persons as actually traveled would have traveled had the lower fares been in effect.

CONCLUSIONS

Changes in air service are usually the result of a complicated process that involves carriers, airport management, and various government agencies. The establishment, expansion, or contraction of service may have a vital impact on successful airport operation and is a matter for public policy analysis. Service expansion, if not supported by a potential market, could result in actual loss of service if existing service is eliminated because of the failure of the new service to develop a viable market. The economic vitality of regions depends on access to markets for goods and services; in our increasingly service-oriented economy, rapid service often requires air access. The methods currently used to test market availability and sensitivity range from small, nonrepresentative samples to the use of elasticity ratios to indicate whether new service will be acceptable and successful.

The technique proposed in this paper shows how the use of existing computerized data on the population of an area can be conveniently converted to a representative sample for public policy purposes. Although the technique requires the use of computers and the availability of socioeconomic data, the results of the application described here served as a cost-effective tool in policy development. This represents a new area for the application of methods of socioeconomic analysis in the formation of public policy as it relates to transportation improvements.

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Publication of this paper sponsored by Committee on Aviation Demand Forecasting.

**M. M. Stein and M. E. Tomassoni were with the Maryland Department of Transportation when this research was performed.*

Airline Deregulation and Its Impacts on Intercity Travel Demand

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Some of the policy questions that arise as a result of deregulation of the airline industry are examined. A national intercity travel demand model that is different in many respects from the conventional aggregate or disaggregate models is presented. The model uses travel distance as a variable of interest, calibrated on nonsurvey industrial data. The model is consistent with the neoclassical theory of consumer behavior and uses a representative consumer concept. It answers many transportation-related policy questions, such as questions about the impact of air-fare reductions and the impact of the introduction of faster aircraft on the intercity market shares of public transportation.

Economic efficiency through competition is the basic motivation behind the deregulation of the airline industry. The deregulation creates many interesting transportation policy questions. How does deregulation change the market structure of the intercity transportation industry? How does the fare reduction affect the demand for air travel and the other competing public modes? How does the introduction of faster airplanes, such as supersonics, affect the market structure of intercity passenger industries? What is the best strategy for the airline industry to expand its intercity market?

To answer these questions, we introduce a national intercity travel demand model that is, in many respects, different from conventional aggregate or disaggregate models (1-5). Conventional models use number of trips as the variable of interest, whereas the model discussed here uses distance of travel. Use of travel distance instead of trips simplifies the understanding of intercity travel demands by eliminating many trip-related variables such as origin, destination, and length. It ties in directly with many policy-related variables such as the energy consumption in intercity transportation, market shares of the intercity transportation industry, accident frequency, and pollution control measures. Distance, which is a continuous variable, can be meaningfully added to answer those policy questions.

Our demand model is designed to evaluate national transportation policies. Our interest is not to identify the travel behavior of individuals but to answer broad intercity travel-related policy questions, such as the impact of airline deregulation on market shares, energy consumption, substitution behavior, and so on.

Conventional travel demand models, both aggregate and disaggregate, are calibrated on survey data. Our model is calibrated on nonsurvey data. Survey data may reflect the travel behavior of an individual in the survey area. The problem of transferring survey data to other geographical areas and over time is still unresolved. Instead of answering national transportation policy questions from an aggregation of the disaggregate model, we answer those policy questions directly from a national intercity travel demand model that was built on national nonsurvey data.

The basic properties of the theory of consumer behavior—summability, homogeneity, and symmetry—are imposed. The substitutability of public travel modes is measured in terms of compensated cross elasticities. Conventional travel demand models have a loose tie with the neoclassical theory of consumer behavior, and market cross elasticities are a popular form of measuring substitutability. A previous study shows that compensated cross elasticities are theoretically more defendable and empirically more reliable (6).

