Use of Performance Data[1]

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Introduction

Once the financial and operating data have been collected, and the results compiled, the next step in the performance evaluation process is calculation of the values of the performance indicators, and interpretation and reporting of the results. This section describes three ways to interpret the results of the proposed performance evaluation framework: **1) comparison of system results to norms or standards, 2) peer group comparison, and 3) comparison of current period results to previous periods**. All three methods may be used for both internal management analysis of performance results and presentation of the performance information to external audiences.

This section also discusses methods that can be used to present the results of a performance evaluation. The method used depends upon the intended use of the evaluation. For example, external reporting of the performance evaluation to a governing board, news media, elected officials, and in some cases, funding agencies, can best be accomplished through a graphical presentation of trends in key indicators. Because people think in images, not words or numbers, the use of graphical presentation can hardly be over-emphasized. Suggested formats for this type of presentation are discussed in this chapter.

Interpretation of Results

Performance indicators alone have little value to either the transit system manager or to external audiences. They must be placed in a context that allows them to be compared in one of three ways: **to absolute standards or norms, to the values achieved by similar systems (peers), or to the performance of the same system in previous periods (time-series comparison).** All three methods can be used to interpret and

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communicate the results of evaluation efforts; however, each method has limitations that must be understood when interpreting the results of a performance analysis. The strengths and weaknesses of each of the three methods of interpretation listed above are described in the following section.

Standards or Norms

The first method of interpreting performance indicators is to compare the results for the particular transit system with industry-wide standards or norms. While such standards would provide objective benchmarks for performance comparisons, few if any such standards exist. For example, no ideal productivity rate measured by the one-way trips per-vehicle-hour statistic exists except as an average of the performance for a group of peers or another industry average. The actual productivity rate varies widely depending on the type of passenger being transported, trip length, and trip purpose.

On the other hand, some benchmarks or standards can be put forth as goals for a system. For example, a system policy board could adopt annual performance goals for the coming year. Performance reports for the year would track actual performance compared to these self-imposed standards. Again, some states such as Pennsylvania require that all urban transit systems adopt a set of performance objectives and then report to the public and the State how the agency's service measures up to the goals. For example, ParaTransit, Inc. had adopted annual goals for a wide range of performance measures. Figure 7-1 shows the system's monthly actual cost per passenger trip compared to the cost goal that was assumed during the budgeting process. The goal varies by month due to known differences in cost attributable to, for example, harsh winter weather that reduces ridership and increases operating costs during the December-through-March period.

Funding agencies may also impose standards upon an operation. For example, the system may be required to cover a certain percentage of expenses from passenger revenue, or as in the case of private for-profit systems, may require that systems break even from fares. In these cases, these requirements pose performance goals that can be used to evaluate a specific system's performance.

In addition to self-imposed or funding agency-imposed goals, another way to compare a system's performance to less specifically defined standards is to compare performance of the system to the range of other systems' performance ratings on a specific measure, without formally comparing systems that are peers. For example, no specific standard exists for the performance indicator percentage of live hours to paid driver hours. However, upon examination of the actual experience of a large group of systems one can see that systems typically achieve a percentage of live time in the range of 33 to 66 percent. Therefore, if a system's proportion of live time is less that 33 percent, one might conclude, unless the system has operating characteristics significantly different from those in the sample, that performance needs to be improved in this area.

This method of comparing a system's performance to gross averages or ranges of values for a number of heterogeneous systems can help interpret performance results if a particular indicator is extremely out of line with other systems. However, it is not precise enough to allow for valid comparisons if the system's performance is within the range of other systems and the performance evaluation is being used to fine tune the system's operation. A comparison of the system's performance with that of more

carefully selected peers is more appropriate and will provide more valid comparative information.

