Chapter 5. Performance Indicators

Introduction

This chapter discusses the role performance indicators can play as part of transit system oversight. Currently, there is no formal process in place for either fixed route or paratransit that results in establishment of service and performance standards, tracking and monitoring actual performance in relationship to stated goals, and reporting on subsequent findings to the policy board. As a result, both the fixed route and paratransit systems may not be achieving their full potential, and/or there may be opportunity to improve the methodology by which performance measures are established, collected, tracked and reported. This chapter recommends policies and procedures for evaluating the effectiveness of existing fixed routes and CUBS demand response service.

Why Have Performance Standards?

Performance measures and standards should articulate the adopted policies and priorities of the transit system and its policy board. As such, they reflect the tradeoffs among competing policy objectives often faced by transit managers. Foremost among these conflicts is that of operating productive service within neighborhoods where transit is well used with the need to serve all citizens of the communities that support transit services through their taxes. Another conflict is that of striving to reduce congestion by providing a high level of commute service with that of providing service for transit dependent persons who do not necessarily travel during peak travel times. While there is no "right or wrong" answer, resolution of these questions often defines the fundamental and unique nature of a local transit system. Furthermore, establishing system goals for efficiency, productivity, and service quality help an agency to benchmark or compare performance against best practices, identify opportunities for improvement, and guide the allocation of resources.

The measures used to make these comparisons are critically important. They need to be reliable indicators of agency success and also understandable and meaningful to decision makers, planners, and lay people alike. Common measures that are used by many transit systems include things like:

- Number of trips operated
- Total cost to provide the services
- Miles traveled per hour
- Cost per trip
- Passenger miles traveled

Standards establish a benchmark for performance relative to a performance measure to ascertain the effectiveness of individual services or the system as a whole. These outcomes should be tracked over time to ascertain whether services are meeting stated objectives, or whether there are any negative trends that warrant closer examination of service practices. While it is probably most useful for an agency to monitor its own service characteristics over time, it can also be useful to compare system outcomes with those of its peers, industry standards or best practices.

Three related terms are used to describe the types of measures that the CTA should track.

- **Tracking Measures** are indicators that should be routinely collected as a means of tracking the system's success.

- **Performance Measures** are used to assess actual service outcomes.
- **Performance Standards** are the targets that should be achieved for a service to be considered a success.

The next section suggests a series of measures and standards that can be utilized to evaluate the efficiency and effectiveness of existing services, along with a suggested process for routinely appraising individual routes and the system as a whole. This is followed by a set of proposed performance measures and standards for the paratransit system.

Fixed Route Service Standards

Depending upon the size of a system and the number of issues it faces, service standards may be complex and require ongoing management attention or may be limited to a few key indicators. Some large systems monitor nearly 100 separate measures that combine to influence organizational success. Such elaborate schemes are not considered appropriate for CUBS, which can prosper with a fairly basic performance evaluation system. As described in more detail later, it is suggested that CTA routinely monitor a variety of performance trends, both for the system as a whole and for individual routes. Some indicators are already collected, as required, for submittal to the National Transit Database (NTD)[18] and can serve as a starting point for enhancing performance monitoring efforts.

Eight proposed performance measures are described below. Each serves a unique purpose, and may point to operating concerns.

- **System Ridership/Hours/Service Miles**: Accurate tracking of services provided through ridership counts is the foundation for almost every other measure of system success. Systems benefit from separately tracking hours and miles required for deadhead trips (traveling to/from the garage) and actual service. Similarly, tracking ridership by fare type (cash, pass, transfer, etc.) can often provide useful information when considering changes.
- **Passenger Miles** (NTD requirement): While the federal government only requires CTA to report passenger miles every three years, collecting this information on a regular basis has local value. The number of passenger miles divided by the number of miles operated provides the average load on buses. If that load is increasing, buses are becoming more crowded. Passenger miles are especially useful when service changes are implemented that may require more riders to transfer buses. If ridership is going up while the number of passenger miles is unchanged or going down, it likely means that service is less convenient than it was before the change was implemented. Conversely, if two routes are combined, ridership may go down, but if passenger miles increase the change was a success.

[18] The NTD was established by Congress to be the Nation's primary source for information and statistics on the transit systems of the United States. Recipients or beneficiaries of grants from the Federal Transit Administration (FTA) under the Urbanized Area Formula Program (§5307) or Other than Urbanized Area (Rural) Formula Program (§5311) are required by statute to submit data to the NTD. Over 660 transit providers in urbanized areas currently report to the NTD through the Internet-based reporting system. Each year, NTD performance data are used to apportion over $5 billion of FTA funds to transit agencies in urbanized areas (UZAs). Annual NTD reports are submitted to Congress summarizing transit service and safety data.

