

# Passenger Air Transportation Data Needs, Resources, and Issues

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Significant issues of passenger air transportation are discussed, and the information resources available to the U.S. Department of Transportation (DOT) for planning purposes are detailed. The issues related to air transportation information that must be considered in the national transportation strategic plan are addressed, and deficiencies in the information for transportation planning are pinpointed. Currently available passenger aviation information has been influenced most by regulation of the aviation industry. Unlike other industries, where disclosure information is voluntary, significant amounts of aviation information are required by federal regulations. Two primary regulatory agencies collect data from members of the airline community: the Civil Aeronautics Board and the Federal Aviation Administration. Air passenger transportation statistics are also available from other government agencies, such as the Internal Revenue Service, the Securities and Exchange Commission, and the National Transportation Safety Board. Additionally, many private enterprises regularly publish and collect statistics for the aviation industry. The current information systems are valuable but are largely deficient in fundamental ways. For example, no national information system exists to coordinate the available government data. Also, there are no consistent demographic and passenger demand statistics. Dramatic increases in international air travel present a critical need for more uniform data on international air passenger travel. Specific information gaps include the lack of data regarding airports eligible for FAA funding, the need for timely and accurate data, and the lack of a physical inventory in the national aerospace plan data. It is suggested that the strategic planning team consider the current data as a single national aviation information resource, then determine the importance of each data source to planning requirements. The team must find a systematic way to shape this information into a useful planning tool.

Significant issues of passenger air transportation are discussed and the information resources available to the U.S. Department of Transportation (DOT) National Transportation Policy Team (NTPT) are detailed. Also addressed are the uses of air transportation information, and the deficiencies in the information for transportation planning are pinpointed.

## ISSUES IN PASSENGER AIR TRANSPORTATION

### Significance of Passenger Air Transportation

Geographically, the United States is enormous, comprising 3.6 billion square miles of land and water. The 50 states are populated by 247 million people, generating \$4.1 trillion of gross national product each year. One of the most significant factors making it possible for this far-reaching economy to

prosper is the connection of the U.S. cities through the world's most advanced transportation systems. The speed of air travel makes any U.S. city accessible within a day's journey. Obviously, air transportation plays an important unifying factor in the interaction of people and businesses.

In 1988, more than 454 million people (1.3 million per day) traveled by air for business or pleasure. The ability to satisfy this demand for air services is accomplished through the cooperative efforts of federal government agencies, state and local governments, and the private enterprises of aviation and aviation-related businesses. Since the beginning of commercial air transportation, these organizations have worked to build a well-integrated air system in the United States.

### Sources of Passenger Aviation Information Resources

Passenger aviation information resources have been affected most by the highly regulated growth of the aviation industry. The primary sources of data for air transportation are statistics supplied to the government agencies that regulate the industry. Unlike other industries, where disclosure of information to the government is voluntary, a significant amount of aviation information is required for compliance with federal regulations.

These regulations were created by the Civil Aeronautics Authority (CAA) following the passage of the Civil Aviation Act of 1938. This federal agency was established to promote orderly development of air services in the United States. CAA recognized early that, to fulfill its responsibilities, it needed timely, consistent, and reliable facts about the performance of the airlines in the industry.

In 1942, CAA instituted part 202.1 of the *Federal Economic Regulations*. This regulation required air carriers to provide uniform financial accounting data. In 1951, the accounting requirements were defined in greater detail with the adoption of 14 CFR part 241 of the *Federal Economic Regulations* entitled, "Uniform System of Accounts and Reports for Certificated Air Carriers." These regulations continue to be enforced today, including the original data requirements, though they have been modified and amended periodically. The most significant change has been the addition of part 298, which provides for data collection from small aircraft operators.

The Civil Aviation Act of 1958 separated economic regulation of the airline industry from air safety regulation. It was largely enacted to avoid conflicts of objectives within CAA. The Civil Aeronautics Board (CAB) was created as an independent federal agency with continuing obligations for economic regulation, while the Federal Aviation Administration

(FAA) was created as an additional agency in the U.S. Department of Transportation (DOT).

FAA was given responsibility to devise and implement regulations that would promote airline safety, assure the development and efficient use of airspace, and promote air commerce in the United States and in foreign countries. Since its inception, FAA has instituted federal regulations specifying rules for the safe operation and maintenance of aircraft in commercial service. These rules are primarily contained in parts 121, 135, and 91 of the *Federal Regulations*.

FAA also administers and maintains the airway and airport system by providing funds, equipment, and personnel. It designed and maintains the U.S. air navigation network and operates the air traffic control system. It develops specifications for airport design and provides federal funds for building airports throughout the United States. To support its administrative responsibility, FAA requires airlines and airports to submit operational data so administrators can monitor the performance of the airline and airport system.

Since 1958, these agencies have collected a large body of aviation data for establishing policies, planning, and adopting regulations. The comments of the users of these data suggest that both CAB and FAA have collected the correct statistics to administer their responsibilities. They also are considered to have adequately made the information available to the general public. However, there is a general consensus that pressing issues exist that must be resolved to ensure continued air transportation growth. Additionally, the users feel there are deficiencies in the type and usefulness of the statistics used for planning.

### Issues Requiring Data Consideration

Comments provided for this resource paper at TRB's 6th International Workshop on Aviation Activities, as well as recent published comments of industry and congressional leaders, were critical of DOT's readiness to resolve what is seen to be pressing problems facing the industry. In general, the problems are the results of the dramatic changes that have occurred in the airline industry over the past 10 years.

#### *Impact of Airline Deregulation*

The Airline Deregulation Act, passed by Congress in 1978, phased out the responsibilities of CAB for regulation of domestic airline route authorization and price setting. International airline economic regulation and the airline data collection system were continued as tasks of DOT. Safety regulation and maintenance of the airway system remained with FAA.

Deregulation was conceived to allow new airlines to be started, thus providing competition for the traditional carriers. A consequence of deregulation was an increase in the ability of traditional airlines to expand into new markets. For several years, the airline industry became highly competitive as the large carriers competed aggressively with new-entrant carriers and smaller traditional airlines for shares of the national air passenger market. The number of air carriers operating in

the United States increased substantially between 1978 and 1985. However, by the end of 1989, nine airlines dominated the airline market, carrying 97 percent of all airline passengers.