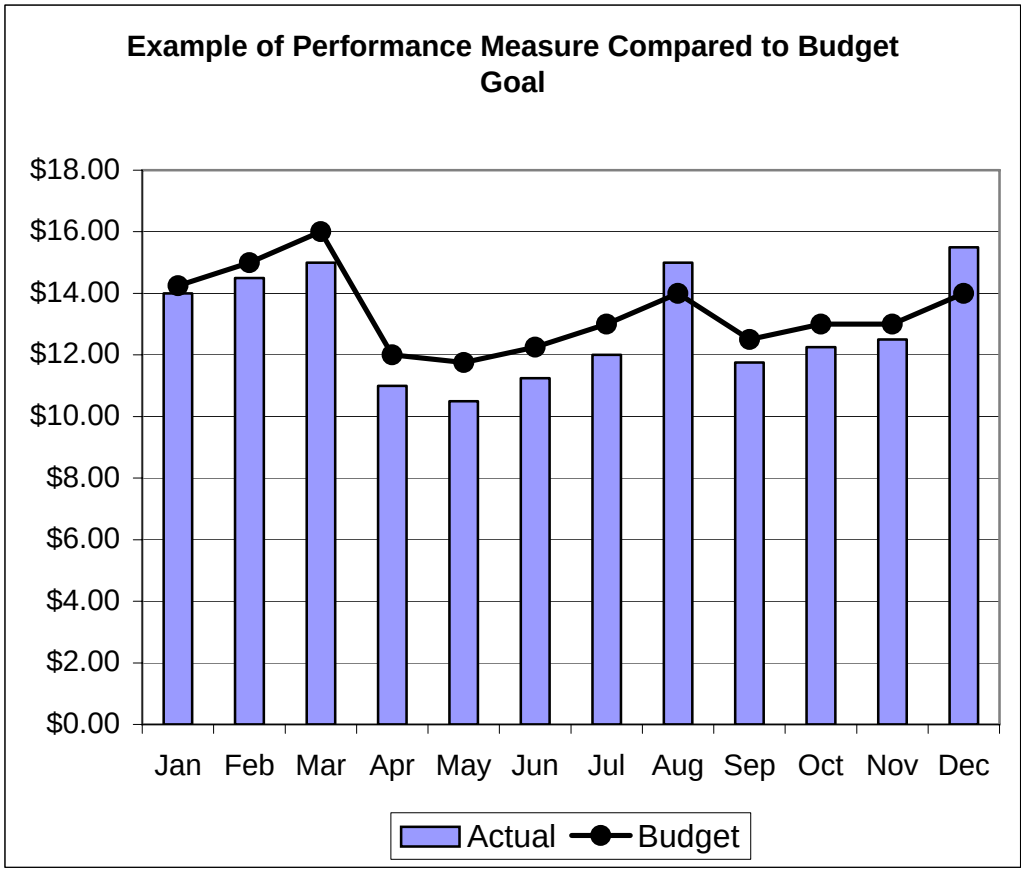


Figure 1. Example of Performance Measure Compared to Budget Goal. Example of performance measure compared to budget goal

Peer Group Comparison

Transit system managers undoubtedly compare their systems' performance to that of other systems with which they are familiar. This is done either informally through discussions with other managers, or more formally through comparison of statistics published by funding agencies. In Pennsylvania, for example, PennDOT publishes annual statistical reports on all of its programs including urban, rural, intercity bus, and paratransit systems. System managers routinely select performance statistics on other systems within the State that they consider peers of their own systems. Not unexpectedly, these managers most often report to external audiences those comparisons that favorably reflect upon their system and downplay less favorable ones.

This tendency to selectively use peer comparisons is one of several shortcomings to peer comparisons of performance data. Other difficulties with this method include selecting peers that are truly comparable to the system being evaluated, and assuring that all peer systems define, collect and report performance data the same way.

The most difficult aspect of peer comparison is selecting the peer systems. The goal of such an effort is to allow comparison of the performance of systems that are similar in the key attributes that influence overall efficiency and effectiveness of operation. Therefore, in order to select appropriate peers for a given system, one must first understand the environment in which the systems operate, as well as their organizational structure, and then select those systems that are similar. Some of the key attributes that should be considered are:

1. Population of area served
2. Type of area (e.g., urban, rural, suburban)
3. Type of population served (e.g., general public or specialized clientele, ambulatory or nonambulatory ridership)
4. Type of service (e.g., random trips or regular scheduled, subscription trips)
5. Type of organization (e.g., for-profit, non-profit, or public agency)
6. Type of operation (e.g., brokerage, direct provider)
7. Size of operation (e.g., annual one-way trips, size of budget, number of vehicles)

Obviously, few systems will be exactly comparable; therefore, some judgement may be required to identify systems that are sufficiently similar to allow for meaningful comparisons.

To use peer comparison as part of the performance evaluation process, one should identify a sample of from 3 to 10 systems that are comparable. Systems within one's home State that receive funding from the same agencies are likely to be most similar. In addition, these similarly-funded agencies will often have data that can be used for the comparisons.

Once similar systems have been identified, the other essential element of peer comparison is uniformity of definitions and data collection methods. This uniformity is difficult to assure for other systems unless all of the systems used for the peer comparison report to the same funding agency, or for some other reason are subject to the same reporting requirements. These systems use common definitions for terms and collect and report data that should be comparable between systems. If a system manager intends to routinely compare a given system to a group of peers, the peer systems should be contacted to determine how their data elements are defined and collected to ensure that valid comparisons are made. Unless one can be certain that the performance measures reported by other systems are equivalent to those being calculated, peer comparison should not be relied upon as a primary basis for evaluating a system's performance.

Time-Series Comparison

Peer group comparisons and comparing system performance to predetermined standards provide objective benchmarks for the transit system. However, time-series comparison--whereby a system's performance is tracked over time and observed for improvement relative to previous periods--represents the most useful comparison both in terms of internal management appraisal, and for external reporting. Furthermore, in many cases, standards or peer data may be unavailable or unreliable so that a system's own data may be the only source of comparative information. This is especially true for measures such as on-time performance or service complaints per 1000 one-way trips, where each system is likely to have different definitions of terms and methods of data collection.

Because a complete performance evaluation framework should take advantage of all available means of comparison, and because one technique need not be used to the exclusion of others, a combination of peer comparison, standards, and time-series analysis should be used to evaluate the performance of a system. All indicators for the system should be tracked over time. In addition, internally set standards should be used to check performance, and, when appropriate and available, peer data should be considered.

