

CONCLUSION

In the last 2 years, Flight Services has begun to deal with a massive challenge to provide an adequate level of service at an acceptable level of safety despite budget cutbacks. A number of initiatives have taken place that have produced and will produce a more streamlined operation and that provide management with the tools and information vital to the operation of

an efficient and cost-effective operation. It has been shown that government can compete with the private sector, despite the burdensome and restrictive costs of government. Future work and initiatives ensure that Flight Services will maintain a competitive position in the aviation industry.

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Analyzing the Financial Impact on Airports of Remote Airport Ground Transportation Terminals

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Airline deregulation in the United States has had a significant impact not only on the airlines but also on the airports that facilitate air travel. Airline "wars" and competition have received considerable attention, but little has been written on competition among airports for airline travellers. Recent steep discounting of fares between major airport hubs and the withdrawal of major carrier service from many smaller airports has led major airport hubs to expand their geographic base, drawing patrons away from smaller airports nearby (50 to 100 mi). This trend has had obvious negative effects on the smaller airports and positive benefits on the more fortunate, larger hubs, which now enjoy greater revenue from additional patrons. In addition, an upward spiral effect is evident when airlines view the hub as a larger market and add additional or more direct flight service. This only accelerates the move away from smaller airports. Seeking to provide service and profit from this national trend, airport ground transportation operators, airlines, and airports are looking at remote ground transportation terminals in distant cities as a means of facilitating this long-distance traffic and increasing its potential. Some airports are motivated by the obvious financial gain, but others are especially hard pressed to provide roadway and parking space for the private vehicles emanating from this new passenger influx. Remote terminals, however, may have negative financial impacts in the form of lost parking and car rental

income. Therefore, a methodology for analyzing the potential market for remote airport ground transportation terminals and their financial impacts is presented in this paper. The methodology is explained through the actual data used in an analysis for the Detroit Metropolitan Airport.

In 1983 Republic Airlines developed a proposal to offer complimentary ground transportation to their Detroit Metropolitan Airport (DMA) hub from selected cities 50 to 100 mi away. The purpose of this paper is to outline the methodology utilized in analyzing the feasibility and financial impacts this proposal would have on DMA.

BACKGROUND

Republic Airlines Proposal

In general, the Republic Airlines proposal was designed to feed passengers into DMA through the use of high-quality ground transportation service. The proposed service would apply principally to passengers who currently originate their trips at airports other than Detroit. This would have the effect of diverting additional passenger traffic to Detroit. The service was to be oriented toward, but not restricted to, passengers who find it preferable to fly Republic Airlines in and out of Detroit.

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The service was to generate a larger passenger base at DMA for all carriers.

Discussions with officials of Republic Airlines and DMA resulted in a recommendation that four cities be considered as possible origin points for the Republic ground service. With the approximate distances between the cities and DMA shown in parentheses, the cities were Toledo (45 mi), Flint (72 mi), Jackson (57 mi), and Lansing (80 mi). The opportunity to divert traffic from Ann Arbor, Michigan, was considered at the time, but this idea was not pursued at length due to the proximity of Ann Arbor and the obvious high percentage of Ann Arbor residents who currently drive to the DMA for outbound flights.

Republic Airlines planned to offer the proposed ground service at no additional cost to passengers who subsequently boarded Republic flights in Detroit. The cost of service in such cases was to be absorbed by Republic Airlines. In the case of a passenger who used the Republic ground service to access a flight at Detroit on an airline other than Republic, a charge was to be made to cover the cost of service. In either case, DMA was to receive concession revenue in the form of a percentage of the payments by Republic to ground operators under contract to provide the service.

It was felt that there were three factors having a significant influence on the extent to which passengers would be interested in such coordinated ground-air service: (a) price, (b) total origin-destination travel time, and (c) frequency of service. The extent to which coordinated ground-air service could be competitive in these areas is discussed in the demand analysis section of this paper.

Detailed Operating Plan

In addition to the passenger's attitude toward price, total travel time, and frequency of service, willingness to accept the intermodal service as an alternative to current travel patterns must be considered. Attitude obviously depends on the quality, reliability, and general atmosphere of the combined intermodal service, facilities, and personnel.

The proposed plan, as related by officials of Republic Airlines, was to establish a ground transportation terminal in each target city that would provide, at a minimum, typical counter services such as baggage check-in, ticket processing, seat assignment, and a comfortable waiting area. Free parking was or was not provided depending on ultimate site selection.

When passengers had checked their baggage and received their seat assignments, they were to board the bus for a nonstop expressway trip to DMA. Initial plans called for minimal services on-board the bus, but future amenities (e.g., hostess, beverage service, etc.) were being considered. Each vehicle was to be equipped with an on-board restroom and full climate control. On arrival at DMA, Republic passengers were to be dropped at the Republic curb where they would proceed to their connecting gates. Passengers of other airlines would then be dropped off at their respective airlines' curb areas. All baggage would be taken to the Republic baggage area for sorting to appropriate flights.

