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Shared-Ride Paratransit Performance Evaluation Guide

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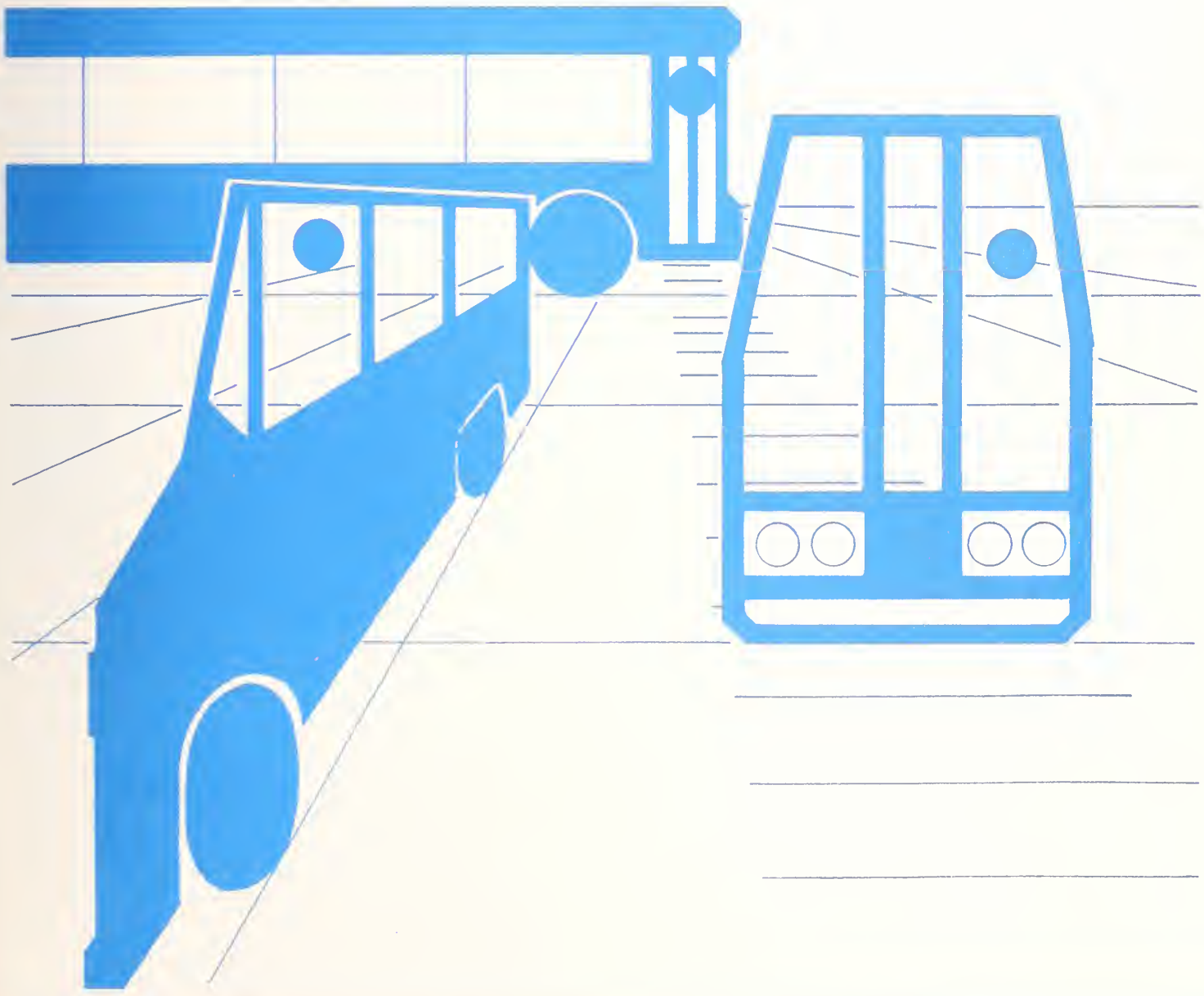

UMTA Technical Assistance Program

Shared-Ride Paratransit Performance Evaluation Guide

Final Report
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Prepared by
James H. Miller
The Pennsylvania Transportation Institute
The Pennsylvania State University
University Park, PA 16802

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16. Abstract

Shared-ride paratransit systems, ranging from public shared-ride taxis to human service agencies that provide specialized transit service for elderly and handicapped persons, provide essential, but often high-cost, mobility to residents in both urban and rural areas. Managers of these systems are increasingly being called upon to improve the cost-effectiveness of these services, and to provide performance reports to funding agencies, policy boards, and others to assure them that their funds are being spent wisely.