- **System (Route) Speed** (Revenue Miles/ Revenue Hours): This can suggest whether traffic congestion and passenger activity are slowing the system down. Most transit systems operate at an average system speed between 11 and 13 miles per hour. If the speed is declining, it may mean that transit priority treatments are becoming more important. It could also mean that operator layover times are increasing, as this will also appear to slow the system. The higher the system speed the more effectively buses are competing with private autos.
- **Rides per Capita** (Annual Boardings/ Service Area Population): This is an indication of the average number of times each citizen rides public transit services during a year. It will suggest whether CTA is becoming a more significant part of the local transportation infrastructure. This is a good way to compare the effectiveness of CTA's services with those operating in other communities.
- **Operating Cost per Revenue Hour:** This is a key financial indicator that can also point to operating issues such as inappropriate staffing levels and maintenance issues. If cost per hour is increasing faster than inflation the long-term sustainability of current service levels may be in doubt.
- **Cost per Rider**: Closely related to cost per hour, this suggests whether the system is becoming more efficient at transporting people. Some measures that increase operating costs can be justified because they generate a larger increase in ridership.
- **Farebox Recovery** (Total Farebox Revenues/ Total Expenses): This is a useful tool for determining the need for a fare increase. At present farebox collection comprise about 6% of total system costs, including the paratransit system. By setting a target farebox recovery percentage, the CTA Board will be able to determine when fares should appropriately be increased.
- **Passengers per Hour:** This is the most common measure of overall performance and should be used to routinely monitor and report the performance of individual routes. CUBS fixed route services average about 20 passengers per hour. Routes failing to achieve this level should be carefully reviewed and weekday services that fail to achieve 15 passengers per hour should be candidates for remedial action. It is appropriate, however, that a lower standard be applied to weekend services.

Figure 5-1 suggests factors that should be used as *tracking measures*; in other words, the baseline data that needs to be collected in order to develop performance standards and goals and to monitor system outcomes. Figure 5-1 also documents actual outcomes for CUBS, based on 2008 NTD data. These measures pertain only to direct services, and do not consider areas such as maintenance, customer service, or personnel utilization. Each of those areas has its own unique measures that may also be considered as appropriate management tools.

Figure 5-1 System Wide Fixed Route Proposed Tracking Measures

System Wide Proposed Tracking Measures			
	CUBS Current Performance[19]		
	Annual/Total	Weekday Average	Saturdays
Service Area Population	46,210	n/a	n/a
System Ridership	361,256	1,286	616
Revenue Hours	16,920	60	30
Revenue Miles	214,803	765	383
Passenger Miles	1,510,050	n/a	n/a
Operating Cost	$1,587,119	n/a	n/a
Farebox Revenue	$119,890	n/a	n/a

Figure 5-2 suggests appropriate *performance standards* for the CUBS fixed route system. The proposed standards are intended to advance a series of strategic goals for the system.

- The system's cost structure should not increase faster than inflation. (Cost per hour and Cost per rider)
- Fares should cover the same proportion of operating costs that they do today. (Farebox recovery)
- The productivity of the system should increase. (Passengers per hour and Cost per rider)
- System ridership should increase faster than the service area population. (Rides per Capita)
- The system should maintain its current operating speed (System speed)

Figure 5-2 System Wide Proposed Performance Standards

System Wide Proposed Performance Standards		
	Proposed Standard	2008 Actual
Rides Per Capita	>8.0	7.8
Cost per Rider (2008 dollars adjusted for inflation)	<$4.00	$4.39
Operating Cost per Revenue Hour	$94.00	$93.80
Farebox Recovery Percentage	>7.5%	7.6%
Passengers per Revenue Hour	>20 pass/hour	21.4
System Speed	>12.5	12.7

[19] Based upon 2008 National Transit Database

As mentioned previously, it is also important to track service outcomes by specific routes. Proposed tracking measures by route, and actual outcomes for Fiscal Year 2009-10, are reflected in Figure 5-3, below.