Finally, we use the concept of the representative consumer instead of the individual consumer for the national transportation policy evaluation. The modal choice of an individual trip maker could be any one of three modes—airline, rail, or bus. But the representative trip maker, which is conceptually defined, could choose all alternative travel modes. When the representative trip maker chooses more air travel in response to the air-fare reduction, it should be interpreted as some portion of bus or rail riders switching to the air mode since they can now afford it because of the fare reduction.

THE MODEL

It is assumed that the consumer has an additively separable utility function in terms of highly aggregate group commodities such as intercity travel, urban travel, leisure, and all other consumption. Consumers have a time budget (TT). They may allocate the time budget to travel, work, and leisure. We assume that their working hours are exogenously determined. Their money budget (Y) depends on wage rate (w), number of working hours (H), and nonwage income (α); i.e.,

$$Y = w \cdot H + \alpha \tag{1}$$

Given income Y and nonworking hours (TT - H), consumers allocate their income to intercity travel (x), urban travel (z), and consumption (c) and allocate their nonworking hours to intercity travel, urban travel, and leisure (L) (the consumption is an aggregate quantity index of all consumption); i.e.,

$$\text{Max } U = U(x, z, c, L) \tag{2}$$

subject to

$$p_x \cdot x + p_z \cdot z + p_c \cdot c = Y \tag{2a}$$

$$v_x \cdot x + v_z \cdot z + L = TT - H \tag{2b}$$

where

- x, z, c = quantity indices of intercity travel, urban travel, and aggregate consumption, respectively;
- p_x, p_z, p_c = price indices of x, z, and c, respectively; and
- v_x and v_z = speed indices of intercity travel and urban travel modes.

Since L is unobservable, we can reformulate the model as follows:

$$\underset{x,z,c}{\text{Max}}\ U = U\,[x,z,c, (TT - H - v_x \cdot x - v_z \cdot z)] \tag{3}$$

subject to

$$p_x \cdot x + p_z \cdot z + p_c \cdot c = Y \tag{3a}$$

A convenient index for aggregation is the divisia index (7).

The money budget ($M = p_x \cdot x$) and the time budget ($T = v_x \cdot x$) are determined in the first-stage decision process. At the second stage, consumers allocate intercity travel money (M) and time (T) budgets to various travel modes to achieve the greatest personal satisfaction:

$$\underset{x_1,\ldots,x_m}{\text{Max}}\ v = U(x_1, \ldots, x_m) \tag{4}$$

subject to

$$\sum_{i=1}^{m} p_i x_i = M \tag{4a}$$

$$\sum_{i=1}^{m} t_i x_i = T \tag{4b}$$

where p_i is the user cost of intercity travel per unit distance by the ith mode and $(1/t_i)$ is the speed of the ith mode.

The usual Lagrangian solutions of intercity travel distance by the ith mode are

$$x_i = x_i\,(p_1, \ldots, p_m, t_1, \ldots, t_m, M, T) \quad (i=1, \ldots, m) \tag{5}$$

From Equations 4 and 5, we can formulate an indirect utility function of intercity travel demand; i.e.,

$$U = V\,(p_1, \ldots, p_m, t_1, \ldots, t_m, M, T) \tag{6}$$

We assume that the consumer has three alternative modes for intercity travel: airline, bus, and rail. (Including the automobile would provide much greater realism and predictive power, but difficulty in collecting a consistent set of national data for intercity automobile driving forces us to exclude automobile driving from the model.) We further assume that the consumer has a translog indirect utility function. Consider the following time- and speed-adjusted translog indirect utility function:

$$\log v = \sum_i a_i \log (p_i/M) + (1/2) \sum_i \sum_j b_{ij} \log (p_i/M) \log (p_j/M) + \sum_i b_{it} \log (p_i/M) \cdot t + \sum_i b_{is} \log (p_i/M) \log (SR) \tag{7}$$

We impose the following restrictions:

1. For symmetry, $b_{ij} = b_{ji}$, $b_{it} = b_{ti}$, $b_{is} = b_{si}$;
2. For normalization, $\sum_i a_i = -1$; and
3. For homogeneity, $\sum_i b_{ij} = \sum_i b_{it} = \sum_i b_{is} = 0$.