Comments supplied for this paper indicated that this concentration in the domestic airline industry is an important issue that will affect the future of air transportation services provided by DOT (1). The key questions concerning airline concentration are as follows:

- Will concentration mean that more or fewer services will be needed in the future?
- Can a smaller number of carriers provide sufficient passenger air transportation to fulfill national defense interest?
- Are adequate data being collected to reveal the impact of carrier concentration?
- Will airlines be less likely to provide data to the government because of a fear of losing competitive advantage?

An additional consequence of deregulation is that airlines have been more free to act independently to change their corporate and financial structures and to modify their operations for greater efficiency. The concentration of the carriers has been largely due to the merger and acquisition of carriers by airlines that wish to gain market share quickly. This has included purchases of or investment in the commuter and small aircraft operators that provide connecting service for passengers in small communities to the larger carriers. To manage these more complex combinations, airlines have adopted corporate structures that separate these diverse airline operations.

Today, a large carrier operating both large and small aircraft is managed by a nonoperating holding company or by private corporate owners. These new management structures coordinate the financial requirements of all carriers in the group. This corporate organization is prevalent in other U.S. industries, meaning airlines are becoming increasingly similar to their less regulated counterparts. Several TRB workshop participants raised the following questions concerning the changing structure of airlines:

- Will airline holding companies need to focus more on financial concerns than on airline operations in the future?
- With structures similar to other industries, will airlines be less willing to work closely with government in developing the air passenger infrastructure?
- Will this new structure mean that valuable information concerning airline financing will be more difficult to obtain?

The primary change in airline operations that has provided carriers with improved efficiency is the increased use of "hub-and-spoke" airport operations. Before deregulation, the majority of airline flights were operated directly from city to city on specific routes. With hub-and-spoke operations, carriers use centrally located hub airports to feed passengers from smaller cities into long-distance flights to their final destination. Because of this, hub airports have experienced dramatic increases in the number of flights operated during the day. This increase has resulted in delays and congestion at hub airports and at airports that are the most popular destinations from the hubs.

The principal questions raised regarding the issue of congestion were the following:

- Is the government collecting sufficient information to find ways to improve the congestion of airways and airports caused by hub operations?
- How will hub operations and delays affect investment requirements for the airport and airway system?
- What information will be needed to better forecast the impact of changes in airline operating strategies on airport and airway capacity?

#### *Other Issues Affecting Data Requirements*

Other issues that will require additional information to facilitate improved strategic planning are

- Domestic passenger demand,
- Increased international traffic growth,
- Alternative airport and airway funding mechanisms,
- Improved airport highway access,
- Impact of airport noise on communities,
- Coordination of federal and local aviation interest,
- Regulation of airline computer management and distribution systems,
- Increase in foreign carrier access to domestic markets,
- Increased foreign investment in U.S. carriers,
- Impact of worldwide airline liberalization,
- Maintaining safety in the deregulated industry,
- Modernization of the air traffic control system,
- Impact of the declining skilled labor force,
- Changes in aircraft financing,
- Access to highly congested airports,
- Opportunities for new-entrant air carriers, and
- Impact of aging aircraft on safety.

To determine the strategic consequences of these issues, a different approach will be required for the collection and use of data. Recent information has largely been used to monitor the effects of regulation on the industry. While it is generally felt that the data currently being collected should be retained, additional information is needed that more specifically provides an understanding of the issues facing the air passenger industry.

## **EXISTING SOURCES OF INFORMATION**

### **CAB and DOT Statistics**

As discussed above, one of the primary information sources for air passenger statistics is the "Uniform System of Accounts and Reports for Certificated Air Carriers," which is maintained by DOT (see Figure 1). This standardized financial accounting system was devised by CAB to ensure that each air carrier that has an operating certificate provides information in a consistent manner. Before deregulation, the data were used to determine whether an airline was financially fit and, thus, could provide scheduled passenger service in a safe

and economic way. The data also provided cost and revenue information to allow CAB to set prices for air services in the United States. Since deregulation, this data collection has continued to be valuable for monitoring trends in industry growth and for measuring the demand for federal government obligations.

CAB's financial accounting system consists of a chart of accounts that conforms to federal accounting standards. CAB provides the air carriers with specific accounting rules and detailed explanations of the accepted content of each account. A reporting system known as the "Form 41 schedules" ensures that the information is presented in a uniform manner.

The Form 41 schedules are separated into three primary areas of financial statistics: balance sheet data, profit and loss statements, and operating statistics. The balance sheet accounts (shown in Figure 2) detail the value of the accumulated assets; an airline's liabilities and equity are reported by the carriers. These accounts provide a way to measure the ability of a company to uphold its financial obligations. Additionally, the balance sheet includes a summary of the accumulation of stockholders' equity, which is the increase or decrease in the overall value of the airline.

The second series of financial schedules collected in the Form 41 accounting system is the profit and loss account classifications (see Figure 3). These schedules detail the sources of revenue generated from an airline's operations, the actual distribution of expenses among the various operational areas within the airline, and the resulting profit or loss generated by the airline from its operations.

The profit and loss accounts also include supplementary schedules detailing the line item expenses for each type of aircraft owned by the airline. These schedules show the expenditures for labor, fuel, maintenance, and depreciation. Other supplemental schedules report expenses related to the ground operations that support the aircraft, the sales and advertising of services, the costs of the reservation and distribution network, and the airline's general and administrative costs.

The final statistical requirement of the Form 41 system is the classification of operating statistics (see Figure 4). These schedules detail the traffic carried by the airline, including both passengers and freight. The schedules also provide measurements of the air carrier's capacity in seats and tons. Schedules that present the actual levels of utilization of each type of aircraft in the airline's fleet are also included in this series of reports.

To further monitor changes of service and passenger demand in the U.S. airline system, the operating statistics require the collection of passenger and seat statistics for each segment flown between the cities served by the airline. This data series, known as "service segment statistics," includes the number of enplaning and deplaning passengers at each city on an airline's flight itinerary. To supplement the demand data, DOT requires the carriers to conduct a survey of the tickets sold by the airline. This origin-and-destination survey is accomplished by selecting a 10 percent sample of the actual processed tickets to develop a statistical estimate of the patterns of passenger movements throughout the air transport system.

