REASSESSING PASSENGER MILE DATA FOR TRANSIT PLANNING AND FUND ALLOCATION

PROBLEM STATEMENT

In the United States, the consumption of transit services is typically measured by unlinked passenger trips (PT) and passenger miles (PM). The use of PT, which counts passengers according to the number of times they board (e.g., initial boarding and one transfer counts as two PTs), offers certain theoretical advantages. For example, at disaggregated levels (i.e., considered by individual trips), boarding volumes at individual stops are important to operations control and planning, and at aggregated levels (i.e., considered by zones), PT may better reflect the fact that demand for transit services is a derived demand (i.e., intentional, based on particular needs/purposes). However, some views in the literature on transit performance regard PM as a better measure of service consumption because (1) PM captures the essential function of mass transit—moving people across space, (2) PM is regarded as a less biased measure of service consumption than PT, (3) most forms of transit user benefits, and even many non-user benefits, are likely proportional to PM; and (4) PM is comparable across modes. Others view PM as a better link between service consumption and service provision because (1) transporting passengers longer distances is likely to cost a transit agency more than transporting passengers shorter distances, (2) PM is more effective in capturing service effectiveness than is PT, and (3) PM better reflects the consumption of transit capacity than PT.

Passenger trip data are now widely used by both operating and non-operating agencies in the United States. However, the transit industry continues to be reluctant to use PM data for transit planning and fund allocation. The source of this reluctance appears to be five perceptions about the collection and use of PM data: (1) determining PM is difficult, (2) determining PM is expensive, (3) PM data are unreliable, (4) there is little or no use for PM data beyond reporting them to the National Transit Database, and (5) using PM data in fund allocation favors transit agencies serving longer trips over agencies serving shorter trips. The problem is that these perceptions do not fully reflect the reality.

OBJECTIVES

This project examines how these perceptions deviate from actual conditions, and it illustrates the potential benefits of using PM data in transit planning, using a case study of a particular transit agency in Florida. Actual conditions are explored in terms of current practices and expected near future practices (e.g., when new technologies are more widely deployed in the industry). The ultimate goal is to re-evaluate the use of PM data for transit planning and fund allocation.

FINDINGS AND CONCLUSIONS

The research suggests that the state of PM data is more positive than perceptions imply. For example:

- *Determining PM is easier than perceived.* Transit agencies that currently determine both PM and PT through sampling would still need to sample even if PM data were no longer required for the National Transit Database (NTD). When sampling for PM, these transit agencies can reduce the required sample size and possibly total costs,by using customized sampling plans rather than FTA-approved sampling plans. Conversely, transit agencies that currently determine only PM through sampling would not need to sample if PM data were no longer required for the NTD. However, many of these agencies currently still use FTA-approved sampling plans for determining PM and, in many cases, unnecessarily over-sample as a result. For all agencies, new technologies will even the levels of difficulty in determining PM relative to PT.

- *Determining PM is less expensive than perceived.* The Federal Transit Administration (FTA) can do a better job of providing user-friendly tools for transit agencies to develop alternative sampling techniques without the need to hire outside statisticians. The literature has many alternative sampling techniques for improving sampling efficiency or for reducing administrative costs over the FTA-approved sampling plans. The problem is that much of this literature is too complex and theoretical for most transit agencies to apply directly. Chu and Ubaka (2004) have made a first step toward that end by developing a practical guide and Excel-based templates for transit agencies to customize sampling plans to the conditions of their own fixed-route bus services.

- *PM data are more reliable than perceived.* The majority of transit agencies that currently report a 100-percent count of unlinked passenger trips to the NTD still use FTA-approved sampling plans to estimate average passenger trip length (TL). For many of these agencies, the PM estimates achieve far higher confidence and precision levels. This happens because these agencies over-sample for FTA's 95-percent confidence and 10-percent precision levels when they use FTA-approved sampling plans. In the near future, it will be possible to improve reliability for transit agencies that directly count PM using new technologies such as Automatic Passenger Counting (APC) technology. Reliability also can be improved for transit agencies that directly count PT and use new technologies to estimate TL.

- *Using PM in fund allocation can be neutral.* Whether and the degree to which using PM data in fund allocation favors one group over another depends on how PM data are used in the allocation formula. Using PT alone as a measure of ridership in fund allocation favor agencies serving shorter trips, but using PM alone favors agencies serving longer trips. However, using both PT and PM in a symmetrical way neutralizes these extreme effects of trip length on fund allocation.

- *PM data are useful for transit planning*. PM data are already widely used by non-operating agencies at the federal, state, and local levels for transit planning and fund allocation. Some operating agencies have also been using PM data. The full potential of PM data for operating agencies will be increasingly realized with a wider deployment of new technologies that allow automated collection of a large amount of data at relatively low costs.

BENEFITS

This research provides additional insights into an ongoing, industry-wide issue, and will contribute to informed decision-making with regard to the use of either PT or PM, or both. This study has shown that the transit industry can benefit both from PT and PM, and that PM data can effectively be used for transit planning and fund allocation. For example, the Jacksonville Transportation Authority (JTA) is effectively using new technologies to collect PM data and benefiting as a result. JTA "declared a war" on empty buses during the mid-1990s with a five-element strategy. The central element of the strategy has been the collection and use of PM data for monitoring, evaluating, and designing its bus services. What has made this effort possible is APC technology. Switching from PT to PM as a key performance measure positively altered JTA's performance image. From 1998 through 2003, the PT for its bus system grew only 1 percent, but the PM gained 41 percent; its PT-based productivity declined during the same period, but its PM-based productivity improved by 3 percent for PM per revenue mile and 34 percent for PM per revenue hour. That is, the change has allowed JTA to provide a more accurate picture of the service it provides its customers.