

265

TRANSPORTATION
RESEARCH



Number 265, September 1983
ISSN 0097-8515

CIRCULAR

Transportation Research Board, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, DC 20418

CONFERENCE REPORT: EFFICIENT INTERMODAL TRAVEL—THE REALITY OR MYTH

mode

1 highway transportation

subject areas

12 planning

13 forecasting

52 human factors

54 operations and traffic control

SESSION 20
January 12, 1981
TRB 60TH ANNUAL MEETING, WASHINGTON, DC

OPERATION AND MAINTENANCE OF TRANSPORTATION FACILITIES
Patricia F. Waller, Chairman
Group 3 Council
University of North Carolina, Chapel Hill, North Carolina

COMMITTEE ON MOTORIST SERVICES
(As of January 31, 1981)

Samuel C. Tignor, Chairman
Federal Highway Administration
McLean, Virginia

Bernard Adler
Archie C. Burnham, Jr.
Victor J. Cantone
Everett C. Carter

J. Edwin Clark
Michael L. Halladay
Robert B. Helland
Ronald N. Hill

Robert F. Jordan, Jr.
Albert N. Pascola
Elizabeth D. Scullin
Gary L. Urbanek
Paul M. Weckesser

James K. Williams, Transportation Research Board Staff

FOREWORD

At the 60th Annual Meeting of the Transportation Research Board, in January 1981, the Committee on Motorist Services (A3B05) sponsored a conference session on intermodal travel. The purpose of the conference was to discuss the status of intermodal travel in the United States in terms of meeting travelers' needs now and in the future. The conference session consisted of introductory remarks by seven of eight panel members and then discussion among the panel members and audience participants.

The members of the panel were: Samuel C. Tignor (Chairman, A3B05), Federal Highway Administration, U.S. Department of Transportation; Kay Colpitts, Traffic Engineering Division, Montgomery County DOT, Maryland; Leon F. Jackson, Operations Research, Amtrak; Raymond Glenbocki, Air Transportation Association; Ross Capon, National Association of Railroad Passengers; Judith L. Stone, Office of Consumer Liaison, U.S. Department of Transportation; Frederick H. Mueller, American Bus Association; and

Robert L. Bowles, U.S. Department of Energy.
The objectives of the conference session were:

1. To illustrate the difficulty travelers have in planning and using intermodal travel.
2. To identify and discuss primary traveler needs -- especially with respect to convenience, service, safety, and cost considerations -- to induce travelers to use more than one mode of travel in a given trip.
3. To present transportation carriers' thoughts and recommendations on how increased intermodal travel could be facilitated from the perspective of travelers' needs and services.
4. To reflect on how energy and economic problems and needs influence encouragement of greater use of intermodal travel.
5. To consider from the traveler services per-

spective how intercity multimodal travel in 1991 will differ from today.

6. To discuss and describe traveler services research or planning that should be undertaken to encourage greater use of multimodal travel.

Due to the extensive informal discussion nature of the conference session, this summary has been written as a general summary of the individual introduction presentations in addition to the overall session findings. It does not include a verbatim treatment of all panel or audience remarks.

BACKGROUND

Samuel C. Tignor, Federal Highway Administration

I would like to welcome you to Session 20 on behalf of the Transportation Research Board (TRB) and TRB Committee A3B05 on Motorist Services. I am the chairman of Committee A3B05. I would like to give you a little background on this session.

Committee A3B05 started in January 1979 to consider what constituted services information for travelers wanting to use more than one mode of travel in an intercity trip. During 1979 and 1980 we investigated and discussed the broad aspects of this problem. We also recognize that other TRB committees have looked and are looking at selected elements of multimodal travel problems. For example, work is being carried out by committees A1E03 on "Intermodal Transfer Facilities," A1B02 on "Passenger and Freight Transportation Characteristics," and A1B12 on "Intermodal Freight Transport."

Committee A3B05 appears to be interested in individual travelers possibly more so than the other committees. This committee may be motorist-service oriented primarily because of its general highway orientation. However, during the past 1½ to 2 years, we have been looking at travelers' problems in general because of the commonalities that we believe exist insofar as the different modes of transportation are concerned.

I think we should consider for a moment the magnitude and importance of travel in the United States. The particular facts and figures that I am going to give you are not the most solid in the world, but I think they do give some idea of the overall magnitude of the problem. Travel is approximately a \$100-billion-a-year industry: there are approximately, at least from the source I had, 6.6 million jobs related to travel one way or another; gasoline accounts for about 18% of consumer travel expenditures; air-travel-plus-rental-car vacation trips represent 15% of the travel market. Fuel costs continue to increase. Generally, airlines have lost business while rail and bus have gained during the past year (it is difficult to get good statistics on this because the past year just ended about a week or two ago and certain regional areas seem to go one way while other areas go another way). Highway travel has decreased this year.

What does this scope of travel mean in terms of travelers service needs? We soon discovered in Committee A3B05 that this is a complex problem with many potential overlapping areas. Who provides the service? There are many kinds of service providers, both government or private. A major concern was what part of the problem should and could Committee A3B05 address.

For example, what will be the traveler service needs and desires in the future? Typical traveler problems might include: difficulty of obtaining pretrip information for multimode trip planning, incompatibility of modal schedules and trip needs,

nonexistence of needed enroute information or service, economic disincentives, and personal convenience trade-offs.