Figures 2 and 3 present examples of time-series reporting of performance data. Figure 2 shows quarterly total and senior citizen ridership for a paratransit system. This is the most basic form of time-series presentation. This graphical presentation indicates, for example, that while overall ridership is growing, senior citizen ridership is declining. If a primary goal of the system is to provide mobility to the elderly population, then steps may be needed to increase ridership for this target population. Alternatively, the data portrayed in figure 2 might indicate that nonelderly riders are increasingly using the system, and because capacity is limited, may be depriving senior citizens of service. Obviously, a knowledge of the system is required to interpret the performance data; however, the time-series graph will help the manager to identify issues that need to be addressed.

Figure 3 shows how ParaTransit, Inc. combines a monthly reporting of one-time performance with a comparison to the system's standard of 93 percent on-time trips. This type of graph allows the manager and external audiences not only to see variations in a measure over time, but also to compare actual performance to the goals that were previously established.

In summary, the manager of a transit system should use a combination of comparison methods to help interpret and report the results of a performance evaluation. In all cases, time-series analysis can be used to portray a system's performance over time and to identify positive and negative trends. If the system has established its own performance goals, a highly desirable practice, then the time-series data can be compared to the goals. Also, if funding agencies or other external agencies have established mandatory or suggested performance standards, these benchmarks can be incorporated into the analysis. Finally, if reliable, comparable data from similar peer systems can be obtained, the system's performance can be compared to that of other systems.

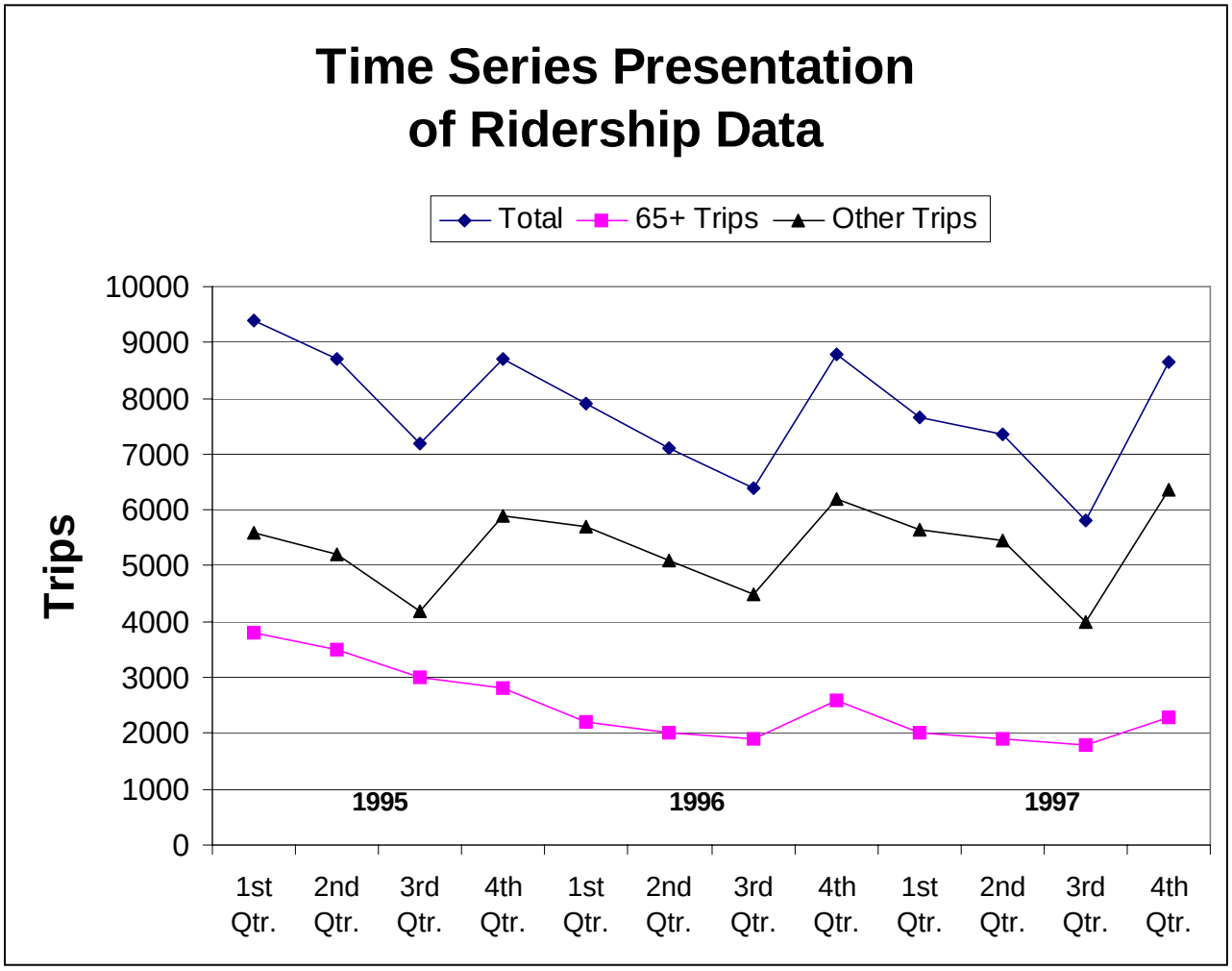
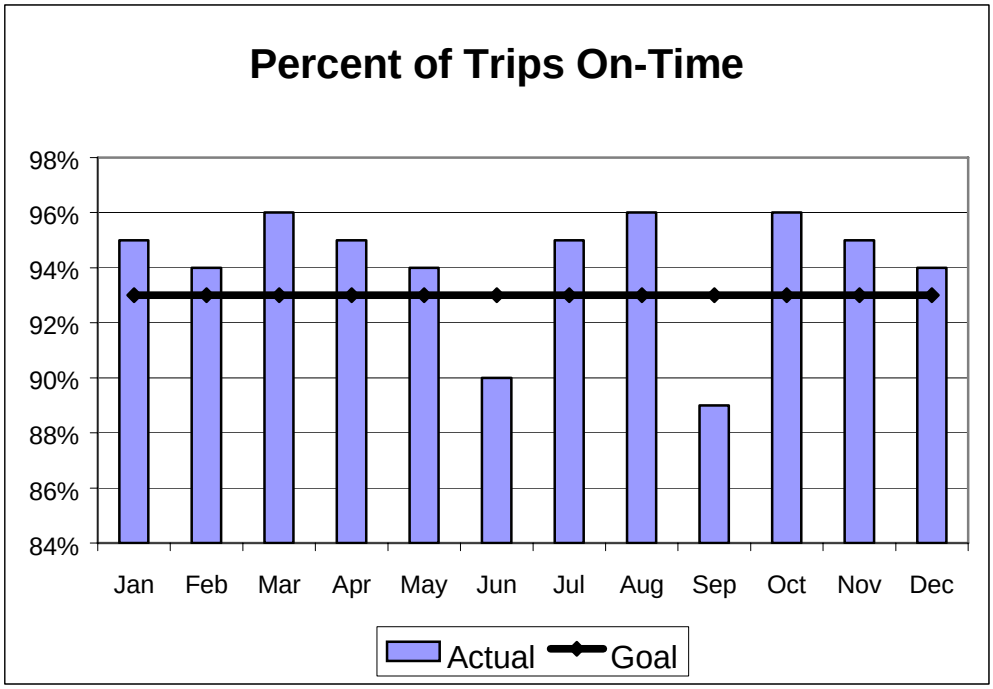


