.63	83,729.71	94,116.37	143,936.69	120,333.26	137,932.96	162,026.33
NM	S	2,886.32	7,912.20	4,502.57	4,547.31	4,944.19	10,040.05	17,336.89	18,467.87	18,230.98
NM	Non-Hub	36.40	10,992.77	0.28	49.64	6.90	1,318.08	2,004.03	2,738.76	11,222.01
NM Total		**233,575.78**	**253,794.85**	**252,068.08**	**273,152.51**	**302,825.98**	**394,912.63**	**377,560.24**	**397,759.84**	**446,451.03**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-6 (continued)

Region	Hub Size	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp frt	1996 Enp Frt
SO	L	144,526.00	155,632.41	188,716.84	160,945.65	183,737.17	203,252.11	226,039.14	234,318.31	259,333.34
SO	M	95,803.54	161,944.31	212,289.27	221,689.05	227,811.34	267,657.69	300,245.59	304,370.22	339,757.88
SO	S	17,634.11	27,062.66	29,469.87	32,203.30	37,597.43	73,192.13	70,866.34	59,625.69	55,907.59
SO Total		**257,963.65**	**344,639.38**	**430,475.98**	**414,838.00**	**449,145.94**	**544,101.93**	**597,151.07**	**598,314.22**	**654,998.81**
SW	L	143,196.65	171,629.18	220,525.89	221,825.90	237,402.74	291,170.47	284,771.41	278,282.61	297,315.18
SW	M	25,057.82	29,426.82	33,718.44	43,003.34	44,200.98	69,495.45	66,716.89	74,775.17	91,336.96
SW	S	8,782.97	15,355.73	17,461.55	19,185.58	21,710.33	30,270.81	47,936.32	33,066.41	39,681.34
SW	Non-Hub	30.72	1,109.32	6,004.52	6,793.76	7,438.28	10,008.38	12,777.57	13,067.68	13,977.29
SW Total		**177,068.16**	**217,521.05**	**277,710.40**	**290,808.58**	**310,752.33**	**400,945.11**	**412,202.19**	**399,191.87**	**442,310.77**
WP	L	607,915.74	673,219.21	762,473.24	718,327.12	737,300.97	782,293.14	828,872.10	840,134.39	919,693.34
WP	M	40,395.08	41,551.33	40,459.74	41,788.48	45,879.66	59,909.82	52,920.38	58,478.11	81,381.82
WP	S	8,663.12	23,705.04	33,868.22	37,067.20	40,317.13	47,224.70	55,805.91	65,014.77	81,962.44
WP Total		**656,973.94**	**738,475.58**	**836,801.20**	**797,182.80**	**823,497.76**	**889,427.66**	**937,598.39**	**963,627.27**	**1,083,037.60**
Grand Total		**2,484,779.47**	**2,507,740.21**	**2,925,020.65**	**2,869,588.95**	**3,022,295.20**	**3,497,374.16**	**3,714,929.82**	**3,872,531.83**	**4,046,641.71**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-6 (continued)

Region	Hub Size	1987 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
CE	L	118,846.66	124,550.90	151.91%	78.41%	2.519	4.50%	1.784	12.28%
CE	M	26,341.95	31,010.59	505.10%	153.13%	6.051	8.95%	2.531	20.41%
CE	S	101,893.19	104,527.36	1414.71%	228.56%	15.147	13.82%	3.286	26.86%
CE Total		**247,081.80**	**260,088.85**	**323.12%**	**128.40%**	**4.231**	**7.11%**	**2.284**	**17.96%**
EA	L	494,834.17	520,917.39	11.01%	21.12%	1.110	0.50%	1.211	3.91%
EA	M	196,797.69	201,921.57	340.02%	78.78%	4.400	7.31%	1.788	12.32%
EA	S	62,385.65	66,468.76	1688.67%	115.53%	17.887	14.72%	2.155	16.60%
EA Total		**754,017.51**	**789,307.72**	**52.13%**	**37.54%**	**1.521**	**2.02%**	**1.375**	**6.58%**
GL	L	686,801.58	656,957.61	21.82%	30.36%	1.218	0.94%	1.304	5.45%
GL	M	48,326.21	50,896.84	188.06%	76.89%	2.881	5.17%	1.769	12.08%
GL	S	18,610.91	20,631.05	324.03%	59.16%	4.240	7.12%	1.592	9.74%
GL	Non-Hub	5,627.98	7,113.73	43676.80%	118.66%	437.768	33.59%	2.187	16.94%
GL Total		**759,366.68**	**735,599.23**	**30.93%**	**34.00%**	**1.309**	**1.29%**	**1.340**	**6.03%**
NE	M	61,159.26	68,410.12	392.59%	170.08%	4.926	7.89%	2.701	21.98%
NE	S	11,823.66	13,514.08	327.32%	126.74%	4.273	7.16%	2.267	17.79%
NE Total		**72,982.92**	**81,924.20**	**380.48%**	**161.83%**	**4.805**	**7.76%**	**2.618**	**21.23%**
NM	L	289,452.15	289,086.53	47.33%	20.64%	1.473	1.86%	1.206	3.82%
NM	M	263,608.08	304,058.14	783.07%	111.24%	8.831	10.93%	2.112	16.13%
NM	S	19,895.13	20,913.84	624.58%	108.30%	7.246	9.89%	2.083	15.81%
NM	Non-Hub	43,327.89	46,440.72	127484.40%	3423.36%	1275.844	40.57%	35.234	103.89%
NM Total		**616,283.25**	**660,499.23**	**182.78%**	**67.25%**	**2.828**	**5.07%**	**1.673**	**10.83%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-6 (continued)

Region	Hub Size	1987 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
SO	L	299,045.99	322,522.21	123.16%	58.68%	2.232	3.90%	1.587	9.67%
SO	M	424,064.56	447,520.11	367.12%	67.20%	4.671	7.62%	1.672	10.83%
SO	S	77,647.11	85,163.06	382.95%	16.36%	4.829	7.79%	1.164	3.08%
SO Total		**800,757.66**	**855,205.38**	**231.52%**	**57.18%**	**3.315**	**5.87%**	**1.572**	**9.47%**
SW	L	396,539.35	390,801.26	172.91%	34.22%	2.729	4.90%	1.342	6.06%
SW	M	165,632.65	194,420.31	675.89%	179.76%	7.759	10.25%	2.798	22.84%
SW	S	33,129.58	21,266.91	142.14%	-29.74%	2.421	4.30%	0.703	-6.82%
SW	Non-Hub	15,627.72	17,893.59	58147.36%	78.79%	582.474	35.42%	1.788	12.32%
SW Total		**610,929.30**	**624,382.07**	**252.62%**	**55.73%**	**3.526**	**6.18%**	**1.557**	**9.26%**
WP	L	1,057,101.05	1,178,533.23	93.86%	50.65%	1.939	3.20%	1.507	8.54%
WP	M	110,258.42	117,966.33	192.03%	96.91%	2.920	5.24%	1.969	14.51%
WP	S	103,113.31	104,706.59	1108.65%	121.72%	12.086	12.60%	2.217	17.26%
WP Total		**1,270,472.78**	**1,401,206.15**	**113.28%**	**57.54%**	**2.133**	**3.67%**	**1.575**	**9.52%**
Grand Total		**5,131,891.90**	**5,408,212.83**	**117.65%**	**54.64%**	**2.177**	**3.77%**	**1.546**	**9.11%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-7
Annual Enplaned Freight for Medium and Small Hub Airports
Not Serving as a Hub to an Express Carrier
Summarized by Hub Size

Hub Size	Region	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp Frt
M Total	CE	5,124.85	3,329.69	5,701.22	6,910.55	7,001.53	12,251.01	12,405.85	11,255.78
M Total	EA	45,889.47	80,004.41	96,771.82	93,921.89	98,753.00	112,942.34	129,868.30	128,196.05
M Total	GL	17,668.63	9,453.68	15,155.47	20,897.29	23,603.39	28,773.28	35,720.79	32,202.76
M Total	NE	13,887.85	9,890.93	14,432.08	26,147.69	15,852.43	25,329.35	36,817.56	25,765.13
M Total	NM	34,431.99	71,219.35	76,809.63	83,729.71	94,116.37	143,936.69	120,333.26	137,932.96
M Total	SO	95,803.54	161,944.31	212,289.27	221,689.05	227,811.34	267,657.69	300,245.59	304,370.22
M Total	SW	25,057.82	29,426.82	33,718.44	43,003.34	44,200.98	69,495.45	66,716.89	74,775.17
M Total	WP	40,395.08	41,551.33	40,459.74	41,788.48	45,879.66	59,909.82	52,920.38	58,478.11
M Total		**278,259.23**	**406,820.52**	**495,337.67**	**538,088.00**	**557,218.70**	**720,295.63**	**755,028.62**	**772,976.18**
S Total	CE	6,900.80	16,715.64	14,547.90	17,057.98	20,522.75	31,813.61	33,543.94	32,598.74
S Total	EA	3,716.10	13,010.37	15,299.58	14,951.21	20,630.14	30,839.94	37,846.53	39,340.99
S Total	GL	4,865.52	7,604.00	9,881.66	9,160.34	10,159.99	12,962.18	18,650.79	18,734.59
S Total	NE	3,162.50	5,272.45	4,899.86	5,104.90	6,167.97	5,960.16	6,669.83	7,440.22
S Total	NM	2,886.32	7,912.20	4,502.57	4,547.31	4,944.19	10,040.05	17,336.89	18,467.87
S Total	SO	17,634.11	27,062.66	29,469.87	32,203.30	37,597.43	73,192.13	70,866.34	59,625.69
S Total	SW	8,782.97	15,355.73	17,461.55	19,185.58	21,710.33	30,270.81	47,936.32	33,066.41
S Total	WP	8,663.12	23,705.04	33,868.22	37,067.20	40,317.13	47,224.70	55,805.91	65,014.77
S Total		**56,611.44**	**116,638.09**	**129,931.21**	**139,277.82**	**162,049.93**	**242,303.58**	**288,656.55**	**274,289.28**
Grand Total		**334,870.67**	**523,458.61**	**625,268.88**	**677,365.82**	**719,268.63**	**962,599.21**	**1,043,685.17**	**1,047,265.46**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-7 (continued)

Hub Size	Region	1996 Enp Frt	1977 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
M Total	CE	10,665.36	26,341.95	31,010.59	505.10%	153.13%	6.051	8.95%	2.531	20.41%
M Total	EA	135,402.11	196,797.69	201,921.57	340.02%	78.78%	4.400	7.31%	1.788	12.32%
M Total	GL	34,174.60	48,326.21	50,896.84	188.06%	76.89%	2.881	5.17%	1.769	12.08%
M Total	NE	34,414.71	61,159.26	68,410.12	392.59%	170.08%	4.926	7.89%	2.701	21.98%
M Total	NM	162,026.33	263,608.08	304,058.14	783.07%	111.24%	8.831	10.93%	2.112	16.13%
M Total	SO	339,757.88	424,064.56	447,520.11	367.12%	67.20%	4.671	7.62%	1.672	10.83%
M Total	SW	91,336.96	165,632.65	194,420.31	675.89%	179.76%	7.759	10.25%	2.798	22.84%
M Total	WP	81,381.82	110,258.42	117,966.33	192.03%	96.91%	2.920	5.24%	1.969	14.51%
M Total		**889,159.77**	**1,296,188.82**	**1,416,204.01**	**408.95%**	**96.61%**	**5.090**	**8.06%**	**1.966**	**14.48%**
S Total	CE	33,963.01	101,893.19	104,527.36	1414.71%	228.56%	15.147	13.82%	3.286	26.86%
S Total	EA	40,420.32	62,385.65	66,468.76	1688.67%	115.53%	17.887	14.72%	2.155	16.60%
S Total	GL	18,661.22	18,610.91	20,631.05	324.03%	59.16%	4.240	7.12%	1.592	9.74%
S Total	NE	7,360.05	11,823.66	13,514.08	327.32%	126.74%	4.273	7.16%	2.267	17.79%
S Total	NM	18,230.98	19,895.13	20,913.84	624.58%	108.30%	7.246	9.89%	2.083	15.81%
S Total	SO	55,907.59	77,647.11	85,163.06	382.95%	16.36%	4.829	7.79%	1.164	3.08%
S Total	SW	39,681.34	33,129.58	21,266.91	142.14%	-29.74%	2.421	4.30%	0.703	-6.82%
S Total	WP	81,962.44	103,113.31	104,706.59	1108.65%	121.72%	12.086	12.60%	2.217	17.26%
S Total		**296,186.95**	**428,498.54**	**437,191.65**	**672.27%**	**80.43%**	**7.723**	**10.22%**	**1.804**	**12.53%**
Grand Total		**1,185,346.72**	**1,724,687.36**	**1,853,395.66**	**81.93%**	**92.54%**	**5.535**	**8.49%**	**1.925**	**14.00%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-7 (continued)