By means of these restrictions, we derive the following homogeneous indirect translog utility function:

$$\log v = \log M + \sum_i a_i \log p_i + (1/2) \sum_i \sum_j b_{ij} \log p_i \cdot \log p_j + t \sum_i b_{it} \log p_i + \log (SR) \sum_i b_{is} \log p_i \tag{8}$$

The homogeneous translog expenditure function can be obtained from Equation 8, as follows:

$$\log M = \log v - \sum_i a_i \log p_i - (1/2) \sum_i \sum_j b_{ij} \log p_i \log p_j - t \sum_i b_{it} \log p_i - \log (SR) \sum_i b_{is} \log p_i \tag{9}$$

The compensated demand equation is obtained from the expenditure function by taking a derivative of the equation with respect to $\log p_j$:

$$\partial \log M/\partial \log p_j = (p_j/M)(\partial M/\partial p_j) = -a_j - \sum_i b_{ij} \log p_i - b_{jt} \times t - b_{js} \log (SR) \tag{10a}$$

$$x_j\big|_{v=v_o} = -[a_j + \sum_i b_{ij} \log p_i + b_{jt} \cdot t + b_{js} \log (SR)]\,[M(v_o)/p_j] \tag{10b}$$

Table 1. Estimation of parameters.

	Air Equation		Bus Equation		Rail Equation	
Variable	Parameter	t-Statistic	Parameter*	t-Statistic	Parameter	t-Statistic
Air fare	-0.045 7	-2.87	0.012 7	1.94	0.033 0	2.53
Bus fare	0.012 7	1.94	-0.005 54	-0.786	-0.007 19	-1.93
Rail fare	0.033 0	2.53	-0.007 19	-1.93	-0.025 8	-2.26
Time trend	0.003 35	4.97	0.000 195	0.833	-0.003 54	-6.17
Speed ratio	-0.136	-6.20	-0.015 7	-2.79	0.152	7.96
Intercept	-0.642	-20.2	-0.027 5	-2.71	-0.330	-12.2
R^2	0.607		-	-	0.706	
Standard error of regression	0.006 37				0.005 53	
D-W statistics	0.784		-	-	0.979	

*Parameters are derived from those of air and rail equations by imposing the summability, normality, and symmetry constraints.

Table 2. Demand elasticities.

Demand	Change	Air Equation	Bus Equation	Rail Equation
Market	Air fare	-0.945	-0.315	-0.268
	Bus fare	-0.015	-0.863	0.058
	Rail fare	-0.039	0.178	-0.790
	Speed	0.163	0.390	-1.24
Compensated	Air fare	-	0.522	0.568
	Bus fare	0.025	-	0.099
	Rail fare	0.083	0.301	-

where

$$M(v_o) = \exp\,[\log v_o - \sum_i a_i \log p_i - (1/2) \sum_i \sum_j b_{ij} \log p_i \cdot \log p_j$$
$$- t \sum_i b_{it} \log p_i - \log (SR) \sum_i b_{is} \log p_i]$$

By using the sample means of p_i, SR, M, and t and the estimated parameters of the equation, the utility level ($\hat{v}_o$) is estimated from Equation 8. With the given utility level $\hat{v}_o$, we simulate the compensated demand by using Equation 10. This simulation is the compensated simulation. Instead of fixing the utility level, we can assume that M is fixed and simulate the model. This is the market simulation.

By using Roy's identity (8, p. 94), we obtain the following:

$$s_j = -[a_j + \sum_{i \epsilon c} b_{ji} \log (p_i/M) + b_{jt} \cdot t + b_{js} \log (SR)] \qquad (11)$$

where $i, j \in c$ and c = (air, bus, rail), and

s_j = budget share of the jth mode,
p_i = user cost of the ith mode,
t = time trend,
SR = ratio of airline speed to bus-rail speed, and
$a_j, b_{ji}, b_{jt}, b_{js}$ = regression parameters.