The performance evaluation procedure described in this guide meets these two requirements by providing management with an important diagnostic tool to gauge the efficiency and effectiveness of shared-ride paratransit systems. It also provides external reviewers with a report card on the performance of the system.

A 10-indicator evaluation framework that uses readily available data is proposed. The guide presents detailed information needed to collect data for these measures, and also explains how to obtain the cost information needed for several measures. Finally, the guide offers recommendations on how to present the results of the analysis and use the indicators to diagnose and correct problems with the system.

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1. PURPOSE AND ORGANIZATION OF THE GUIDE

WHY MONITOR SYSTEM PERFORMANCE?

Shared-ride paratransit systems, ranging from public shared-ride taxi systems to human service agencies that provide specialized transit for elderly and handicapped persons, have increased in number, size, and complexity during the past 10 to 15 years. These systems provide essential, but often high-cost, mobility to residents of both urban and rural areas. Because most of these paratransit services depend on increasingly scarce, publicly-provided funding, paratransit system managers must improve the sophistication and effectiveness with which they manage the systems to provide the most rides possible with available funds. Further, funding agencies and elected officials often insist on performance reports to ensure that their funds are being spent wisely. Consequently, shared-ride paratransit systems need to adopt a performance evaluation procedure that responds to these concerns.

The performance evaluation procedure described in this guide meets these two requirements by providing management with an important diagnostic tool to gauge the efficiency and the effectiveness of the operation. This procedure can also provide funding agencies, elected officials, and the general public with a report card on the performance of the paratransit system that can be used to justify needed public funds. This guide proposes a procedure that uses readily available data and that can be used to evaluate all sizes of shared-ride systems. In addition to describing how the data can be collected, this guide also describes corrective actions that can be taken to remedy substandard performance. Substandard performance is identified by a particular indicator that is unfavorable when compared to other peer systems or to a system's prior performance. Finally, the guide describes a presentation format that can be used to organize the data for internal evaluation and for use in communicating a system's performance to policymakers and the general public.

Shared-ride paratransit system managers continually should want to monitor their system's performance so that they can identify problems and

remedy them. "We never do anything much about a problem until we learn to measure it."[1] As Gordon J. Fielding, one of the foremost experts on performance evaluation, says, "Particularly important for strategic management in transit are the measuring and monitoring of performance; without such evaluation, managers are merely supervising operations."[2]

Though these comments were written primarily for managers of larger fixed-route systems, they apply equally to small public and private shared-ride systems. Shared-ride managers need to monitor performance in order to:

1. Control costs
2. Justify changes in service levels (hours of operations, number of vehicle in service)
3. Monitor subcontractors
4. Guide marketing efforts
5. Ensure the financial integrity of the system

Because only a few key indicators are needed to monitor the important aspects of shared-ride transit system performance, the procedure is relatively easy to implement for even the smallest shared-ride system. While some useful indicators may require that additional data be collected and analyzed, the critical indicators can be developed using readily available financial and operating data.

Performance monitoring also benefits the shared-ride system manager by providing the manager with a means to communicate fundamental information about the shared-ride systems to the organization's constituencies, including outside funding agencies, the media, the general public, elected officials, employees, and policy boards. Just as private corporations report key performance indicators, such as sales, profits, and return on investment, managers of shared-ride systems can report financial and operating data to the

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[1] Moynihan, D. P., "The Politics and Economics of Regional Growth," *The Public Interest*, 1978, 51, p. 12.

[2] Fielding, Gordon J., Managing Public Transit Strategically: A Comprehensive Approach to Strengthening Service and Monitoring Performance, (San Francisco: Jossey-Bass Publishers, 1987), p. 59.

groups listed above. Not only will these constituencies better understand the benefits and costs of the shared-ride system, but a regular report card on operations will convey management's effective stewardship of the system and inspire confidence in the organization and its management.