Hub Size	Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume	% of 1996 Volume	% of 1997 Volume	% of 1998 Volume
M Total	CE	1.53%	0.64%	0.91%	1.02%	0.97%	1.27%	1.19%	1.07%	0.90%	1.53%	1.67%
M Total	EA	13.70%	15.28%	15.48%	13.87%	13.73%	11.73%	12.44%	12.24%	11.42%	11.41%	10.89%
M Total	GL	5.28%	1.81%	2.42%	3.09%	3.28%	2.99%	3.42%	3.07%	2.88%	2.80%	2.75%
M Total	NE	4.15%	1.89%	2.31%	3.86%	2.20%	2.63%	3.53%	2.46%	2.90%	3.55%	3.69%
M Total	NM	10.28%	13.61%	12.28%	12.36%	13.09%	14.95%	11.53%	13.17%	13.67%	15.28%	16.41%
M Total	SO	28.61%	30.94%	33.95%	32.73%	31.67%	27.81%	28.77%	29.06%	28.66%	24.59%	24.15%
M Total	SW	7.48%	5.62%	5.39%	6.35%	6.15%	7.22%	6.39%	7.14%	7.71%	9.60%	10.49%
M Total	WP	12.06%	7.94%	6.47%	6.17%	6.38%	6.22%	5.07%	5.58%	6.87%	6.39%	6.36%
M Total		**83.09%**	**77.72%**	**79.22%**	**79.44%**	**77.47%**	**74.83%**	**72.34%**	**73.81%**	**75.01%**	**75.16%**	**76.41%**
S Total	CE	2.06%	3.19%	2.33%	2.52%	2.85%	3.30%	3.21%	3.11%	2.87%	5.91%	5.64%
S Total	EA	1.11%	2.49%	2.45%	2.21%	2.87%	3.20%	3.63%	3.76%	3.41%	3.62%	3.59%
S Total	GL	1.45%	1.45%	1.58%	1.35%	1.41%	1.35%	1.79%	1.79%	1.57%	1.08%	1.11%
S Total	NE	0.94%	1.01%	0.78%	0.75%	0.86%	0.62%	0.64%	0.71%	0.62%	0.69%	0.73%
S Total	NM	0.86%	1.51%	0.72%	0.67%	0.69%	1.04%	1.66%	1.76%	1.54%	1.15%	1.13%
S Total	SO	5.27%	5.17%	4.71%	4.75%	5.23%	7.60%	6.79%	5.69%	4.72%	4.50%	4.59%
S Total	SW	2.62%	2.93%	2.79%	2.83%	3.02%	3.14%	4.59%	3.16%	3.35%	1.92%	1.15%
S Total	WP	2.59%	4.53%	5.42%	5.47%	5.61%	4.91%	5.35%	6.21%	6.91%	5.98%	5.65%
S Total		**16.91%**	**22.28%**	**20.78%**	**20.56%**	**22.53%**	**25.17%**	**27.66%**	**26.19%**	**24.99%**	**24.84%**	**23.59%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-7 (continued)

Hub Size	Region	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998% / 1977%	Compound Growth Rate Share 1977 to 1998	Ratio 1998% / 1993%	Compound Growth Rate Share 1993 to 1998
M Total	CE	9.33%	31.47%	109.33%	0.43%	131.47%	1.31%
M Total	EA	-20.50%	-7.15%	79.50%	-1.09%	92.85%	-0.35%
M Total	GL	-47.95%	-8.13%	52.05%	-3.06%	91.87%	-0.40%
M Total	NE	-11.00%	40.27%	89.00%	-0.55%	140.27%	1.62%
M Total	NM	59.55%	9.71%	159.55%	2.25%	109.71%	0.44%
M Total	SO	-15.60%	-13.16%	84.40%	-0.80%	86.84%	-0.67%
M Total	SW	40.19%	45.30%	140.19%	1.62%	145.30%	1.80%
M Total	WP	-47.24%	2.27%	52.76%	-3.00%	102.27%	0.11%
M Total		**-8.04%**	**2.12%**	**91.96%**	**-0.40%**	**102.12%**	**0.10%**
S Total	CE	173.68%	70.65%	273.68%	4.91%	170.65%	2.58%
S Total	EA	223.18%	11.94%	323.18%	5.74%	111.94%	0.54%
S Total	GL	-23.39%	-17.34%	76.61%	-1.26%	82.66%	-0.90%
S Total	NE	-22.79%	17.76%	77.21%	-1.22%	117.76%	0.78%
S Total	NM	30.92%	8.19%	130.92%	1.29%	108.19%	0.38%
S Total	SO	-12.74%	-39.57%	87.26%	-0.65%	60.43%	-2.37%
S Total	SW	-56.25%	-63.51%	43.75%	-3.86%	36.49%	-4.69%
S Total	WP	118.38%	15.15%	218.38%	3.79%	115.15%	0.67%
S Total		**39.53%**	**-6.29%**	**139.53%**	**1.60%**	**93.71%**	**-0.31%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-8
Annual Enplaned Freight for Medium Hub Airports
Not Serving as a Hub to an Express Carrier
Listing by Location ID

Hub Size	Region	LocID	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp Frt
M	SW	ABQ	3,529.14	3,408.06	5,286.72	7,593.61	9,964.91	17,785.54	11,966.57	10,599.29
M	NE	BDL	13,887.85	9,890.93	14,432.08	26,147.69	15,852.43	25,329.35	36,817.56	25,765.13
M	SO	BHM	2,433.36	6,893.31	5,937.63	5,741.83	6,003.52	6,701.97	9,551.45	10,603.55
M	SO	BNA	7,775.13	4,996.33	7,453.14	7,994.85	10,834.57	10,087.38	14,888.77	10,936.81
M	EA	BUF	11,981.52	5,343.72	8,505.88	6,669.60	6,573.24	7,360.38	15,229.84	7,956.38
M	EA	BWI	16,683.24	15,143.26	18,041.52	17,234.16	13,654.98	22,236.79	20,618.37	22,946.55
M	SO	CLT	14,293.97	32,706.36	36,242.84	39,277.18	39,762.72	47,620.59	41,565.77	44,660.21
M	GL	CMH	6,154.18	1,365.37	3,407.81	5,594.88	6,258.42	7,985.11	12,730.08	5,711.02
M	SW	ELP	6,924.75	3,795.58	4,824.94	5,756.84	5,986.48	13,163.46	16,605.68	21,231.96
M	SO	FLL	5,494.92	22,664.17	38,330.43	41,041.13	41,781.76	47,903.53	53,460.64	60,852.84
M	NM	GEG	2,890.68	6,077.87	7,827.61	8,552.13	9,447.64	27,997.60	11,943.85	11,356.49
M	WP	HTO	22,359.19	11,943.51	4,522.27	4,597.30	4,325.17	5,119.20	5,249.81	5,904.80
M	EA	IAD	11,542.03	44,958.57	53,609.69	52,794.18	61,606.88	66,329.64	76,168.15	80,677.49
M	SO	JAX	2,452.29	4,884.02	8,073.55	7,616.16	9,072.17	6,724.60	6,490.04	6,409.00
M	WP	LIH	1,754.00	2,429.71	969.51	981.05	949.25	844.45	880.17	971.62
M	SO	MCO	14,926.61	20,463.69	23,940.73	28,462.70	32,686.44	49,054.90	50,881.86	48,663.93
M	GL	MKE	11,514.45	8,088.31	11,747.66	15,302.41	17,344.97	20,788.17	22,990.71	26,491.74
M	WP	OGG	3,239.78	5,103.55	9,015.42	9,754.27	11,265.08	11,190.79	11,162.87	11,333.34
M	SW	OKC	3,763.06	7,341.38	5,316.15	9,022.57	7,022.87	13,224.47	11,527.51	14,085.10
M	CE	OMA	5,124.85	3,329.69	5,701.22	6,910.55	7,001.53	12,251.01	12,405.85	11,255.78
M	EA	ORF	1,828.51	3,454.75	5,371.22	5,614.55	4,997.18	5,273.41	6,386.30	5,945.55
M	SO	PBI	1,867.09	1,858.29	3,089.87	3,058.91	2,904.02	3,294.94	3,826.53	2,982.29
M	NM	PDX	21,669.59	37,420.87	33,735.01	37,020.44	41,431.89	63,343.66	52,477.33	63,845.16
M	SO	RDU	3,933.06	11,791.18	16,302.95	15,853.56	16,007.79	18,249.90	19,076.12	19,937.22
M	WP	RNO	1,406.44	3,705.84	3,361.04	4,969.14	5,617.83	15,233.62	6,691.76	5,641.83
M	WP	SAN	9,305.59	15,269.31	18,882.03	17,636.88	19,796.82	24,046.21	23,312.36	24,867.10
M	SW	SAT	4,517.14	7,942.36	10,049.59	11,265.34	12,297.79	15,556.55	13,503.51	15,016.72
M	SO	SJU	42,627.11	55,686.96	72,918.13	72,642.73	68,758.35	78,019.88	100,504.41	99,324.37
M	NM	SLC	9,871.72	27,720.61	35,247.01	38,157.14	43,236.84	52,595.43	55,912.08	62,731.31
M	EA	SYR	3,854.17	11,104.11	11,243.51	11,609.40	11,920.72	11,742.12	11,465.64	10,670.08
M	SW	TUL	6,323.73	6,939.44	8,241.04	9,364.98	8,928.93	9,765.43	13,113.62	13,842.10
M	WP	TUS	2,330.08	3,099.41	3,709.47	3,849.84	3,925.51	3,475.55	5,623.41	9,759.42

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-8 (continued)

Hub Size	Region	LocID	1996 Enp Frt	1997 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
M	SW	ABQ	15,750.16	45,292.87	43,566.71	1134.49%	144.96%	12.345	12.71%	2.450	19.62%
M	NE	BDL	34,414.71	61,159.26	68,410.12	392.59%	170.08%	4.926	7.89%	2.701	21.98%
M	SO	BHM	11,748.74	20,285.13	18,470.28	659.04%	175.59%	7.590	10.13%	2.756	22.48%
M	SO	BNA	10,579.25	10,285.64	10,264.40	32.02%	1.75%	1.320	1.33%	1.018	0.35%
M	EA	BUF	6,136.54	24,097.63	23,277.56	94.28%	216.25%	1.943	3.21%	3.163	25.89%
M	EA	BWI	24,241.35	41,181.63	46,237.41	177.15%	107.93%	2.771	4.97%	2.079	15.77%
M	SO	CLT	49,200.19	61,807.73	53,902.11	277.10%	13.19%	3.771	6.52%	1.132	2.51%
M	GL	CMH	3,211.57	3,405.38	2,791.40	-54.64%	-65.04%	0.454	-3.69%	0.350	-18.96%
M	SW	ELP	29,600.32	35,220.54	27,864.12	302.38%	111.68%	4.024	6.85%	2.117	16.18%
M	SO	FLL	68,755.24	74,567.46	79,854.49	1353.24%	66.70%	14.532	13.59%	1.667	10.76%
M	NM	GEG	14,337.91	39,758.06	42,980.51	1386.87%	53.51%	14.869	13.72%	1.535	8.95%
M	WP	HTO	16,731.83	17,382.37	15,001.42	-32.91%	193.04%	0.671	-1.88%	2.930	23.99%
M	EA	IAD	84,472.77	95,732.52	97,147.13	741.68%	46.46%	8.417	10.68%	1.465	7.93%
M	SO	JAX	7,896.77	14,140.41	22,720.39	826.50%	237.87%	9.265	11.18%	3.379	27.57%
M	WP	LIH	3,024.85	3,839.79	5,419.99	209.01%	541.84%	3.090	5.52%	6.418	45.04%
M	SO	MCO	48,683.47	74,082.53	123,495.58	727.35%	151.75%	8.274	10.59%	2.517	20.28%
M	GL	MKE	30,963.03	44,920.83	48,105.44	317.78%	131.41%	4.178	7.05%	2.314	18.27%
M	WP	OGG	14,974.85	18,093.34	22,254.07	586.90%	98.86%	6.869	9.61%	1.989	14.74%
M	SW	OKC	15,167.22	17,995.95	15,880.67	322.01%	20.09%	4.220	7.10%	1.201	3.73%
M	CE	OMA	10,665.36	26,341.95	31,010.59	505.10%	153.13%	6.051	8.95%	2.531	20.41%
M	EA	ORF	6,666.29	7,663.73	7,628.63	317.20%	44.66%	4.172	7.04%	1.447	7.66%
M	SO	PBI	2,554.49	12,299.12	13,418.21	618.67%	307.24%	7.187	9.85%	4.072	32.42%
M	NM	PDX	74,174.30	114,728.89	153,100.49	606.52%	141.70%	7.065	9.76%	2.417	19.30%
M	SO	RDU	25,539.94	36,278.07	37,782.01	860.63%	107.03%	9.606	11.38%	2.070	15.67%
M	WP	RNO	7,495.99	15,932.12	18,699.58	1229.57%	22.75%	13.296	13.11%	1.228	4.19%
M	WP	SAN	30,719.83	43,917.51	46,937.34	404.40%	95.20%	5.044	8.01%	1.952	14.31%
M	SW	SAT	16,149.59	42,842.97	83,773.47	1754.57%	438.51%	18.546	14.92%	5.385	40.04%
M	SO	SJU	114,799.79	120,318.47	87,612.64	105.53%	12.30%	2.055	3.49%	1.123	2.35%
M	NM	SLC	73,514.12	109,121.13	107,977.14	993.80%	105.30%	10.938	12.07%	2.053	15.47%
M	EA	SYR	13,885.16	28,122.18	27,630.84	616.91%	135.31%	7.169	9.83%	2.353	18.67%
M	SW	TUL	14,669.67	24,260.32	23,335.34	269.01%	138.96%	3.690	6.41%	2.390	19.03%
M	WP	TUS	8,434.47	11,093.29	9,653.93	314.32%	177.77%	4.143	7.00%	2.778	22.67%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-9
Annual Enplaned Freight for Small Hub Airports
Not Serving as a Hub to an Express Carrier
Listing by Location ID