The reports of the Uniform System of Accounts are submitted in a variety of frequencies. Most of the data are pro-

[ER-914, 40 FR 27017, June 26, 1975]

**PART 241—UNIFORM SYSTEM OF ACCOUNTS AND REPORTS FOR LARGE CERTIFICATED AIR CARRIERS**

**Sec.**

- 01 Authority Under Which Accounting and Reporting Rules and Regulations are Prescribed and Administered.
- 02 [Reserved]
- 03 Definitions for Purposes of This System of Accounts and Reports.
- 04 Air Carrier Groupings.

**GENERAL ACCOUNTING PROVISIONS**

- 1 Introduction to System of Accounts and Reports.
  - 1-1 Applicability of system of accounts and reports.
  - 1-2 Waivers from this system of accounts and reports.
  - 1-3 General description of system of accounts and reports.
  - 1-4 System of accounts coding.
  - 1-5 Records.
  - 1-6 Accounting entities.
  - 1-7 Interpretation of accounts.
  - 1-8 Address for reports and correspondence.
  - 1-9 Conversion to this system of accounts and reports.
- 2 General Accounting Policies.
  - 2-1 Basis of allocation between entities.
  - 2-2 Distribution of revenues and expenses within entities.
  - 2-3 Transactions in foreign currencies.
  - 2-4 Accounting period.
  - 2-5 Liability accruals.
  - 2-6 Income tax accruals.
  - 2-7 Extraordinary items, discontinued operations, prior period adjustments, and accounting changes.
  - 2-8 Unaudited items.
  - 2-9 Improvements, additions and betterments.
  - 2-10 Capitalization of interest.
  - 2-11 Accounting for transactions in gross amounts.
  - 2-12 Acquisition and valuation of assets.
  - 2-13 Establishment of allowances.
  - 2-14 Depreciation and amortization.
  - 2-15 Contingent assets and contingent liabilities.
  - 2-16 Notes to financial statements.
  - 2-17 Revenue and accounting practices.
  - 2-18 Transactions between members of an affiliated group.
  - 2-19 [Reserved]
  - 2-20 Accounting for leases.
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**BALANCE SHEET CLASSIFICATIONS**

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- 4 General.
- 5 Balance Sheet Account Groupings.
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  - 5-2 Investments and special funds.
  - 5-3 Property and equipment.
  - 5-4 Property and equipment depreciation and overhaul.
  - 5-5 Other assets.
  - 5-6 Current liabilities.
  - 5-7 Noncurrent liabilities.
  - 5-8 Deferred credits and commitments and contingent liabilities.
  - 5-9 Stockholder equity.
- 6 Objective Classification of Balance Sheet Elements.

**PROFIT AND LOSS CLASSIFICATION**

- 7 Chart of Profit and Loss Accounts.
- 8 General.
- 9 Functional Classification—Operating Revenues.
- 10 Functional Classification—Operating Expenses of Group I Air Carriers.
- 11 Functional Classification—Operating Expenses of Group II and Group III Air Carriers.
- 12 Objective Classification—Operating Revenues and Expenses.
- 14 Objective Classification—Nonoperating Income and Expense.
- 15 Objective Classification—Income Taxes for Current Period.
- 16 Objective Classification—Discontinued Operations.
- 17 Objective Classification—Extraordinary Items.
- 18 Objective Classification—Cumulative Effect of Changes in Accounting Principles.

**OPERATING STATISTICS CLASSIFICATIONS**

- 19 Uniform Classification of Operating Statistics.
  - 19-1 Chart of operating statistical elements.
  - 19-2 Maintenance of data.
  - 19-3 Accessibility and transmittal of data.
  - 19-4 Service classes.
  - 19-5 Air transport traffic and capacity elements.
  - 19-6 Public disclosure of service-segment data.
  - 19-7 Passenger origin-destination survey.

**GENERAL REPORTING PROVISIONS—LARGE CERTIFICATED AIR CARRIERS**

- 21 Introduction to System of Reports.
- 22 General Reporting Instructions.

**FINANCIAL REPORTING REQUIREMENTS**

- 23 Certification and Balance Sheet Elements.

**FIGURE 1 Uniform System of Accounts and Reports for Large Certificated Air Carriers.**

**Section 3—Chart of Balance Sheet Accounts**

[See footnotes at end of table]

[See footnotes at end of table]

Name of account	General classification		Name of account	General classification	
Current assets:			Buildings .....	1660	1760
Cash .....	1010		Maintenance buildings and improvements .....	1660.1	1760.1
Short-term investments .....	1100		Other buildings and improvements .....	1660.9	1760.9
Notes receivable .....	1200		Allowance for depreciation of flight equipment and ground property and equipment, and amortization of overhaul and airworthiness costs .....	1668	1768
Accounts receivable .....	1270		Land .....	1679	1779
Allowance for uncollectible accounts .....	1290		Equipment purchase deposits and advance payments .....	1685	1785
Spare parts and supplies .....	1300		Construction work in progress .....	1689	1789
Allowance for obsolescence—Spare parts and supplies .....	1311		Leased property under capital leases .....	1695	1795
Prepaid items .....	1410		Capital leases—flight equipment .....	1695.1	1795.1
Other current assets .....	1420		Capital leases—other property and equipment .....	1695.2	1795.2
Investments and special funds:			Leased property under capital leases, accumulated amortization .....	1696	1796
Investments in associated companies .....	1510		Accumulated amortization—capitalized flight equipment .....	1696.1	1796.1
Investments in investor controlled companies .....	1510.1		Accumulated amortization—capitalized other property and equipment .....	1696.2	1796.2
Investments in other associated companies .....	1510.2		Property on operating-type lease to others and property held for lease .....		1797
Advances to associated companies .....	1510.3		Property on operating-type lease to others and property held for lease, accumulated depreciation .....		1798
Other investments and receivables .....	1530		Other assets:		
Special funds .....	1550		Long-term prepayments .....	1820	
Property and equipment .....	1600-1700		Unamortized developmental and preoperating costs .....	1830	
			Other assets and deferred charges .....	1890	
	Operating	Nonoperating	Current liabilities:		
Airframes .....	1601	1701	Current maturities of long-term debt .....	2000	
Airframes .....	1601.1	1701.1	Notes payable:		
Unamortized airframe overhauls .....	1601.2	1701.2	Banks .....	2005	
Aircraft engines .....	1602	1702	Other .....	2015	
Aircraft engines .....	1602.1	1702.1	Trade accounts payable .....	2021	
Unamortized aircraft engine overhauls .....	1602.2	1702.2	Accounts payable—other .....	2025	
Improvements to leased flight equipment .....	1607	1707	Current obligations under capital leases .....	2080	
Flight equipment rotatable parts and assemblies .....	1608	1708	Accrued salaries, wages .....	2110	
Airframe parts and assemblies .....	<sup>1</sup> 1608.1	<sup>1</sup> 1708.1	Accrued vacation liability .....	2120	
Aircraft engine parts and assemblies .....	<sup>1</sup> 1608.5	<sup>1</sup> 1708.5	Accrued interest .....	2125	
Other parts and assemblies .....	<sup>1</sup> 1608.9	<sup>1</sup> 1708.9	Accrued taxes .....	2130	
Flight equipment .....	1609	1709	Dividends declared .....	2140	
Allowance for depreciation:			Air traffic liability .....	2160	
Airframes .....	1611	1711	Other current liabilities .....	2190	
Aircraft engines .....	1612	1712	Noncurrent liabilities:		
Improvements to leased flight equipment .....	1617	1717	Long-term debt .....	2210	
Flight equipment rotatable parts and assemblies .....	1618	1718	Advances from associated companies .....	2240	
Flight equipment airworthiness allowance .....	<sup>2</sup> 1629	<sup>2</sup> 1729	Pension liability .....	2250	
Equipment .....	1630	1730	Noncurrent obligations under capital leases .....	2280	
Furniture, fixtures and office equipment .....	1636	1736	Other noncurrent liabilities .....	2290	
Improvements to leased buildings and equipment .....	1639	1739	Deferred credits:		
	General classification		Deferred income taxes .....	2340	
Buildings .....	1640	1740	Deferred investment tax credits .....	2345	
Maintenance buildings and improvements .....	1640.1	1740.1	Other deferred credits .....	2390	
Other buildings and improvements .....	1640.9	1740.9			
Ground property and equipment .....	1649	1749			
Allowance for depreciation:					
Equipment .....	1650	1750			
Improvements to leased buildings and equipment .....	1654	1754			
Furniture, fixtures, and office equipment .....	1656	1756			