While many of the performance indicators and evaluation procedures described in this manual are the same as those used to evaluate fixed-route transit performance, shared-ride systems have several performance evaluation-related characteristics that distinguish them from scheduled operations. First, because of the relatively low productivity of shared-ride systems--measured by one-way passenger trips per vehicle hour--the per-trip cost of shared-ride systems is high. Furthermore, small changes in the passenger-per-hour indicator will have a major impact on the financial viability of a shared-ride system. Therefore, shared-ride system performance evaluation must place priority on the vehicle and driver productivity as measured by this key indicator.

Another characteristic of shared-ride paratransit systems that distinguishes them from fixed-route bus systems is the information system used by shared-ride systems to schedule, dispatch, and charge for transportation services. Shared-ride systems focus on the individual passenger trip as the basic unit of service whereas fixed-route systems usually maintain aggregate information based on runs or scheduled hours. While the trip-by-trip record-keeping required by shared-ride operations is tedious to maintain, it provides an enormously useful source of primary data for shared-ride system evaluation and serves as the basis for most of the procedures described in this manual.

SCOPE AND ORGANIZATION OF THIS GUIDE

This guide is designed to be a resource for shared-ride paratransit system managers to help them develop a performance procedure for their operation, be it a private shared-ride taxi service, a human service transportation system, or a specialized transit system operated by a public transit agency. Because urban and rural shared-ride systems are similar in most evaluation-related aspects, the procedures described here are applicable to both operating environments.

The procedures presented in this guide have been developed based on a review of the relevant literature, as well as extensive experience gained from assisting private and public shared-ride systems in conducting performance evaluations. Most of this experience resulted from training and technical assistance projects that assisted Pennsylvania shared-ride operators to set up and evaluate their systems.

This guide is organized into four major sections. The first section (chapters 2 and 3) presents the theory and general framework of the performance evaluation methodology, including the selection rationale of the goals and objectives, the specific indicators to be monitored, and presentation formats to communicate the results of the evaluation. The second section of the guide (chapters 4 and 5) presents detailed information needed to collect necessary data, including service-specific cost statistics. The third section (chapter 6) describes corrective actions/policies that can be implemented to correct substandard performance. The final section of the report (chapter 7) presents a case study that illustrates the application of the methodology to a typical system. To facilitate comparison of the individual shared-ride system to similar systems, selected peer data from Pennsylvania and other States are presented in the appendix. A glossary of terms used in this report is also included in the appendix.

As is discussed in chapter 2, worthwhile peer group analysis requires careful selection of the systems to be used for the comparison; therefore, not all data will be relevant to all shared-ride agencies. For example, systems that primarily provide group transportation for human service agency clients should not be compared to systems that provide random, many-to-many, demand-responsive transportation for medical trips; the different demand characteristics result in inherently different productivity levels for the two systems. Likewise, public agencies that contract with private carriers should not be compared to public agencies that directly provide service, as these two systems exhibit fundamental differences in administrative costs and requirements.

2. THE SHARED-RIDE TRANSIT PERFORMANCE EVALUATION FRAMEWORK

The general framework for evaluation of transit system performance has been widely described in previous studies. Several excellent sources that were drawn upon for this chapter include the seminal work by Gordon J. Fielding that is summarized in his recent book on strategic transit management.[3] Other hands-on guides that present evaluation frameworks for rural systems include the Transportation Resource Management for Rural Elected Officials - Resource Notebook,[4] prepared for the U. S. Department of Transportation, and the Rural Public Transportation Performance Evaluation Guide, prepared to assist rural transit systems in Pennsylvania.[5]

The specific performance indicators described in these resources primarily apply to the evaluation of fixed-route systems; however, the general evaluation framework proposed applies to both fixed-route and demand-responsive shared-ride systems. As will be described later in this chapter, the principal differences between fixed-route performance evaluation techniques and those described in this guide as appropriate for shared-ride systems are the specific indicators to be calculated and the methods used for collecting the required data.

USES OF THE SHARED-RIDE TRANSIT PERFORMANCE EVALUATION PROCEDURE

The results of the performance evaluation procedures described in this guide can be used for at least two major purposes: (1) to provide the manager with indicators of performance in order to diagnose and correct problems, and (2) to allow constructive communication between the shared-ride system management and its constituencies. While the overall evaluation framework

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[3] Fielding, Chapter 4.