Loc ID	Region	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp Frt	1996 Enp Frt
ABE	EA	307.42	1,590.88	2,017.81	1,733.00	2,571.11	5,096.73	6,136.44	7,799.18	4,512.59
ALB	EA	1,025.02	1,684.58	2,184.93	2,210.85	2,450.23	2,848.86	2,848.44	2,899.27	3,992.14
AME	SW	533.31	206.34	327.14	343.70	309.30	264.02	226.59	236.16	235.75
AUS	SW	1,485.89	6,248.75	7,549.00	9,528.49	11,036.91	19,425.50	35,908.85	20,138.07	27,601.95
BFM	SO	801.35	3,408.72	5,438.91	5,398.16	5,682.81	5,329.92	3,595.61	4,112.89	636.65
BOI	NM	869.80	5,895.71	3,007.15	3,263.85	3,713.31	4,980.16	10,265.70	12,563.65	10,604.52
BTR	SW	548.49	622.75	526.69	479.55	435.70	503.60	369.15	362.25	355.12
BUR	WP	2,221.30	3,044.16	6,414.64	6,756.49	6,831.18	7,142.43	8,008.00	10,744.74	12,328.06
CHS	SO	1,272.27	1,699.19	2,179.36	2,158.26	2,154.33	16,338.45	11,876.74	7,207.62	4,092.96
CID	CE	1,868.77	6,013.08	5,937.53	5,854.99	9,606.99	12,930.20	13,253.24	10,734.33	11,864.21
COS	NM	1,493.82	361.16	638.32	527.00	394.94	1,241.59	6,158.61	4,999.96	6,732.44
CRP	SW	464.92	232.73	298.30	280.36	319.26	313.42	367.46	427.64	506.64
DAB	SO	740.66	502.46	377.78	431.09	442.99	400.86	328.79	305.71	264.13
DSM	CE	2,284.94	963.82	1,705.15	3,275.42	3,512.71	7,254.43	9,522.85	12,481.78	11,803.17
EUG	NM	522.70	1,655.33	857.10	756.46	835.94	3,818.30	912.58	904.26	894.02
GRR	GL	1,667.81	3,358.21	4,010.83	4,674.06	4,948.36	7,604.04	9,845.99	9,354.04	10,217.69
GSO	SO	4,056.38	11,418.14	9,601.19	11,231.59	13,617.21	22,499.64	19,686.89	17,640.87	17,759.53
GSP	SO	1,307.45	648.93	1,314.55	703.38	609.58	3,690.39	5,511.45	8,620.88	10,155.02
ICT	CE	2,747.09	9,738.74	6,905.22	7,927.57	7,403.05	11,628.98	10,767.85	9,382.63	10,295.63

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-9 (continued)

Loc ID	Region	1977 Enp Frt	1987 Enp Frt	1990 Enp Frt	1991 Enp Frt	1992 Enp Frt	1993 Enp Frt	1994 Enp Frt	1995 Enp Frt	1996 Enp Frt
JAN	SO	2,085.53	438.74	543.63	415.17	272.83	1,882.83	4,169.16	2,299.87	5,651.09
KOA	WP	2,154.42	8,022.16	5,166.70	5,891.31	6,828.56	9,095.16	10,218.17	6,720.99	11,016.50
LBB	SW	1,775.44	6,711.73	7,282.66	6,887.09	8,035.09	7,703.67	8,757.81	8,878.68	8,066.80
LEX	SO	1,788.20	486.22	373.87	349.98	374.90	392.51	403.15	632.29	538.57
LIT	SW	2,658.05	779.56	918.25	1,055.54	947.39	1,365.30	1,596.22	2,237.21	2,004.67
MAF	SW	1,316.87	553.87	559.51	610.85	626.68	695.30	710.24	786.40	910.41
MDT	EA	1,105.49	6,017.74	5,692.89	6,439.89	8,528.89	8,857.00	12,440.57	12,639.85	14,721.35
MSN	GL	2,229.87	1,819.88	4,044.83	2,838.28	3,262.06	2,807.81	2,794.45	2,928.76	3,436.29
PNS	SO	421.46	1,238.14	864.82	405.08	487.20	1,032.02	733.22	451.40	474.75
PSP	WP	185.61	174.28	151.42	132.56	110.60	97.69	93.02	67.80	88.97
PVD	NE	2,492.21	2,785.77	2,372.95	1,971.60	2,362.53	2,726.94	3,016.37	3,218.16	3,436.75
PWM	NE	670.29	2,486.68	2,526.91	3,133.30	3,805.44	3,233.22	3,653.46	4,222.06	3,923.30
RIC	EA	1,278.17	3,717.17	5,403.95	4,567.47	7,079.91	14,037.35	16,421.08	16,002.69	17,194.24
SAV	SO	571.23	852.70	1,306.61	1,398.85	1,597.91	1,787.51	1,932.55	1,509.70	1,591.92
SBN	GL	967.84	2,425.91	1,826.00	1,648.00	1,949.57	2,550.33	6,010.35	6,451.79	5,007.24
SJC	WP	3,491.31	10,879.41	20,971.84	22,820.73	24,343.93	27,191.39	33,249.52	39,061.28	48,737.66
SNA	WP	610.48	1,585.03	1,163.62	1,466.11	2,202.86	3,698.03	4,237.20	8,419.96	9,791.25
SRQ	SO	824.76	513.91	542.07	484.79	525.63	564.80	584.17	939.65	348.07
TYS	SO	2,621.84	5,442.30	6,192.36	8,291.43	11,159.14	12,586.28	11,969.12	8,753.13	9,104.34

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-9 (continued)

Loc ID	Region	1997 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
ABE	EA	4,402.40	5,109.19	93.98%	0.24%	16.620	14.32%	1.002	0.05%
ALB	EA	8,476.59	8,358.96	87.74%	65.92%	8.155	10.51%	2.934	24.02%
AME	SW	234.36	284.10	-87.72%	7.07%	0.533	-2.95%	1.076	1.48%
AUS	SW	17,687.23	5,421.59	72.59%	-258.30%	3.649	6.36%	0.279	-22.53%
BFM	SO	477.85	356.22	-124.96%	-1396.24%	0.445	-3.79%	0.067	-41.79%
BOI	NM	12,775.49	13,757.19	93.68%	63.80%	15.816	14.05%	2.762	22.53%
BTR	SW	325.65	267.41	-105.11%	-88.33%	0.488	-3.36%	0.531	-11.89%
BUR	WP	17,119.14	17,651.05	87.42%	59.54%	7.946	10.37%	2.471	19.84%
CHS	SO	1,459.29	898.05	-41.67%	-1719.33%	0.706	-1.65%	0.055	-44.02%
CID	CE	26,295.48	21,835.62	91.44%	40.78%	11.684	12.42%	1.689	11.05%
COS	NM	6,313.79	6,325.34	76.38%	80.37%	4.234	7.11%	5.095	38.49%
CRP	SW	361.54	285.29	-62.96%	-9.86%	0.614	-2.30%	0.910	-1.86%
DAB	SO	195.42	187.43	-295.17%	-113.87%	0.253	-6.33%	0.468	-14.10%
DSM	CE	60,755.02	64,669.12	96.47%	88.78%	28.302	17.26%	8.914	54.89%
EUG	NM	805.85	831.31	37.12%	-359.31%	1.590	2.23%	0.218	-26.28%
GRR	GL	11,467.74	9,896.91	83.15%	23.17%	5.934	8.85%	1.302	5.41%
GSO	SO	27,361.55	35,209.98	88.48%	36.10%	8.680	10.84%	1.565	9.37%
GSP	SO	10,442.10	10,528.17	87.58%	64.95%	8.052	10.44%	2.853	23.33%
ICT	CE	14,842.69	18,022.62	84.76%	35.48%	6.561	9.37%	1.550	9.16%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-9 (continued)

Loc ID	Region	1997 Enp Frt	1998 Enp Frt	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
JAN	SO	14,159.91	12,888.13	517.98%	584.51%	6.180	9.06%	6.845	46.92%
KOA	WP	10,680.33	12,101.52	461.71%	33.05%	5.617	8.57%	1.331	5.88%
LBB	SW	6,949.80	7,341.55	313.51%	-4.70%	4.135	6.99%	0.953	-0.96%
LEX	SO	1,445.93	359.48	-79.90%	-8.42%	0.201	-7.36%	0.916	-1.74%
LIT	SW	6,571.40	6,621.20	149.10%	384.96%	2.491	4.44%	4.850	37.13%
MAF	SW	999.60	1,045.77	-20.59%	50.41%	0.794	-1.09%	1.504	8.51%
MDT	EA	23,470.49	22,644.27	1948.35%	155.67%	20.483	15.46%	2.557	20.65%
MSN	GL	3,179.58	3,490.93	56.55%	24.33%	1.566	2.16%	1.243	4.45%
PNS	SO	396.21	410.15	-2.68%	-60.26%	0.973	-0.13%	0.397	-16.85%
PSP	WP	65.18	62.03	-66.58%	-36.50%	0.334	-5.09%	0.635	-8.68%
PVD	NE	5,575.53	6,847.23	174.75%	151.10%	2.747	4.93%	2.511	20.22%
PWM	NE	6,248.13	6,666.85	894.62%	106.20%	9.946	11.56%	2.062	15.57%
RIC	EA	26,036.17	30,356.34	2274.98%	116.25%	23.750	16.28%	2.163	16.68%
SAV	SO	1,622.13	1,730.92	203.02%	-3.17%	3.030	5.42%	0.968	-0.64%
SBN	GL	3,963.59	7,243.21	648.39%	184.01%	7.484	10.06%	2.840	23.22%
SJC	WP	60,876.98	60,351.58	1628.62%	121.95%	17.286	14.53%	2.220	17.29%
SNA	WP	14,371.68	14,540.41	2281.80%	293.19%	23.818	16.30%	3.932	31.50%
SRQ	SO	424.54	449.43	-45.51%	-20.43%	0.545	-2.85%	0.796	-4.47%
TYS	SO	15,661.11	17,039.94	549.92%	35.39%	6.499	9.32%	1.354	6.25%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-10
Total Annual Enplaned Freight
by FAA Region

Region	1977	1987	1990	1991	1992	1993	1994	1995
AK	34,650.01	333,942.70	318,663.23	316,717.34	289,192.80	300,915.17	235,832.21	219,614.72
CE	61,468.77	80,054.10	87,653.64	84,988.03	93,418.62	113,875.82	125,483.14	126,963.50
EA	617,461.39	608,117.48	773,424.35	730,386.73	742,977.58	859,058.34	971,103.51	1,125,442.86
GL	593,285.54	455,391.66	591,612.78	579,016.75	663,115.11	874,996.69	919,105.95	1,043,690.00
NE	17,050.35	15,163.38	19,331.94	31,252.59	22,020.40	31,289.51	43,487.39	33,205.35
NM	233,575.78	253,794.85	252,068.08	273,152.51	302,825.98	394,912.63	377,560.24	397,759.84
SO	419,021.39	1,014,805.76	1,264,034.55	1,333,880.62	1,448,863.84	1,810,041.25	2,093,009.38	2,182,324.58
SW	177,068.16	217,521.05	277,710.40	290,808.58	310,752.33	400,945.11	412,202.19	399,191.87
WP	659,295.56	796,500.51	915,165.64	893,056.79	938,311.37	1,059,668.99	1,113,991.33	1,178,866.83
Total	2,812,876.96	3,775,291.49	4,499,664.61	4,533,259.94	4,811,478.03	5,845,703.52	6,291,775.34	6,707,059.55

Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume
AK	1.23%	8.85%	7.08%	6.99%	6.01%	5.15%	3.75%	3.27%
CE	2.19%	2.12%	1.95%	1.87%	1.94%	1.95%	1.99%	1.89%
EA	21.95%	16.11%	17.19%	16.11%	15.44%	14.70%	15.43%	16.78%
GL	21.09%	12.06%	13.15%	12.77%	13.78%	14.97%	14.61%	15.56%
NE	0.61%	0.40%	0.43%	0.69%	0.46%	0.54%	0.69%	0.50%
NM	8.30%	6.72%	5.60%	6.03%	6.29%	6.76%	6.00%	5.93%
SO	14.90%	26.88%	28.09%	29.42%	30.11%	30.96%	33.27%	32.54%
SW	6.29%	5.76%	6.17%	6.41%	6.46%	6.86%	6.55%	5.95%
WP	23.44%	21.10%	20.34%	19.70%	19.50%	18.13%	17.71%	17.58%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-10 (continued)

1996	1997	1998	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
267,595.92	378,092.37	419,503.46	1110.69%	39.41%	12.107	12.61%	1.394	6.87%
131,762.42	247,081.80	260,088.85	323.12%	56.22%	4.231	7.11%	2.284	17.96%
1,068,465.96	1,436,583.96	1,532,501.45	148.19%	43.94%	2.482	4.42%	1.784	12.27%
1,231,358.25	1,343,666.16	1,341,150.83	126.05%	34.76%	2.261	3.96%	1.533	8.92%
41,774.76	72,982.92	81,924.20	380.48%	61.81%	4.805	7.76%	2.618	21.23%
446,451.03	616,283.25	660,499.23	182.78%	40.21%	2.828	5.07%	1.673	10.83%
2,398,319.86	3,601,431.89	3,782,680.09	802.74%	52.15%	9.027	11.05%	2.090	15.88%
442,310.77	610,929.30	624,382.07	252.62%	35.79%	3.526	6.18%	1.557	9.26%
1,349,565.68	1,823,183.76	1,998,408.56	203.11%	46.97%	3.031	5.42%	1.886	13.53%
7,377,604.65	10,130,235.41	10,701,138.74	280.43%	45.37%	3.804	6.57%	1.831	12.85%
% of 1996 Volume	% of 1997 Volume	% of 1998 Volume	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998% / 1977%	Compound Growth Rate Share 1977 to 1998	Ratio 1998% / 1993%	Compound Growth Rate Share 1993 to 1998
3.63%	3.73%	3.92%	68.58%	-31.31%	3.182	5.67%	0.762	-5.30%
1.79%	2.44%	2.43%	10.09%	19.85%	1.112	0.51%	1.248	4.52%
14.48%	14.18%	14.32%	-53.28%	-2.62%	0.652	-2.01%	0.975	-0.52%
16.69%	13.26%	12.53%	-68.29%	-19.43%	0.594	-2.45%	0.837	-3.49%
0.57%	0.72%	0.77%	20.82%	30.08%	1.263	1.12%	1.430	7.42%
6.05%	6.08%	6.17%	-34.53%	-9.45%	0.743	-1.40%	0.914	-1.79%
32.51%	35.55%	35.35%	57.86%	12.40%	2.373	4.20%	1.142	2.68%
6.00%	6.03%	5.83%	-7.89%	-17.55%	0.927	-0.36%	0.851	-3.18%
18.29%	18.00%	18.67%	-25.51%	2.93%	0.797	-1.08%	1.030	0.60%
100.00%	100.00%	100.00%						

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-11
Enplaned Freight Summarized by
Airport Hub Size

Table	1977	1987	1990	1991	1992	1993	1994	1995
3	2,372,313.16	2,287,220.84	2,689,283.76	2,594,002.33	2,707,741.79	3,142,026.44	3,445,999.27	3,684,210.38
4	380,258.91	1,300,446.06	1,585,031.42	1,685,512.28	1,812,348.38	2,269,923.40	2,353,154.92	2,503,389.77
5	60,221.52	175,088.71	214,849.85	241,597.90	281,690.64	419,173.86	474,481.18	499,577.95
6	83.37	12,535.88	10,499.58	12,147.43	9,697.22	14,579.83	18,139.97	19,881.45
Total	2,812,876.96	3,775,291.49	4,499,664.61	4,533,259.94	4,811,478.03	5,845,703.52	6,291,775.34	6,707,059.55

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-11 (continued)

Table	1996	1997	1998	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1977 to 1998
3	3,814,894.91	4,633,901.61	4,894,997.02	106.34%	55.79%	2.063	3.51%	1.558	9.27%
4	2,957,477.22	4,367,373.50	4,607,321.02	1111.63%	102.97%	12.116	12.61%	2.030	15.21%
5	575,229.69	1,064,376.71	1,127,372.66	1772.04%	168.95%	18.720	14.97%	2.690	21.88%
6	30,002.83	64,583.59	71,448.04	85599.94%	390.05%	856.999	37.93%	4.900	37.42%
Total	7,377,604.65	10,130,235.41	10,701,138.74	280.43%	83.06%	3.804	6.57%	1.831	12.85%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

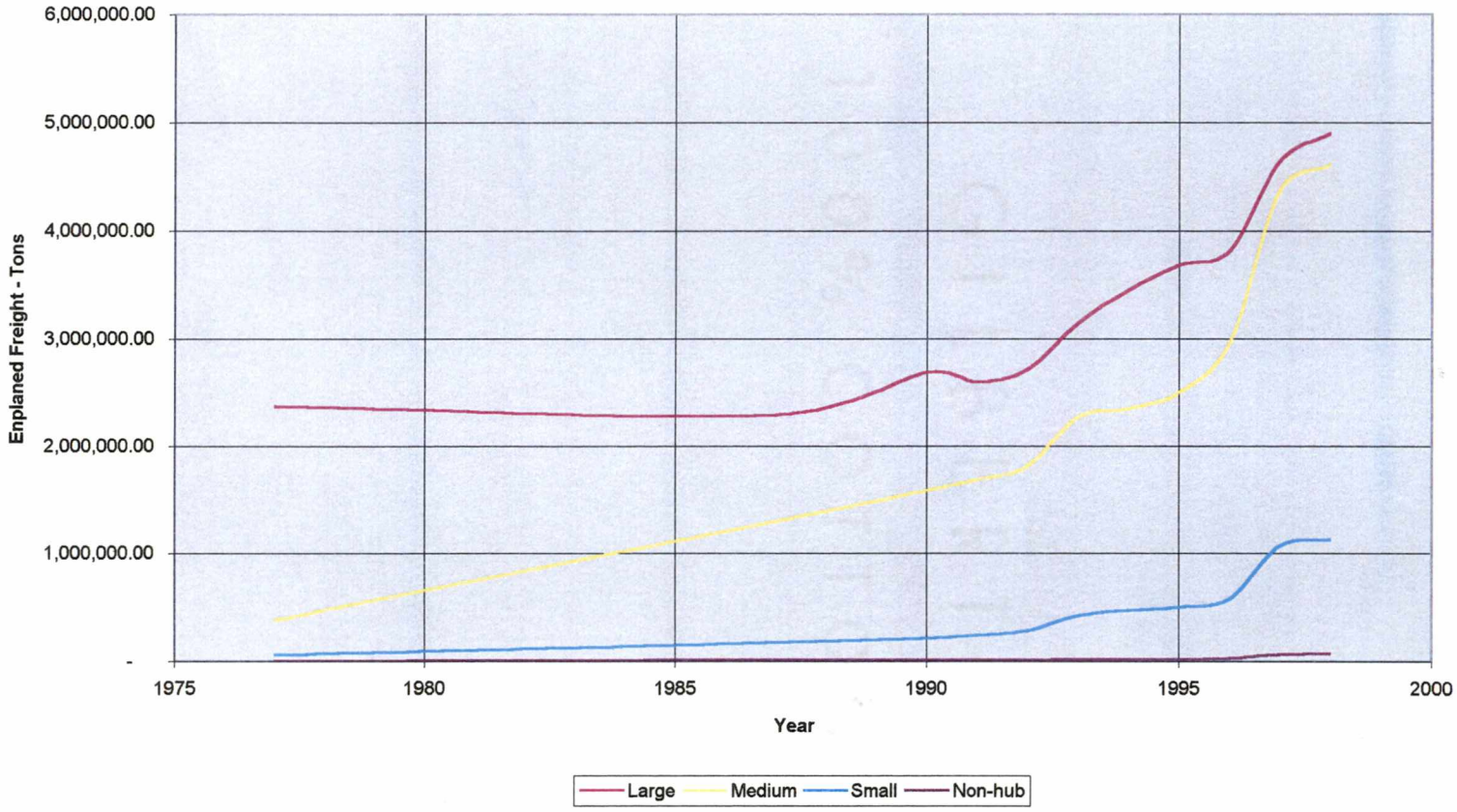

Figure B-1
Enplaned Freight by Airport Hub Size

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-12
Total Annual Enplaned Passengers
by Airport Hub Size

Hub Size	Region	1977 Enp Passengers	1987 Enp Passengers	1990 Enp Passengers	1991 Enp Passengers	1992 Enp Passengers	1993 Enp Passengers	1994 Enp Passengers	1995 Enp Passengers	1996 Enp Passengers
L	CE	6,263,890	14,208,611	12,690,207	12,640,542	13,781,898	13,679,068	15,879,827	17,269,245	18,366,581
L	EA	31,241,360	57,769,266	54,699,257	50,128,411	52,468,009	54,439,732	57,854,016	58,602,388	60,785,633
L	GL	29,429,479	46,789,091	48,212,739	47,898,352	52,172,401	54,432,342	57,949,137	60,123,832	62,545,713
L	NM	10,032,238	22,419,135	19,347,433	20,010,214	21,781,049	23,338,453	24,751,025	25,059,690	26,734,950
L	SO	21,606,252	36,673,263	36,672,788	31,338,916	33,019,559	37,008,152	41,940,321	44,546,500	47,989,440
L	SW	14,050,449	30,144,739	33,804,228	33,621,968	35,968,033	36,634,697	39,031,491	40,897,508	42,425,066
L	WP	27,944,815	55,480,740	59,438,914	60,296,308	60,386,181	62,347,908	67,558,579	71,076,717	76,994,656
L Total		**140,568,483**	**263,484,845**	**264,865,566**	**255,934,711**	**269,577,130**	**281,880,352**	**304,964,396**	**317,576,880**	**335,842,039**
M	AK	888,004	1,005,785	1,362,282	1,321,269	1,363,849	1,391,119	1,514,265	1,519,340	1,645,978
M	CE	829,483	1,072,964	994,132	1,057,836	1,038,245	1,024,619	1,165,479	1,460,605	1,666,357
M	EA	5,665,931	13,705,014	12,927,754	12,708,646	11,596,787	11,488,435	13,854,213	13,665,083	14,119,588
M	GL	4,592,296	7,754,035	8,047,489	7,680,412	7,876,695	8,050,229	8,929,606	8,970,283	9,751,899
M	NE	1,240,646	2,267,686	2,312,455	2,107,004	2,131,225	2,167,003	2,196,235	2,413,738	2,549,673
M	NM	3,953,815	8,372,800	9,160,852	9,426,143	10,079,057	12,474,584	13,988,090	15,182,476	17,210,549
M	SO	14,907,115	39,193,602	43,624,058	43,814,090	46,678,944	46,639,015	50,819,552	49,942,138	54,966,329
M	SW	4,041,971	8,749,711	9,654,341	9,397,196	9,766,422	10,171,083	10,940,037	10,938,357	11,777,080
M	WP	5,755,532	11,791,423	11,878,354	12,096,259	12,649,123	13,049,529	14,462,347	14,986,265	15,847,794
M Total		**41,874,793**	**93,913,020**	**99,961,717**	**99,608,855**	**103,182,347**	**106,455,616**	**117,869,826**	**119,078,305**	**129,535,247**
S	CE	1,258,205	1,778,148	1,561,193	1,557,076	1,628,346	1,445,452	1,455,144	1,644,925	1,813,608
S	EA	1,524,305	2,301,334	2,529,452	2,373,856	2,534,039	2,615,154	2,751,092	2,722,713	2,642,944
S	GL	871,881	1,216,828	1,263,893	1,216,880	1,503,701	1,524,459	1,544,896	1,599,441	1,694,497
S	NE	633,612	1,438,391	1,533,112	1,404,460	1,424,127	1,443,182	1,541,811	1,466,193	1,562,152
S	NM	675,480	1,495,362	1,301,257	1,413,504	1,565,901	1,838,963	1,960,131	2,746,044	3,926,439
S	SO	4,264,963	6,866,848	6,860,778	6,275,989	6,383,751	6,404,070	7,814,548	7,289,191	7,214,980
S	SW	2,072,983	5,185,360	5,480,416	5,227,607	5,502,697	5,680,238	5,998,723	6,228,154	6,524,318
S	WP	2,193,026	11,726,977	13,672,922	14,664,934	14,901,066	16,117,087	18,140,242	19,500,913	20,023,434
S Total		**13,494,455**	**32,009,248**	**34,203,023**	**34,134,306**	**35,443,628**	**37,068,605**	**41,206,587**	**43,197,674**	**45,402,372**
N-H	GL	5,234	2,541,301	3,547,040	2,936,521	1,971,557	2,978,353	4,077,804	4,169,909	4,411,711
N-H	NM	4,247	947	2,154	957	807	1,885	2,007	2,122	2,542
N-H	SW	69,356	6,365,416	6,855,163	6,558,316	6,944,736	7,258,662	7,330,262	7,316,319	7,565,707
N-H Total		**78,837**	**8,907,664**	**10,404,357**	**9,495,794**	**8,917,100**	**10,238,900**	**11,410,073**	**11,488,350**	**11,979,960**
Grand Total		**196,016,568**	**398,314,777**	**409,434,663**	**399,173,666**	**417,120,205**	**435,643,473**	**475,450,882**	**491,340,109**	**522,759,618**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-12 (continued)