FIGURE 2 Balance Sheet Chart of Accounts.

Section 7—Chart of Profit and Loss Accounts

Objective classification of profit and loss elements	Functional or financial activity to which applicable (00)		
	Group I carriers	Group II carriers	Group III carriers
OPERATING REVENUES AND EXPENSES			
Transport revenues:			
01 Passenger:			
01.1 Passenger—first class .....	31, 32	31, 32	31, 32
01.2 Passenger—coach .....	31, 32	31, 32	31, 32
05 Mail:			
05.1 Priority .....	31, 32	31, 32	31, 32
05.2 Nonpriority .....	31, 32	31, 32	31, 32
05.3 Foreign .....	31, 32	31, 32	31, 32
06 Property:			
06.1 Freight .....	31, 32	31, 32	31, 32
06.2 Excess passenger baggage .....	31, 32	31, 32	31, 32
07 Charter:			
07.1 Passenger .....	32	32	32
07.2 Property .....	32	32	32
19 Air transport—other:			
19.1 Reservation cancellation fees .....	31, 32	31, 32	31, 32
19.2 Miscellaneous operating revenues .....	31, 32	31, 32	31, 32
08 Public service revenues (subsidy) .....	48	48	48
Transport-related revenues and expenses:			
09 In-flight sales:			
09.1 Liquor and food—gross revenues .....	48	48	48
09.2 Movies and stereo—gross revenues .....	48	48	48
09.3 Other—gross revenues .....	48	48	48
09.4 Liquor and food—depreciation expense .....	71	71	71
09.5 Liquor and food—other expense .....	71	71	71
09.6 Movies and stereo—depreciation expense .....	71	71	71
09.7 Movies and stereo—other expense .....	71	71	71
09.8 Other—depreciation expense .....	71	71	71
09.9 Other—expense .....	71	71	71
10 Restaurant and food service (ground):			
10.1 Gross revenues .....	48	48	48
10.2 Depreciation expense .....	71	71	71
10.3 Other expenses .....	71	71	71
11 Rents:			
11.1 Gross revenues .....	48	48	48
11.2 Depreciation expense .....	71	71	71
11.3 Other expenses .....	71	71	71
12 Limousine service:			
12.1 Gross revenues .....	48	48	48
12.2 Depreciation expense .....	71	71	71
12.3 Other expenses .....	71	71	71
:	:	:	:
DISCONTINUED OPERATIONS			
95 Discontinued operations:			
95.1 Income from discontinued operations .....	96	96	96
95.2 Loss on disposal of discontinued operations .....	96	96	96
EXTRAORDINARY ITEMS			
96 Extraordinary items .....	97	97	97
97 Income taxes applicable to extraordinary items .....	97	97	97
CHANGES IN ACCOUNTING PRINCIPLES			
98 Cumulative effects of change in accounting principles .....	98	98	98

[ER-755, 37 FR 19726, Sept. 21, 1972, as amended by ER-781, 37 FR 25223, Nov. 29, 1972; 37 FR 28277, Dec. 22, 1972; ER-797, 38 FR 10926, May 3, 1973; ER-841, 39 FR 11995, Apr. 2, 1974; ER-948, 41 FR 12295, Mar. 25, 1976; ER-980, 42 FR 35, Jan. 3, 1977; ER-1013, 42 FR 37515, July 21, 1977; ER-1401, 50 FR 242, Jan. 3, 1985; Amdt. 241-56, 52 FR 9129, Mar. 23, 1987]

FIGURE 3 Profit and Loss Chart of Accounts.

vided quarterly, but some operating statistics schedules are available on a monthly cycle and some balance sheet and profit and loss schedules are only reported yearly. Distinctions are made between the report forms based on the size of the airline. Smaller airlines report more abbreviated schedules to lessen the burden of compliance with the regulations.

All information collected under the Uniform System of Accounts is considered to be publicly owned and is readily

available for use in planning and analysis of the industry. Due to the large volume of data collected, computerized processing and storage is the most effective way for this information to be maintained and disseminated.