Figure 5-3 Proposed Tracking Measures by Route

Proposed Tracking Measures by Route					
Route	10	11	12	20	21
Route Ridership					
Annual	68,493	79,198	68,505	95,970	49,090
Weekdays	268	308	267	374	192
Saturdays	-	233	168	233	-
Revenue Hours					
Annual	3060	3600	3600	3600	3060
Weekdays	12.0	12.0	12.0	12.0	12.0
Saturdays		10.0	10.0	10.0	
Revenue Miles					
Annual	36,504	44,431	49,939	47,369	36,504
Weekdays	140.4	145.2	163.2	154.8	140.4
Saturdays	0	121	136	129	0

Source: Ridership data from CUBS' 2008 Service Standards Report
Revenue Hours and Miles calculated by Nelson|Nygaard from system schedules and GIS files.

Figure 5-4, below, indicates proposed performance standards for CUBS fixed routes. The proposed standards embody a series of strategic goals that apply to individual routes.

- Route productivity should increase. (Passengers per hour)
- Routes should maintain their current operating speed (Route speed)

Figure 5-4 Proposed Performance Standards by Route

Proposed Performance Standards by Route						
	Standard	10	11	12	20	21
Passengers per Hour						
Overall	>20 pass/hr	22.3	22.0	19.0	26.7	16.0
Weekdays	>20 pass/hr	22.3	25.7	22.3	31.2	16.0
Saturdays	>15 pass/hr		23.3	16.8	23.3	
Route Speed						
Overall	>12.5 mph	11.7	12.1	13.6	12.9	11.7
Weekdays	>12.5 mph	11.7	12.1	13.6	12.9	11.7
Saturdays	>12.5 mph	11.7	12.1	13.6	12.9	11.7

Currently, CUBS staff provides an informational report to the CTA Board of Directors that indicates ridership counts by day and by route, and that provides a five year trend of bus ridership. It also shows the growth rate of paratransit and fixed route services over a five year period, and compares the ridership among the five routes. However, it has not established performance goals such as those described above.

Remedial Actions

This section describes potential responses when a segment fails the Productivity Standard for its category:

Routes that Fail to Achieve System Speed Standard

1. Work with operations staff to ensure that the problem isn't caused by an operations procedure or habit, or a specific operator discipline problem.

   Work with the relevant city to introduce treatments (street design, signalization, etc) to improve speed and reliability.

Routes that Fail to Achieve Passengers per Hour Standard

Does the failing segment score well below system average on speed and reliability? If so, address these problems first. Go through these options in sequence until the problem is addressed:

a. Is there a contextual reason to expect this segment's performance to improve, such as projected redevelopment that will increase demand along the line or between the endpoints? If so, consider retaining the segment on a "watch list" without action. Once the redevelopment has either occurred or clearly will not occur, return to this review. This step may require Board judgment as to how long a service should be allowed to run while "leading development."

b. If frequency were reduced on shoulder periods (evenings, weekend mornings, Saturdays), would this be sufficient to bring Productivity into line? If so, consider targeted reductions in these areas. Where possible, avoid cutting all service at any time of day, or the midday frequency on weekdays.

c. Is the service frequency better than 60 minutes with a span longer than 12 hours? If so, reduce. Generally, frequencies worse than 60 minutes and service spans of less than 12 hours, 5 days a week will discourage ridership and should be avoided.

d. Can the failing route be shortened to eliminate the low performing segment? If so, delete the low-performing segment.

e. Does this route have other failing or low-performing routes nearby? If so, consider combining the best performing segments of both routes into a single service, either a traditional fixed route service or flex-route that requires fewer vehicles.

As a last resort, delete the entire failing route.

Paratransit Service Standards

Performance measures allow paratransit administrators to assess system performance based on their established criteria, and compare that to past measures of performance and target goals. They also enable providers to calculate the benefit of coordination in financial terms and passengers served and further base their resource allocation decisions on that information.

Finally, performance measures also provide data to support further advocacy at a local, state and federal level through the illustration of cost-savings and improved services.