Returning intermodal passengers would be assembled at the Republic intermodal gate (or waiting area) just as they would

for any connecting flight. Passengers would then use an airline exit door and walk down steps to board the bus. Operational problems that could have precluded the use of a regular departure gate were to be worked out through future negotiations. Bus drivers would have to have clearance to drive in the area of aircraft. Arriving passengers would have their baggage transferred to the bus as if to any other connecting flight. Tentative plans called for nine round trips daily to meet Republic's flight banks. Buses were to arrive 30 min before departure time and would leave as soon as the arriving passengers' baggage had cleared.

Rationale for Proposal

As a result of many factors, including general economic conditions and the regulatory reform that has taken place in the commercial airline industry, passenger enplanements had declined recently at all airports (1982–1983) in the area; however, percentage losses at DMA have not been as severe as at other airports.

The Republic proposal was intended to route through Detroit certain traffic that was currently bypassing the airport. The airlines and airports themselves were more competitive than ever, and it was clear that many innovative ideas were being considered. The coordinated ground-air concept, for example, had been implemented by Frontier Airlines between Ft. Collins, Colorado, and Denver's Stapleton Airport (70 mi away), as well as between Boulder, Colorado, and Stapleton (40 mi away). Also, Republic Airlines had begun such service over the 90 mi between Ft. Benning/Columbus, Georgia, and Atlanta's Hartsfield International Airport.

DEMAND ANALYSIS

Civil Aeronautics Board data indicate that in the 12-month period from October 1, 1981, to September 30, 1982, passenger enplanements at Toledo, Flint, Jackson, and Lansing totaled 588,330. This figure is broken down as follows:

<i>Airport</i>	<i>Passenger Enplanements</i>
Toledo	351,680
Flint	51,650
Jackson	1,210
Lansing	<u>183,790</u>
Total	588,330

Therefore, the grand total of passengers who conceivably could be diverted to Detroit from other airports was 588,330. This number represented about 13 percent of Detroit's total enplanements for fiscal year 1982 of 4,498,839 (data supplied by DMA officials). However, before the upper limit of 588,330 could take on a realistic meaning, it was necessary first to determine the extent to which coordinated ground-air service would be preferable, and second, to estimate the proportion of air travelers who would use such a service if it were available and attractive.

There were three other categories of passengers who might patronize the ground-air service, and each represented a class of passenger that drives to or from outlying areas in relation to the DMA. The first category consisted of people who currently drive from Toledo, Flint, Jackson, or Lansing, and who park in one of the airport parking lots at Detroit. The second category consisted of those who came from these other cities but were driven by a friend, relative, or business associate and dropped off at Detroit. The third category consisted of people who rented cars at DMA and who would use the ground service if it were available.

In summary, there were four types of airport patrons who would be likely to patronize the coordinated ground-air service to be offered by Republic Airlines:

1. Those diverted from other airports,
2. Those who drive and park,
3. Those who are driven and dropped off, and
4. Those who rent cars (inbound).

Each is discussed in the following sections.

Patrons Diverted From Other Airports

Implicit in this portion of the analysis was the assumption that patrons of other airports could be diverted most easily to

Detroit in cases where final destinations were among the major markets served from Detroit by Republic and other airlines. Actually, the top 25 or so major markets served by any origin city typically account for 75 to 80 percent of the city's total passenger enplanements. In the case of Detroit, for example, enplanements of the top 25 destinations account for about 79 percent of total enplanements. The major destination points served from each of the airports studied are listed in Table 1 in order of importance. The last column shows the top 25 markets served by Republic from Detroit. Also, it should be noted that the top 15 destination points served from Jackson captured nearly all of Jackson's traffic, and there were no additional significant destination points.

Next, a variety of information was acquired in relation to each of the origin-destination (O-D) pairs identified in Table 1. Specific types of information included

1. Enplanement statistics on each O-D pair over the past 6 years (for the Civil Aeronautics Board 10 percent samples of passenger enplanements);
2. Profile of existing flights between each O-D pair for all airlines together and for Republic Airlines separately—flight data were broken down into the categories of nonstop, direct, connecting on-line, and connecting off-line;
3. Y-class fare data for each O-D pair acquired both for Republic Airlines and for other airlines;

