TRANSIT NEEDS FOR PLANNING PURPOSES

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Transit planning data needs, which represents an important building block in the data that will be required for the management systems, include data for policy, finance, and evaluation. There will be some interrelationship and overlap among three types, as well as with the management system oriented data and the specifics on condition and performance. These relationships are important as we go through.

Basically, what is being presented are two building blocks from a transit perspective--data for operations planning and data for long-range planning for transit. These represent the responsibility of the transit operator, primarily, as well as the MPO, in developing information for its own use, as well as for use by the states and the MPOs in the development of the management systems.

The first is operations planning. In general, it is a back to the basics approach, as well as an approach with some new issues that are coming up as we implement the requirements of ISTEA and the Clean Air Act. We need data for the near term management of the transit system. We need data to continually monitor transit system performance and make changes in the system in order to maximum the efficiency and effectiveness of that system. The information on performance consists of on-time performance, ridership data, fare data, costs, service, and so on.

The most problematic of these has been data on ridership. Complete data on ridership is necessary to make the adjustments in transit routes so that the services best respond to rider needs and operate efficiently. Adjustments include changes in service frequency, duration, stop location and density, route alignment, and the interaction with other routes.

It's been our experience over the last few years that operators have ceased collecting these data through sources, such as ride checks or standing load checks, which are the customary ways of tracking ridership. It's becoming more and more critical for these data to be collected and for transit operators to reinstitute continuous data collection along these lines, as well as supplementing that information with surveys, such as on-board surveys, to provide more detail information.

The 1990 Census information and the availability of the TIGER files allow route planners to now extract information on detailed socioeconomic characteristics of the ridership base, that is, the population around the transit stops. This detailed information relates to the potential transit market, which, coupled with the patronage data, already forms a strong base to make route refinements. It also allows the development of route level patronage models. The development of this kind of information provides the operator with an ability to forecast, as well as to simply respond to existing transit ridership.

Technology is also playing an increasing role in the collection of route level data. Passenger counters, automated fare collection boxes, and real time location systems through innovations, such as the advanced public transportation systems which allow voluminous amounts of data to be collected.

This is a good news, bad news situation. The good news is that more and more data are now becoming available. The bad news is that a significant effort is required to process their data so that they can be used in a meaningful way. The paradox is that effective route analysis requires a lot of data which we have the technology to capture, but which is extremely difficult to digest even with the more sophisticated data management systems that are now available.

Agencies that do collect data, that are conducting these on-board ride checks or point checks, or that have passenger counters or automated fare collection systems, collect reams of data on passenger boarding, location, on-time performance, fare payment, and then come to realize that they don't have the capability to analyze the data.

There's a clear need for methods and techniques to transform the volumes of data which are now available from the automated techniques into formats that can serve effective route planning.

The geographic information systems offer great potential to facilitate assimilation of the data, but experience in their use is limited. Transit operators should look at these techniques to develop better information.

A similar problem exists with the management of maintenance information. Systems have been created which allow for the development of considerable data on bus and rail car maintenance, that is, data on the maintenance history of specific vehicles, but so far it has not been our experience that the data have been fully utilized.

What we don't have in many of these cases is historical data for a number of years on which to compare the data that are being collected. An example illustrates this point. A number of years ago, TRB was asked to undertake an investigation of the useful life of a bus--an issue of considerable import to us in terms of our policy with respect to how we replace vehicles and in terms of providing federal support. Data were to be based on life cycle costing in order to determine the optimal time to replace a bus, but there was little historical data available at the time. So, we were unable to get specific maintenance recommendations out of this study.

Now that maintenance management systems are becoming more available, it's likely that this kind of information will be available as the years of data become accumulated. However, the challenge remains assimilating the information and then using it in a way that makes sense.

Another important area--and this ties directly to the issue of management systems and the relationship to operations planning and management systems--is the increasing amount of assets that transit operators have accumulated over the last several years, particularly with the availability of federal assistance, but also with the growing availability of state and local assistance.

Systems have expanded, and new assets have been acquired. At the same time, there remains the enormous rehabilitation needs and the need to maintain the system that's in-place. The management system makes sense for transit operators, and it's going to be important for transit operators to participate in the development of those management systems by the creation of data on transit equipment and facilities in terms of condition, performance, and need.

The system needs to monitor the physical state of equipment and facilities, evaluate how well the system is serving the public, and identify actions to maintain the system to local standards. By identifying the condition of transit assets, adequate planning for proper maintenance and replacements can also occur.

Regarding the issue of long-range planning, it's clear that there's a continued concern about the process of developing plans for major capital investment in terms of the costs, which tend to be underestimated, and ridership, which tends to be overestimated. It's clear that there's a need for improved modeling in order to get more accurate estimates. The current state of the practice is an important place to start.

For most point models, most urbanized areas tend to use models borrowed from other cities. The borrowed models are validated on local data and adjusted, as necessary. It's becoming more and more apparent that if we're going to get accurate forecasts, we need more mode split models that are based on local behavior characteristics and.more sophisticated than those in the past. While it's more time consuming and costly, using local data is the only way we can ensure that models are sensitive to local travel habits, and maybe even more important, the coding conventions behind the way the models are actually operated.

These estimation techniques also need to recognize aspects of travel demand that have not been addressed well in the past. We need larger samples of survey trip data or, at a minimum, targeted samples.