The most common criticism of the system by nongovernment users centers on the current method of distribution for the form 41 statistics. The computer distribution of the data is performed by several independent contractors. These com-

**Section 19—Uniform Classification of Operating Statistics**

**Sec. 19-1 Chart of Operating Statistical Elements**

Air transport traffic and capacity elements		Service classes
<b>AIRPORT-TO-AIRPORT TRAFFIC AND CAPACITY</b>		
501	Interairport distance .....	Z.
110	Revenue passengers enplaned.....	A, C, E, G, L, N, P, R.
111	First class .....	A, E.
112	Coach.....	C, E.
210	Revenue cargo tons enplaned.....	A, C, E, G, L, N, P, R.
213	U.S. mail—priority.....	A, C, E, G, L, N, P, R.
214	U.S. mail—nonpriority.....	A, C, E, G, L, N, P, R.
215	Foreign mail.....	A, C, E, G, L, N, P, R.
217	Freight.....	A, C, E, G, L, N, P, R.
130	Revenue passengers transported.....	A, C, E, G, L, N, P, R.
131	First class .....	A, E.
132	Coach.....	C, E.
150	Nonrevenue passengers transported.....	A, C, E, G, L, N, P, R.
230	Revenue tons transported .....	A, C, E, G, L, N, P, R.
231	Passenger.....	A, C, E, G, L, N, P, R.
233	U.S. mail—priority.....	A, C, E, G, L, N, P, R.
234	U.S. mail—nonpriority.....	A, C, E, G, L, N, P, R.
235	Foreign mail.....	A, C, E, G, L, N, P, R.
236	Express.....	A, C, E, G, L, N, P, R.
237	Freight.....	A, C, E, G, L, N, P, R.
250	Nonrevenue tons transported.....	A, C, E, G, L, N, P, R.
310	Seats available .....	A, C, E, G, L, N, P, R.
311	First class .....	A, E, G.
312	Coach.....	C, E, G.
270	Tons available.....	A, C, E, G, L, N, P, R.
410	Revenue aircraft miles flown .....	A, C, E, G, L, N, P, R.
411	Scheduled.....	A, C, E, G.
412	Extra section .....	A, C, E, G.
430	Revenue aircraft miles scheduled.....	A, C, E, G.
431	Scheduled aircraft miles completed.....	A, C, E, G.
510	Revenue aircraft departures performed.....	A, C, E, G, L, N, P, R.
511	Scheduled service.....	A, C, E, G.
512	Extra section .....	A, C, E, G.
520	Revenue aircraft departures scheduled.....	A, C, E, G.
521	Scheduled aircraft departures completed.....	A, C, E, G.
<b>AIRCRAFT OPERATIONS</b>		
420	Nonrevenue aircraft miles flown .....	Z.
610	Revenue aircraft hours (airborne).....	A, C, E, G, L, N, P, R.
620	Nonrevenue aircraft hours (airborne).....	Z.
630	Aircraft hours (ramp-to-ramp).....	A, C, E, G, L, N, P, R.
<b>MISCELLANEOUS OPERATING ELEMENTS</b>		
810	Aircraft days assigned to service-carrier's equipment.....	Z.
820	Aircraft days assigned to service-carrier's routes .....	Z.
830	Hours on other carriers' interchange equipment (airborne).....	Z.
921	Aircraft fuels issued (gallons).....	Z.
922	Aircraft oils issued (gallons).....	Z.

[ER-1401, 50 FR 246, Jan. 3, 1985]

**FIGURE 4 Operating Statistics Chart of Accounts.**

panies distribute the data as a product, at prices that reflect their costs, and generate a profit for providing these services. Their prices are considered to be too high by many users and have proven to be an inhibiting factor in wider use of the information for planning purposes.

Additionally, one of the companies providing the statistics is a foreign firm that has a monopoly on computerized distribution. During the 1960s, this firm was among the first companies capable of providing high-capacity computerized data services. Because of this limited competition, it was able to negotiate a monopoly contract for the maintenance of the CAB airline data system. While CAB had found an effective way to solve its problem of managing the enormous amount of statistics, this company exercised its monopoly power by charging what are considered to be exorbitant prices. Because the data are considered to be publicly owned and are supported by U.S. taxation, this situation has been a source of considerable irritation for many users of these statistics.

**Other DOT Statistics**

Other sources of valuable information are generated by DOT, but they are not organized into public data bases. Oversight of the industry requires the carriers to make formal requests for authority to fly new routes, enter into mergers, or make any significant change in their organizational structure. For each request, a government "docket" is initiated. (The docket is a numbering system for orderly control of information related to a specific subject.)

During the many years of regulation, thousands of dockets have been initiated. They are a valuable information resource because they provide a historical record of airline strategic activities. A review of the exchange of responses to dockets from other carriers can provide an understanding of alternative points of view on each docket issue. Dockets usually include supporting data in the form of exhibits and reports, which can be used to provide insight into a carrier's objectives.

Other regulatory and legislative processes of both federal and state governments generate a collection of diverse legal opinions, budget reviews, and congressional reports. This information reflects a variety of perspectives on aviation issues from interested industry participants. Though not statistical, the ability to review and cross-reference these documents can have great value in the strategic planning process.

### FAA Statistics

FAA collects a variety of statistical information that is available to the aviation industry. These statistics are not as structured as those collected through CAB/DOT data systems. However, information accumulated by FAA is available through special request and in periodic publications. The information is collected primarily to assist the agency in the management of aviation safety and the airport and airway system.

FAA is a large organization with specific informational needs in each area of responsibility (2). It is headed by an administrator, who is responsible for establishing overall policies and continually reviewing the operation of the entire agency. The administrator is assisted by a deputy administrator, who helps in the execution of the agency's responsibilities and substitutes for the administrator during times of absence.

Reporting to the FAA administrator are four executive directors. Each director is responsible for a specific activity. The executive directors are assisted by associate administrators, who execute the plans and programs established by the directors. Each of these directors has a specific role in the operation of the agency, and each has developed information resources that are useful for strategic planning.

The executive director for regulatory standards and compliance is responsible for establishing and ensuring compliance with the rules and regulations for commercial aviation activity in the United States. The director is assisted by the associate administrator of regulation and certification, who develops regulations for air carrier operations, devises rules for airway operation, and establishes rules for the certification of aircraft and pilots in the aviation industry. The associate administrator for aviation standards provides oversight of aircraft airworthiness programs, flight operating standards, civil aviation security programs, and aviation medicine programs. This group ensures that FAA regulations are applied consistently at all field offices throughout the country.