Hub Size	Region	1997 Enp Passengers	1998 Enp Passengers	% Increase 1977 to 1998	% Increase 1993 to 1998	Ratio 1998/1977 (21 years)	Compound Growth Rate 1977 to 1998	Ratio 1998/1993 (5 years)	Compound Growth Rate 1993 to 1998
L	CE	19,099,148	19,490,061	211.15%	42.48%	3.111	5.55%	1.425	7.34%
L	EA	62,772,593	64,689,359	107.06%	18.83%	2.071	3.53%	1.188	3.51%
L	GL	65,251,161	67,261,667	128.55%	23.57%	2.286	4.01%	1.236	4.32%
L	NM	27,763,515	29,064,494	189.71%	24.53%	2.897	5.20%	1.245	4.49%
L	SO	50,650,925	53,654,851	148.33%	44.98%	2.483	4.43%	1.450	7.71%
L	SW	44,163,002	45,854,692	226.36%	25.17%	3.264	5.79%	1.252	4.59%
L	WP	77,054,056	77,052,697	175.73%	23.59%	2.757	4.95%	1.236	4.33%
L Total		**346,754,400**	**357,067,821**	**164.02%**	**26.67%**	**2.640**	**4.64%**	**1.267**	**4.84%**
M	AK	1,634,249	1,626,402	83.15%	16.91%	1.832	2.92%	1.169	3.17%
M	CE	1,638,851	1,711,299	106.31%	67.02%	2.063	3.51%	1.670	10.80%
M	EA	14,830,412	15,877,513	180.23%	38.20%	2.802	5.03%	1.382	6.69%
M	GL	10,055,494	10,060,184	119.07%	24.97%	2.191	3.80%	1.250	4.56%
M	NE	2,538,879	2,630,340	112.01%	21.38%	2.120	3.64%	1.214	3.95%
M	NM	17,176,074	16,725,719	323.03%	34.08%	4.230	7.11%	1.341	6.04%
M	SO	58,449,347	58,892,021	295.06%	26.27%	3.951	6.76%	1.263	4.78%
M	SW	11,324,968	11,305,184	179.69%	11.15%	2.797	5.02%	1.112	2.14%
M	WP	16,184,259	16,428,480	185.44%	25.89%	2.854	5.12%	1.259	4.71%
M Total		**133,832,633**	**135,267,142**	**223.00%**	**27.05%**	**3.230**	**6.74%**	**1.271**	**4.91%**
S	CE	1,697,455	1,677,714	33.34%	16.07%	1.333	1.38%	1.161	3.03%
S	EA	2,898,757	3,033,816	99.03%	16.01%	1.990	3.33%	1.160	3.01%
S	GL	1,822,710	1,883,398	116.02%	23.55%	2.160	3.74%	1.235	4.32%
S	NE	2,328,172	2,613,618	312.50%	81.10%	4.125	6.98%	1.811	12.61%
S	NM	3,543,018	2,831,501	319.18%	53.97%	4.192	7.06%	1.540	9.02%
S	SO	7,279,947	7,499,630	75.84%	17.11%	1.758	2.72%	1.171	3.21%
S	SW	6,589,795	6,637,180	220.18%	16.85%	3.202	5.70%	1.168	3.16%
S	WP	19,861,494	20,045,269	814.05%	24.37%	9.140	11.11%	1.244	4.46%
S Total		**46,021,348**	**46,222,126**	**242.53%**	**24.69%**	**3.425**	**6.04%**	**1.247**	**4.61%**
N-H	GL	4,391,698	5,024,066	95889.03%	68.69%	959.890	38.68%	1.687	11.02%
N-H	NM	4,784	7,310	72.12%	287.80%	1.721	2.62%	3.878	31.14%
N-H	SW	7,330,431	7,546,024	10780.13%	3.96%	108.801	25.02%	1.040	0.78%
N-H Total		**11,726,913**	**12,577,400**	**15853.68%**	**22.84%**	**159.537**	**27.32%**	**1.228**	**4.20%**
Grand Total		**538,335,194**	**551,124,489**	**181.16%**	**26.51%**	**2.812**	**5.05%**	**1.265**	**4.82%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-12 (continued)

Hub Size	Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume	% of 1996 Volume
L	CE	3.20%	3.57%	3.10%	3.17%	3.30%	3.14%	3.34%	3.51%	3.51%
L	EA	15.94%	14.50%	13.36%	12.56%	12.58%	12.50%	12.17%	11.93%	11.63%
L	GL	15.01%	11.75%	11.78%	12.00%	12.51%	12.49%	12.19%	12.24%	11.96%
L	NM	5.12%	5.63%	4.73%	5.01%	5.22%	5.36%	5.21%	5.10%	5.11%
L	SO	11.02%	9.21%	8.96%	7.85%	7.92%	8.50%	8.82%	9.07%	9.18%
L	SW	7.17%	7.57%	8.26%	8.42%	8.62%	8.41%	8.21%	8.32%	8.12%
L	WP	14.26%	13.93%	14.52%	15.11%	14.48%	14.31%	14.21%	14.47%	14.73%
L Total		**71.71%**	**66.16%**	**64.69%**	**64.12%**	**64.63%**	**64.70%**	**64.14%**	**64.63%**	**64.24%**
M	AK	0.45%	0.25%	0.33%	0.33%	0.33%	0.32%	0.32%	0.31%	0.31%
M	CE	0.42%	0.27%	0.24%	0.27%	0.25%	0.24%	0.25%	0.30%	0.32%
M	EA	2.89%	3.44%	3.16%	3.18%	2.78%	2.64%	2.91%	2.78%	2.70%
M	GL	2.34%	1.95%	1.97%	1.92%	1.89%	1.85%	1.88%	1.83%	1.87%
M	NE	0.63%	0.57%	0.56%	0.53%	0.51%	0.50%	0.46%	0.49%	0.49%
M	NM	2.02%	2.10%	2.24%	2.36%	2.42%	2.86%	2.94%	3.09%	3.29%
M	SO	7.61%	9.84%	10.65%	10.98%	11.19%	10.71%	10.69%	10.16%	10.51%
M	SW	2.06%	2.20%	2.36%	2.35%	2.34%	2.33%	2.30%	2.23%	2.25%
M	WP	2.94%	2.96%	2.90%	3.03%	3.03%	3.00%	3.04%	3.05%	3.03%
M Total		**21.36%**	**23.68%**	**24.41%**	**24.95%**	**24.74%**	**24.44%**	**24.79%**	**24.24%**	**24.78%**
S	CE	0.64%	0.45%	0.38%	0.39%	0.39%	0.33%	0.31%	0.33%	0.35%
S	EA	0.78%	0.58%	0.62%	0.59%	0.61%	0.60%	0.58%	0.55%	0.51%
S	GL	0.44%	0.31%	0.31%	0.30%	0.36%	0.35%	0.32%	0.33%	0.32%
S	NE	0.32%	0.36%	0.37%	0.35%	0.34%	0.33%	0.32%	0.30%	0.30%
S	NM	0.34%	0.38%	0.32%	0.35%	0.38%	0.42%	0.41%	0.56%	0.75%
S	SO	2.18%	1.72%	1.68%	1.57%	1.53%	1.47%	1.64%	1.48%	1.38%
S	SW	1.06%	1.30%	1.34%	1.31%	1.32%	1.30%	1.26%	1.27%	1.25%
S	WP	1.12%	2.94%	3.34%	3.67%	3.57%	3.70%	3.82%	3.97%	3.83%
S Total		**6.88%**	**8.04%**	**8.36%**	**8.55%**	**8.50%**	**8.61%**	**8.67%**	**8.79%**	**8.69%**
N-H	GL	0.00%	0.64%	0.87%	0.74%	0.47%	0.68%	0.86%	0.85%	0.84%
N-H	NM	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
N-H	SW	0.04%	1.60%	1.67%	1.64%	1.66%	1.67%	1.54%	1.49%	1.45%
N-H Total		**0.04%**	**2.24%**	**2.54%**	**2.38%**	**2.14%**	**2.35%**	**2.40%**	**2.34%**	**2.29%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-12 (continued)

Hub Size	Region	% of 1997 Volume	% of 1998 Volume	% Increase 1977 to 1998	% Increase 1993 to 1998	1998% / 1977%	Compound Growth Rate Share 1977 to 1998	1998% / 1993%	Compound Growth Rate Share 1993 to 1998
L	CE	3.55%	3.54%	9.64%	11.21%	1.107	0.48%	1.126	2.41%
L	EA	11.66%	11.74%	-35.79%	-6.46%	0.736	-1.45%	0.939	-1.24%
L	GL	12.12%	12.20%	-23.02%	-2.38%	0.813	-0.96%	0.977	-0.47%
L	NM	5.16%	5.27%	2.95%	-1.58%	1.030	0.14%	0.984	-0.31%
L	SO	9.41%	9.74%	-13.22%	12.74%	0.883	-0.59%	1.146	2.76%
L	SW	8.20%	8.32%	13.85%	-1.07%	1.161	0.71%	0.989	-0.21%
L	WP	14.31%	13.98%	-1.97%	-2.37%	0.981	-0.09%	0.977	-0.47%
L Total		**64.41%**	**64.79%**	**-10.69%**	**0.13%**	**0.903**	**-0.48%**	**1.001**	**0.03%**
M	AK	0.30%	0.30%	-53.51%	-8.21%	0.651	-2.02%	0.924	-1.57%
M	CE	0.30%	0.31%	-36.28%	24.25%	0.734	-1.46%	1.320	5.71%
M	EA	2.75%	2.88%	-0.33%	8.46%	0.997	-0.02%	1.092	1.78%
M	GL	1.87%	1.83%	-28.35%	-1.23%	0.779	-1.18%	0.988	-0.24%
M	NE	0.47%	0.48%	-32.62%	-4.22%	0.754	-1.34%	0.959	-0.82%
M	NM	3.19%	3.03%	33.54%	5.65%	1.505	1.96%	1.060	1.17%
M	SO	10.86%	10.69%	28.83%	-0.19%	1.405	1.63%	0.998	-0.04%
M	SW	2.10%	2.05%	-0.52%	-13.82%	0.995	-0.02%	0.879	-2.56%
M	WP	3.01%	2.98%	1.50%	-0.49%	1.015	0.07%	0.995	-0.10%
M Total		**24.86%**	**24.54%**	**12.95%**	**0.43%**	**1.149**	**0.66%**	**1.004**	**0.09%**
S	CE	0.32%	0.30%	-110.86%	-8.99%	0.474	-3.49%	0.917	-1.71%
S	EA	0.54%	0.55%	-41.27%	-9.05%	0.708	-1.63%	0.917	-1.72%
S	GL	0.34%	0.34%	-30.16%	-2.40%	0.768	-1.25%	0.977	-0.47%
S	NE	0.43%	0.47%	31.84%	30.15%	1.467	1.84%	1.432	7.44%
S	NM	0.66%	0.51%	32.93%	17.84%	1.491	1.92%	1.217	4.01%
S	SO	1.35%	1.36%	-59.89%	-8.03%	0.625	-2.21%	0.926	-1.53%
S	SW	1.22%	1.20%	12.18%	-8.27%	1.139	0.62%	0.924	-1.58%
S	WP	3.69%	3.64%	69.24%	-1.72%	3.251	5.77%	0.983	-0.34%
S Total		**8.56%**	**8.39%**	**17.92%**	**-1.46%**	**1.218**	**0.94%**	**0.986**	**-0.29%**
N-H	GL	0.82%	0.91%	99.71%	25.00%	341.401	32.02%	1.333	5.92%
N-H	NM	0.00%	0.00%	-63.35%	67.38%	0.612	-2.31%	3.065	25.11%
N-H	SW	1.36%	1.37%	97.42%	-21.69%	38.697	19.02%	0.822	-3.85%
N-H Total		**2.18%**	**2.28%**	**98.24%**	**-2.99%**	**66.742**	**21.20%**	**0.971**	**-0.69%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13
Total Annual Enplaned Passengers by FAA Region