Some of the examples of the issues that the models need to be sensitive to include: 1) sensitivities to the travel characteristics of three different groups of travelers; 2) those travelers with different socioeconomic characteristics; and 3) those which receive parking subsidies. The last group is becoming more important when it comes to modeling travel to the CBD. It is becoming more and more clear as we look at this issue that parking subsidies and the whole issue of who's paying for parking on a specific trip make a much bigger difference in terms of travel behavior than I think we recognized in the past. Somebody else pays is simply the situation. Recent analysis of the nationwide personal transportation survey shows that 95 percent of those who drive to work do not pay to park. It's not quite so high in central business districts, and a lot of that is the result of increased suburbanization, but the numbers are clear and that makes a very big difference in travel behavior on the trip-to-work basis.

Traditional model estimations have not differentiated the markets because limited samples of survey information were available. This results in models that may not, for example, adequately show the correlation between parking costs and mode share because the models were based on assumptions that everyone pays for parking, which, at this point, is clearly no longer the case, if it ever was.

The problem is compounded by poor information on parking costs of people who do pay market rates. Similarly, the models may not accurately portray a particular income group's sensitivity to transit changes. With more emphasis in air quality and congestion being paid to matters, such as increases in parking costs and increases in transit services, we need to better understand the relationship of those changes in transit demand.

We also need to collect more data to accurately understand the sensitivities of the nonwork transit market, and, as the share of total travel represented by the work trip decreases over the years, this is becoming increasingly important.

The current state of the mode split models is that there's only a weak correlation between the causal variables that have been identified in transit demand in the non-work market. There is a need to examine possible other model forms, such as direct demand estimation, or again place more emphasis on market segmentation to look at this demand.

Recent research also suggests that the burden of transferring in a transit trip is much more important than our models estimate. Fixed guideway forecasts frequently indicate that as many as 80 percent of a rail system will access the system using foot or bus. This is at variance with experience showing that 20 to 30 percent of rail patrons access rail by bus, and recent research indicates that transfer penalties could be as high as 20 minutes of in-vehicle time, which is a significant amount of sensitivity to transferring.

In order to better understand this phenomenon, we need more detailed transit networks, market segments, and information on path choice. In other words, we need better data on the way transit trips are actually made so that the models can be made sensitive to those realities.

While the data for estimation of models are important, we need better data on current transit usage to properly validate the models. The obvious question related to this is how can we have faith in our model's ability to predict the future if we cannot demonstrate and reasonably replicate what is happening now? Many transit agencies have not conducted systemwide on-bus surveys for years, or if they have, they've been done so for purposes other than model validation.

We need carefully developed surveys so that they're useful for the modeling process. They must be rich enough that they allow for model validation at a reasonable level of detail. The bottom line is that we must be able to do a validation in a more detailed way than just simply checking screen lines and systemwide totals.

With the considerable interest in fixed guideway systems, we need better data describing the patrons using existing systems. This goes back to the actual performance, validation, and evaluation issues.

What's the nature of trip making with respect to mode of access, trip purpose, time of day? These are basic modeling issues, and the data are fairly easy to get because it's much easier to collect data on a fixed guideway system than it is in a bus system.

We have some data on "park and ride" and "kiss and ride," but the remainder of the transit system has little information. We spend hundreds of millions of dollars building rail systems and then don't spend very much at all on collecting information on their actual usage.

To further enhance the credibility of modeling systems, we also need time series validation of the models. Modelers from other disciplines can't believe we rely on models that have not been validated in this way. It's clear that this is a fundamental issue.

Such data exercises are rarely done because data get lost, data are not understood, and staff turns over.

To accomplish time series validation, we need to fully document the data we collect so that it can be easily retrieved and understood and used for time series validation.

Finally, we need better accounting of the capital costs of major transit projects. Current construction costs of rail projects are compiled for each project based on bid contracts. Because each rail project has contracts containing different components, it's frequently difficult, if not impossible, to make comparisons between different projects. The result is we do not have basic costs to develop even coarse estimates of major projects, particularly for the so-called soft costs, and it is becoming clearer and clearer that this is an important issue in the cost modeling process.

The costs of preliminary engineering, final design, construction management, construction insurance, local work force, and project start-up are not easily gathered, but where we have gathered the information, it indicates that the costs are as much as 40 percent of the total project costs. That's a startling number. We need to track these costs for construction projects much more carefully.

In summary, there are two areas--operations planning and long-range planning. In the operations planning area, we need ongoing ridership data. We need to derive data to support root level patronage modeling. We need better data management techniques to take advantage of all the data we can collect from the technology that's now becoming available. We need to look at the maintenance management data that are now being collected and we also need to collect the condition data for the management systems.

On the long-range planning side, the mode split models need additional sensitivity to specific markets. We need to look at non-work travel. We need to look at validating our models, both current travel patterns on a time series basis, and we need better data on the capital costs of transit systems as they're actually constructed.

DISCUSSANTS

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Edward J. Boyle

Caltrans is in the process of letting contracts for the data collection and planning work needed by the state. In the contract, the state will not be specifying what kinds of data to collect. They are just interested in the results to satisfy their present needs. However, the overall systems are not defined by Caltrans. The bids are still being prepared by consultants and the contracts will be let by the end of the year.

Regarding air pollution, most traffic in the Bay area is at a slow speed, not at the over 55 mph which has shown to emit more emissions. The state will develop