The summability, normality, and symmetry conditions are imposed as follows:

1. For summability, $\sum_{j \epsilon c} s_j = 1$,
2. For normality, $\sum_{j \epsilon c} a_j = -1$ and $a_j < 0$, and
3. For symmetry, $b_{ij} = b_{ji}$ for $i \neq j$.

Various elasticities are derived from Equation 11 [for $j, k \in c$ and c = (air, bus, rail)]:

1. The market own elasticity—$e_{kk} = -(b_{kk}/s_k) - 1$,
2. The market cross elasticity—$e_{jk} = -(b_{jk}/s_j)$ for $j \neq k$,
3. The compensated own elasticity—$E_{kk} = -(b_{kk}/s_k) -1 + s_k$,
4. The compensated cross elasticity—$E_{jk} = -(b_{jk}/s_j) + s_k$,
5. The Allen-Uzawa pairwise partial elasticity of substitution (9)—$d_{jk} = E_{jk}/s_k$, and
6. The speed ratio elasticity—$ES_j = b_{js}/s_j$.

DESCRIPTION OF DATA AND EMPIRICAL RESULTS

The data used are annual series data that cover the period 1947 to 1974 and were obtained from various sources. Intercity passenger kilometers, prices per passenger kilometer (calculated by dividing revenues by passenger kilometers and then deflated by the consumer price index for base year 1967), and the number of passengers by each mode were collected from the Transportation Association of America (10). Price per passenger kilometer is calculated by dividing revenue by passenger kilometers and deflating by the consumer price index for base year 1967. The average annual speed of airline service was obtained from the Civil Aeronautics Board (11). The average speeds of bus and rail were obtained from the Federal Highway Administration and Amtrak, respectively.

Data on rail speed include both intercity and suburban trains. Waiting time is included in the estimation of rail speed. The air and bus speeds are the average maximum trip speed excluding waiting time. There is not much difference in speed between the bus and rail modes. As the speed variable in this study, we used a ratio of air speed to the average of bus-rail speed.

The money budget for the representative consumer is obtained as follows:

$$M = p_a \cdot x_a + p_b \cdot x_b + p_r x_r \qquad (12)$$

where p_a, p_b, and p_r are the price of airline, bus, and rail service per kilometer, respectively, and x_a, x_b, and x_r are per capita passenger kilometers of respective modes.

We estimate the parameter of the share equations (Equation 11) by using a nonlinear maximum likelihood estimation method with proper constraints to meet the summability, normality, and symmetry conditions. Table 1 gives the parameter estimates and relevant statistics.

Table 2 gives both market and compensated demand elasticities. A 1 percent increase in air price decreases air passenger demand by 0.945 percent. It also decreases passenger demand for rail and bus service: Demand for bus decreases by 0.315 percent and that for rail by 0.268 percent. Such decreases in bus and rail demand are caused by income effects. When the air fare increases, the purchasing power of the intercity travel budget becomes smaller. We exclude the income effect and estimate the compensated cross elasticities for bus and rail service. A 1 percent increase in air fare results in a 0.522 percent increase in the compensated demand for bus and a 0.568 percent increase in the demand for rail. The model predicts that a change in air fares has the most significant impact on intercity travel demand and a change in rail fares the next most significant impact. A change in bus fares has a minimal impact on the intercity market structure. A 1 percent increase in bus fare causes a 0.863 percent decrease in the demand for intercity bus service. To evaluate the substitutability among alternative travel modes, we exclude the income effect and estimate the compensated cross elasticities. A 1 percent increase in bus fare results in a 0.025 percent increase in air travel demand and a 0.099 percent increase in rail travel demand.

The own price elasticity of rail demand is -0.79, the smallest among the three modes. The compensated cross elasticities of rail are 0.083 and 0.301 with respect to air and bus demand, respectively.