TABLE 1 PRINCIPAL DESTINATION CITIES SERVED BY VARIOUS AIRPORTS UNDER STUDY

RANK	TOLEDO	FLINT	JACKSON	LANSING	DETROIT	DETROIT (RC)
1	Chicago	New York	Minneapolis	Chicago	New York	Boston
2	Tampa	Chicago	St. Louis	New York	Chicago	Toronto
3	Denver	Tampa	New York	Washington	Los Angeles	Milwaukee
4	Atlanta	Washington	Houston	Tampa	Washington	Baltimore
5	Miami	Orlando	Oklahoma City	Los Angeles	Atlanta	Los Angeles
6	New York	Dallas/Ft. Worth	Los Angeles	Boston	Tampa	Minneapolis
7	Los Angeles	Philadelphia	Orlando	Denver	Boston	Philadelphia
8	Washington	Boston	San Francisco	Miami	Miami	New York
9	Pittsburgh	Los Angeles	Atlanta	Houston	Philadelphia	Tampa
10	Phoenix	Houston	Chicago	Minneapolis	Houston	Grand Rapids
11	Ft. Lauderdale	Miami	Dallas/Ft. Worth	Dallas/Ft. Worth	San Francisco	Nashville
12	Dallas/Ft. Worth	Atlanta	Duluth	Detroit	Ft. Lauderdale	Phoenix
13	Philadelphia	St. Louis	Greensboro	San Francisco	Cleveland	Kansas City
14	Ft. Myers	Minneapolis	Boston	Orlando	Orlando	Atlanta
15	San Francisco	Pittsburgh	Kansas City	Phoenix	Denver	Montreal
16	Las Vegas	Norfolk		Sarasota	Dallas/Ft. Worth	Houston
17	Houston	Phoenix		Milwaukee	Phoenix	Orlando
18	San Diego	Milwaukee		Atlanta	Minneapolis	Memphis
19	Seattle	Detroit		Baltimore	St. Louis	Sarasota
20	Cincinnati	Oklahoma City		Philadelphia	Milwaukee	Ft. Myers
21	Boston	Denver		St. Louis	Las Vegas	Cincinnati
22	West Palm Beach	Indianapolis		Kansas City	West Palm Beach	West Palm Beach
23	St. Louis	San Francisco		Greensboro	Indianapolis	Saginaw
24	Salt Lake City	Baltimore		Madison	Pittsburgh	Lansing
25	Sarasota	Memphis		Ft. Lauderdale	Sarasota	Traverse City

4. Discount fare data for each O-D pair, for Republic and other airline flights; and

5. Minimum and maximum travel times between origins and destination via Republic and other airlines.

As stated previously, there were three factors that would be given top consideration by patrons of other airports who would be considering the use of coordinated ground-air service. The first was price. Potential patrons of Republic's service obviously would prefer a lower fare for the trip. As a general statement, air fares from Detroit to major markets were approximately equal to or lower than fares from Toledo, Flint, Jackson, or Lansing. With few exceptions, Detroit would be the preferable origin airport. Also, this relationship would be maintained in the case of coordinated ground service connecting to Republic flights because the cost of ground service would be absorbed by Republic. In cases where the connection was to another airline, the passenger would have to pay for the cost of the ground service, or have it absorbed by the connecting carrier, but in most cases this would not absolutely affect the price advantage enjoyed by Detroit.

The second factor was that of total O-D travel time, and this would include the time associated with the ground portion of Republic's coordinated service. Third, the frequency of service factor was important to many air travellers, and Detroit generally offered a far greater choice of departure times to most destinations than was available through Toledo, Flint, Jackson, or Lansing.

For each of the major market areas served by Republic and other airlines from Detroit, an analysis was conducted to assess

the extent to which traffic would be diverted from other airports if the coordinated ground-air service were available. Because there were three factors (e.g., price, total O-D travel time, and frequency of service) considered as influential by air travellers, it was desirable to consider them simultaneously to evaluate the relative attractiveness of the ground-air service. The procedure followed would make an overall evaluation as to whether the ground-air service would be preferable for travel from Toledo, Flint, Jackson, or Lansing to major markets served by Republic and other airlines from Detroit. Therefore, the ground-air alternative for each O-D pair was characterized by one of the following designations:

1. Preferable, connecting to Republic flight in Detroit (RC);
2. Preferable, connecting to non-Republic flight in Detroit (other);
3. Approximately equal, connecting to Republic flight in Detroit (RC*);
4. Approximately equal, connecting to non-Republic flight in Detroit (other*); and
5. Not preferable.

The O-D pairs for which Republic Airlines' ground-air proposal was thought to be either preferable or approximately equal to originating air service from one of the other airports are listed in Table 2. Shown for each O-D pair is the ground-air evaluation (RC, RC*, Other, or Other*) as given in the foregoing list, and the market potential measured in terms of 1982 enplanements (from the Civil Aeronautics Board study referenced earlier). Also included in Table 2 are the market penetra-

TABLE 2 ORIGIN-DESTINATION PAIRS FOR WHICH COORDINATED GROUND-AIR SERVICE WOULD BE MOST ATTRACTIVE

ORIGIN	DESTINATION	GROUND-AIR EVALUATION	MARKET POTENTIAL (1982 ENPLANEMENT)	MARKET PENETRATION FACTOR	PROJECTED DEMAND
TOLEDO	ATLANTA	RC*	16340	.12	1961
TOLEDO	BOSTON	RC	3700	.25	925
TOLEDO	DALLAS/FT. WORTH	OTHER	6770	.10	677
TOLEDO	DENVER	RC*	19520	.12	2342
TOLEDO	FT. LAUDERDALE	OTHER	7460	.10	746
TOLEDO	FT. MYERS	RC	6370	.25	1593
TOLEDO	HOUSTON	RC	6090	.25	1523
TOLEDO	LAS VEGAS	OTHER	4890	.10	489
TOLEDO	LAS ANGELES	RC	9540	.25	2380
TOLEDO	MIAMI	OTHER	11220	.10	1122
TOLEDO	NEW YORK	RC	11360	.25	2840
TOLEDO	PHILADELPHIA	RC	7420	.25	1855
TOLEDO	PHEONIX	RC	6710	.25	1678
TOLEDO	ST. LOUIS	OTHER	3160	.05	158
TOLEDO	SAN FRANCISCO	OTHER*	6130	.10	613