Table	Region	1977 Enp Passengers	1987 Enp Passengers	1990 Enp Passengers	1991 Enp Passengers	1992 Enp Passengers	1993 Enp Passengers	1994 Enp Passengers	1995 Enp Passengers
4	AK	888,004	1,005,785	1,362,282	1,321,269	1,363,849	1,391,119	1,514,265	1,519,340
	AK Total	**888,004**	**1,005,785**	**1,362,282**	**1,321,269**	**1,363,849**	**1,391,119**	**1,514,265**	**1,519,340**
3	CE	6,263,890	14,208,611	12,690,207	12,640,542	13,781,898	13,679,068	15,879,827	17,269,245
4	CE	829,483	1,072,964	994,132	1,057,836	1,038,245	1,024,619	1,165,479	1,460,605
5	CE	1,258,205	1,778,148	1,561,193	1,557,076	1,628,346	1,445,452	1,455,144	1,644,925
	CE Total	**8,361,578**	**17,059,723**	**15,245,532**	**15,255,454**	**16,448,489**	**16,149,139**	**18,500,450**	**20,374,775**
3	EA	31,241,360	57,769,266	54,699,257	50,128,411	52,468,009	54,439,732	57,854,016	58,602,388
4	EA	5,665,931	13,705,014	12,927,754	12,708,646	11,598,787	11,488,435	13,854,213	13,665,083
5	EA	1,524,305	2,301,334	2,529,452	2,373,856	2,534,039	2,615,154	2,751,092	2,722,713
	EA Total	**38,431,596**	**73,775,614**	**70,156,463**	**65,210,913**	**66,600,835**	**68,543,321**	**74,459,321**	**74,990,184**
3	GL	29,429,479	46,789,091	48,212,739	47,898,352	52,172,401	54,432,342	57,949,137	60,123,832
4	GL	4,592,296	7,754,035	8,047,489	7,680,412	7,876,695	8,050,229	8,929,608	8,970,283
5	GL	871,881	1,216,828	1,263,893	1,216,880	1,503,701	1,524,459	1,544,896	1,599,441
6	GL	5,234	2,541,301	3,547,040	2,936,521	1,971,557	2,978,353	4,077,804	4,169,909
	GL Total	**34,898,890**	**58,301,255**	**61,071,161**	**59,732,165**	**63,524,354**	**66,985,383**	**72,501,445**	**74,863,465**
4	NE	1,240,646	2,267,686	2,312,455	2,107,004	2,131,225	2,167,003	2,196,235	2,413,738
5	NE	633,612	1,438,391	1,533,112	1,404,460	1,424,127	1,443,182	1,541,811	1,466,193
	NE Total	**1,874,258**	**3,706,077**	**3,845,567**	**3,511,464**	**3,555,352**	**3,610,185**	**3,738,046**	**3,879,931**
3	NM	10,032,238	22,419,135	19,347,433	20,010,214	21,781,049	23,338,453	24,751,025	25,059,690
4	NM	3,953,815	8,372,800	9,160,852	9,426,143	10,079,057	12,474,584	13,988,090	15,182,476
5	NM	675,480	1,495,362	1,301,257	1,413,504	1,565,901	1,838,963	1,960,131	2,746,044
6	NM	4,247	947	2,154	957	807	1,885	2,007	2,122
	NM Total	**14,665,780**	**32,288,244**	**29,811,696**	**30,850,818**	**33,426,814**	**37,653,885**	**40,701,253**	**42,990,332**
3	SO	21,606,252	36,673,263	36,672,788	31,338,916	33,019,559	37,008,152	41,940,321	44,546,500
4	SO	14,907,115	39,193,602	43,624,058	43,814,090	46,678,944	46,639,015	50,819,552	49,942,138
5	SO	4,264,963	6,866,848	6,860,778	6,275,989	6,383,751	6,404,070	7,814,548	7,289,191
	SO Total	**40,778,330**	**82,733,713**	**87,157,624**	**81,428,995**	**86,082,254**	**90,051,237**	**100,574,421**	**101,777,829**
3	SW	14,050,449	30,144,739	33,804,228	33,621,968	35,968,033	36,634,697	39,031,491	40,897,508
4	SW	4,041,971	8,749,711	9,654,341	9,397,196	9,766,422	10,171,083	10,940,037	10,938,357
5	SW	2,072,983	5,185,360	5,480,416	5,227,607	5,502,697	5,680,238	5,998,723	6,228,154

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13 (continued)

Table	Region	1996 Enp Passengers	1997 Enp Passengers	1998 Enp Passengers	% Increase 1977 to 1998	% Increase 1993 to 1998	1998/1977 (21 years)	Compound Interest Rate 1977 to 1998	1998/1993 (5 years)	Compound Interest Rate 1993 to 1998
4	AK	1,645,978	1,634,249	1,626,402	45.40%	14.47%	1.832	2.92%	1.169	3.17%
	AK Total	**1,645,978**	**1,634,249**	**1,626,402**	**45.40%**	**14.47%**	**1.832**	**2.92%**	**1.169**	**3.17%**
3	CE	18,366,581	19,099,148	19,490,061	67.86%	29.82%	3.111	5.55%	1.425	7.34%
4	CE	1,666,357	1,638,851	1,711,299	51.53%	40.13%	2.063	3.51%	1.670	10.80%
5	CE	1,813,608	1,697,455	1,677,714	25.00%	13.84%	1.333	1.36%	1.161	3.03%
	CE Total	**21,846,546**	**22,435,454**	**22,879,074**	**63.60%**	**29.42%**	**2.739**	**4.92%**	**1.417**	**21.17%**
3	EA	60,785,633	62,772,593	64,689,359	51.71%	15.84%	2.071	3.53%	1.188	3.51%
4	EA	14,119,588	14,830,412	15,877,513	64.31%	27.64%	2.802	5.03%	1.382	6.69%
5	EA	2,642,944	2,898,757	3,033,816	49.76%	13.80%	1.990	3.33%	1.160	3.01%
	EA Total	**77,548,165**	**80,501,762**	**83,600,688**	**64.03%**	**18.01%**	**2.176**	**3.77%**	**1.220**	**13.21%**
3	GL	62,545,713	65,251,161	67,261,667	56.25%	19.07%	2.286	4.01%	1.236	4.32%
4	GL	9,751,899	10,055,494	10,060,184	54.35%	19.98%	2.191	3.80%	1.250	4.56%
5	GL	1,694,497	1,822,710	1,883,398	53.71%	19.06%	2.160	3.74%	1.235	4.32%
6	GL	4,411,711	4,391,698	5,024,066	99.90%	40.72%	959.890	38.68%	1.687	11.02%
	GL Total	**78,403,820**	**81,521,063**	**84,229,315**	**58.57%**	**20.47%**	**2.414**	**4.28%**	**1.257**	**24.23%**
4	NE	2,549,673	2,538,879	2,630,340	52.83%	17.62%	2.120	3.64%	1.214	3.95%
5	NE	1,562,152	2,328,172	2,613,618	75.76%	44.78%	4.125	6.98%	1.811	12.61%
	NE Total	**4,111,825**	**4,867,051**	**5,243,958**	**64.26%**	**31.16%**	**2.798**	**5.02%**	**1.453**	**16.56%**
3	NM	26,734,950	27,763,515	29,064,494	65.48%	19.70%	2.897	5.20%	1.245	4.49%
4	NM	17,210,549	17,176,074	16,725,719	76.36%	25.42%	4.230	7.11%	1.341	6.04%
5	NM	3,926,439	3,543,018	2,831,501	76.14%	35.05%	4.192	7.06%	1.540	9.02%
6	NM	2,542	4,784	7,310	41.90%	74.21%	1.721	2.62%	3.878	31.14%
	NM Total	**47,874,480**	**48,487,391**	**48,629,024**	**69.84%**	**22.67%**	**3.316**	**5.87%**	**1.291**	**50.68%**
3	SO	47,989,440	50,650,925	53,654,851	59.73%	31.03%	2.483	4.43%	1.450	7.71%
4	SO	54,966,329	58,449,347	58,892,021	74.69%	20.81%	3.951	6.76%	1.263	4.78%
5	SO	7,214,980	7,279,947	7,499,630	43.13%	14.61%	1.758	2.72%	1.171	3.21%
	SO Total	**110,170,749**	**116,380,219**	**120,046,502**	**66.03%**	**24.99%**	**2.944**	**5.28%**	**1.333**	**15.70%**
3	SW	42,425,066	44,163,002	45,854,692	69.36%	20.11%	3.264	5.79%	1.252	4.59%
4	SW	11,777,080	11,324,968	11,305,184	64.25%	10.03%	2.797	5.02%	1.112	2.14%
5	SW	6,524,318	6,589,795	6,637,180	68.77%	14.42%	3.202	5.70%	1.168	3.16%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13 (continued)

Table	Region	1977 Enp Passengers	1987 Enp Passengers	1990 Enp Passengers	1991 Enp Passengers	1992 Enp Passengers	1993 Enp Passengers	1994 Enp Passengers	1995 Enp Passengers
6	SW	69,356	6,365,416	6,855,163	6,558,316	6,944,736	7,258,662	7,330,262	7,316,319
	SW	**20,234,759**	**50,445,226**	**55,794,148**	**54,805,087**	**58,181,888**	**59,744,680**	**63,300,513**	**65,380,338**
3	WP	27,944,815	55,480,740	59,438,914	60,296,308	60,386,181	62,347,908	67,558,579	71,076,717
4	WP	5,755,532	11,791,423	11,878,354	12,096,259	12,649,123	13,049,529	14,462,347	14,986,285
5	WP	2,193,026	11,726,977	13,672,922	14,664,934	14,901,066	16,117,087	18,140,242	19,500,913
	WP	**35,893,373**	**78,999,140**	**84,990,190**	**87,057,501**	**87,936,370**	**91,514,524**	**100,161,168**	**105,563,915**
	Grand Total	**196,016,568**	**398,314,777**	**409,434,663**	**399,173,666**	**417,120,205**	**435,643,473**	**475,450,882**	**491,340,109**

Table	Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume
4	AK	0.45%	0.25%	0.33%	0.33%	0.33%	0.32%	0.32%	0.31%
	AK Total	**0.45%**	**0.25%**	**0.33%**	**0.33%**	**0.33%**	**0.32%**	**0.32%**	**0.31%**
3	CE	3.20%	3.57%	3.10%	3.17%	3.30%	3.14%	3.34%	3.51%
4	CE	0.42%	0.27%	0.24%	0.27%	0.25%	0.24%	0.25%	0.30%
5	CE	0.64%	0.45%	0.38%	0.39%	0.39%	0.33%	0.31%	0.33%
	CE Total	**4.26%**	**4.28%**	**3.72%**	**3.82%**	**3.94%**	**3.71%**	**3.89%**	**4.15%**
3	EA	15.94%	14.50%	13.36%	12.56%	12.58%	12.50%	12.17%	11.93%
4	EA	2.89%	3.44%	3.16%	3.18%	2.78%	2.64%	2.91%	2.78%
5	EA	0.78%	0.58%	0.62%	0.59%	0.61%	0.60%	0.58%	0.55%
	EA Total	**19.61%**	**18.52%**	**17.13%**	**16.34%**	**15.97%**	**15.73%**	**15.66%**	**15.26%**
3	GL	15.01%	11.75%	11.78%	12.00%	12.51%	12.49%	12.19%	12.24%
4	GL	2.34%	1.95%	1.97%	1.92%	1.89%	1.85%	1.88%	1.83%
5	GL	0.44%	0.31%	0.31%	0.30%	0.36%	0.35%	0.32%	0.33%
6	GL	0.00%	0.64%	0.87%	0.74%	0.47%	0.68%	0.86%	0.85%
	GL Total	**17.80%**	**14.64%**	**14.92%**	**14.96%**	**15.23%**	**15.38%**	**15.25%**	**15.24%**
4	NE	0.63%	0.57%	0.56%	0.53%	0.51%	0.50%	0.46%	0.49%
5	NE	0.32%	0.36%	0.37%	0.35%	0.34%	0.33%	0.32%	0.30%
	NE Total	**0.96%**	**0.93%**	**0.94%**	**0.88%**	**0.85%**	**0.83%**	**0.79%**	**0.79%**
3	NM	5.12%	5.63%	4.73%	5.01%	5.22%	5.36%	5.21%	5.10%
4	NM	2.02%	2.10%	2.24%	2.36%	2.42%	2.86%	2.94%	3.09%
5	NM	0.34%	0.38%	0.32%	0.35%	0.38%	0.42%	0.41%	0.56%
6	NM	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13 (continued)

Table	Region	1996 Enp Passengers	1997 Enp Passengers	1998 Enp Passengers	% Increase 1977 to 1998	% Increase 1993 to 1998	1998/1977 (21 years)	Compound Interest Rate 1977 to 1998	1998/1993 (5 years)	Compound Interest Rate 1993 to 1998
6	SW	7,565,707	7,330,431	7,546,024	99.08%	3.81%	108.801	25.02%	1.040	0.78%
	SW	**68,292,171**	**69,408,196**	**71,343,080**	**71.64%**	**16.26%**	**3.526**	**6.18%**	**1.194**	**10.67%**
3	WP	76,994,656	77,054,056	77,052,697	63.73%	19.08%	2.757	4.95%	1.236	4.33%
4	WP	15,847,794	16,184,259	16,428,480	64.97%	20.57%	2.854	5.12%	1.259	4.71%
5	WP	20,023,434	19,861,494	20,045,269	89.06%	19.60%	9.140	11.11%	1.244	4.46%
	WP	**112,865,884**	**113,099,809**	**113,526,446**	**68.38%**	**19.39%**	**3.163**	**5.64%**	**1.241**	**4.41%**
	Grand Total	**522,759,618**	**538,335,194**	**551,124,489**	**64.43%**	**20.95%**	**2.812**	**5.05%**	**1.265**	**4.82%**