The market cross elasticities fail to show substitutability among alternative modes. Previous studies on intercity travel demand, such as the Northeast Corridor models (1-3) and some disaggregate models (4), had negative market cross elasticities; i.e., as the fare of one mode increases, there is a decrease not only in the demand for that mode but also in the demand for competing modes. Previous empirical studies attempt to correct this apparent inconsistency by using the inequality-constrained least-squares estimation method (12, 13). Our study shows that this inconsistency is caused by income effects and not necessarily by specification errors in the model. Actual average passenger kilometers during the sample period are 929, 248.4, and 100 km (576, 154, and 62 miles) for air, rail, and bus, respectively. The model predicts an average passenger demand of 913, 247, and 99.8 km (566, 153, and 61.9 miles) for the three modes, respectively (see Table 3).

It is interesting to observe how passengers react in response to various fare and speed changes. We consider two cases: (a) a market simulation in which the money budget (M) remains unchanged and (b) a compensated simulation in which the utility level remains unchanged. These results also are given in Table 3.

Our model does not assume a constant elasticity. The value of the price elasticities may vary depending on which point we evaluate. We decided to evaluate passenger kilometers by varying various passenger fares and the speed ratios.

The deregulation of air fare is expected to provide lower air fare by providing various types of discounted trips. We simulate the model by decreasing 10 percent of air fare. The 10 percent reduction should be interpreted as the average reduction per customer because of the introduction of more discounted classes of air fares. The 10 percent fare reduction increases the average passenger kilometers of airline service from 913 to 1009 km (from 566 to 626 miles), a 10.1 percent increase. The reduction in air fare increases the purchasing power of the intercity travel budget. Because of this income effect, passenger kilometers by bus and rail also increase. Passenger kilometers by bus increase from 99.6 to 102.8 km (61.9 to 63.9 miles) and passenger kilometers by rail also increase from 246 to 252 km (153 to 157 miles) because of the increased purchasing power of the intercity travel budget. The same simulation was done by excluding income effects, a process called compensated simulation. A 10 percent reduction in air fare increases air passenger kilometers to 922 (573 miles) from the original 913 (566 miles). As expected, bus passenger kilometers decrease from 99.6 to 94 (from 61.9 to 58.5 miles) and rail passenger kilometers also decrease from 247 to 232 (from 153 to 144 miles).

A fare reduction affects passenger demand in two ways: (a) through an increase in real income and (b) through the price attraction. Table 4 gives the details. For example, a 10 percent decrease in air fare increases air passenger kilometers by 96.7 (60 miles), of which the 85.4-km (53-mile) increase is a result of higher real income and the remaining 11.2-km (7-mile) increase is a result of the attractive lower fare. Higher real income also increases the demand for bus and rail service by 8.7 and 21 km (5.4 and 13 miles), respectively. However, since the prices of bus and rail are not attractive in comparison with the reduced air fare, intercity passengers switch to airlines. Therefore, bus demand and rail demand decrease by 5.5 and 14.5 km (3.4 and 9 miles), respectively, because of the substitution effects. It is interesting to observe that the largest income effects are on air travel demand, followed by those on rail and bus. This is attributable to the fact that air service has the largest share of the intercity travel budget (approximately 83 percent). Income effect is measured by budget share times the marginal change in demand attributable to income change $[s_j (\partial x_j/\partial m)]$.