TABLE 2 *continued*

ORIGIN	DESTINATION	GROUND-AIR EVALUATION	MARKET POTENTIAL (1982 ENPLANEMENT)	MARKET PENETRATION FACTOR	PROJECTED DEMAND
TOLEDO	SARASOTA	RC	2950	.25	738
TOLEDO	TAMPA	RC	25220	.25	6350
TOLEDO	WASHINGTON	RC	7400	.25	1850
TOLEDO	WEST PALM BEACH	OTHER	4630	.10	463
FLINT	ATLANTA	RC	1150	.25	288
FLINT	BALTIMORE	RC	550	.25	138
FLINT	BOSTON	RC	1110	.25	278
FLINT	DALLAS/FT. WORTH	OTHER	1640	.10	164
FLINT	DENVER	OTHER	770	.10	77
FLINT	HOUSTON	RC	1400	.25	350
FLINT	INDIANAPOLIS	OTHER	570	.10	57
FLINT	LOS ANGELES	RC	1580	.25	395
FLINT	MEMPHIS	RC	640	.25	160
FLINT	MIAMI	OTHER	360	.10	36
FLINT	MILWAUKEE	RC	950	.25	238
FLINT	MINNEAPOLIS	RC	1340	.25	335
FLINT	NEW YORK	RC	3810	.25	953
FLINT	PHILADELPHIA	OTHER*	1910	.05	96
FLINT	PHOENIX	RC*	990	.12	119
FLINT	ST. LOUIS	OTHER	1330	.05	67
FLINT	SAN FRANCISCO	OTHER	620	.10	62
FLINT	TAMPA	RC	970	.25	243
FLINT	TORONTO	RC	N/A	.25	N/A
FLINT	WASHINGTON	RC	2020	.25	505
JACKSON	ATLANTA	RC	10	.25	3
JACKSON	BOSTON	RC	NEG	.25	NEG
JACKSON	DALLAS/FT. WORTH	OTHER	60	.10	6
JACKSON	HOUSTON	RC	30	.25	8
JACKSON	LANSING	RC	NEG	.25	NEG
JACKSON	LOS ANGELES	RC	40	.25	10
JACKSON	MINNEAPOLIS	RC	120	.25	30
JACKSON	NEW YORK	RC	60	.25	15
JACKSON	ORLANDO	RC	40	.25	10
JACKSON	ST. LOUIS	OTHER	80	.10	8
JACKSON	SAN FRANCISCO	OTHER	20	.10	2
LANSING	ATLANTA	RC	3190	.25	798

TABLE 2 *continued*

ORIGIN	DESTINATION	GROUND-AIR EVALUATION	MARKET POTENTIAL (1982 ENPLANEMENT)	MARKET PENETRATION FACTOR	PROJECTED DEMAND
LANSING	BALTIMORE	RC	3430	.25	858
LANSING	BOSTON	RC	5920	.25	1480
LANSING	DALLAS/FT. WORTH	OTHER	3720	.10	372
LANSING	DENVER	OTHER	6000	.10	600
LANSING	FT. LAUDERDALE	OTHER	2210	.10	221
LANSING	HOUSTON	RC	5040	.25	1260
LANSING	KANSAS CITY	RC	2550	.25	638
LANSING	LAS VEGAS	OTHER	830	.10	83
LANSING	LOS ANGELES	RC	6060	.25	1515
LANSING	MIAMI	OTHER	3370	.10	337
LANSING	MILWAUKEE	RC*	3420	.12	410
LANSING	MINNEAPOLIS	RC	5990	.25	1498
LANSING	NEW YORK	RC	11040	.25	2760
LANSING	ORLANDO	RC	2030	.25	508
LANSING	PHILADELPHIA	RC	2720	.25	680
LANSING	PHOENIX	RC	2780	.25	695
LANSING	ST. LOUIS	OTHER	2220	.10	222
LANSING	SAN FRANCISCO	OTHER	4150	.10	415
LANSING	SARASOTA	RC	3190	.25	798
LANSING	TAMPA	RC	5520	.25	1380
LANSING	WASHINGTON	RC	7910	.25	1978
TOTAL			284,320		54,417

tion factors that estimate the extent to which the ground-air service, if promoted satisfactorily by Republic Airlines, would be able to capture the passengers currently travelling between each O-D pair. The percentages shown on Table 2 were assumed to represent realistic estimates of market penetration. The last column of Table 2 shows the projected demand for each O-D pair. This figure was obtained by multiplying the market potential for each pair by the market penetration factor.