[4] Peat, Marwick, Mitchell, Inc., Transportation Resource Management for Rural Elected Officials - Resource Notebook, USDOT, April 1985. (DOT-I-85-29)

[5] Carter-Goble Associates, Rural Public Transportation Performance Evaluation Guide, Prepared for the Pennsylvania Department of Transportation, Harrisburg, Pennsylvania, November 1982. (DOT-I-83-31)

applies to both purposes, the number of performance indicators calculated and reported differs significantly for each purpose. Specifically, the use of the performance evaluation methodology for internal management requires the use of more indicators to diagnose and monitor operations within specific functional areas, whereas external communication objectives are better accomplished by reporting a few key indicators of overall system performance.

For example, internal managerial use of performance indicators requires a two-step process: (1) continuously monitoring a number of general diagnostic performance indicators to identify problem areas within the shared-ride system, and (2) collecting additional data to calculate more specific measures related to a specific problem area. These problem areas may be overall system performance or effectiveness such as low ridership, high cost, low service productivity, or problems within a specific functional area such as maintenance or administration. Furthermore, because the financial viability of shared-ride systems is so sensitive to minor changes in productivity, shared-ride system managers need to continually monitor the performance of individual subservices within the overall shared-ride operation. These subservices may include individual vehicles or service sectors, the services provided by individual subcontractors, or the services provided at different times of the day or days of the week. Whereas the general set of indicators can be derived from readily available data, the secondary performance indicators that can be used to diagnose specific problems will often require costly and time-consuming data collection. Consequently, while managers may not be able to routinely monitor these secondary indicators, they can collect the appropriate sample data in response to specific problems.

By contrast, the use of performance indicators to communicate to various constituencies such as the policy board, the general public, or employees can best be accomplished by reporting a very limited list of systemwide measures that may include, for example: operating expense per one-way passenger trip, operating expense per vehicle hour, passenger trips per vehicle hour, overall cost recovery, and service-related complaints. The values for these measures can be presented and compared to previous time periods or to target values set for the system.

Finally, in addition to using performance evaluations for internal management or communication purposes, shared-ride operators are often required to provide funding agencies with data and/or performance indicators that influence funding provided to the shared-ride system. In Pennsylvania, for example, each of the State's nearly 100 shared-ride programs funded by the Pennsylvania Department of Transportation (PennDOT) must submit monthly and quarterly data that allow the funding agency to monitor key performance variables such as passenger trips per vehicle hour, revenue per passenger, and percentage of driver time spent actually transporting passengers. These performance measures are used along with other data when the State determines the reimbursement level it will approve.

Usually the performance measures required by a funding agency are specified by that agency so that the shared-ride system manager has little latitude in designing a performance evaluation framework for this purpose. Therefore, this use of performance evaluation will not be specifically addressed in this guide. However, the funding agency needs should be considered when designing both the internal evaluation framework and the communications-oriented performance reporting so that the mandated data and indicators can be tracked along with the ones designed for the other purposes. Most often, the data requirements of all three uses of performance evaluation overlap, so that the effort needed to achieve the three reporting objectives will be reduced if these needs are considered together when designing a shared-ride performance evaluation framework.

THE SIX-STEP EVALUATION PROCEDURE

The performance evaluation process consists of six steps as shown in figure 1. Because the process of identifying problems and solving them is a continuous one, the performance evaluation framework described here is a loop whereby the results of specific actions are further evaluated using the performance measures that are used to quantify the goals and objectives set for the system. An overview of the six steps is presented in this chapter; more detailed descriptions of each performance measure, data collection, and diagnostic information are presented in later chapters of this guide.