Figure 2. Example of Time-Series Presentation of Ridership Data. Example of time-series presentation of ridership data.
(Hypothetical)

Figure 3. Example of Time-Series Presentation. Example of time-series presentation That Includes Performance Standards.



Presentation of Results

Once the performance indicators are tabulated, and time-series, norm, or peer-group comparisons have been made, the next step in the performance evaluation process is presentation of the results to the intended audience. If the performance evaluation has been prepared solely for internal management use, then the method of presentation is less important than if the results are to be communicated to a policy board, funding agency, or the media. Use of performance indicators for internal management analysis and decision making requires a more complex analysis and presentation of operating and financial data than that which can be effectively presented to external audiences.

Performance reports to external audiences need to be simple yet complete. The ten-indicator list of measures proposed in this guide represents a straightforward report card on a transit system that includes measurements of key aspects of the operation that should be understandable to external audiences. A more lengthy list of indicators, while better describing the details of the operation, will likely overload the reader with information that cannot be accurately interpreted and therefore will be of little value in describing the paratransit operation's efficiency and effectiveness.

For external reporting, a simple graphical presentation format is recommended. Figure 4 presents an excellent example of the type of external reporting that clearly communicates the needed information about key performance indicators. The example is taken from the Queen City Metro General Manager's Report, which is distributed to the board of directors, local elected officials, the media, and other interested parties. This report includes a series of the type of graph and table shown in figure 4. Note that the graph includes time-series data for the fiscal year as compared to the goal for the particular