Summarized in Table 3 are the projected demand totals for each O-D pair. Using the assumptions stated, the total projected demand for such a service is 54,417 passengers. Of this total, 47,392 would connect in Detroit to Republic flights, and 12,093 would connect to flights of other airlines. Most of the patronage would be diverted from Toledo (56 percent), with smaller portions from Flint (8 percent), Jackson (less than 1 percent), and Lansing (36 percent).

As indicated earlier in this section, the 12-month period ending September 30, 1982, showed total enplanements at Toledo, Flint, Jackson, and Lansing of 588,330. The projected

TABLE 3 SUMMARY OF PROJECTED DEMAND

Current Origin City	Projected Demand at Detroit		
	Total	Republic	Other
Toledo	30,258	25,990	4,268
Flint	4,561	4,002	559
Jackson	92	76	16
Lansing	19,506	17,324	7,250
Total	54,417	47,392	12,093

demand of 54,417, derived through the use of somewhat conservative estimates of market potential, represents approximately 9.2 percent of this total. Although it is quite possible that actual patronage of Republic Airlines' coordinated ground-air service could exceed the projected demand, the conserva-

TABLE 4 RESULTS OF LICENSE PLATE SURVEY FOR WEDNESDAY EVENING, JULY 27, 1983

LOT	NUMBER OF CARS	PERCENT OUT-OF-STATE	PERCENT OHIO	PERCENT ONTARIO	PERCENT OTHERS
DECK (Level 1-4)	1932	6.73 (130)	4.30 (83)	.78 (15)	1.66 (32)
LONG TERM	941	17.22 (162)	10.00 (94)	2.34 (22)	4.98 (46)
MAIN LOT	414	10.87 (45)	5.31 (22)	1.21 (5)	4.35 (18)
ANNEX	392	5.61 (22)	3.57 (14)	.77 (3)	1.28 (5)
INTL.	216	7.41 (16)	3.70 (8)	1.39 (3)	2.31 (5)
TOTAL	3895	9.63 (375)	5.67 (221)	1.23 (48)	2.72 (106)

Note: Parentheses show number of parking lot patrons.

tive figure of 54,417 was used throughout the remainder of the analysis.

Patrons Who Drive and Park

DMA patrons who currently drive from Toledo, Flint, Jackson, or Lansing and who park their personal automobiles in one of the airport's parking lots make up the next group. The goal here was to estimate the number of people who would patronize the Republic-coordinated ground-air service instead of using the airport parking lot. This is not to suggest that Republic was interested in promoting such a diversion of traffic. What is meant, however, is that it is inevitable that certain airport patrons may wish to switch from the drive-and-park mode to the use of Republic's ground-air service.

In order to obtain data regarding the number of Detroit airport patrons who drive from Toledo, Flint, Jackson, or Lansing

and who park their personal automobiles in one of the airport's parking lots, a license plate survey was incorporated into the analysis. The number of cars parked in the various parking areas on Wednesday evening, August 27, 1983, is given in Table 4, and each total is divided into the following categories: out-of-state, Ohio, Ontario, and other. If all of the cars bearing Ohio license plates found Republic's coordinated ground-air service from Toledo more attractive than the currently used drive-and-park mode, then 221 or 5.67 percent of the parking lot patrons are indicated in this category in Table 4. The parking revenues and total cars parked in each lot from July 1982 through June 1983 are given in Table 5. It is indicated in Table 5 that a ground total of 2,951,106 cars entered the parking lots during that time interval. Therefore, it was estimated that 167,328 cars (5.67 percent of 2,951,106) is the yearly total number of cars from Ohio. Because these vehicles are parked in varying quantities in all of the airport parking areas,

TABLE 5 PARKING REVENUES AND VEHICLES BY PARKING LOTS, JULY 1, 1982 THROUGH JUNE 30, 1983

	TOTAL DOLLARS	TOTAL VEHICLES	AVERAGE DOLLARS PER VEHICLE
HOTEL	562,970.00	275,029	2.05
INTERNATIONAL	395,766.25	187,583	2.11
EXPRESS II	370,513.00	197,288	1.88
EXPRESS III	292,225.50	153,673	1.90
LONG TERM	1,013,840.50	142,632	7.11
MAIN-DECK	7,761,430.10	1,994,901	3.89
TOTAL	10,396,745.00	2,951,106	3.52

TABLE 6 ESTIMATED DRIVE-AND-PARK DIVERSIONS BY CITY

CITY	PERCENTAGE OF PROJECTED DEMAND	ESTIMATED NUMBER OF DIVERSIONS
TOLEDO	56	33,466
FLINT	8	4,781
JACKSON	1	598
LANSING	36	21,514
	100	60,359

this fact was considered later in the analysis of parking revenue for each such patron. Finally, it was assumed that only 20 percent of these 167,328 cars can realistically be expected to switch from the drive-and-park mode; therefore, the total number of cars so diverted would be 33,466.

