Are They Fulfilling Their Promise?

DON H. PICKRELL

"The phony cost estimates and even phonier ridership figures must stop. . . . There are enough worthy projects that will be built if the public is given the straight facts about them." —*Paul Weyrich (1)*

A few years ago transportation planners began to develop an uneasy feeling that recently built rail transit systems were failing to live up to expectations. Then in 1989, the Urban Mass Transportation Administration issued a report comparing ridership and cost forecasts for 10 such projects with each one's subsequent experience (2). The report's purposes were to (a) identify the sources of any divergence between these projects' forecast and actual ridership or costs, and (b) make recommendations for improving the reliability of future forecasts. As explained in the report, the focus was the accuracy of projections available to local decision makers at the time they chose among alternative projects.

Don H. Pickrell is an economist with the John A. Volpe National Transportation Systems Center, U.S. Department of Transportation, Cambridge, Massachusetts.

(In the context of UMTA's project development process, these are the forecasts published in the Draft Environmental Impact Statement and supporting documents prepared by a local project sponsor as part of its Alternatives Analysis for an individual transportation corridor.)

The UMTA report went to extreme lengths to ensure fairness, such as comparing ridership and costs for partly built systems (those in Washington, D.C., Baltimore, and Atlanta) with forecasts prepared for their then-current stages of completion. Actual ridership and operating cost data were reported for the same number of years following the opening of each system as the forecast year followed the planned start of its service (in a few cases the systems were so new that this was impossible). Construction costs were adjusted to account for differences between projected and actual inflation rates. In addition, the data for each project were circulated to staff members of the local sponsoring agency, who reviewed their accuracy and provided corrected or updated values where appropriate.

What the Report Found

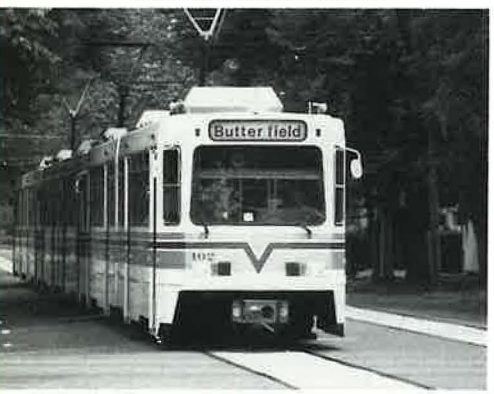
The UMTA study showed that planners' uneasiness was well founded. As Table 1 (from the report) reveals, only the extensive Metrorail system in Washington, D.C., carries more than half the number of riders forecast to use it. Two others (Baltimore and Portland) carry somewhat less than half of their projected riders, another two (Buffalo and Pittsburgh) carry about a third, and ridership on four others is about one-quarter or less than anticipated. If actual ridership figures omitted those traveling within downtown fare-free zones, as did the corresponding forecasts, these comparisons would be even less "favorable" in Buffalo, Portland, and Sacramento. (Since the time the study was completed, ridership has increased significantly in Washington and Baltimore, where major extensions of the systems have been completed, as well as in Pittsburgh and Sacramento.)

More important, the table also shows that the impact of these projects on total transit ridership in their respective cities has been similarly disappointing in comparison with planners' expectations, reflecting the fact that the bulk of their users formerly rode bus routes that rail lines replaced. Because every other benefit claimed for these projects—reduced traffic congestion, air pollution, and energy consumption, as well as longer-term changes in land use patterns—depends critically on the number of new riders these systems draw from automobiles, the benefits generated by these projects must also have fallen correspondingly short of earlier expectations. Surprisingly, the report found that most cities' errors in predicting ridership cannot be explained by errors in projecting future demographic trends or automobile travel conditions, or by over-optimism about the improvements in transit service that would result.

MARTA train in downtown Atlanta.