The purpose of this Session is to discuss the status of intermodal travel in the United States. Is it a reality or a myth in terms of meeting travelers needs now as well as the future? When I think about this problem, I sometimes remember Abraham Lincoln's remark: "If we could first know where we are and whether we are tending, we could better judge what to do and how to do it." I think, to a large part, this is the dilemma in which Committee A3B05 finds itself. Defining travelers' needs for multimodal travel is the problem.

We have identified six specific objectives (presented above) that we will discuss today. With respect to the Session mechanics, each panel participant, except for Mr. Glenbocki, who is substituting for a panel member who could not attend, will make a 5-minute opening presentation, after which panel discussion relative to the Session objectives will be undertaken. Some audience participation will be permitted after the panel participants have made their initial 5-minute presentations. I will monitor the audience participation.

The first panel participant is a member of Committee A3B05 and she will present a few examples of the problems sometimes experienced by travelers in trying to go from X to Y by more than one mode of transportation.

OPENING COMMENTS

Kay Colpitts, Montgomery County, Maryland

What do you think about when you are considering travel from one point to another -- especially when, for one reason or another, it is not possible or practical to drive your own car from door to door?

To get a handle on the factors that go into multimodal trip planning, I asked the members of the Motorist Services Committee to document case studies of how they planned and executed a specific trip. I categorized trips into four types: familiar, local trips; familiar, long-distance trips; unfamiliar, local; and unfamiliar, long-distance. I received case studies on 10 different trips from four Committee members. Since all four trip types were represented, I've selected a different trip type from each member to present to you today. The specific examples also represent the most commonly available modes of travel.

The first trip, a familiar, local one, was my own today -- from Rockville, Maryland (my office) to the Sheraton, a distance of just under 15 miles. The modes available to me were private automobile, public automobile, commercial automobile, bus, and combinations of those with subway. I eliminated bus and subway because either would take too long, especially at the off-peak times I would be traveling. Commercial automobile, taxi, would have been too expensive to take from door to door even for just one way. I could have carpooled in a government car, but I was not traveling at the same time as anyone else in my office. The major problem I anticipated in driving my own car was the lack of available parking. I decided to drive and check first to see if I could get parking in the garage at either the Sheraton or Shoreham Hotels; if not, I was going to backtrack, driving north on Connecticut Avenue until I could find a legal spot on a side street and either walk back, depending on the distance, or hail a taxi or bus, depending on whichever came first. I also left early enough to allow myself time to wait in line for a garage space if the line were short enough.

When I arrived at the Sheraton Hotel, it was full. The attendant suggested I try the Shoreham Hotel where I found a parking space. While this trip was not multimodal, it does illustrate the planning needed.

The second trip, a familiar, long-distance one, was taken by Dr. J. Edwin Clark, an Associate Professor in Clemson University's civil engineering department. Bus, train, and plane were the modes available for the terminal-to-terminal portion of his trip. He chose plane and listed convenience as the primary determining factor, with cost secondary. He selected personal automobile over taxi to get to and from the airport at the origin end because of cost and convenience, and he selected subway at the destination end because of its cost and his familiarity with the mode. He planned all steps in advance and no changes were necessary. Information available to him in planning the trip was the Official Airline Guide (OAG) and the Ground Transportation Services published by the OAG.

The third trip, an unfamiliar, local one, was taken by Gary L. Urbanek from his office at Allard Inc. in Ellsworth, Kansas, to Topeka, Kansas. Although it was 150 miles long, Gary considered this to be a local trip for the rural midwest area in which he lives. The modes available to him for the major portion of his trip were: bus, commercial air, and private air. He selected a combination of automobile, private air, and taxi. Both bus and commercial air schedules would have necessitated two overnight stays and private automobile would have meant 6 hours on Interstate-type roads. The primary variable that determined his choice was time. However, he translated the time into money because this was a business trip. When his chargeable hourly rate was included, the cost was greater for all modes other than private air. Gary also noted that, if information had been obtained in advance about the exact location of the meeting, he would have had the plane land at a different airport in order to minimize the ground taxi costs.

The fourth and final trip that I describe, an unfamiliar, long-distance one, is the most interesting of all those submitted. It was a business trip taken by Robert F. Jordan, Jr., of the Virginia Department of Highways and Transportation, from his home in Charlottesville, Virginia, to Northwestern University in the Chicago suburb of Evanston, Illinois. Although information about plane fares and schedules was more easily obtained, Bob decided to travel by Amtrak for the major portion of his 600-mile journey, primarily because of its reputed energy savings, its competitive prices, and the attractive scenery along the route during the mid-October trip. However, because of the long layover in Washington, D.C., he decided it was more practical to travel by Trailways bus for the first 100-mile leg of his trip.

Because the bus only stops at terminals, he had to get someone to drive him the 10 miles to the bus terminal even though the bus passed within two blocks of his home. When he reached the Trailways terminal in Washington, D.C., none of the four attendants he approached had any suggestions about how he could reach Union Station, only 2 miles away. A stranger told him he could reach a Metro subway station by walking eight blocks. Bob hauled his luggage that distance but does not highly recommend the area for those concerned about their personal safety. He apparently had no trouble in using Metro and was impressed with its informational displays. At Union Station he did experience trouble finding out what to do and where to go but finally managed to reach the right car at the right time, mainly be-

cause the conductors told him when he was at the wrong car rather than where the right one was. The car he boarded was too hot and the windows dirty so he transferred to a satisfactory one three cars away. Looking out the window, he found the train took a circuitous route to pick up passengers in Baltimore, Wilmington, Philadelphia, and Harrisburg -- where it was joined by the New York train and where he switched to a car that had separate sleeping compartments.