Table	Region	% of 1996 Volume	% of 1997 Volume	% of 1998 Volume	% Increase 1977 to 1998	% Increase 1993 to 1998	1998% / 1977%	Compound Growth Rate Share 1977 to 1998	1998% / 1993%	Compound Growth Rate Share 1993 to 1998
4	AK	0.31%	0.30%	0.30%	70.46%	69.04%	65.14%	57.94%	92.42%	65.93%
	AK Total	**0.31%**	**0.30%**	**0.30%**	**70.46%**	**69.04%**	**65.14%**	**57.94%**	**92.42%**	**65.93%**
3	CE	3.51%	3.55%	3.54%	105.32%	142.29%	110.67%	110.07%	112.63%	152.39%
4	CE	0.32%	0.30%	0.31%	79.97%	191.50%	73.38%	69.54%	132.02%	224.36%
5	CE	0.35%	0.32%	0.30%	38.81%	66.07%	47.43%	27.34%	91.75%	62.82%
	CE Total	**4.18%**	**4.17%**	**4.15%**	**98.65%**	**140.38%**	**97.43%**	**97.43%**	**111.99%**	**439.58%**
3	EA	11.63%	11.66%	11.74%	80.25%	75.62%	73.65%	69.89%	93.93%	72.90%
4	EA	2.70%	2.75%	2.88%	99.82%	131.93%	99.67%	99.67%	109.25%	138.84%
5	EA	0.51%	0.54%	0.55%	77.22%	65.86%	70.79%	66.03%	91.70%	62.61%
	EA Total	**14.83%**	**14.95%**	**15.17%**	**83.85%**	**85.96%**	**77.37%**	**74.72%**	**96.41%**	**274.35%**
3	GL	11.96%	12.12%	12.20%	87.29%	91.03%	81.29%	79.56%	97.68%	89.79%
4	GL	1.87%	1.87%	1.83%	84.35%	95.35%	77.91%	75.41%	98.78%	94.67%
5	GL	0.32%	0.34%	0.34%	83.35%	90.95%	76.83%	74.03%	97.66%	89.71%
6	GL	0.84%	0.82%	0.91%	155.04%	194.32%	34140.09%	766.55%	133.34%	228.94%
	GL Total	**15.00%**	**15.14%**	**15.28%**	**90.90%**	**97.70%**	**85.84%**	**84.92%**	**99.40%**	**503.11%**
4	NE	0.49%	0.47%	0.48%	82.00%	84.07%	75.41%	72.20%	95.95%	82.06%
5	NE	0.30%	0.43%	0.47%	117.57%	213.72%	146.71%	138.35%	143.15%	261.93%
	NE Total	**0.79%**	**0.90%**	**0.95%**	**99.73%**	**148.69%**	**99.51%**	**99.51%**	**114.82%**	**343.99%**
3	NM	5.11%	5.16%	5.27%	101.63%	94.02%	103.04%	102.97%	98.44%	93.17%
4	NM	3.29%	3.19%	3.03%	118.51%	121.30%	150.46%	140.89%	105.98%	125.45%
5	NM	0.75%	0.66%	0.51%	118.18%	167.29%	149.09%	139.97%	121.71%	187.24%
6	NM	0.00%	0.00%	0.00%	65.03%	354.18%	61.22%	51.92%	306.54%	646.63%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13 (continued)

Table	Region	% of 1977 Volume	% of 1987 Volume	% of 1991 Volume	% of 1990 Volume	% of 1992 Volume	% of 1993 Volume	% of 1994 Volume	% of 1995 Volume
	NM Total	**7.48%**	**8.11%**	**7.28%**	**7.73%**	**8.01%**	**8.64%**	**8.66%**	**8.75%**
3	SO	11.02%	9.21%	8.96%	7.85%	7.92%	8.50%	8.82%	9.07%
4	SO	7.61%	9.84%	10.65%	10.98%	11.19%	10.71%	10.69%	10.16%
5	SO	2.18%	1.72%	1.68%	1.57%	1.53%	1.47%	1.64%	1.48%
	SO Total	**20.80%**	**20.77%**	**21.29%**	**20.40%**	**20.64%**	**20.67%**	**21.15%**	**20.71%**
3	SW	7.17%	7.57%	8.26%	8.42%	8.62%	8.41%	8.21%	8.32%
4	SW	2.06%	2.20%	2.36%	2.35%	2.34%	2.33%	2.30%	2.23%
5	SW	1.06%	1.30%	1.34%	1.31%	1.32%	1.30%	1.26%	1.27%
6	SW	0.04%	1.60%	1.67%	1.64%	1.66%	1.67%	1.54%	1.49%
	SW Total	**10.32%**	**12.66%**	**13.63%**	**13.73%**	**13.95%**	**13.71%**	**13.31%**	**13.31%**
3	WP	14.26%	13.93%	14.52%	15.11%	14.48%	14.31%	14.21%	14.47%
4	WP	2.94%	2.96%	2.90%	3.03%	3.03%	3.00%	3.04%	3.05%
5	WP	1.12%	2.94%	3.34%	3.67%	3.57%	3.70%	3.82%	3.97%
	WP Total	**18.31%**	**19.83%**	**20.76%**	**21.81%**	**21.08%**	**21.01%**	**21.07%**	**21.48%**
Grand Total		**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-13 (continued)

Table	Region	% of 1996 Volume	% of 1997 Volume	% of 1998 Volume	% Increase 1977 to 1998	% Increase 1993 to 1998	1998% / 1977%	Compound Growth Rate Share 1977 to 1998	1998% / 1993%	Compound Growth Rate Share 1993 to 1998
	NM Total	**9.16%**	**9.01%**	**8.82%**	**108.39%**	**107.71%**	**117.93%**	**116.42%**	**102.09%**	**1052.49%**
3	SO	9.18%	9.41%	9.74%	92.70%	148.07%	88.32%	87.73%	114.60%	160.15%
4	SO	10.51%	10.86%	10.69%	115.91%	99.29%	140.51%	133.99%	99.81%	99.19%
5	SO	1.38%	1.35%	1.36%	66.94%	69.72%	62.54%	53.99%	92.57%	66.64%
	SO Total	**21.07%**	**21.62%**	**21.78%**	**102.48%**	**119.26%**	**104.70%**	**104.56%**	**105.38%**	**326.98%**
3	SW	8.12%	8.20%	8.32%	107.64%	95.96%	116.07%	114.83%	96.94%	95.37%
4	SW	2.25%	2.10%	2.05%	99.71%	47.88%	99.48%	99.48%	87.86%	44.38%
5	SW	1.25%	1.22%	1.20%	106.73%	68.81%	113.88%	112.92%	92.36%	65.69%
6	SW	1.45%	1.36%	1.37%	153.77%	18.17%	3869.70%	495.87%	82.18%	16.19%
	SW	**13.06%**	**12.89%**	**12.95%**	**111.18%**	**77.59%**	**126.40%**	**122.56%**	**94.39%**	**221.62%**
3	WP	14.73%	14.31%	13.98%	98.91%	91.08%	98.07%	98.07%	97.69%	89.85%
4	WP	3.03%	3.01%	2.98%	100.83%	98.16%	101.52%	101.50%	99.51%	97.88%
5	WP	3.83%	3.69%	3.64%	138.22%	93.52%	325.10%	220.22%	98.31%	92.60%
	WP	**21.59%**	**21.01%**	**20.80%**	**106.13%**	**92.53%**	**112.49%**	**111.70%**	**98.06%**	**91.48%**
Grand Total		**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-14
Percentage of Annual Enplaned Freight
Summarized by Airport Hub Size

Year	Large Hub % of Annual Enplaned Freight	Medium Hub % of Annual Enplaned Freight	Small Hub % of Annual Enplaned Freight	Non-Hub % of Annual Enplaned Freight
1977	84.34%	13.52%	2.14%	0.00%
1987	60.58%	34.45%	4.64%	0.33%
1990	59.77%	35.23%	4.77%	0.23%
1991	57.22%	37.18%	5.33%	0.27%
1992	56.28%	37.67%	5.85%	0.20%
1993	53.75%	38.83%	7.17%	0.25%
1994	54.77%	37.40%	7.54%	0.29%
1995	54.93%	37.32%	7.45%	0.30%
1996	51.71%	40.09%	7.80%	0.41%
1997	45.74%	43.11%	10.51%	0.64%
1998	45.74%	43.05%	10.54%	0.67%
1977 to 1998				
Average	56.80%	36.17%	6.70%	0.33%
Median	54.93%	37.40%	7.17%	0.29%
Maxium	84.34%	43.11%	10.54%	0.67%
Minimum	45.74%	13.52%	2.14%	0.00%
1993 to 1998				
Average	51.11%	39.97%	8.50%	0.42%
Median	52.73%	39.46%	7.67%	0.35%
Maxium	54.93%	43.11%	10.54%	0.67%
Minimum	45.74%	37.32%	7.17%	0.25%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-15
Percentage of Annual Enplaned Freight
for Airports Not Serving as a Hub to an Express Cargo Carrier
Summarized by Airport Hub Size

Year	Large Hub % of Annual Enplaned Freight - Not Serving as Hub to Express Cargo Carriers	Medium Hub % of Annual Enplaned Freight - Not Serving as Hub to Express Cargo Carriers	Small Hub % of Annual Enplaned Freight - Not Serving as Hub to Express Cargo Carriers	Non-Hub % of Annual Enplaned Freight - Not Serving as Hub to Express Cargo Carriers
1977	86.52%	11.20%	2.28%	0.00%
1987	78.63%	16.22%	4.65%	0.50%
1990	78.26%	16.93%	4.44%	0.36%
1991	75.97%	18.75%	4.85%	0.42%
1992	75.88%	18.44%	5.36%	0.32%
1993	72.06%	20.60%	6.93%	0.42%
1994	71.42%	20.32%	7.77%	0.49%
1995	72.44%	19.96%	7.08%	0.51%
1996	69.96%	21.98%	7.32%	0.74%
1997	65.13%	25.26%	8.35%	1.26%
1998	64.41%	26.19%	8.08%	1.32%
1977 to 1998				
Average	73.70%	19.62%	6.10%	0.58%
Median	72.44%	19.96%	6.93%	0.49%
Maximum	86.52%	26.19%	8.35%	1.32%
Minimum	64.41%	11.20%	2.28%	0.00%
1993 to 1998				
Average	69.24%	22.38%	7.59%	0.79%
Median	70.69%	21.29%	7.55%	0.63%
Maximum	72.44%	26.19%	8.35%	1.32%
Minimum	64.41%	19.96%	6.93%	0.42%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table B-16
Percentage of Annual Enplaned Passengers
Summarized by Airport Hub Size

Year	Large Hub % of Annual Passenger Traffic	Medium Hub % of Annual Passenger Traffic	Small Hub % of Annual Passenger Traffic	Non-Hub % of Annual Passenger Traffic
1977	71.71%	21.36%	6.88%	0.04%
1987	66.15%	23.58%	8.04%	2.24%
1990	64.69%	24.41%	8.35%	2.54%
1991	64.12%	24.95%	8.55%	2.38%
1992	64.63%	24.74%	8.50%	2.14%
1993	64.70%	24.44%	8.51%	2.35%
1994	64.14%	24.79%	8.67%	2.40%
1995	64.63%	24.24%	8.79%	2.34%
1996	64.24%	24.78%	8.69%	2.29%
1997	64.41%	24.86%	8.55%	2.18%
1998	64.79%	24.54%	8.39%	2.28%
1977 to 1998				
Average	65.29%	24.24%	8.36%	2.11%
Median	64.63%	24.54%	8.51%	2.29%
Maximum	71.71%	24.95%	8.79%	2.54%
Minimum	64.12%	21.36%	6.88%	0.04%
1993 to 1998				
Average	64.49%	24.61%	8.60%	2.31%
Median	64.52%	24.66%	8.61%	2.31%
Maximum	64.79%	24.86%	8.79%	2.40%
Minimum	64.14%	24.24%	8.39%	2.18%

Source Data: United States. Department of Transportation. Airport Activity Statistics of Certificated Air Carriers Summary Tables. N.p.: n.p. 1977, 1987, 1990-1998.