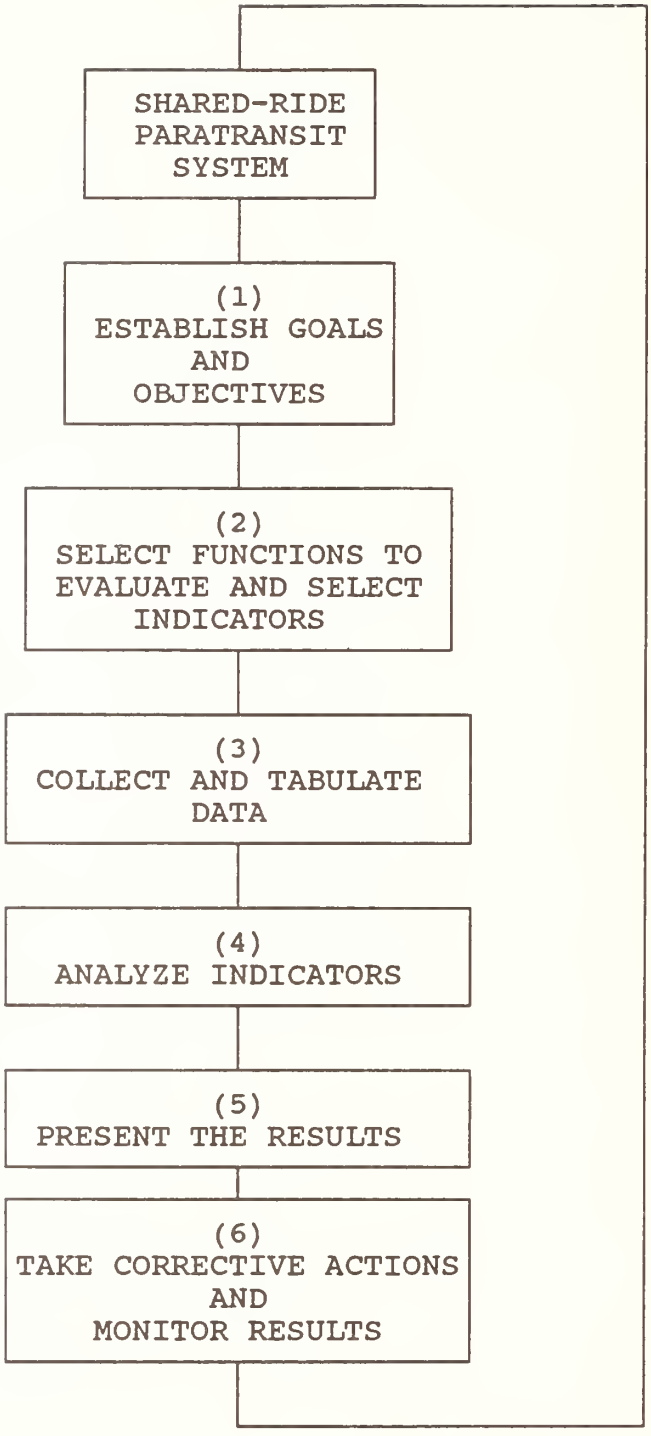

Figure 1. Shared-ride performance evaluation framework.

ESTABLISHMENT OF GOALS AND OBJECTIVES

The first step in setting up a performance evaluation process is to define the overall system goals and objectives. While each shared-ride system may have specific local goals and objectives, most often the overall goal of a shared-ride system can be stated as follows:

> GOAL: to provide, safely and reliably, the greatest number of shared-ride trips to the greatest number of persons at the lowest possible cost within the budget provided.

After the general goal of a shared-ride system is established, more specific, quantifiable objectives must be defined so that the specific measures necessary to a performance evaluation methodology can be determined. In the case of the general goal stated above, a number of more quantifiable objectives are implicit within this overall goal statement. These objectives can be grouped into categories such as financial, safety, ridership, and service quality. Specific indicators can then be selected to measure accomplishment of these specific objectives.

A sample set of measurable objectives that logically follow from the previously stated goal statement might include:

Operating Efficiency

1. Operating expense per vehicle hour should not exceed the statewide average and should annually increase by no more than the rate of inflation.

2. Administrative expense as a percentage of total operating expense should not exceed 15 percent.

3. The percentage of live hours (when passengers are in the vehicle) to total paid driver hours should be at least 50 percent.

Effectiveness

4. A minimum of 3.5 one-way passenger trips per vehicle hour should be provided.

5. A minimum of 4.0 one-way passenger trips by senior citizens should be provided annually for each senior citizen within the service area.

Service Quality

6. Service-related complaints by customers should not exceed one complaint per 1,000 one-way passenger trips.

7. Ninety-five percent of all pickups will be made within ± 15 minutes of the promised time.

Financial

8. The expense per one-way passenger trip should increase by no more than the Consumer Price Index and should not exceed the maximum rate allowed by the State DOT.

9. The revenue per one-way passenger trip should be set to recover, on average, 100 percent of the operating expense per trip.