When he awoke in the morning, the view outside was of Ohio instead of Indiana where the schedule said they were supposed to be. Rail bed conditions were such that the Chicago arrival was almost 6 hours behind schedule and the conductors told Bob this was typical. He noted the crew changed frequently during the 22-hour trip but none of the crew or station personnel could tell him how to get to Evanston during the taxi strike then occurring in Chicago. He finally took a very slow and crowded bus and transferred to an elevated train to complete the trip, but later found out he could have taken one of two nearby commuter trains. One of the commuter lines, however, was then being victimized by a "subway slasher" who had murdered two and wounded one that week, and the passenger cars on that line were rumored to display bullet holes on their exterior siding. Bob completed the first half of his round trip feeling sympathetic for Amtrak's problems, but, nevertheless, he paid 25% more; he completed the return trip home by plane, including one transfer, in 3 hours.

The conclusions I have drawn from examining these multimodal trip planning case studies include the following:

1. Each modal system operates largely independently of all other modal systems; little concern is shown by system planners, designers, and operators for how, when, and where a user gets to and from each modal system.
2. Most travelers choose the familiar whenever they can. If the destination is an unfamiliar one, the mode of travel is more likely to be a familiar one; but, if the destination is a familiar one, travelers are more willing to consider alternative modes to the ones they have tried previously.
3. Travelers are not as strictly concerned with out-of-pocket expenses as some might believe. A significant amount of concern is given to energy conservation, to the value of time, and to convenience. (This conclusion is based on my own personal observations.)
4. The "glue" that holds a multimodal trip together is the pedestrian mode. Yet, these modal "users" are the most neglected during intermodal trip transfers. They are deprived of convenient transfer locations and facilities; adequate information about schedules, fares, and station locations; physical protection in the form of protection from weather and criminal elements; and facilities designed to be used by all types of travelers whether in a wheelchair or on crutches or handicapped by a load of suitcases or a fear of escalators.
5. Until travelers are able to transfer from one to another safely and conveniently, and can be sure of this in advance, they will plan trips to use as few modes as possible. And often this will be only one mode -- the private automobile -- from origin to destination. If one of this country's transportation goals is to provide increased mobil-

ity to its citizens, we will have to find ways of making multimodal trips more attractive to travelers without restricting free enterprise competition.

OPENING COMMENTS

Leon F. Jackson, Amtrak

I am very pleased Dr. Tignor just acknowledged that we are trying to illustrate a number of problems without really picking on any particular mode of transportation. If we looked hard enough and long enough, we could probably find equally disruptive types of problems relative to any mode of transportation.

While listening to Ms. Colpitts, I thought for a minute that I was going to hear another Amtrak horror story and, sure enough, I did. Although there were comments about the bullet holes in the commuter train and other things, the one item that does concern me is the on-time performance. All the equipment now is head-in power electric. I was on that same train a month or so ago and it was 45 minutes ahead of schedule. Six-hour delays are few and far between these days; the record can be checked. It happens sometimes, of course; however, with the kind of weather we have now, I would have to add that rail does go, and, despite the weather, you will get there sooner or later.

"Intermodality," although a word you will not find in most standard dictionaries, is a word that is being used increasingly in the travel industry. And even though we probably cannot agree on a standard definition of that word, for our purposes here, we can define it as the use of all the different transportation modes -- air, rail, bus, ship, and car. I would also consider hotel/motel and rental cars as part of the total travel picture.

With the exception of the automobile, of course, almost every trip is intermodal. Our research, regarding our transportation to Amtrak stations, shows that 7% arrive by local bus, 3% by intercity bus, 55% by private automobile, a little over 1% by rental car, about 15% by taxi, 12% by local commuter train, and, the remaining percent by other means. If alternate modes are not there, they cannot be used.

At Amtrak, we feel strongly about intermodal travel as a concept for the future, although it is a concept that is here now. The Board of Directors, the President of Amtrak, and the Vice President of Marketing, as well as our complete executive staff, have completely endorsed this concept and it is part of our marketing plan. We keep this in mind in everything we do. Alan Boyd, the President of Amtrak, was quoted recently in Travel Management Daily as being intensely interested in forging an alliance with the bus companies and the airlines, and he has succeeded in doing quite a bit of this. Today, for example, Amtrak has interline arrangements with over 60 bus lines, 9 rail lines, a steamship company -- I do not have the figures, but there are a few tour packages with airlines, air-rail type packages. And, as most of you know, as of the end of October, the rail link between Baltimore-Washington International Airport and Washington began. Some of the things we are interested in and working on in these agreements are joint ticketing, joint advertising, the tour packages, of course; probably the main thing is the stations, the sharing of the stations.

While we are committed to intermodal travel, there are a number of problems. We look at this like carriers in the past who have suffered from short-sightedness in their approach to travel; but there is also another category here you might call carrier narrow-mindedness. Carriers in general have

tended to think of themselves rather than looking at the passengers and the passengers' problems. We know of cases, for example, where freight train crews have just parked the train and left, tying up passenger trains for hours because they had put in their 8 hours or had satisfied their work rules.