The executive director for system operations is responsible for operation of the U.S. airport network and the airway navigation and communication system. Assisted by the associate administrator of airway facilities and the associate administrator of air traffic, this directorate manages FAA's air traffic operation activities. It ensures that the airway system operates safely on a day-to-day basis, that sufficient personnel are trained for continuous operation, and that airway equipment and airport facilities are maintained in good working order. This group continually evaluates the performance of airports and airway services and recommends policies and plans for system improvements.

The executive director for system development is responsible for devising and implementing recommended changes to the U.S. airport and airway system. The associate administrator of airports develops safety standards for airport operations, assesses the changes in the capacity of additional air

carrier operations at all federally funded airports, and prepares plans and programs for enhancement and modernization of the airport system. Implementation of the National Airspace System (NAS) is the responsibility of the associate administrator for NAS development. The NAS plan is a comprehensive system devised in the 1970s to completely upgrade the airway system using the most advanced automation and systems technology available. This group is developing the next generation of airway equipment and facilities, which will allow for continued growth in air transportation services in the next several decades. Assisting these associate administrators is the associate administrator for advanced design and management control. This department coordinates the NAS plan implementation with other operational departments in FAA and ensures that orderly operation of the airway and airport system continues.

The executive director for policy, plans, and resource management is responsible for the internal administration of all FAA activity. Executed by the associate administrator of administration and the associate administrator for human resources, this group is responsible for the internal accounting, budget, equipment acquisition, materiel management, and other management systems of the agency. The associate administrator for policy, planning, and international aviation establishes and disseminates aviation policy for U.S. air carrier activity and environmental and energy programs and coordinates international aviation programs with other aviation authorities around the world.

These administrative areas have initiated significant information management programs to provide supporting data for their specific tasks. They routinely make this information available in reports and publications. Several of the statistical databases are available through computer access; however, most FAA information is not distributed in this manner.

The types of information generated from FAA's activities can be summarized in the following categories:

- Airport information,
- Air traffic control and airspace information,
- Aviation activity information,
- Aviation safety analysis information,
- Financial resources,
- Human resources information,
- Materiel resources, and
- NAS facilities information.

FAA has taken significant steps toward building internal computer information management systems to provide readily available data for the activities of the associate administrators. Access to this body of data would be extremely valuable to the strategic planning team.

Each associate administrative section has developed specialized information systems containing data for the planning processes of the agency. This information provides statistics for programs and policy review. It is also used as a tool to analyze significant industry changes. A summary of these data systems is provided below (3):

- Airports
  - Airport pavement analysis;
  - Airport program management;
  - Bird hazards system;



- Airport capacity modeling;
  - National plan for integrated airports;
  - Development and analysis statistical specifications;
  - Runway friction measurement system;
  - Airport improvements program;
  - Regional grants management system;
  - Airport noise monitoring system;
  - Airports information inquiry and reporting system;
  - Airport capacity enhancement reports; and
  - Domestic and terminal area traffic forecasts.
- Air Traffic Control (ATC) and Airspace
    - Aeronautical information system;
    - Air traffic problem analysis system;
    - Air traffic planning requirements analysis;
    - Air traffic density analysis system;
    - Obstruction, evaluation, and airport airspace analysis;
    - Air traffic publication and research system;
    - ATC information retrieval system;
    - Air traffic count system; and
    - Air traffic field facility summary.
  - Aviation Activity
    - Aircraft statistical system;
    - General aviation activity and avionics survey;
    - Certifications catalogs;
    - Air carrier activity information;
    - Air traffic activity; and
    - Aircraft document index.
  - Aviation Safety Analysis
    - ATC health information system;
    - Enforcement inspection system;
    - General aviation accident reporting;
    - Comprehensive airman information;
    - Aviation safety reporting system;
    - Service difficulty reporting;
    - Accident incident data system;
    - Enforcement information system;
    - Airman medical certification data; and
    - Facility performance reports.
  - National Airspace System Facilities
    - Obligation planning system;
    - National airspace performance reporting;
    - National energy management statistics; and
    - NAS facilities information.
  - Other FAA Information
    - Operator error/deviation reports;
    - Air quality program information;
    - Equipment criteria system;
    - Policy/analytical studies;
    - Aircraft engine emissions information;
    - Environmental noise data;
    - Air carrier delay reporting;
    - International aviation information;
    - Energy policy analysis;
    - Activity forecast;
    - Advisory circular data;
    - Airport noise modeling;
    - Aircraft registration statistics; and
    - Consumer complaint system.

Easier access to FAA information resources was cited as a valuable course of action to pursue as part of the national transportation strategic plan. Additionally, the ability to select related information from a variety of different government data bases to be used in conjunction with the FAA information resources would enhance the value of the data as an analytical tool.

#### Statistics Provided to Other Government Agencies

In addition to providing detailed statistics to agencies directly responsible for regulation of the airline industry, the airlines must provide information to a variety of other government agencies.

The National Transportation Safety Board (NTSB) is responsible for investigating transportation accidents in all commercial rail, air, surface, and ocean transportation modes regulated by DOT. NTSB provides a system of checks and balances for the safety responsibilities of FAA. The agency has an extensive technical and engineering capability, which it uses to investigate and determine the specific causes of transportation accidents. This activity provides vital information on the effectiveness of FAA regulations on transportation safety. The information collected and the recommendations for changes in regulations provided by NTSB can be a valuable source of strategic planning data.

The Internal Revenue Service receives periodic statements of tax liability from each carrier. In addition to accounting for taxes levied on the revenues of the airline operation, the carriers collect federal taxes on ticket sales. Revenues from ticket sales are used to fund airway system maintenance and modernization.

In executing its responsibility for fair trade in the securities market, the Securities and Exchange Commission collects information from all airlines that issue stock to the general public. This information can be used to measure the viability of companies and to monitor changes that may have negative effects on a carrier's financial viability.

#### Statistics from Other Independent Sources

A variety of private enterprises specialize in publishing aviation statistics. Newspapers report current events of the industry, supplementing press release data with interviews from industry specialists. Aircraft manufacturers, parts suppliers, industry associations, international aviation organizations, aviation consulting firms, and academic institutions perform research and prepare studies on subjects of specific interest to them. This information is usually provided to the public in the form of periodicals, reports, and newsletters that present analyses of significant industry trends.