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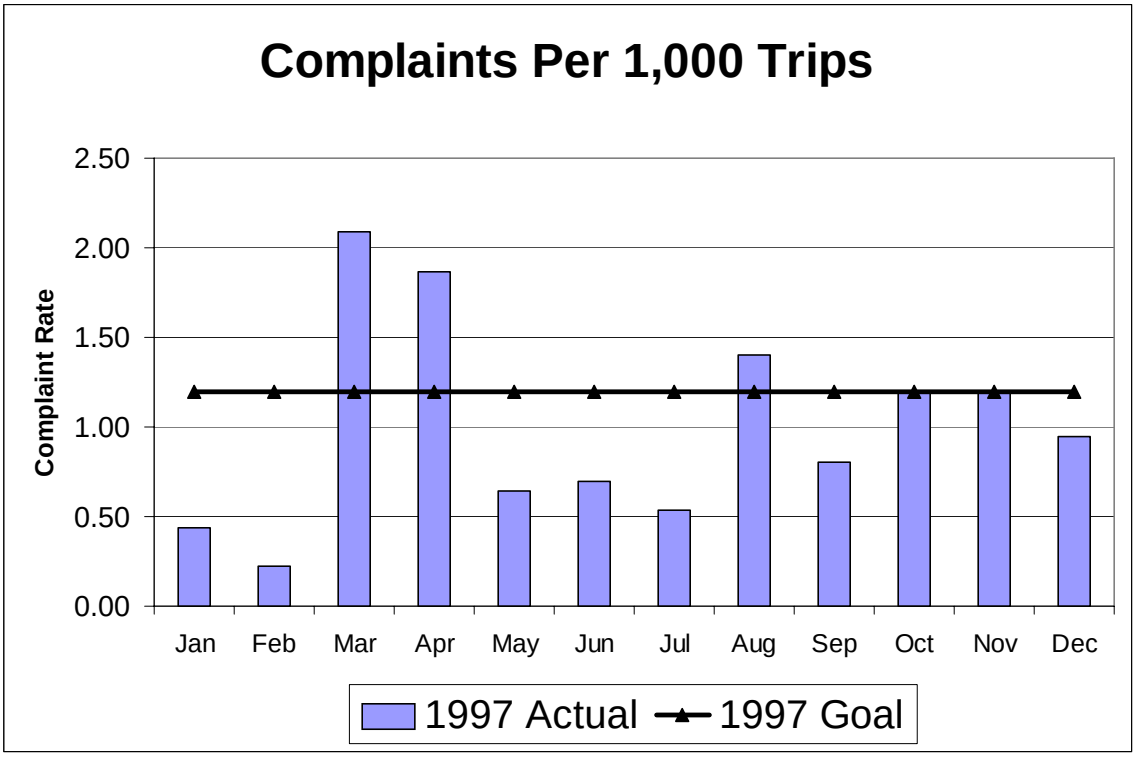
Additional examples of presentation formats are included in a case study example of a performance evaluation. The reader should feel free to design reporting formats that best respond to the needs of the audience. However, the two key attributes of an effective presentation that should be maintained are: the list of indicators, which should be kept at 10 or fewer measures that can easily be understood; and a graphical presentation of the results that is simple but includes key time-series information as well as any standards, norms, or peer comparisons that will help with the interpretation of the data.

Paratransit Trips Per 1,000 Passenger Trips

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997 Actual	0.44	0.22	2.09	1.87	0.64	0.70	0.54	1.40	0.80	1.20	1.20	0.95
1997 Goal	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
1996 Actual	1.70	0.90	0.35	1.40	1.45	0.75	0.66	0.69	1.30	0.90	0.85	0.87

Definition: The number of service delivery and/or equipment complaints per 1,000 one-way passenger trips per month.

Figure 4. Example of Graphical Presentation of. Example of graphical presentation of Performance Results with Definitions and Back-up Data.



Diagnosis of Problems and Corrective Actions.

This section focuses on the use of indicators by the system manager to diagnose system problems and make changes in the operation to improve performance. The performance indicators recommended in this guide represent the starting point in a more detailed analysis of the system's operation. This analysis usually involves examining additional, secondary indicators in order to diagnose fully the cause of problems first identified by one of the primary indicators. The remainder of this section describes how each of these primary indicators can be used along with appropriate secondary indicators to identify problems within the transit system. Possible corrective actions are also presented for each indicator. Additional examples of how these indicators can be used to manage a transit or paratransit system are included in a case study example.

PROBLEMS AND CORRESPONDING ACTIONS

Problem	Indicators	Possible Actions
1. Financial		
A. High Total Operating Cost	PRIMARY INDICATORS Exp/veh.-mi. Exp/veh.-hour Exp/passenger SECONDARY INDICATORS Exp/rev-hour Admin. exp/exp	Decrease expenses Reroute service Expand ridership Decrease deadhead Modify fares Eliminate marginal routes Part time help Renegotiate labor contract Shorten phase-in for new employees Cooperative purchasing and maintenance Insurance pooled risk Private contractors
B. Poor Cost Effectiveness	PRIMARY INDICATORS Rev/rev-hour Rev/passenger SECONDARY INDICATORS Pass rev/rev-mi. Pass rev/rev-hour Pass rev/passenger Pass rev/exp Fares/rev Pass rev/rev	Increase speed Increase service Stop unproductive routes Decrease headways Increase stop locations Increase fares Reduce administrative cost Increase fare paying passengers Increase contract service Increase ancillary services
C. Limited Subsidy Revenue	PRIMARY INDICATORS Rev/exp Subsidy/veh.-mi. Subsidy/veh.-hour Subsidy/pass	Reduce administration Reduce staff Streamline procedures Reduce service Reroute and reschedule Improve promotions Increase fares Modify fare structure Increase contract service Improve fleet reliability

2. Quality of Service

A. Poor Service Quality	PRIMARY INDICATORS % stops on time Complaints/driver SECONDARY INDICATORS Stops with signs/stops Veh.-mi./road call	Monitor drivers Change stop dwell time Reroute congested areas Speed up fare collection Increase stop spacing Improve on-time performance Improve vehicle reliability Improve employee training Improve bus cleanliness Improve preventative maintenance Rehabilitate and replace vehicles Improve passenger amenities
B. Schedule Adherence Problem	PRIMARY INDICATORS % of trips late	Holding strategy Increase run time and/or layover Modify route
C. Unacceptable Crowding	PRIMARY INDICATORS Load factor	Increase frequency Articulated buses