Safety

10. The system should have no more than one avoidable accident per 100,000 vehicle miles.

This sample set of objectives is not meant to be comprehensive; many other worthwhile quantitative and qualitative objectives can be defined. However, this set encompasses the major, measurable objectives that might be established by a shared-ride system that serves a specialized or general market.

Measurability is an essential attribute of objectives formulated for use as part of a performance evaluation framework. Certain qualitative aspects of a shared-ride system, such as the degree to which the transportation service affords individuals the opportunity to lead a "full life," while laudable, are nonetheless difficult or impossible to measure. Therefore, a list of the objectives of a shared-ride system such as the one presented above must be limited to financial and operating attributes of the system that can be unambiguously measured.

Data availability and data collection costs also limit the range of objectives that can be considered since shared-ride systems typically have few resources available to them to support extensive data collection efforts. Ideally, the performance evaluation framework should be workable using readily available or easily collectable information. Fortunately, experience has shown that a small number of objectives, measured by clearly defined performance statistics, provides for the most effective evaluation process and, therefore, the resource limitations of a shared-ride system do not preclude an effective evaluation process.

SELECTION OF PERFORMANCE INDICATORS

After the shared-ride system's objectives have been clearly defined, the next step in the performance evaluation process is the selection of the specific performance indicators which will measure accomplishment of the objectives. Three subissues related to the selection of indicators include:

1. The extent to which a specific indicator has a generally agreed upon meaning, permitting cross-system comparisons, can be calculated using readily available or easily collectable data, and is unambiguous as to its meaning.

2. The operating level at which the indicator will be applied; for example, will the indicator be used to measure overall system performance, or will it be used to measure subservice performance, such as by time of day or service sector area?

3. The time period to be measured (e.g., annual, quarterly, monthly).

Dozens of indicators can be calculated using readily available information; however, a few key measures that meet the characteristics listed above are all

that is needed to carry out an effective evaluation process. Gordon Fielding found, as the result of his research, that a preliminary list of 48 indicators could be reduced to 7 "marker variables" that captured the essential aspects of fixed-route performance.[6] A similar, selective list of indicators for shared-ride systems is proposed in this guide. A short, focused list of indicators not only reduces the data collection required, but will encourage managers and external constituencies to focus on the overall condition of a shared-ride system before delving into detailed aspects of subfunctional areas.

The first step in selecting indicators is to identify measurable indices for each objective developed in the framework of goals and objectives established in step one. After an overall list has been compiled, the list should be screened to eliminate indicators that measure the same performance attribute. For example, indicators with miles or hours in the denominator generally can be substituted for each other (e.g., expense per mile and expense per hour both track overall efficiency so that only one of these indicators is needed in an evaluation framework to measure the efficiency of a shared-ride system).

Data availability and data collection costs will undoubtedly be the most important determinants of whether a performance indicator can be considered for inclusion in the shared-ride evaluation methodology. For example, an excellent measure of services delivered is passenger miles; however, calculation of the average trip length data needed to estimate passenger miles is very time consuming, and therefore may preclude use of this measure.

Moreso than the sheer number of indicators selected, the system level at which the indicators are calculated and the frequency with which they are reported will determine the resources required to conduct the recommended evaluation. Disaggregation of financial and operating data by service sector,

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[6]Fielding, Gordon J., Managing Transit Strategically, pp. 64-65. The seven performance indicators include: revenue vehicle hours per operating expense, unlinked passenger trips per revenue vehicle hour, corrected operating revenue per operating expense, total vehicle hours per total employees, total vehicle miles per peak vehicle, total vehicle miles per maintenance employee, and total vehicle miles per collision accident.

or time of day, not only requires maintenance of more detailed data files; it also requires that cost information usually maintained at the system level be allocated to subservices. Monthly or quarterly analysis also requires that accrual accounting systems be used to report financial data. While the record-keeping and additional methodological issues increase the complexity of the performance evaluation process, shared-ride systems need the type of data that this evaluation provides. Therefore, a primary goal of this guide is to assist shared-ride system staff in developing and implementing such an evaluation scheme by providing easy-to-understand explanations and examples of the recommended approach.

COLLECTION AND TABULATION OF DATA

After the overall goals and objectives of the shared-ride system have been determined and the specific performance indicators are selected, the data elements needed to calculate each indicator must be collected. Nearly all of the data required to perform the performance analysis can be obtained from basic financial and operating records normally maintained by a shared-ride system. For example, except for accident and complaint statistics, all data required to calculate the performance indicators listed earlier in this chapter can be obtained from the driver's log and the system's financial accounting system. Furthermore, the accident and complaint data can be obtained through a simple record-keeping system that tabulates these events.