MARTA

SACRAMENTO REGIONAL TRANSIT DISTRICT



Left: **Street running of light rail vehicle in Sacramento.**

LEVINE/WMATA

Crowded platform at WMATA's Smithsonian station.

On the cost side, it can be seen from the table that although capital outlays for Pittsburgh's light rail project were 11 percent less than their forecast value, actual outlays to construct and equip the nine other projects ranged from 13 percent more to as much as 106 percent more than their anticipated totals. Changes in the physical specifications of these projects between their planning and construction phases were generally minor, and many should have resulted in reduced, not increased, construction costs. Design changes simply cannot be used to explain these cost increases. Operating expenses for Sacramento's light rail line during 1988 were 10 percent below their projected year 2000 level (although only about half as many vehicle-miles were operated as projected), but elsewhere actual expenses ranged from 12 percent above to more than 200 percent above projected levels. In every case, introducing rail service added considerably to system-wide operating expenses (the resulting increase averaged almost 40 percent of pre-rail expenses). The anticipated savings in operating expenses that justified many of these projects therefore has apparently not widely materialized.

The most extended chapter of the report was devoted to a variety of recommendations too numerous and detailed to include here. They were intended to serve a dual purpose: to make the forecasts relied on by local officials in choosing among competing projects more credible and require those officials to acknowledge publicly the uncertainty that surrounds these forecasts. The discussion carefully avoided pointing out that local political officials often seek inflated ridership projections and unrealistically low cost estimates to promote projects they favor, or that the conflict of interest inherent in the willingness of certain firms to provide planning, engineering, and construction management services to local project sponsors makes them willing accomplices in supplying these.

Reaction to the Report

Judging from the ensuing outcry, one would think writers of the report had defaced a national monument. Various critics have made unsubstantiated allegations about the veracity of the report's data. Most of this criticism simply reflects failure to read carefully the detailed explanations of the procedures used to make the forecasts and experience comparable. I would have thought that a report devoting more than half its length to documenting the source of each data item would have placed on its would-be critics a burden of proof requiring them to identify and correct specific factual errors. Instead, readers have repeatedly attempted to impugn UMTA's and my motives in selecting projects and in the choice of time periods used to compare forecasts with the actual record.

To cite the most alarming example of this, some critics suggest that forecasts from the so-called Alternatives Analysis stage of the planning process were chosen because they were most likely to differ widely from the subsequent performance of the projects. In fact, it is carefully explained in the report that this decision was made to assess the accuracy of forecasts on which local decision makers acted. To assert that federal funding decisions were made on the basis of subsequent forecasts—which proved even farther from the mark as often as they were closer—is both misleading and irrelevant. Anyone familiar with the UMTA planning process realizes that the federal government does not choose among projects, it determines the eligibility of locally chosen candidates for more detailed study and ultimately for federal funding. Thus assessing the accuracy of post-decision forecasts whose greater realism was compelled by the onset of construction or the impending start of service would have been a meaningless and misleading exercise.

Another example is the transit industry's allegation of tampering in converting

boarding data (known misleadingly as "unlinked-trip data") from before and after the start of rail service to its door-to-door trip ("linked-trip"*) equivalents, by far a more useful measure of transit service use. Protesting this conversion reveals a puzzling failure to understand the increase in transfer activity and trip circuity that invariably accompanies replacement of direct bus service with the combination of feeder bus and line-haul rail service. For exactly this reason, multimodal transit systems regularly estimate and report the number of linked trips they carry, and most rely on these data (rather than boardings) to support important managerial decisions. Further, these linked-trip data are measured considerably more accurately than the notoriously unreliable passenger-mile data that some rail advocates have used to indicate the apparent increase in patronage resulting from the introduction of rail service.