You have probably all heard a number of stories about our conductors and, unfortunately, too many of them are true. A conductor goes 200 miles or 8 hours, whichever comes first (this is a work rule that goes back to 1890). Some of them work 2 days a week to complete their weekly work and are paid quite well for this. Frequently we have studee problems or sleeper space problems on down lines; the conductor on board at that time does not worry because he gets off at the next station and it will then be the next conductor's problem.

I think the tendency for public carriers to put their own interests ahead of the traveler has evolved due to economic and some regulatory factors rather than due to any deliberate planning to get out of solving passengers train problems. For example, rail was the dominant mode before World War II. After the war, it went into a steady decline until it became the least dominant mode. We believe the reason for this was that freight business was more profitable. They had no interest in passengers. If they had done some marketing, gone after it, worked with the other modes, chances are what happened never would have happened. But we see passenger demand returning, and it is growing each year. There are some good reasons for this. Energy, environmental, congestion, inflation -- these are all reasons why rail demand is returning. Although it will never reach the status it once enjoyed, we do believe it is here to stay. For example, it is the only mode that can use electricity. That may be coming for the automobile but it is not here now. In the northeast corridor, between Washington and New York, and part way to Boston, more than half of Amtrak's total system carriage is moved by electricity over those routes; this is about 2,000,000 passengers a month.

There are several things unique to rail: operation on electricity; more leg room than any other mode; the traveler can also get up and move around. He may be thrown against the wall if he is not careful, over some of the trackage, but he can get up and walk around. There is also sit-down dining services; the train goes in any kind of weather; and it is a traveling hotel (there are over 1,000 beds per night).

The need, as we see it, is for a balanced transportation system which includes all of the modes. The need is to approach travel from an integrated point of view, or what some people might call the systems approach, with service to the traveler as the primary objective. This includes urban as well as intercity travel, along with lodging and food services.

We look at travel in the broad perspective as including five phases: First, the pretravel phase or the planning part of the trip, which has probably been sorely neglected in the past; next the getting there, the second phase; the being there, the third phase; the returning, fourth phase; and then the posttravel experience, the fifth phase.

Traditionally, carriers have concentrated on the second and the fourth phases, the getting there and returning, and that is all they have cared about. Recently, some of the air carriers have looked into the being there phase, but it is usually when they have worked out an agreement with some promoter at the local scene. Phase three, has involved the people on the local scene, the hotels and the motels, the tour travel promoters in the

local area. The travel agencies have been the only people, by and large, that have really concentrated on the first phase in planning what we call an integrated trip that ties all the travel together relative to the passenger's interest. And then there is the fifth phase, the postravel. Has the passenger made a decision never to return to you again? Usually this is not found out; this type of research is not done.

We believe that in the future the travel and tourism business will have to concentrate on the total travel experience. We feel that intermodality is not a myth. It is here today; it is real; and we are going to have to deal with it.

OPENING COMMENTS

Ross Capon, National Association of Railroad Passengers

I have to wonder if that gentleman from Charlottesville has found out yet that there is a train that goes straight west from Charlottesville to Chicago without going through to Philadelphia. I guess this illustrates one of Amtrak's problems as well as one of the airlines. The problem is getting out the right information about your own mode, let alone somebody else's.

More and more people are being priced out of their automobiles. A friend of mine with the Coalition For Clean Air in New York estimates now there are some people paying 40¢ a mile and, if they were charged the full cost for congestion, air pollution, police, etc., they would be paying 80¢ a mile. Although drivers probably will never pay the full cost, the cities will be paying an increasing percentage of those costs. As a result, people will probably go to smaller cars, which are less comfortable for long-distance trips, and they will be more inclined, if they consider the automobile at all for a very long trip, to think in terms of rental. This means that the cost of flying or taking the train or the bus becomes more competitive with the rental effort. I do think the price issue is a very important one. Out-of-pocket expenses may not be a great concern right now for a certain segment of the population and, undoubtedly, it will never be a great concern for some people. I think if you look at what is happening in this country and the world, however, you have to realize it is going to be a very great concern for a growing number of people. Of course, there are also a certain number of people who have never owned a car. Thus, my conclusion is to maintain mobility, for national security and social equity, we need the best possible non-automobile transportation system, both for people who do not own automobiles and people who choose not to use them for individual trips.

I think and hope that in the pricing of the automobile use, we are going to see greater emphasis on per-mile payments and less emphasis on heavy lump sums for initial purchase and insurance.

Public transportation can never match the flexibility of the automobile, but the development of convenient intermodal possibilities can dramatically improve the flexibility of public transportation over what it is now. My trip over here was by Metro and bus, and it was not as fast as it could have been by cab. But when I am on the bus and train I read; I find I can make very good use of my time that way.

I will give you an example of one trip some relatives of mine took between Poughkeepsie, New York, and northern Wisconsin a few weeks ago. Their own investigation led to getting reservations on Amtrak to and from Duluth because air fares were too high. They called Amtrak first and found the fares to be

exorbitant; but after calling the airlines, they went back to the train. On the basis of some additional information I gave them, they rode the bus in one direction between Chicago and northern Wisconsin, because it went closer to their actual destination. Since they would not have considered taking the bus all the way from Poughkeepsie, the existence of Amtrak, their willingness to change modes, and their being related to me had the effect of generating business for the bus company and enhancing the energy efficiency of the trip.