Another interesting question for transportation policymakers is how industries share their markets in response to fare and speed changes. Data given in Table 5 show that the predicted average market shares of the model for the sample period are 83.67 percent for the airline industry, 4.04 percent for the intercity bus industry, and 12.29 percent for the rail industry. A 10 percent reduction in air fare shrinks the air travel market share from 83.67 to 83.19 percent. Since the inelastic price elasticity of air fare (-0.945) has already been seen in Table 2, these results are not surprising (the revenue of a firm declines as the price is lowered if the firm is selling a product that has an inelastic price elasticity). However, the 10 percent reduction in air fare expands the market shares of the bus and rail industries. The bus industry expands its market share from 4.04 to 4.17 percent, and the rail industry expands its share from 12.29 to 12.64 percent. This is partially caused by income effects and partially by the inelastic price elasticity of air fare. Similar results are observed when bus fare or rail fare decreases. Because of inelastic fare elasticity, a reduction in fare reduces the market share of that industry. For example, a 10 percent reduction in bus fare reduces the bus market share from 4.04 to 3.98 percent. The airline industry is the only gainer from the reduction in bus fare. The air market gains from 83.67 to 83.80 percent, whereas there is a slight reduction in the rail market share. A 10 percent reduction in rail fare reduces the rail market share from 12.29 to 12.02 percent. It also reduces the bus market share from 4.04 to 3.96 percent. Such a reduction is caused by the expansion of the air passenger market. The airline industry boosts its market share from 83.67 to 84.02 percent.

The model is simulated by increasing air speed by 10 percent. Competition among airlines is expected not only to introduce lower fares but also to improve the quality of service by means of faster aircraft. A 10 percent increase in the speed of air service could expand the air travel market by as much as 84.97 percent, which is approximately a 1.54 percent increase. The loser from the air speed increase is the rail industry, whose market share decreases from 12.29 to 10.84 percent. The market share of the bus industry increases from

Table 3. Results of price simulation.

Measure	Market Simulation Air	Bus	Rail	Compensated Simulation Air	Bus	Rail
Average passenger kilometers predicted by the model before simulation	912.9	99.7	246.7	912.9	99.7	246.7
Kilometers with fare decrease						
Air						
10 percent	1009.6	103	253	924	94.3	232
25 percent	1198.3	108.8	266	943.5	85.6	209.6
Bus						
10 percent	914.5	97.9	245	911.3	108.8	243.5
25 percent	917.7	94.6	242	906.4	126.3	240.3
Rail						
10 percent	917.7	108.7	267.7	906.4	96.6	264.5
25 percent	924	127.7	309.6	893.5	91.4	298.3
Kilometers with fare increase						
Air						
10 percent	835.4	96.7	240.3	904.8	104.8	261.2
25 percent	740.3	92.7	232	892	112	280.6
Bus						
10 percent	913	92	248.4	916	92.3	250
25 percent	909.6	82.3	250	919.3	83	251.6
Rail						
10 percent	909.6	101.4	229	921	102.7	232
25 percent	904.8	103.7	206.4	930.6	106.7	213

Note: 1 km = 0.62 mile.

Table 4. Decomposition of income and substitution effects.

Measure	Change (km) Total	Due to the Real-Income Increase	Due to Price Incentive
Effect of 10 percent decrease in air fare on			
Air demand	1009.6 - 912.9 = 96.7	1009.6 - 924 = 85.4	96.7 - 85.4 = 11.2
Bus demand	103 - 99.7 = 3.3	103 - 94.3 = 8.7	3.3 - 8.7 = -5.4
Rail demand	253 - 246.7 = 6.3	253 - 232 = 21	6.3 - 21 = -14.7
Effect of 25 percent decrease in air fare on			
Air demand	1198.3 - 913 = 285.3	1198.3 - 943.5 = 254.8	285.3 - 254.8 = 30.5
Bus demand	108.8 - 99.8 = 9	108.8 - 85.6 = 23.2	9 - 23.2 = -14.2
Rail demand	266 - 246.7 = 19.3	266 - 209.6 = 56.4	19.3 - 56.4 = 37.1

Note: 1 km = 0.62 mile.

Table 5. Simulation of market revenue share.

Measure	Air	Bus	Rail
Predicted average market share before simulation[a]	83.67	4.04	12.29
Market share with fare decrease			
Air			
10 percent	83.19	4.17	12.64
25 percent	82.35	4.40	13.24
Bus			
10 percent	83.80	3.98	12.21
25 percent	84.04	3.88	12.08
Rail			
10 percent	84.02	3.96	12.02
25 percent	84.62	3.83	11.55
Market share with 10 percent fare increase			
Air	84.11	3.92	11.98
Bus	83.55	4.09	12.36
Rail	83.36	4.11	12.54
Market share with change in speed ratio			
10 percent increase	84.97	4.19	10.84
25 percent increase	89.18	4.68	6.14
10 percent decrease	82.24	3.87	13.89

[a]Average market share of each industry for the sample period.