Critics also repeatedly note the ostensible superior ridership attraction and cost-effectiveness of rail transit, neither of which is documented by the data employed. The near-doubling of passenger boardings in Washington, D.C., Atlanta, and Baltimore is reduced to 30 percent growth when measured by the more accurate indicator of linked trips. If three bus-only cities (Los Angeles, Houston, and Denver) outside the upper Midwest, which was particularly affected by the recession of the early 1980s, are examined, an even larger ridership increase (about 40 percent) would be evident. Similarly, the purportedly superior cost-effectiveness of rail transit systems over their all-bus counterparts (another misleading way of using unlinked trip data) is erased if at least half of the rail trips, which also entail feeder bus trips, are taken into consideration. When capital costs are added, linked trips in rail cities are from two to three times as costly as those carried by bus-only systems.

Restoring Credibility to the Transit Planning Process

The most puzzling aspect of the preoccupation of critics with the comparative ridership attraction and cost-effectiveness of bus and rail transit is its complete irrelevance to the UMTA report. My analysis simply showed that the experience of most new rail transit systems has fallen far short of the promise that led local officials to favor them. Despite assertions to the contrary, this problem is growing worse, not better. The average error in forecasting ridership for federally supported rail projects planned in the 1970-to-1975 period was 44 percent, yet this figure rose to 70 percent during the late 1970s, and further to nearly 80 percent during the early 1980s (results for projects planned since then are not yet in).

A planning process that generates recurring forecasting errors of the direction and magnitude documented in the UMTA study is simply not credible. The causes of these errors must be detected and remedied if the viability of this process in allocating resources—not to mention its respectability as a professional activity—is to be restored. Publication of the UMTA report, with its documentation of past errors, detailed analysis of source data, and recommendation of carefully designed measures to reduce prevalence and magnitude of predictive error, is the first important step in that direction. As such, the report deserves far more serious consideration than many critics—those who most need to absorb these lessons—have been willing to give it.

References

1. P. Weyrich. *The New Electric Railway Journal*. Spring 1990, p. 2.
2. D. Pickrell. *Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs*. Urban Mass Transportation Administration, U.S. Department of Transportation, 1989.

*A linked trip is defined as a trip from the point of origin to the final point of destination. For example, one linked trip could be made up of four unlinked trips: from home by automobile to the station, a trip by rail transit, a bus ride, and a walk to the office.

TABLE 1 FORECAST AND ACTUAL DATA FOR 10 FEDERALLY ASSISTED RAIL TRANSIT PROJECTS (*2*)

	Heavy Rail Transit Projects				Light Rail Transit Projects				DPM Projects	
	Washington	Atlanta	Baltimore	Miami	Buffalo	Pittsburgh	Portland	Sacramento	Miami	Detroit
Weekday Rail Passengers (thousands)										
Forecast	569.6	NF	103.0	239.9	92.0	90.5	42.5	50.0	41.0	67.7
Actual	411.6	184.5	42.6	35.4	29.2	30.6	19.7	14.4	10.8	11.3
% difference	−28	—	−59	−85	−68	−66	−54	−71	−74	−83
Total Transit Trips per Average Weekday (thousands)										
Forecast	796.8	228.4	NF	650.9	184.0	93.7	264.0	112.0		
Actual	697.7	247.0	302.5	169.7	93.2	45.9	126.9	43.3		
% difference	−12	8	—	−74	−49	−51	−52	−61		
Capital Cost (millions of 1988 dollars)										
Forecast	4,352	1,723	804	1,008	478	699	172	165	84	144
Actual	7,968	2,720	1,289	1,341	722	622	266	188	175	215
% difference	83	58	60	33	51	−11	55	13	106	50
Annual Operating Expense (millions of 1988 dollars)										
Forecast	66.3	13.2	NF	26.5	10.4	NF	3.8	7.7	2.5	7.4
Actual	199.9	40.3	21.7	37.5	11.6	8.1	5.8	6.9	4.6	10.9
% difference	202	205	—	42	12	—	45	−10	84	47

Note: DPM % = Downtown People Mover; NF indicates that no published forecast was available.