Table C-1
Airport Survey Responses

	BUF	BUR	CID	DSM	JAN	MDT	PWM	RIC
1. Would you describe your airports role in this development as proactive or reactive?	Reactive	Reactive	Proactive	Both	Proactive		Proactive	Proactive
2. Identify the cargo tenants at your airport								
a. Express package delivery	ABX	FedEx	ABX	ABX	UPS	Emery	ABX	ABX
	FedEx	UPS	DHL	DHL	ABX	UPS	FedEx	DHL
	UPS	Ameri-flght	FedEx	UPS		FedEx		FedEx
			UPS	FedEx		ABX		UPS
			USPS					USPS
b. Heavy weight freight	Emery		None	Emery	Bax-Global			Bax-Global
					Emery			Small heavy weight charter airlines
c. Freight forwarder			Blackhawk Frt Syst		M.G. Maher, Page & Jones			Shankers
d. Warehouse operation using express delivery			Nordst-rom.Com		Ariborne			Eddie Bower warehouse in FTZ
e. Number of flights per day (week) for each airline	262/YR	41/mo	42/mo	2/day	UPS 2/day,	Emery 1/day,	FedEx 2/day,	Not reported
	542/YR	22/mo	25/mo	2/day	ABX 1/day	UPS 1/day,	ABX 1/day	
	741/YR	740/mo – small acft	75/mo	20/day		FedEx 2/day,		
			25/mo	6/day		ABX 1/day		
	340/YR		25/mo	6/day				

Table C-1 (continued)

	BUF	BUR	CID	DSM	JAN	MDT	PWM	RIC
3. Briefly describe the facilities available								
a. Does the airport or city own the buildings and ramp?	Airport owns ramp. Third part developer under contract for 15 years owns buildings.	Airport & leased to FBOs	Airport owns bldg. & ramps	City owned	Airport	Airport owns ramp only	FedEx ramp owned by Airport, ABX facility owned by FBO	Airport owns some of the buildings & 2/3 of the ramp. UPS owns a building. Third party developer owns buildings & remainder of ramp.
b. Number of tenants?					4 all cargo carriers			
i. Express carriers			4					
ii. Heavy weight freight			0					
c. Number and size of buildings?	Two buildings		25,000 sf	2,200 sf – UPS & FedEx	37,000 sf multi tenant,	Two for 80,000 sf by private owner, Emery building size not reported	20,000 sf – FedEx owned by third party dev	8 buildings
			20,800 sf	2,200 sf – ABX & Emery	30,000 sf ABX		5,000 sf – ABX owned by FBO	aprox.
	"Large"		90,000 sf					400,000 sf
d. Ramp area?		7-8 ac.	Two	23 ac. FedEx & UPS	6.6 ac	18.6 ac	FedEx – 3 Boeing 727s, ABX ramp not reported	23 ac
				7 ac. ABX & Emery				

Table C-1 (continued)

	BUF	BUR	CID	DSM	JAN	MDT	PWM	RIC
e. Is the ramp shared with passenger airlines or general aviation?	Exclusive	GA	Exclusive	Exclusive	Exclusive	Exclusive	Exclusive	Exclusive
4. Have you constructed cargo facilities prior to having a tenant or do you build to suit based on a specific tenant's needs?	Third party developer	Build to suit	Both	Both	Build to suit	No	Build to suit	Both
a. If a facility is developed prior to securing a tenant what are the sizes and types of facilities constructed?		NA	25k sf – non-load bearing partitions			Unknown		60,000 sf
b. How are the spec facilities funded?		NA	GO bonds by City & cash reserves by Airport	Revenue Bonds, AIP Grants		Third party		Airport Revenue Bonds
c. Has readily available space or a pre-pared site played a key role in attracting a tenant to your airport?		No - Location of apt for niche market	Yes	No				Yes

Table C-1 (continued)

	BUF	BUR	CID	DSM	JAN	MDT	PWM	RIC
5. Do you have a marketing program to attract cargo business to your airport?	Third party developer	No	Component of overall Airport marketing program	Yes		No	No	Yes
a. Do you know the major industries using air cargo in your area?		No	Yes	No	Yes	Yes	No	Yes
b. Do you call on local businesses to inform them of the cargo service available at your airport?		No	Through marketing program	Trying to	No	No	No	Yes
c. Do you call on out of town businesses who may ship to your area?		No	Through marketing program	No	No	No	No	Yes
6.Do you have a cargo study developed specifically for your airport?	No (15 years ago)	No	Master Plan	Yes	Yes	Yes – in draft form	Master Plan	Yes
a. Have you done forecasting for future cargo demand?			Yes	5 years ago	Yes			Yes
b. How have you predicted future demand?			Yes	Master Plan	Historical volume			Historical & Inventory of users plans for development

Table C-1 (continued)

	BUF	BUR	CID	DSM	JAN	MDT	PWM	RIC
i. Linear regression of historical volume?			Yes					
ii. Prediction of future volume based on a study of local cargo customers?			No					
iii. Prediction based on a demographic measure of the population in your area?			No					
c. How accurate have your predictions been?			Mixed results		High – one carrier started shipping by truck			Short term forecasts have proven accurate

GLOSSARY OF TERMS

Aircraft Apron – A paved area on an airport adjacent to the runway/taxiway system, terminal building, or hanger. The terminal building could be a passenger terminal, general/corporate aviation terminal, or cargo terminal. The apron area can be further subdivided into taxi lanes, aircraft parking positions, and areas for ground support equipment to operate. The aircraft apron may also be referred to as a ramp.

Airline Direct – Airline direct service is generally provided by the major passenger airlines. They provide line-haul transportation from origin city to destination city only. They do not provide or arrange for local pick-up or delivery. Their service is limited to ticket counter to ticket counter.

Center Loading – Operators of sea going freighters prefer to limit the number of ports of call while unloading the inbound containers, before loading for the next trip across the ocean. Center loading is a concept whereby the owner of the steamship signs an agreement with a post on a cost line to handle all of their containers regardless if the final destination may be closer to another port. This is also referred to as load centering.

Double Stack Rail Cars – Double stack rail cars are a refinement of piggy-back. The rail car is specially designed to shift the load as low as possible and

standard sea containers are then stacked two high on the car. The height of the loaded car is approximately 18 feet, less than the 20.5 foot standard. Standard intermodal containers are 8.5 feet tall, 8 feet wide and 20, 40, or 45 feet long. Each double stack unit is five cars long accepting 10 to 20 containers, depending on the length.

Enplaned/Deplaned – Enplaned passenger or cargo is simply a total of the number of people or tonnage of cargo placed on board an aircraft at a reporting airport. Enplaned totals represent the people or product leaving an airport. Deplaned represents the arriving totals. The Bureau of Transportation Statistics collects enplaned passengers, freight, and mail data.

Expedited Motor Carrier – Expedited motor carriers operate along the same lines as the integrated express (airline) carriers. They provide complete door-to-door service with their own personnel and equipment. They operate scheduled "truck flights", some even use "flight numbers", the difference is they are limited in the distance they can offer next day delivery and all transportation is by truck.

FAA Regions – The Federal Aviation Administration has divided the United States into nine regions. They are: Alaska, Central (Iowa, Kansas, Missouri, Nebraska), Eastern (Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, West Virginia, District of Columbia), Great Lakes

(Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, North Dakota, South Dakota), New England (Connecticutt, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Northwest Mountain (Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming), Southern (Kentucky, Tennessee, Missouri, Alabama, North Carolina, South Carolina, Georgia, Florida, Puerto Rico, Virgin Islands), Southwest (New Mexico, Texas, Oklahoma, Arkansas, Louisiana), and Western Pacific (California, Nevada, Arizona, Hawaii, Guam, American Samoa).

Gross Domestic Product (GDP) – Gross domestic product is a measure of the output of goods and service in the United States calculated by the United States Department of Commerce. It includes personal consumption, government expenditures, private investments, inventory growth, and time balance.

Hub – In this paper the term hub has been used in two contextual relationships. One is used by the Federal Aviation Administration (FAA) to identify the relative size of airports providing commercial scheduled passenger service. The size is categorized based on the percentage of total annual passengers boarding aircraft that board at the individual airport. Large hub airports board 1.00 percent or more of the total annual enplaned passengers. Medium hubs range from 0.25 percent to less than 1.00 percent, small hubs from 0.05 percent to less than 0.25 percent, and non-hub enplane more than 10,000 passengers but less than 0.05 percent of the annual total. The second use of the term hub is to

describe the hub and spoke system used by passenger and cargo airlines. In this system flights are merged at a central "hub" city for interchange with connecting flights to the destination cities.

Integrated Express Carriers – Integrated express carriers provide every facet of the transportation with their own employees and equipment. They provide local pick-up service at the origin, line-haul transportation to the destination (by air or ground) and local delivery to the recipient. In addition, they provide package-tracking information.

Just-in-Time – Just-in-time is a concept whereby industries limit their investment in large inventories and associated costs by scheduling supplies to be delivered to the assembly line in small quantities on an as needed basis.

Landbridge – A landbridge connects one or two sea legs of a journey with a land based railroad leg. The steam ship line may contract with multiple railroad companies to expedite unit trains of their containers through the individual railroad's route system. The goods remain in the same container for the entire trip and are covered by one bill of lading. The steam ship companies publish the rates to the customers and negotiate with the intermodal partners for their share. Landbridge, minibridge, and microbridges are derivations on how the transportation charges are calculated.

Less-Than-Truck Load (LTL) – Less-than-truck load shipments are small volume shipments that do not require an entire tractor-trailer dedicated to the order.

Line-Haul Shipment – Line-haul shipment is the transportation for the long distance portion of the trip. It can be thought of as origin city to destination city. Local pick-up or delivery is not included.

Microbridge – see landbridge.

Non-integrated Forwarders – Non-integrated forwarders provide their service directly to the public, however they sub-contract segments of the transportation service to third parties. They do not provide all aspects of the service with their own employees and equipment as the integrated carriers. The non-integrated forwarder may contract for line-haul while providing pick-up and delivery at the origin and destination. Alternately they may sub-contract for all transportation aspects providing coordination service only.

Piggy-back – Piggy-back is the practice of loading of one or two conventional semi trailers on a railroad flat car for the long distance or line-haul portion of the trip.

Scheduled Freight – Scheduled freight is freight carried by a transportation company who provides shipment on a scheduled basis, i.e. departure at a specific time each day. This is compared to charter freight, where the time for the transportation is arranged mutually between the shipper and transportation company on a contract basis.

Standard Industrial Code – Standard industrial code, now the North American Industry Classification System, is a unified system for reporting and tabulating data related to industrial activity. The new NAICS system uses six digits to classify 1,170 industries, including 565 service industries. There are 20 industrial sectors classified including "Transportation and Warehousing".

Time-based Competition – Time-based competition is a concept of minimizing the time to develop a new product and deliver it to the end used. In this approach to managing a business, the cost of transportation is balanced against the value of the time required for all modes of transportation.

Time-Critical Service – Time-critical service means delivery as soon as possible. This is typically the next business day with delivery time options. The integrated express carriers also offer weekend delivery options.

Time-Definite Service – Time-definite guarantees delivery within a specified number of days or by a specific date.

Time-Indefinite Service – Time-indefinite service means the shipment is delivered when it arrives. There is no guarantee or statement regarding the anticipated date for delivery.

Total Cost Concept – Total cost concept is a concept of analyzing the total cost of product development and production. This includes assigning a cost to the time required, including delivery of raw materials and shipping of the finished product.

Yield – Yield for a cargo carrier is income measured in terms of weight and distance. High yield products are typically the overnight letter, time critical service.

VITA

L. Thomas (Tom) Lindquist was born in Rockford, Illinois on November 15, 1945. He graduated from Rockford East Senior High School in June of 1963 and attended Milton College in Milton, Wisconsin for two years majoring in business administration. He transferred to the civil engineering program at the Wisconsin State University in Platteville, Wisconsin, now the University of Wisconsin – Platteville. He graduated with a Bachelor of Science degree in Civil Engineering in June of 1969. He has worked for the Illinois Department of Transportation in the Bureau of Planning where he was involved with long-range transportation planning for the Rockford, Illinois urban area and traffic volume forecasting for highway improvement projects in the twelve counties in the district. In 1977 he accepted the position as Assistant County Superintendent of Highways for DeKalb County Illinois. At the county highway department he was responsible for the capital improvement projects on the county highway system and served as a consulting engineer to the twelve township highway commissioners in the county. In 1979 he joined the Department of Public Works for the City of DeKalb, Illinois where he was responsible for management of the municipal airport plus land and easement acquisition for department projects. In 1989 he accepted the position of Vice President of Engineering for the Metropolitan Knoxville Airport Authority in Knoxville, Tennessee where he is responsible for all capital construction projects and environmental management for a small hub airport and a reliever

airport. He is a registered professional engineer in the states of Wisconsin, Illinois, and Tennessee and is a member of the Honor Society of Phi Kappa Phi, the American Society of Civil Engineers, Institute of Transportation Engineers (national and student chapters), National Society of Professional Engineers, and the American Association of Airport Executives. He started the masters program in Civil Engineering with an emphasis in transportation at the University of Tennessee, Knoxville in the fall semester of 1997 and graduated in the spring semester of 2001. He is currently pursuing accreditation with the American Association of Airport Executives.