3. Efficiency

A. Poor Productivity	PRIMARY INDICATORS Rev/cost Load factor Pass/veh.-hour	Decrease frequency Split route Short turn strategies Local/express/zonal strategies Partial deadheading
B. Poor Vehicle Utilization	PRIMARY INDICATORS Rev/cost Pass/veh.-hour	Eliminate route segments Eliminate trips Extend route Modify schedule

4. Ridership
   A. Low Ridership

PRIMARY INDICATORS	
Pass/veh.-mi.	Improve cleanliness, safety, and reliability
Pass/veh.-hour	Modify fare structure
	Fare incentives
SECONDARY INDICATORS	Alter routes and schedules
Fare pass/pass	Increase vehicle speed
Elderly pass/pass	Improve marketing
% change pass/year	Decrease deadhead
	Increase number of fare passengers

DATA REQUIRED FOR PRIMARY AND SECONDARY INDICATORS

Performance Concern	Data Needed for Primary Indicators	Data Needed for Secondary Indicators
1. Financial		
A. Expense	Passengers Total expense Vehicle-hour Vehicle-mile	Administrative expense Total expense Vehicle-hour
B. Revenue	Passengers Revenue-hour Revenue-mile Total revenue	Expense Fares Passengers Passenger revenue Revenue-hour Revenue-mile Total revenue
C. Subsidy	Passengers Subsidy Total expense Total revenue Vehicle-hour Vehicle-mile	
2. Quality of Service		
A. System Quality	Complaints Drivers Stops Stops on time	Road calls Stops Stops with signs Vehicle-mile
B. Schedule Adherence	Trips late Trips	
C. Crowding	Load factor	

3. Efficiency
   - A. Productivity
     - Cost
     - Load
     - Passengers
     - Total revenue
     - Vehicle-hours
   - B. Vehicle Usage
     - Cost
     - Passengers
     - Total revenue
     - Vehicle-hours

4. Ridership
   - A. Low Ridership
     - Passengers
       - Elderly passengers
       - Fare passengers
       - Passengers
       - Prior year's number of passengers
       - Year's number of passengers
     - Vehicle-hour
     - Vehicle-mile

Operating Efficiency Indicators

The following three operating efficiency indicators measure the amount of resources required to provide transit or paratransit service.

1. Operating expense per vehicle hour.
2. Administrative expense as a percentage of total expense
3. Live hours as a percentage of paid driver hours.

The most important indicator in this group, operating expense per vehicle hour, measures how efficiently or economically the system provides service. The other two indicators can be used to identify causes if the expense per hour figure is too high. In addition, the live hours/paid driver hours indicator can be regularly tracked to measure the efficiency of dispatching and labor utilization.

The operator's objective should be to minimize the operating expense per hour. At the time of this report, paratransit systems typically reported operating expense-per-hour rates between $16.00 and $30.00. The wide variation is due to differences in labor rates, vehicle maintenance costs, and other factors which vary depending upon the environment in which the system operates. Generally, urban systems experience higher hourly costs than those in suburban and rural areas because of higher labor rates, higher maintenance costs, and higher rents.

Possible causes of higher-than-desired hourly operating expenses include:

- High rates for inputs such as labor and maintenance
- High administrative expenses relative to the amount of service provided
- High percentage of paid driver hours versus vehicle hours
- Old, high-cost fleet that requires excessive maintenance expenses.

Labor rates paid for drivers are largely determined by the environment in which the system operates so that, to a great extent, this factor is out of the control of the manager. However, an effective manager should continuously seek ways to keep total labor wages and benefits at the lowest level consistent with attracting qualified drivers. Part-time drivers and volunteer drivers often can be used to reduce labor expenses.

Maintenance expenses are also a major, controllable cost for transit systems. Obviously, an old fleet with worn-out vehicles will result in extremely high maintenance expenditures and therefore increase the overall cost of operation. If high maintenance costs for old vehicles are expected to be a cause of the high overall operating cost, performance measures such as maintenance expense per vehicle mile can be calculated and compared with those of similar systems. Such information can then be used by the manager, the policy board, and funding agencies to support the case for capital funding of new vehicles.

Another cause of high maintenance expenses may be an ineffective preventive maintenance program, or a poorly run maintenance program that results in premature failure of repairs or a high frequency of breakdowns. The service quality indicators related to complaints and on-time performance may provide support for this diagnosis. Also, more detailed analysis of the causes of breakdowns and unscheduled

maintenance may provide insight into the validity of this cause of high maintenance expense.

High overall operating expenses may be due to the level of administrative expenditures relative to the size of the operation. Small publicly-owned systems often suffer from an administrative structure that is too large for the number of rides provided. Spreading of administrative expenses is always a problem for a small operation since basic management, accounting, personnel, and other functions must be provided no matter how small the system. However, public agencies often employ administrative and support staff beyond that needed for efficient operation.