Some key industry paratransit performance indicators include: cost per hour, cost per trip, cost per mile, and trips per hour, and miles per trip. On-time performance is also usually monitored, which is an indicator both for service productivity and for service quality.[20] These indicators are described below:

- **Cost per revenue hour**: defined as annual operating costs divided by annual vehicle service hours. This measure highlights an agency's cost effectiveness, normalizing operating costs (primarily labor and fuel) to the number of hours the service is provided, which is useful when comparing operations between agencies and when analyzing the impact of service expansion or contraction.
- **Cost per trip**: defined as annual operating costs divided by the number of trips provided. For ADA paratransit services, it is common to include rider companions and attendants in the number of trips (i.e. total boardings). This measure allocates operations costs on a per passenger basis which is often useful when analyzing growth trends or when comparing modes.
- **Cost per revenue mile**: defined as annual operating costs divided by annual vehicle service miles. This measure highlights cost effectiveness, normalized to service miles provided.
- **Trips per hour**: defined as annual boardings (again including attendants and companions) divided by annual vehicle service hours. This measure is a key performance indicator highlighting the number of passengers carried for a unit of service delivered. For demand-response services, it reflects the level of shared rides and amount of slack time in a route.
- **Revenue miles per trip**: defined as annual vehicle service miles divided by the number of annual boardings. This measure can show variations or trends in trip length which is useful when examining factors contributing to the efficiency of a demand-response system (longer trips are harder to schedule with shared rides and create more deadhead time where the vehicle is operating without a passenger onboard).
- **Percent of trips on-time**: defined and the percent of all trips where the passenger is picked up within the allotted appointment time window. This measure is a key performance indicator, especially from the customer's perspective, indicating the reliability of the service.

Monitoring the quality of paratransit service is an essential ingredient for good customer service. Since most systems are public-funded, the transit manager needs to improve productivity and effectiveness by providing the most rides possible with existing funds. This need for better productivity has to be balanced with maintaining a level of service that is responsive to the needs of paratransit customers. The City of Longview's contract with its paratransit provider includes two specific service standards intended to monitor service quality; first, it establishes a goal of on-time performance of 90%. On-time is defined as 10 minutes before or 20 minutes after assigned times. A second service expectation is established for on-board travel time for passengers not to exceed 75 minutes. A goal of 90% compliance is established.

Currently, CUBS staff provides the CTA Board of Directors with a monthly report that indicates number of trips provided (including attendants and escorts), number of vehicle revenue hours passenger cancellation and no-shows, and vehicle revenue miles traveled. However, with the

[20] TCRP Report 124, page 31

exception of establishing expectations for on-time performance and length of time on the vehicle, the paratransit program has not established system goals such as those indicated above.

It is important to note, that for most of these "common" indicators, there is no industry standard. For example, while trips per hour can reflect an operator's ability to schedule and dispatch trips efficiently and its ability to group trips, the results vary from community to community. This indicator is often influenced by other external factors over which the operator has no control, such as size of the service area, land use patterns, traffic congestion, etc. Furthermore, the goal should not be considered static and should be set to "raise the bar" in order to achieve system improvements, but also be realistic to attain.

Recommendations

Fixed Route

The following recommendations are specific to the CUBS fixed route program:

1. Establish a set of performance measures and standards that are consistent with the agency's goals and future vision. The measures and standards identified present the consultant team's understanding of the agency's intended future. It is critically important that these be fully considered and ratified by the CTA Board.
2. Develop a consistent methodology for collecting performance data.
3. Develop and implement a system for tracking monthly performance relative to adopted standards. This should include a quarterly review of agency performance with the CTA Board.
4. Establish procedures and a possible course of action if productivity goals are not met.
5. Continue to track fixed route ridership and system usage data that is currently recorded on a daily basis,
6. Every 3-4 years CUBS should sponsor a full boarding/alighting survey that identifies where people board and disembark CUBS buses. This information should then be used to analyze the productivity and effectiveness of individual routes and route segments. When appropriate, remedial changes should be instituted. As necessary, surveys of passenger demographics, travel habits, and transfer activity should also be conducted.

Paratransit

The following recommendations are specific to the CUBS paratransit program:

1. Develop a productivity plan to establish performance goals and objectives, a methodology for collecting relevant data, and a process for monitoring trends over time. The productivity plan should also spell out a possible course of action if productivity goals are not met.

2. Establish performance goals for the following:

   - Average trips per hour
   - Average miles per trip
   - Average operating cost per hour
   - Percent of no-shows for total system ridership

- Level of on-time performance
- Average length of time on vehicle

3. Continue to track paratransit ridership and system usage data that is currently recorded on a daily basis, including: Total passengers, number of cancellations and no-shows, miles traveled, vehicle revenue hours, and monthly operating costs. This baseline information is already being collected and reported to the CTA Board, with the exception of monthly operating costs. To begin with, these goals could be based on actual performance to establish a baseline, but could be revised over time with the intent of "raising the bar".
4. These indicators should be tracked on a monthly basis to reflect trends or patterns. Key findings should be reported to the Board of Directors on a regular basis.