Although it was expected that the license plate survey would indicate the number of cars from the Flint, Jackson, and Lansing areas, no such breakdown was possible. This is because license plate numbers are assigned randomly in the state of Michigan, and it is not possible to decode a license number to determine the residence area of a vehicle or its operator. Therefore, in order to estimate the number of drive-and-park patrons who originated from Flint, Jackson, and Lansing and who would divert to Republic's service, the same relative percentages of projected demand by origin city given in Table 3 were used here. Using those percentages and the estimated number of Toledo drive-and-park diversions, 33,466, the expected number of drive-and-park diversions by city is given in Table 6. Therefore, it was estimated that approximately 60,359 people could switch from the drive-and-park mode and use Republic's coordinated ground-air service instead.

Patrons Who Are Driven and Dropped Off

A study conducted for DMA in 1968 indicated that approximately 43 percent of enplaning passengers arrived in private automobiles and were dropped off at the airport. Although this percentage is not inconsistent with what would be expected in 1983, it did not offer any information regarding the proportions of such passengers who were driven from the areas of Toledo, Flint, Jackson, or Lansing. In order to resolve this problem, an assumption was made that the number of passengers in this category from the various origin areas could be computed as 25 percent of the people in the respective drive-and-park categories who would begin to use the coordinated ground-air service. The expected number of patrons to come from each of the other origin cities is summarized in Table 7.

Inbound Rental Cars

Data provided by officials of the DMA indicated that during fiscal year 1982 the rental car agencies (Avis, Budget, Dollar, Hertz, and National) reported gross revenues of \$28,556,001. Using an average rental charge of \$100 per vehicle, it was

TABLE 7 ESTIMATED DRIVE-AND-DROP-OFF DIVERSIONS BY CITY

CITY	DRIVE AND PARK ^a	DROPPED OFF
TOLEDO	33,466	8,367
FLINT	4,781	1,195
JACKSON	598	150
LANSING	21,514	5,379
		15,091

^aData from Table 6.

estimated that the number of cars actually rented during fiscal year 1982 was equal to \$28,556,001 divided by 100, or 285,560 rentals. Assuming that approximately 5.63 percent (16,077) of these rental-car trips are to the Toledo area, and that the rental-car trips to the other cities can be estimated similar to the drive-and-park analysis, the expected diversions by city to use of coordinated ground-air service are given in Table 8. Therefore, it was estimated that a total of 10,300 rental-car patrons would be diverted to the use of the Republic service.

Summary

Results of the demand analysis by category of passenger (market segment) and by current origin area are given in Table 9. It is important to reiterate that although the principal market targeted by Republic Airlines was composed of those people who currently fly out of other airports, a certain portion of Detroit's existing customer base undoubtedly would find the coordinated ground-air service attractive.

POTENTIAL IMPACTS

There are a number of effects on DMA that might result from the implementation by Republic Airlines of coordinated ground-air service. Those that would be viewed as positive from the airport perspective are related to concession revenue, ground operator revenue, and overall increases in enplanements from DMA. Negative effects could possibly result in areas related to parking revenue, rental car revenue, revenues from commuter airlines to Detroit, and relations with other

TABLE 8 ESTIMATED RENTAL CAR DIVERSIONS BY CITY

CITY	PERCENTAGE OF PROJECTED DEMAND	ESTIMATED NUMBER OF DIVERSIONS
TOLEDO	56	3,215*
FLINT	8	459
JACKSON	1	57
LANSING	36	2,067
	100	5,798

*Computed as 20 percent of the 16,077 cars rented to Toledo.

airports and other airlines. These are discussed in the following sections.

Concession Revenue

In fiscal year 1982 the concession revenues that could reasonably be expected to vary with marginal increases or decreases in enplanements totaled \$4,280,256. This figure was broken down in Table 10 into specific revenue sources. Based on fiscal year 1982 enplanements in DMA of 4,498,839, the average concession revenue that varies per passenger is \$4,280,256 divided by 4,498,839, or \$0.95 per passenger. Therefore, each additional passenger enplaning at Detroit could be viewed as generating an expected concession revenue of \$0.95.

Ground Operator Revenue

As stated previously, Republic Airlines planned to absorb the cost of the ground service for passengers connecting in Detroit to an on-line flight and to assess off-line patrons a reasonable charge for the service. In either case Republic would pay the ground operator for the contract services, and DMA would recover 10 percent of the payments received by the ground operator for transporting deplaning passengers. This was con-

sistent with the existing arrangement with limousine services, bus operators, and so on. For example, if the ground operators receive an average of \$15 per deplaning person transported, the airport would recover \$1.50 per patron. This figure was used to estimate the monetary effect on the airport from the use of contract ground services by Republic.

Overall Increases in Enplanements

To the extent that overall air traffic into and out of Detroit increases as a result of this program, it was conceivable that Republic and other airlines would add more flights over time to accommodate the additional demand for service. As a result, the landing fee revenue received by the airport could be seen to increase. Although this impact was not estimated in dollar terms for purposes of this analysis, it did represent a longer-term factor that could be significant.