But, for people who are not related to promoters of intermodal travel, such trips require too much work, as you have already heard. We do have a growing number of still-isolated exceptions. The Amtrak Timetable includes bus schedules, and I believe those particular schedules are also in Amtrak's information computer. If you call Amtrak, you can get information on the bus to Myrtle Beach or to a few other places -- a growing number of places, I should say. Also there are examples of ticketing and baggage arrangements. Trailways Timetables show Amtrak routes as connections in a couple of cases. I discovered that Trailways publishes Amtrak schedules between Cincinnati and Charlottesville as the connection for their bus between Richmond and Charlottesville. Amtrak service between Chicago and the Twin Cities is the connection for the bus between New York and Chicago. I understand that there are a couple of small airlines, I believe Republic and Pacific Southwest, that are actually interested in, or perhaps already are, promoting the Amtrak service at Baltimore-Washington International Airport. People can fly from Texas or wherever, and then they can take the train to Philadelphia. There are also a growing number of directories that show telephone numbers for different carriers. For example, California Department of Transportation's highway maps include the telephone numbers for every small and large transportation service company.

I believe that someday we will need to have all the public transportation carriers underwriting a comprehensive travel information and reservation center. Perhaps economics will force this development. I believe that the net effect will be that more people will use all forms of public transportation.

We need more rail-bus terminals. (Where the rail station is out of the town center, this may not be reasonable, unless some buses stop at the rail terminal en route to or from the downtown bus terminal.) The most dramatic improvement, but not yet funded, would be to relocate Greyhound and Trailways to Washington's Union Station. This would do several things. First, it would effectively put many surrounding communities with no rail service on the Amtrak system; Frederick, Annapolis, and Winchester as examples. Most people today, if confronted with the need to get from, for example, North Carolina (or New York City) to Frederick, would drive or fly-and-drive. With an easy transfer between rail and bus in Washington, and the right promotion, many people would use rail-and-bus. This would help improve the economics of, for example, the Frederick bus service, because there would be more people traveling off peak to balance out their commuter operation.

Second, it would improve bus ridership, because Union Station is a more attractive place than New York Avenue.

And third, it would encourage people to consider intermodal roundtrips. What are you going to do if you are in New York after 9 p.m. when the last Amtrak train leaves? I recently observed some people in the Providence, Rhode Island, station who just missed the last train to New York. I had the Grey-

hound schedule with me and pointed out to them that a bus would soon leave. Because the bus terminal was right across the street, they were able to walk over and catch the bus.

The bottom line is that we need the maximum number of alternatives to the automobile. Most people do not like to ride buses for very long distances, and trains will never go to many places. Intermodal travel is essential, and its growth is inevitable.

OPENING COMMENTS

Judith L. Stone, U.S. Department of Transportation

I would like to use this opportunity to emphasize citizen participation, which I think is very important. Also we have a recent policy from the Secretary of Transportation on this subject.

I would like to address two questions. First, how can we find out what consumers' and citizens' needs are in the field on intermodal travel? And, second, how can we give consideration to those needs when we make transportation plans and decisions?

We start from several assumptions in this discussion, many with which I am only peripherally familiar. One common-sense assumption, however, is when only one mode of transportation does not suffice during a trip, a traveler usually has to use more than one mode. Typically, there are certain elements of the additional mode of transportation that make it more or less attractive to the user.

In addressing the first question, those of us who espouse citizen participation techniques or the use of them simply say: "Ask them." Besides using scientific modeling and statistical methodologies, which I must say are Greek to me, there are some seemingly obvious but sometimes forgotten techniques for getting information.

We are told that formal surveys require a lot of money and expertise. So we are not saying that you have to go through a long series of contracting procedures to do formal surveys. There are other ways of doing it, although, clearly, you want to be as scientific as possible. One approach is to use mail surveys to households in a city, town, or county. But another kind of survey -- and there might be others here who know more about this than I do -- is the bus or mass transit user survey, which reach business travelers and tourists and other transportation users.

We would like to espouse using local community groups -- those who are really in touch with active transportation users in the community -- to organize their own research on the needs and consumer choices in their communities. These findings can then be communicated to the planning agencies and other community makers and often have more credibility within the community because they, the people, have been involved early on in the process, and they feel there is some sort of ownership.

Employee surveys are another idea. I think the Washington Council of Governments did this with people coming into government offices; they took surveys of commuter trends, etc.

We would also suggest conducting several public hearings and meetings on the subject of consumer choice in intermodal travel, in several locations, at convenient times, and in accessible places, advertising the meetings well in advance in the media, neighborhood, and regional information centers. Consider providing simple background papers and fact sheets, explaining the purpose of this outreach effort, and communications effort; and distribute these ahead of time. Keep the jargon simple; use maps and simple graphics to supplement the fact sheets.

Get the media involved as important members of the community themselves. Talk shows are sometimes good mechanisms. But the press can help get input on how people feel, how they travel, and what the problems are in a particular community. Relationships with the press obviously have to be nurtured.

The second element of an active citizen participation effort is feeding the information into the decision making process. Obviously, not all points of view and ideas can be accommodated or adopted. Nonetheless, citizens, especially those particularly affected by a change, need to know that their ideas and comments have been fully understood and considered. Procedures should be established to collect, analyze, consider, and respond to public comment. Summaries of all the elements of the process can be made available, and something like a "docket" -- although nothing quite that formal -- might be set up so people could come in and view it.

Let citizens see the results of their involvement -- use mailings, write articles for newspapers and other media, advertise results of what you have found in this quest.