The collection of data on airline activity has evolved over many years. Each item of information has been necessary to improve understanding of the passenger transportation industry or to find solutions for specific problems. Most aviation information needed to aid understanding of the industry's past performance is currently available in the public domain.

The regulatory framework to continue and expand government information programs remains in place. Therefore, the NTPT has a substantial resource for air transportation infor-

mation that can be used as the basis for its activities. However, users of the data caution that gaps in the data may limit their usefulness as planning resources.

## GAPS IN AIR PASSENGER INFORMATION RESOURCES

From the point of view of passenger air transportation planning requirements, the current information systems are valuable because they provide a variety of data that can be analyzed to aid understanding of the historical performance of the air transportation system. But, aviation users of these data agree that the current data are largely deficient for strategic planning in several fundamental ways.

### National Aviation Information System for Analysis

Primarily, all current methods of government data collection evolved from a need for more information to monitor the rapidly changing airline industry. Most of the data are focused on verification of regulatory compliance. In other words, the information is tailored to provide answers to specific questions of aviation performance. Little effort has been made to provide an easy way to cross-reference data contained in other government information systems.

For example, CAB/DOT statistics are best used to determine financial fitness and statistical performance of individual carriers and the industry as a whole. The statistics do not adequately explain the relationship between overall changes in the U.S. economy and changes in airline performance. This type of analysis is undertaken periodically by independent researchers, but the government has not provided these correlations on a continuous and consistent basis.

A report by the AASHTO Task Force on Data Requirements (4) clearly summarizes the impact of this gap. After extensive use of several FAA data bases for the development of a year 2020 forecast of state aviation transportation needs, the task force concluded that, though the FAA data bases are extensive, they are inadequate as a resource for strategic planning due to the following reasons:

- No national data exist for airports not eligible for FAA funding.
- The data lack timeliness and accuracy, and much information is old or subjectively derived.
- No relationship exists between the airport physical inventory and the national airspace planning data.
- Future needs are based on projections rather than consideration of strategic alternatives.
- Aviation forecasts are done on a top-down basis. Projections are based primarily on past performance rather than projected passenger demand.
- There are no requirements for accurate state infrastructural inventory.
- No data are collected concerning airport access requirements.

Although the task force was relaying its direct experience with FAA statistics, similar comments were made by others concerning use of government data for planning purposes. All

had difficulty finding the interdependent relationships between the data elements because the information to establish these relationships was not readily available in the data they originally found useful. For example, a data item in one data base could not easily be compared with related information in other data bases, or the related information was not available at all.

### Gaps in Demand Analysis

Another common criticism of DOT statistics is that no data bases of demographic information for passenger air transportation are regularly collected. Independent organizations develop this type of information; however, they use infrequent surveys that do not fully explain the reasons for changes in passenger preferences or patterns of passenger travel demand.

For example, the Immigration and Naturalization Service collects data for all persons entering or leaving the United States through a customs facility. This provides excellent counts of air movements in and out of the country but reveals little about the type of person traveling and the specific reason for travel. Also, the Air Transport Association of America executes a yearly telephone survey of airline passengers that is administered by the Gallup polling organization. This survey provides a statistical sample of the number of people that have traveled by air in the most recent year, by their age and the frequency and purpose (business or pleasure) of travel. This information is valuable for determining future demand for airport services but is too limited in scope and could be far more detailed.

An additional problem with the passenger statistics currently collected by DOT is the inconsistency of the passenger statistics. The passenger enplanement reports provided by the carriers, though extremely complete, count all passengers boarding an airplane, regardless of origin and destination. Another statistical collection, the origin-and-destination survey, is a 10 percent sample of airline coupons. Independently, these two reports provide helpful information about the movements of passengers at an airport; however, because they are inconsistent, it is difficult to use them together as an analysis tool. The analyst must be careful to avoid the double counting that occurs in the enplanement data when a passenger boards for the return trip and must consider the inaccuracy of the origin-and-destination data caused by the sampling technique.

Passenger demand statistics are vital for understanding past growth factors and future airport capacity requirements. Each region of the country has specific socioeconomic characteristics that affect the rates of growth in travel. Without an understanding of the dynamics of demand, accurate forecasts will be difficult to predict.

### Gaps in International Air Passenger Transportation Data

For the past 5 years, dramatic changes have been occurring in international aviation. The impending liberalization of air services in the European common market, scheduled for 1992, has focused airline attention on preparations for a more liberal world airline industry. U.S. carriers have formed strategic alliances to build international distribution systems. They have actively pursued additional international route authority and

have purchased record numbers of aircraft to exploit the opportunity to gain a share of a growing international market.

The airlines of Europe and the carriers of the Pacific Rim have moved aggressively to use the impending liberalization of Europe as a quid pro quo for cabotage in U.S. domestic markets. Their moves to prepare for an open-skies environment have recently included purchase of minority ownership in U.S. airlines.

The most serious impediment to understanding the implications of greater international liberalization is the lack of consistent and reliable international air carrier data. No uniform source of world international statistics exists. The statistics currently collected are limited and outdated. Although international air carrier associations such as the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO), and the Association of European Airlines (AEA) collect statistics from their members, these data are infrequent and limited. For the purpose of explaining increases in international travel demand, there is no collection of information that relates the growing international ownership of U.S. corporations and its impact on international travel.

Every possible effort must be made to improve international data collection. The regulatory and planning requirements for a liberalized world aviation industry have generated an immediate and serious need for consistent, accurate international data.

#### Other Gaps in Transportation Data

Several specific areas of air passenger data were cited as having substantial gaps at recent TRB workshops. The gaps are in a variety of aviation data, but all impact the planning requirements for future aviation services.

Representatives of the General Aviation Manufacturers Association and the Aircraft Manufacturers Work Group expressed an interest in more information on the potential for growth in the small air carrier and regional airline passenger market. It was indicated that this information should include the potential growth in the European regional passenger markets.

The workshop participants also expressed interest in greater availability of pilot and aircraft registry information as a planning tool. This FAA data collection is a continuous record of all aircraft registered in the United States as well as a complete list of private and commercial pilots who hold licenses. The primary restriction of these data is the infrequency of availability. Also, forecasts of expected changes in fleet and personnel for all sectors of the aviation community is an important factor in understanding future demand for air services.