Parking Revenue

To the extent that current patrons of airport parking lots are diverted to the use of the ground-air service, a decline in parking revenues would result. The average revenue per parked car by lot for the period July 1982 through June 1983 is given in

TABLE 9 SUMMARY OF DEMAND ANALYSIS

MARKET SEGMENTS	ORIGIN AREAS				
	TOLEDO	FLINT	JACKSON	LANSING	TOTAL
DIVERT FROM OTHER AREAS	30,258	4,561	92	19,506	54,417
DRIVE AND PARK	33,466	4,781	598	21,514	60,359
DRIVE AND BE DROPPED OFF	8,367	1,195	150	5,379	15,091
RENTAL CARS INBOUND	3,215	459	57	2,067	5,798
TOTALS	75,306	10,996	897	48,466	135,665

TABLE 10 SOURCES OF CONCESSION REVENUES THAT VARY DIRECTLY WITH PASSENGER ENPLANEMENTS

SOURCE	AMOUNT RECEIVED BY AIRPORT (\$)
Aero Enterprise	
General Merchandise	\$ 194,055.44
Lottery	3,964.07
Aeroplex Stands-Newsstand	695,166.84
American Foods	1,850.87
Detroit Airport Advertising	
TV Chairs	12,600.00
Dobbs House, Inc.	1,247,387.05
Don's Vending Service	29,632.49
GODOGA	
L.C. Smith Game Room	82,929.96
Host International	
Food	771,130.79
In-flight food	275,140.26
Liquor	575,758.50
Cigarette Vending	6,907.79
Amusement Vending	2,239.19
Mobile Food Carts	53,870.12
Howell J&E Enterprises	
Ice Cream Shack	17,076.94
Keys Enterprises	23,874.35
Northwest Airlines	
Pierre's Vending	1,232.65
Paradise Airport Shop	171,381.08
Smarte Carte, Inc.	666.40
Tele-Trip Insurance	
Insurance	41,221.49
Vita-Stat	7,129.69
Walou	65,040.13
TOTAL	4,280,256.10

Table 11. The last figure in Table 11, \$3.52, is the weighted average dollar amount that a vehicle parked at the airport would pay for that privilege. The figure of \$3.52 is based on the average revenues per car for each of the individual lots weighted by the number of vehicles parked in each (see Table 5). Therefore, each parked car lost to the coordinated ground-air service would result in an average loss to DMA of \$3.52.

Rental Car Revenues

Assuming an average gross revenue from the rental of a car as \$100, the airport would receive 10 percent, or \$10 for each car rented. This figure was used to assist in calculating the income foregone by the airport in the case of patrons who would be diverted from the rental cars to the coordinated ground-air service.

Revenue from Commuter Airlines to Detroit

It is possible that patrons of the coordinated ground-air service might include certain passengers who would ordinarily take a commuter airline to Detroit to connect with a major carrier. If any commuter flights were cancelled in response to decreasing load factors, landing fee receipts would be affected. On the positive side, however, these diverted passengers would generate ground operator revenue as discussed earlier, and the airport would receive 10 percent of the incremental revenue. In any event, these patrons would still be "through" passengers connecting in DMA. In an overall sense, this impact was somewhat remote and difficult to estimate. It was not regarded as being of great significance, particularly in the short run, and did not receive further consideration in the analysis.

TABLE 11 AVERAGE REVENUE PER PARKED CAR BY LOT

	MAIN DECK (SHORT-TERM)	HOTEL	INTL	EXPRESS II	EXPRESS III	LONG TERM	TOTAL
JULY '82	\$2.85	\$1.82	\$1.55	\$1.69	\$1.73	\$4.44	\$ 2.59
AUG. '82	2.89	1.79	1.58	1.63	1.75	4.75	2.58
SEPT. '82	3.27	1.83	1.72	1.65	1.63	4.24	2.40
OCT. '82	3.61	1.81	1.81	1.62	1.61	4.58	3.15
NOV. '82	3.53	1.86	1.87	1.65	1.66	4.46	3.15
DEC. '82	3.32	1.87	1.88	1.79	1.84	7.72	3.04
JAN. '83	4.07	1.90	2.25	1.68	1.70	9.73	3.65
FEB. '83	5.18	2.46	2.93	2.21	2.17	10.09	4.67
MAR. '83	5.12	2.43	2.63	2.26	2.28	10.83	4.66
APR. '83	4.81	2.33	2.84	2.16	2.15	11.22	4.44
MAY '83	4.64	2.33	2.53	2.07	2.20	10.11	4.24
JUNE '83	4.05	2.38	2.32	2.20	2.32	9.60	3.82
JULY '82- JUNE '83	3.89	2.05	2.11	1.88	1.90	7.11	3.52

Relations with Other Airports and Other Airlines

A major effect of the proposal would be to draw traffic from other airports (particularly Toledo) to Detroit, and this would not be received enthusiastically by the operators of those airports. Because the airline and airport industries are becoming more competitive, it was necessary for all parties involved to attempt to be as responsive as possible to the needs of the marketplace. To the extent that patronage of the ground-air service increases, this is an indication that such a service is meeting a previously unfilled need. It was recommended, therefore, that officials of DMA be aware of and sensitive to the impacts of the service on the other airports, but at the same time proceed with the project if it is otherwise acceptable.