If the results and findings of the outreach and other research are organized and structured, and if the process is documented, the decisionmakers will find it easier to make their decisions. They will feel that they have done their homework and have been responsive and responsible. They have a foundation upon which to build and are less likely to be stopped in their tracks.

It may take a little longer at the outset to conduct these efforts, but an active citizen participation effort is like an insurance policy -- it pays off in the end.

OPENING COMMENTS

Frederick H. Mueller, American Bus Association

Thank you, Dr. Tignor. I believe that some of the areas I will cover here have already been discussed.

Intermodal travel involves essentially four basic factors: (a) through routes; (b) fares, ticketing, and, possibly, baggage-checking service; (c) intermodal terminals or stations; and (d) ready accessibility to information for intermodal movements.

Let us take a quick look at intermodal travel as it exists today from the perspective of the bus industry. Through routing and ticketing are available for travel over a comparatively substantial number of routes involving both Amtrak and bus service. Schedules and fares for the bus segments of such rail-bus routes are published in the Official Bus Guide and individual route schedules or in the Amtrak Tariff and Timetables. Conversely, schedule departure times for certain Amtrak trains are shown in the Official Bus Guide. Additionally, regular-fare Amtrak tickets are honored by a substantial number of bus companies where the routes involved are served by both the bus and rail modes.

Intermodal terminal and station facilities for the bus and rail modes follow several variations. Facilities specifically intended for such purposes are in service in a number of cities, including those in Carbondale, Illinois; Kalamazoo, Michigan; and Harrisburg, Pennsylvania -- the one in Kalamazoo having been specifically arranged for this purpose.

In other instances, some bus systems operate out of or make stops at Amtrak stations. For example, certain bus systems in Maine make scheduled stops at the Amtrak South Station in Boston. There also is significant service, essentially intermodal

in character, involving bus lines and air transportation. Intercity bus schedules operate into or through substantial numbers of airports. Examples are Logan International Airport, Boston, Massachusetts; O'Hare International Airport, Chicago, Illinois; Mitchell Field, Milwaukee, Wisconsin; and Stapleton International Airport, Denver, Colorado. Through ticketing is not, in general, provided in such situations, and intermodal schedule and fare information requires reference to the Official Bus Guide, the Official Airline Guide, and applicable bus tariffs. Furthermore, much travel involving both the bus and air modes necessarily involves some form of supplemental ground transportation between the air and bus terminals or stations -- a condition dictated by the fact that, due to airport space requirements, an air terminal must generally be located some distance from the central city.

Intermodal service involving local transit services is pervasive from one point of view and quite elusive from another. Located generally in the central city of most large communities and at important points in suburban places and in smaller communities, intercity bus stations and terminals are, for the most part, readily accessible from local transit services that may exist. However, use of such local transit services tends to be difficult for persons not familiar with routes, fare structure, and so on, as has been described here earlier. Taxicabs and private automobiles probably represent the remaining modes of significance. Both find comparatively ready accessibility to bus terminals and stations. In some cities automobile parking is not as convenient to such facilities as it might be. A broad problem in some cities is that the neighborhood locations of bus terminals and stations have deteriorated over the years, and they have, therefore, become less attractive to the traveling public.

Two principal questions remain: Why has not more been done? And what are likely development possibilities for the future? It should be noted that most governmental and other authorities and groups involved have expressed approval of intermodal concepts, at least in principle. The Congress in 1978 authorized a program of assistance for development of bus terminals in which the facilities would be primarily for intercity bus service and also for "coordinating such services with other modes of transportation." No funds have as yet been appropriated for this purpose.

The extensive and expensive Northeast Corridor Improvement Program, primarily for the benefit for Amtrak, includes funds for terminal acquisition and development in the corridor. However, despite repeated assertions by the Department of Transportation, the Federal Railroad Administration, and Amtrak recognizing the need for greater coordination between Amtrak and the intercity bus mode, most terminal development under the Carter program for assisting bus operations has been effectively ruled out by the Federal Railroad Administration.

With respect to Union Station in Washington, D.C., all of the development to date at this location has been directed to facilities for the benefit of Amtrak and local transit. Most proposals for future development also ignore intermodal aspects involving intercity bus.

Intermodal travel of one type or another is necessary for most intercity journeys. Travel to a terminal or a station is generally required before an intercity trip can be commenced, whether the mode is bus, air, or rail. The principal exception is charter bus travel where members of a charter party are often picked up in their local neighborhoods.

In many instances, the individual traveler's choice of mode is limited. If the travel begins in

a rural area or small community, intercity bus may be the only common carrier mode available for part or all of the trip, along with, possibly, a short, initial leg by automobile or, where it exists, some form of paratransit. At the end of the trip, the same requirement for local transportation often exists.

For travel from or to a large city, somewhat greater choice of intercity mode may exist where rail or air transport is available. The air mode is becoming increasingly expensive, as will the rail mode if any reasonable fraction of the cost of operating rail service is reflected in the cost of passenger tickets. For the local leg at the beginning or end of an intercity trip from or to a large community, local transit travel may be an option along with taxicab and private automobile. As a result of such considerations, there have been proposals for a comprehensive program of surface transportation centers for both large and medium-size communities to improve interface between local and intercity transport modes.

A problem often faced with intermodal terminals serving more than one intercity mode is that the terminal location may be optimum or required for one mode but may not meet the requirements of other modes. For trips on which more than one mode of transportation is available, such factors as comparative convenience, comfort, speed, and flexibility are important in modal selection for all or successive parts of the travel involved.