A recent article by Cunningham and Brand (5) relates deficiencies the authors found in available information. They performed an analysis of the DOT *Air Travel Consumer Report* to determine the report's effectiveness in providing valuable consumer information to passengers. *Air Travel Consumer Report* is a monthly publication intended to provide consumers with quality of service information to assist them in choosing an airline. It shows the percentage of carrier flight delays, levels of mishandled baggage, and the number of overbooking and consumer complaints that have occurred during the year for a particular flight.

To compare the effectiveness of the report as consumer information, Cunningham and Brand developed a model that describes how consumers develop service expectations and perceive quality of service. The model also describes how other companies perceive consumer expectation of service, develop service specifications, and actually deliver service.

Their research concludes that, though the *Air Travel Consumer Report* attempts to present valid indicators of service quality, the information in the report is inappropriate to cause a change in consumer choice when compared with other methods for developing service perception. Cunningham and Brand criticize the data because some of the indicators are factors airlines cannot entirely control (e.g., flight delays and on-time performance). They suggest that the report could have been more helpful if an understanding of passenger perception of airline service quality had been part of the research in designing the report.

Though this article is extremely specific in its point of view, it highlights the importance and value of "systematically evaluating the use and effectiveness" of information to gain significant results (5). The research shows how aviation information can be collected and analyzed and can result in an apparently significant conclusion but, without an understanding of related factors, truly important conclusions can be missed.

Another gap in information related to delays is in the FAA flight delay reporting systems. Two primary flight delay reports are collected: the Air Traffic Operations Management System (ATOMS) and the Standardized Delay Reporting System (SDRS). These are used to determine the cause of increases and decreases in flight delays in the airway system.

ATOMS consists of reports made by air traffic controllers and supervisors when a flight is delayed for more than 15 min at a particular airport. The following categories are used for delays:

- Weather,
- Center volume,
- Terminal volume,
- Runway construction,
- NAS equipment, and
- Other.

SDRS delays are reported by a sample of three U.S. air carriers. These reports detail the location of an aircraft at the time of a delay. The following locations are included:

- Gateholds,
- Taxi-out,
- Airborne, and
- Taxi-in.

Though both systems provide information to reveal the reasons for delays in the airway system, many users of the data find that the reports do not adequately explain the problem. The ATOMS system is easily distorted because it relies on the controller to report the reason for the delay accurately. During extremely heavy work loads, it may not be possible for the report to be completed. Therefore, the information may not be reliable in providing the total count of all delays occurring in the airway system. The SDRS system appears to be flawed because the sample of three airlines is extremely small and because the report provides no explanation for

delays at the time of the aircraft operation. This means the two reports cannot be accurately correlated.

As delays continue to grow in the airport and airway system, it will become increasingly necessary to understand their specific causes. This will require a consistent, standardized delay reporting system that provides an understanding of all delays in the airway system and can be used for planning changes in operations to reduce the delay problem effectively.

Another substantial gap in information exists in the area of air cargo statistics. Since deregulation of the scheduled air cargo carriers in 1978, a limited collection of information has continued at DOT. It is possible to determine how many ton miles of cargo are carried by cargo airlines, but there is no report of the cargo capacity, the number of cargo shipments enplaned, the number of cargo departures operated, or the value of the shipments for the entire U.S. air cargo fleet. This information is important for determining the demand and amount of investment that will be required for cargo facilities and activities in the future.

A serious gap exists in consistent information on the costs and requirements for ground transportation for passengers at the beginning and end of air journeys. Each local government has been given the responsibility to provide these transportation services for the air passenger, but there is no way to determine whether these air-related ground services are consistent on a national basis or whether they are adequate to support future growth in airport capacity.

In short, there are substantial gaps in detailed information concerning the operation of the airport and airway system from the point of view of national airport and airway activity. Without data that will allow the government to determine the demand for passenger air transportation on a national scale, it will be difficult to establish priorities for investment in the future. The NTPT must have the ability to collect an orderly and consistent range of data that will provide insights into the real problems that exist in the air transportation system. Only through this approach will alternative solutions to total system requirements be able to be developed.

## CONCLUSIONS AND SUMMARY

The aviation industry changed rapidly in the past decade. In the deregulated environment, the key to success for the airlines has been the ability to change their management style from one of implementing regulations to active strategic planning of airline activities. The successful airline today has adopted computer-assisted planning techniques supported by complex data management systems that allow decisions to be made quickly in response to competitive market changes.

The U.S. regulatory agencies must reassess their responsibility for building an airway system that can support future growth. They also must place greater emphasis on preparing for an increasing growth in international air services. This will require working closely with foreign governments to formulate plans for a worldwide system of airways and airports. It will become increasingly important to implement these plans at rates equivalent to carrier demand.

Unfortunately, the current problems of airport and airway congestion and slow airway system modernization indicate that past planning efforts have not been adequate. DOT's

pursuit of a national transportation strategic plan is an important first step in correcting today's pressing problems.

A wide range of aviation information resources is available from government and private sources to begin the planning process. But, as users of these data have indicated, the information is not being used in the best way to provide answers to the complex problems that must be solved. Unlike the airlines, which have invested heavily in computerized aviation information systems to analyze the current data, the government has not taken significant steps to develop analysis systems for government-collected data. Additionally, it will be necessary to use the substantial base of statistics produced by academic institutions, independent research firms, aircraft manufacturers, and others in the strategic planning process.

The NTPT must consider the current collection of aviation data as a single national aviation information resource. They must determine the importance of each data source and develop a systematic way to compile this information into a useful planning tool.

To accomplish this, the following tasks will be necessary:

- State, local, and federal governments and the airports and airlines must all agree to provide information to the NTPT.
- The appropriate techniques for empirical analysis of the information must be determined, and efficient analytical tools and state-of-the-art information management systems must be used to facilitate planning activities. This should include computer equipment and software that can be readily used for planning and research.
- An appropriate way to fill the gaps in aviation information must be found in a cooperative effort between all aviation industry participants, both in the United States and abroad.
- The NTPT must find a way to ensure that the information requirements for the strategic planning process can be obtained in a consistent, timely manner.
- There must be a continuous effort to foster the participation of all industry members in future planning activities to ensure successful implementation and execution of programs included in the strategic plan.

If these steps are taken, the national transportation strategic plan can be completed with the best information resources available. With this information, the NTPT will be able to find more accurate strategies to solve the current transportation problems and prepare for continued growth in passenger air transportation.

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