Finally, other airlines may express an opinion about the coordinated ground-air service offered by Republic, but the fact is that the arrangement between the airport and Republic would be the same as that between the airport and any other ground operator. Because the airport would not be discriminating in favor of Republic Airlines (or against the other airlines), there was really no basis for legitimate complaint by any of the competing airlines.

Summary of Potential Impacts

The estimated impact in dollars that each market segment under consideration would have on concession revenue, parking revenue, rental car revenue, and ground operator revenue is given in Table 12. The figures shown represent the dollar amount that would be received by the airport itself in terms of

direct income (or loss). The dollar values shown in each cell of Table 12 were obtained by multiplying the marginal dollar impact of each person in each market segment. The coordinated ground-air service by Republic Airlines was estimated to result in a slight gain of \$7,386 to DMA as indicated in Table 12. This amount was small enough to conclude that Republic's proposal was break-even in nature based on the short-run revenue-cost analysis.

RECOMMENDATIONS AND SUMMARY

It has been shown that the proposed air-ground intermodal service by Republic Airlines was basically a break-even proposition for DMA. Therefore, it was recommended that Republic be encouraged to begin their service as soon as a detailed plan could be submitted. DMA could expect some concerns by other airlines that might be adversely affected, but Republic's request should be regarded as a means of improving overall growth of DMA.

Care was required, however, to evaluate the true impact of Republic's proposed new service on airport revenue loss. As shown by the analysis, parking and automobile rental losses of current DMA patrons are largely offset by gains from passengers diverted from other airports. These new passengers represent new income from ground operator franchise fees (10 percent of deplaning passengers) and through-airport concessions.

However, if the assumptions used to estimate losses in the analysis were not valid, greater losses could occur. For example, if ridership on the proposed systems were mainly current DMA users, there would be a negative cash flow to DMA as a

TABLE 12 ANALYSIS OF ECONOMIC IMPACTS OF PROPOSAL

MARKET SEGMENT	PROJECTED DEMAND	CONCESSION REVENUE + \$.95	PARKING REVENUE - \$3.52	RENTAL CAR REVENUE -\$10.00	GROUND OPERATOR REVENUE + \$1.50	TOTALS
DIVERT FROM OTHER AIRPORTS	54,417 people	+ \$51,696	NONE	NONE	+ \$81,626	+ \$133,322
DRIVE AND PARK	60,359 cars 72,431 people*	NONE	- \$212,464	NONE	+ \$108,647	- \$103,817
DRIVE AND BE DROPPED OFF	15,091 cars 18,109 people*	NONE	NONE	NONE	+ \$27,164	+ \$ 27,164
RENTAL CARS	5,798	NONE	NONE	- \$103,000	+ \$ 8,697	- \$ 49,283
TOTALS		+ \$51,696	-212,464	- \$ 57,980	+ \$ 7,386	+ \$ 7,386

*For the "drive and park" and "drive and be dropped off" market segments, projected demand (cars) has been multiplied by a factor of 1.2 to obtain an estimate of projected demand in terms of passengers.

TABLE 13 EXPECTED GROUND TRANSPORTATION RIDERSHIP LEVELS

CITY	PRESENT ANNUAL RIDERSHIP	DRIVE AND DROPPED OFF DIVERSIONS	DRIVE AND PARK DIVERSIONS	DRIVE AND RENTALS	TOTAL ANNUAL DEMANDS	AVERAGE DAILY DEMAND	AVERAGE PASSENGER PER SERVICE LEVEL	
							"A" 18 Trips	"B" 9 Trips
TOLEDO	7,800	8,367	30,258	33,466	3,215	83,106	227.7	12.65
FLINT	N/A	1,195	4,561	4,781	459	10,996	30.1	3.38
JACKSON	N/A	150	92	598	57	897 (12,401)*	2.46 (39.17)*	0.58 (4.35)*
LANSING	3,000	5,379	19,506	5,379	2,067	35,331	99.24	5.51

*Potential air/ground ridership without essential air service 409 subsidy to Simmons Airline.

result of the service. In this case, the DMA would find it necessary to raise foregone revenue from alternative sources.

In order to safeguard itself from potential revenue losses, it was recommended that DMA reserve the right to establish a final franchise fee for ground transportation carriers until further operational data were gathered. The current 10 percent fee on deplaning passengers appears sufficient to cover expected losses based on the assumptions of the foregoing analysis. However, a statistical sample of diverted new versus existing old customers who formerly parked would be the only way of knowing if these previous assumptions were correct. Therefore the recommendation was made that Republic sample the passengers using the service after 3, 6, and 9 months to determine the mode split (Table 13).

If a significant revenue loss was evident, there were several options open to DMA to balance the system financially:

1. Charge a fee on enplaning passengers, such as a bus landing fee;
2. Assess a 10 percent fee on automobile rentals derived from remote terminals; and
3. Receive commission on parking revenue received, if any, by remote terminal operators.

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