The popularity of the automobile rests primarily on its flexibility and comparative economy where the travel party consists of more than one or two persons. Air travel is unmatched for speed, at least terminal to terminal, and rail travel enjoys comforts and amenities stemming from space and weight equipment relative to passenger seating capacity. The intercity bus has a number of advantages, including more flexibility than either air or rail, comparative economy, and schedule speed often equal to or exceeding rail, particularly for short and mid-length trips.

To the extent that travelers can avail themselves of a variety of such attributes on successive segments of trips without undue effort, expense, or time in transfers, intermodal travel is obviously advantageous. As already noted, some steps have been taken to facilitate such intermodal movements, and developments for the foreseeable future appear likely to follow the same general patterns, probably on an accelerated basis as the cost of travel increases. Comparative fuel efficiencies will also be a factor.

OPENING COMMENTS

Robert L. Bowles, U.S. Department of Energy

In this discussion I will review and highlight some approaches to evaluating and comparing the energy intensities of various transportation modes. Some comments will also be offered on the perspective with which energy intensity information should be used, and the energy conservation potential afforded by intermodal travel.

Energy intensive values are useful tools in studying the energy-related behavior of a particular transportation mode and forecasting its future fuel requirements. These numbers are frequently employed as benchmarks to evaluate the energy conservation potential or performance of an improvement to a particular means of passenger travel.

Great care must be employed, however, when energy intensive values are used in an assessment of alternative intermodal transportation scenarios.

For example, one common method used is to determine the ratio of the total modal energy consumed to the total modal services produced. Thus, in such cases the energy intensive figures are describing only an average condition. Actual specific cases can vary significantly from such averages. It is also common for these calculations to fail to take into account the energy consumption used in the construction, maintenance, and repair of both the vehicles and the thoroughfare systems of a transportation mode.

Further, it must be noted that energy intensity represents only one criteria on which to base transportation planning or other decisions. Service needs cannot be ignored. For example, while it is true that air passenger service is the most energy intensive mode for intercity travel, few consumers would be willing to travel across the country by any other mode.

Another constraint on the utility of energy intensive factors is that only the "line haul" portion of the trip is typically considered and not the complete door-to-door trip. For an intermodal trip from Washington to New York, the energy consumed getting to and from the transportation terminals can represent about 20% of the total trip energy consumption. Terminal access and egress as well as metropolitan area congestion issues for specific cases can also dominate system planning and modal choice decisions.

There are two major parameters used to express the energy intensity of various intercity passenger transport modes. These are Btu's per passenger-mile and Btu's per seat-mile. Others, such as gallons per seat-mile and passenger-miles-per-gallon, can be calculated by simple mathematical manipulations.

The number of Btu's per passenger-mile takes into account the load factor achieved by a particular mode. This parameter thus represents the average energy required to transport a single passenger one mile via a particular transportation mode. The energy intensity of the automobile or aircraft is far greater than that of the bus or the rail modes.

Btu's per seat-mile represents the average energy required to transport a single passenger one mile considering 100% of all the seats on the vehicle are occupied. It is a useful measure for comparing the limits of energy conservation potential for various modes. On the basis of the Btu's per seat-mile, air travel is four to five times as energy intensive as either the bus or rail modes.

Hence, we see that energy intensive values are useful indicators of the energy conservation potential of operational changes to improve scheduling and thereby increase load factors. Technological improvements can also decrease the energy intensiveness of a particular mode of travel. These improvements can be classified under the two generalized headings of evolutionary and revolutionary changes.

An evolutionary change occurs when a particular class of vehicles is progressively refined. These refinements of a vehicle usually yield a small percentage reduction in energy intensity. A few examples of such changes might be the dieselization of buses, the use of high-pressure, high-bypass turbofan engines on aircraft, and the introduction of electronic engine energy controls for automobiles. These improvements may also be implemented without major changes to existing vehicle or component designs.

A revolutionary change requires a breakthrough in which some new concept or technological development makes possible a new class of vehicle or major design modification. This type of improvement often has the potential for a major reduction in the energy intensity of the transportation mode if the use

of the new vehicle significantly displaces less efficient vehicles in its class. Examples of revolutionary changes might be the magnetic levitation train, the Lear fan aircraft, and specialized automobiles, such as the electric car.

From an energy conservation point of view, it is indeed unfortunate that energy intensive numbers are not considered by consumers when choosing between alternative modes of travel. The criteria of cost, timeliness, and availability appear to be the major factors that influence the utilization of one mode over another. It then follows that one way to induce consumers to use a less energy intensive form of intercity travel is to improve the interrelated factors of timeliness and availability. Such an approach appears to be applicable to intermodal trips.

Recently, several excellent examples of this concept have been implemented that required relatively simple implementation. This concept has been alluded to earlier by several of the panel members. In several cases, bus schedules now provide immediate tie-in and follow-on service to some of the Amtrak schedules. The New York subway system provides combination subway-bus service to the JFK Airport. Additionally, as has also been alluded to, an Amtrak train station was recently opened at Baltimore-Washington International Airport, which provides rail service between the two cities.

These newly added intermodal services also provide excellent examples of ways to lessen the petroleum dependency of the passenger transportation system, since intercity rail and subways can be powered by electricity generated from non-petroleum energy sources.