One way to evaluate this potential cause of high cost is to examine the ratio of administrative expense to total operating expense. As indicated earlier, administrative expense must be carefully defined, especially when the statistic is to be compared across systems. As used in this guide, administrative expenses do not include passenger reservation and dispatching expenses, a cost commonly included in the administrative category. Assuming the narrower definition of administrative expenses, paratransit systems typically devote 8 to 15 percent of their expenses to administration. Values in excess of 15 or 20 percent suggest that the system should either increase ridership to support the administrative structure that has been established, or it should reduce administrative staffing and expenses to the scale appropriate for the size of the operation.

Finally, the third efficiency indicator, live hours as a percentage of paid driver hours, can be used to evaluate how efficiently the greatest single expense, the driver, is used. The live hours statistic represents the amount of time the driver spends actually transporting passengers. The difference between live time and total paid driver hours represents dead time spent traveling between trips, and time spent "on the clock" but not in service. While some dead time is unavoidable, too much dead time may indicate ineffective dispatching and trip scheduling. It may also indicate that rider demand is insufficient to support the number of drivers in service.

While paratransit systems are usually not burdened with labor work rules that mandate full shifts or payment for non-revenue time, these systems often suffer from driver staffing levels that do not match demand. This situation is particularly common when county or municipal employees of a paratransit system are paid for a 37.5 or 40-hour workweek even though the demand characteristics of the service result in significant off-peak periods with little demand.

The Pennsylvania systems that reported data on the percentage of live hours to paid driver hours most often reported that drivers spent between 33 and 66 percent of their paid time actually transporting passengers. A more detailed examination of cases where live time represented less than a third of total driver time indicated that too many drivers were employed for the level of demand, and that part-time drivers should have been used in some cases (where, for example, demand occurred within two narrow time periods and therefore could not justify full-time drivers).

Effectiveness Indicators

The first three indicators described above measure how efficiently a transit system could produce its service. They reveal nothing about how well the service is used. However, the following two performance measures do indicate how effectively the service is provided, relative to the cost of providing it and the extent to which it serves the target population it was designed to serve. These measures are:

1. One-way passenger trips per vehicle hour
2. Senior citizen one-way passenger trips per senior citizen resident in the service area.

The first measure, one-way passenger trips per vehicle hour, is perhaps the most important single indicator that can be tracked for a transit system. It indicates how successful the system is in providing its product and how well the supply and demand for service are matched to each other.

A review of the Pennsylvania system statistics, as well as reports on other systems around the United States indicates that paratransit systems typically average from 2 to 6 one-way trips per hour if they provide a significant amount of random trips, or as many as 10 one-way trips per hour if a large portion of their demand is accounted for by group trips such as to senior centers. The number of rides a system can provide per vehicle hour depends on a number of factors, including:

- Average trip length. The average trip length in rural areas is likely to be much greater than that in urban areas; therefore, fewer passengers per hour can be served.

- Population density and the concentration of rides. Because more riders can be picked up and delivered in a given time period in a more densely populated area, more rides can be provided per hour. On the other hand, in very densely populated areas, traffic congestion may reduce productivity.

- Type of service provided. High ridership per hour (10 one-way trips or more) can be achieved if the system provides regularly scheduled route service to senior centers, sheltered workshops, and other locations where full vehicle loads can efficiently be assembled. On the other hand, systems that provide medical transportation for non-ambulatory passengers may achieve ridership productivity rates of 1 or 2 one-way trips per vehicle hour.

- Dispatching efficiency. The number of rides per hour can be influenced by the efficiency of the dispatchers in grouping rides and organizing vehicle tours.

- Driver scheduling. As indicated above, overall productivity, as measured by one-way trips per vehicle hour, can be greatly influenced by the match between demand and driver shifts. If a driver is scheduled for 8 hours of work and produces 8 vehicle hours, but demand is effectively satisfied with trips during only 3 hours, then overall productivity will be greatly reduced.

The first three factors listed above, while generally beyond the control of the paratransit system manager, are environmental control variables that should be considered when

selecting peer systems for comparison. The other two factors, dispatching and driver scheduling, are within the control of the manager, and are the primary factors that should be examined if the one-way trips per vehicle hour statistic is too low.

Unfortunately, the most effective approach for increasing productivity as measured by this indicator is to decrease the number of drivers or change some full-time driver slots to part-time ones. Neither of these actions is a popular one. A more positive approach, and one that should be tried before reducing service, is to encourage increased ridership during off-peak periods when greater passenger traffic could be served. In either case, the manager's objective should be to more closely balance demand with the service supplied. This can best be accomplished by looking at each component of the service (e.g., each vehicle or service sector). The case study in chapter 7 presents this type of detailed analysis that helps the manager to determine if the entire system performs poorly, or as is more often the case, poor productivity in one or two service sectors is dragging down overall performance.

The second effectiveness indicator listed above, one-way senior citizen trips per senior citizen resident, indicates how well the service responds to the needs of the community being served. While the indicator used in this guide compares senior citizen usage to total senior citizen population, other population groups such as low-income or disabled persons could be targeted, depending upon the objectives of the system. Because calculation of this measure relies on U.S. Census data, the indicator should use census data that is readily available.