4.04 to 4.19 percent. The increase in air speed hurts the rail industry and benefits the air and bus industries. One possible explanation is that the bus is used for short-distance trips and air and rail are used for long-distance trips.

What, then, are the best strategies by which the airline industry can expand its market share? The model suggests that increased air speed is the most effective way to increase the air share of the travel market. Fare reduction is not an effective way to improve the market share. The study shows that airline service is not a luxury but a necessity. The inelastic price elasticity reduces revenue as the airline industry lowers the air fare. The industry could expand its market share through the introduction of higher-speed aircraft, not through the reduction of air fares. Our conclusion is based on the given intercity travel budget. If the intercity travel budget increases, the airline industry becomes the largest beneficiary since the air mode has the largest income effect.

ACKNOWLEDGMENT

Empirical portions of this research were done while the authors were on leave at the Department of Economics, Harvard University. We are grateful to professors Dale W. Jorgenson, Antti Talvitie, and other referees for valuable comments. We are solely responsible for any omissions and errors that may remain. The Center for Economic and Management Research at the University of Oklahoma provided partial support for this research.

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Publication of this paper sponsored by Committee on Aviation Demand Forecasting.

Airport Planning: A Consultant's Viewpoint

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The evolution of airport development, the utility and benefits of airports, and the problems of expanding or implementing a major new airport facility in light of the many constraints imposed by opposition groups are briefly examined. The responsibility of government in planning airport operations and expansion is discussed. It is concluded that too many agencies are responsible for accomplishing a sound airport transportation system and that one overall agency should be responsible for ensuring adequate airport development in all areas—roads, the groundside, and the airside.

The past decade has witnessed extreme frustration in the evolution of aircraft, the forecasting of air travel, and the expansion of existing airports and provision of new airports to serve a growing need. This paper begins with a brief recap of the evolution of air travel and air facility development, highlighting some of my own experiences in planning for the growth and expansion of a number of regional airports in this country and abroad.

Between 1965 and 1970, there was phenomenal growth in air travel, in both passenger and goods movement. Government, state, and municipal groups responsible for airport planning became acutely aware of capacity restraints imposed on this growth and readied many plans and funding programs to proceed expeditiously with airport development.

In the past five years, there have been some major reductions in the growth of air travel as well as a number of major changes in the overall transportation industry. The oil crisis of 1972 and 1973 affected the airline industry harder than most. In contrast to the period of meteoric expansion during the 1960s, the situation has now somewhat reversed. Before the downturn, new aircraft were in the making and interface facilities were being constructed at airport terminals. But administrative officials have become very reluctant to spend additional money at the earlier pace. In addition, environmental considerations have moved to the forefront in the 1970s to such a degree that air quality and noise levels are considered as important as economic recession and inflation and the energy crisis in the decision making on all investments in airport planning and development.

OVERVIEW OF THE PAST 20 YEARS

The first era of air travel after World War II was one of general accord among aircraft, airports, people, and the environment. Propeller-driven aircraft predominated until the end of the 1950s, when turboprop engines were introduced. This was the golden age, in which aviation lived in a state of amity with all of its neighbors, but it was relatively short-lived. The image of aviation was by no means a negative one. The typical airport was rather modest, short on marble walls and multi-story parking facilities. Most airport terminals featured single-story buildings with a back door to the airport apron and a front door to the parking lot. You could actually see the aircraft!

In general, aviation was accepted by local communities as a good source of employment and a necessary support to local service industries and commerce. Although many problems had already been encountered in the development of new and existing airports, such as Idlewild in New York (now known as John F. Kennedy International), no one yet understood the severity of the problem of airport development.

Further development of aircraft into the jet age and