I would like to conclude my remarks by postulating that future reductions in the energy intensity of passenger travel will almost probably occur at all levels; that is, through higher load factors, more efficient fuel-efficient operations and maintenance practices, and evolutionary and revolutionary technological improvements. Also, the multifaceted nature of the passenger transportation system possesses the capability for a rapid reduction in the total transportation energy and petroleum consumption. This is due to its inherent ability to absorb modal shifts to less energy intensive modes and non-petroleum modes during energy supply disruptions. However, the task remains for individuals, like those of us gathered here today, to effect such changes. Lastly, while door-to-door energy use for multimodal travel is not clearly understood, the improvements in availability and timeliness of bus and rail travel for intermodal trips clearly hold the potential to save petroleum by encouraging people to use less energy intensive vehicles both at the beginning and end of an intercity trip.

FINAL SUMMARY AND CONCLUSIONS

The preceding pages have provided the opening comments made by the panel participants. These opening comments serve as an overview. To condense all of the discussion from the panel and audience into a few short statements is, perhaps, misleading; however, certain points did consistently emerge. These points are organized by the six conference session objectives.

Objective 1: Illustration of the difficulty travelers have in planning and using intermodal travel.

- o Each modal system operates largely independently of all other modal systems; little concern is shown for user needs.
- o There are too few comprehensive sources of intermodal transfer information regarding schedules, fares, facilities, locations, etc.
- o There are too few terminals serving more than one or two common carrier modes.
- o Carriers think of themselves first instead of passengers' needs.
- o The pedestrian mode is the weakest modal link in an intermodal trip.
- o Travelers tend to choose the familiar when and where possible and to avoid the unfamiliar.
- o Along with cost, travelers are concerned about the values of energy, time, and convenience.

Objective 2: Identification and discussion of primary traveler needs -- especially with respect to convenience, service, safety, and cost considerations -- to induce travelers to use more than one mode of travel in a given trip.

- o Trip necessity is the determinant factor in most cases.
- o Trip length, available modes, and knowledge about available services influence consumer choice of modes.
- o Trip purpose (business versus nonbusiness), size of travel party, income, rational and irrational phobias all are identified as influencing modal choices.
- o There is a need for a central clearinghouse for consumer information about intercity tripmaking.
- o Intermodal ticketing, scheduling, and routing would help induce multimodal trips.
- o Security, especially for a pedestrian between modes in a city, is a significant disincentive to multimodal tripmaking.
- o A single bad experience of unsatisfied need or service such as having to wait outside in the rain or carrying one's luggage a half mile, can discourage a traveler from using a particular mode a second time.

Objective 3: Transportation carriers' thoughts and recommendations on how increased intermodal travel could be facilitated from the perspective of travelers' needs and services.

- o Joint ticketing, joint advertising, tour packages, and the sharing of stations would help promote intermodal travel.
- o There is a need for a balanced transportation system in order to approach travel from an integrated point of view -- the systems approach -- with service to the traveler as the primary objective.
- o There is a need to have all the public transportation carriers involved in underwriting a comprehensive travel information and reservation center.
- o The development of convenient intermodal possibilities can dramatically improve the flexibility of public transportation over what it is today.
- o Intermodal travel is essential and its growth is inevitable.
- o In order to maintain mobility and for national security and social equity, the best possible nonautomobile transportation system must be developed; the maximum number of alternatives to the automobile must be developed.

Objective 4: How energy and economic problems and needs influence encouragement of greater use of intermodal travel.

- o Energy intensive numbers are not considered by consumers when choosing between alternative modes of travel.
- o One way to induce consumers to use a less energy intensive form of intercity travel is to improve the interrelated factors of timeliness and availability.
- o Bus companies fear that local restrictions may result in losing line haul service.
- o The local community can play a role in helping carriers to promote joint terminal development.
- o Although authorized by Congress in 1978, no funds have been appropriated for assisting bus terminal development.

Objective 5: Consideration, from the traveler services perspective of how intercity multimodal travel in 1991 will differ from today.

- o In the future, computers may be used to supply tripmaking information.
- o In the Netherlands, 2,500 subscribers have a computerized cable TV hookup for schedule and fare information.
- o What will happen in the next 10 years depends on whether the carriers are mature enough to compete with the automobile; very slow progress can be expected.
- o Although sometimes deregulation muddies the waters, other aspects of it will make the system more efficient.

Objective 6: Travel services research or planning that should be undertaken to encourage greater use of multimodal travel.

- o Alternatives to the structuring, operating, and implementing of systems to best serve travelers' needs must be examined.
- o A synthesis of regional and state mapping resources of modal facilities, especially transfer stations, should be undertaken.
- o Successful intermodal facilities, such as Kalamazoo, should be examined; the findings should be publicized.
- o The kind of consumer feedback needed to encourage multimodal travel must be identified.
- o The Transportation Research Board or others should take the lead in setting up a model demonstration program to determine if modes can be integrated.

This summary of the Transportation Research Board conference session, "Efficient Intermodal Travel -- The Reality or Myth," is not necessarily an expression of opinions endorsed by the Motorist Services Committee or its members, the Transportation Research Board, or the National Academy of Sciences; rather it is intended merely to represent items of concern to those who participated in the conference session. The Motorist Services Committee has prepared this summary to identify some of the problems associated with existing multimodal travel, to examine potential future needs for multimodal travel, and to focus attention on the role, or lack thereof, of multimodal travel in our national transportation plans.