Again, using the Pennsylvania experience, the systems in the State provided about 4 annual one-way trips per senior citizen resident. The value of this indicator varies significantly from community to community due to factors such as the amount of service provided, the availability of other public and specialized transportation services in the community, the quality of the service, and the fare charged for the service. A free, high-quality service that is readily available to residents will be used much more intensively than a high-fare, low-quality system that, because of equipment availability or policy decision, limits trips.

The system manager can use this indicator to determine whether the target population is being served, and whether additional marketing efforts or other actions are likely to result in increased ridership. If, for example, the value of the indicator for the system being evaluated is 7 one-way trips per capita, major growth in ridership would not seem likely. Therefore, efforts to increase productivity as measured by one-way trips per vehicle hour should focus on the denominator rather than the numerator, and service hours should be cut.

Service Quality

Most often, the system manager focuses upon financial and productivity indicators, since operating within budget and providing as many rides as possible are the primary goals of specialized as well as general public transit systems. However, a balanced performance review should include one or more indicators of the quality of the service provided. Two quality-of-service measures are included in the proposed evaluation guide:

6. Service-related complaints per 1,000 one-way passenger trips
7. On-time pick-ups as a percentage of total pickups

The two measures are interrelated because late pick ups are likely to become service-related complaints; however, complaints also result from other factors. The most effective way to identify the cause of complaints and ultimately to reduce them is to document each one and develop a reporting system that summarizes them. Adequate documentation will allow the manager to determine if a particular driver, vehicle, rider, or portion of the service area is responsible for an inordinate number of the complaints. Building a written case by using complaint information will also allow the manager to discipline, or ultimately dismiss an employee who is the cause of the complaint.

The on-time performance indicator can be used to monitor the quality of service that is delivered, and then, by taking appropriate action, improve the service so that complaints can be avoided. Because the on-time performance data is obtained from driver logs and therefore can be tabulated by driver, vehicle, or service area, the manager can determine the factors leading to poor service quality. Perhaps a particular vehicle is off schedule because of frequent breakdowns, or a driver is always late because of poor work habits, or lack of knowledge of the service area. If none of these factors is at fault, perhaps the dispatchers need to revise their scheduling to allow for more time between trips or schedule fewer trips per hour. This latter factor is often the cause of late trips because trips are scheduled too closely, so that when a rider is late for a pickup or if other disruptions delay the schedule, many trips will be thrown off schedule. The manager needs to closely monitor the dispatching function so that the proper trade-off between operating efficiency (trips per hour) and on-time performance can be achieved.

Financial Indicators

Every transit or paratransit system manager must be concerned about the financial performance of the system, whether as a private for-profit taxi operator that seeks a profit or as a government or nonprofit agency that seeks to balance the budget through passenger revenues and grants. Two key indicators that track the financial viability of the system are:

8. Operating expense per one-way passenger trip
9. Passenger revenue per one-way passenger trip

Both indicators should be calculated for the system as a whole and for sub-services. The cost allocation method described in chapter 4 can be used to estimate the cost of providing particular sub-services. The revenue earned by each sub-service can best be calculated using the methods described in section 5.

Although each measure should be tracked independently, the most likely use of these indicators will be in comparison to each other. If the goal of the - system is to cover all expenses from fares, then the operating expense and passenger revenue per passenger should be equal. If the system is subsidized so that the policy goal is to recover 50 percent of the cost from passenger fares, then the average revenue per passenger should equal at least half the expense per passenger.

Considered independently, the expense per one-way passenger trip figure can be used to evaluate whether other service options are less expensive and therefore should be considered. For example, if a trip costs $5.50 to provide, but an exclusive taxi ride for

the same distance would cost $4.50, then the paratransit manager should consider contracting with the taxi for the trip.

If the expense per one-way trip is too high when compared to previous time periods, or to peer systems, the manager needs to examine the factors discussed above for the indicators expense per vehicle-hour and one-way passenger trips per hour. If revenue per passenger is too low, then steps need to be taken to raise fares.

Safety

The final indicator on the proposed 10-measure list tracks the paratransit system's accident record. Safety performance is measured by the following indicator:

10. Avoidable accidents per 100,000 vehicle miles

Unlike most of the other indicators that can be measured for a short time interval and for sub-services of the system, avoidable accidents per 100,000 vehicle miles should only be reported for the overall system. The primary reason for this is that most paratransit systems would experience only a few accidents system-wide for an entire year, so that a single accident would cause a wide variation in the statistic on a month-to-month basis or between small sub-services.

The most likely cause of a high level of avoidable accidents is driver error. Careful selection of drivers and continuous driver training are the two actions that will result in a reduction in this indicator. The manager should also review accident patterns to determine if particular locations are hazardous and result in a high proportion of accidents, or if design flaws in vehicles make them more accident prone due to such factors as blind spots, excessive overhangs, etc.

The list of causes and solutions for poor performance as reflected by the proposed indicators is meant to be representative and not exhaustive. Additional examples of how the performance measures can be used to diagnose