While the basic data for the performance evaluation can be obtained from readily available sources, these data must be analyzed and aggregated before they can be used to calculate the required measures. Before aggregating the raw data into the performance indicators, the time period must be established for the analysis and the operational level being considered. Typically, a performance evaluation such as the one described in this guide covers a 12-month period of operation so that annual financial and operating data are required. While the manager may wish to calculate some indicators on a monthly or quarterly basis to spot problems or to monitor how the system is moving toward its 12-month objectives, annual reporting of results is usually sufficient for funding agencies and other external constituencies. Furthermore, even with a good accrual accounting system that assigns costs and revenues to the proper time period, wide variations in month-to-month cost,

revenue, and performance could unnecessarily complicate the interpretation of performance results. Therefore, the 12-month performance period is recommended.

The level of system detail to be included in the evaluation also must be determined prior to data collection and tabulation. For example, as will be demonstrated in the case study presented in chapter 7, an important use of the performance framework described in this guide is the analysis of individual service sectors or subcontractors within a shared-ride system. This type of detailed analysis helps the manager identify services within the overall operation that are unproductive and that need special attention. Also, special analysis of the services provided by subcontractors can aid a manager in monitoring the quality and performance of shared-ride services provided by these outside vendors.

One common pitfall that should be avoided when collecting and tabulating financial and operating data is inconsistency of the data with respect to time period or level of aggregation. For example, annual ridership figures should not be divided into a one-month sample of vehicle hours to calculate the rides-per-vehicle-hour productivity measure. Such an error often occurs when a data element such as vehicle hours or trip length is not available for the entire year, so that only a sample measure of the data is available. This sample data may be used; however, adjustments to the data would be required to allow for proper calculation and interpretation of the resulting measures.

A similar inconsistency error is also possible in the analysis of a specific service sector. Here the common error is to compare data, such as ridership for a particular portion of the service area, with costs or other performance data for the entire system. Obviously, the resulting calculation is meaningless. Recommendations for addressing these data collection and tabulation issues are presented in chapter 3.

ANALYSIS AND INTERPRETATION OF INDICATORS

Though most of the time required to conduct a performance evaluation will be spent collecting and organizing the required data, this step, analyzing and interpreting the indicators, is the most important one. In each case, the indicator must be analyzed to determine if the system's performance is satisfactory relative to the goals set for the system, or with respect to an external norm. One or more of the following three approaches may be employed to analyze the results. All three may be used as part of a system's evaluation and reporting procedure.

The first and most common method of analysis is to compare similar statistics for the system over time. Time-series analysis for a single system allows a manager (or external evaluators such as funding agencies or governing boards) to see how a system is progressing toward the system's own goals and whether its performance is improving or deteriorating over time. Some systems set annual goals at the beginning of a year so that the year-end performance evaluation includes a comparison of how the system performed relative to the established goals. For example, if in the prior year, a shared-ride system achieved a productivity of 2.5 one-way passenger trips per vehicle hour, then the system's goal for the next year might be set at 2.7 one-way passenger trips per vehicle hour to increase overall efficiency. Even if specific goals are not set (e.g., the 2.7 goal), a time-series analysis of the system will allow the manager and others to identify areas of performance that need improvement and allow for an overall assessment of the system's condition.

A second way to interpret performance indicators is to compare the value obtained for a particular system to that of other, peer systems. Peer systems would include those shared-ride systems that are comparable in key aspects such as size, operating environment (e.g., urban, suburban, rural), and type of operation (e.g., contracted, directly provided). Another operational characteristic that must be considered when selecting peers for valid comparison are the characteristics of the riders and the type of service provided. For example, a shared-ride system that primarily transports ambulatory senior citizens to senior centers in a many-to-one operating mode will display significantly different performance characteristics than a system that transports disabled persons in wheel chairs to medical facilities in a

many-to-many mode of operation. Also, for financial indicators, it is important to compare cost data for the same period or to use cost indices to adjust data from different years.

The third approach that may be used to analyze performance indicators involves comparing a particular statistic for the individual system to an industry norm or standard. However, few such norms exist unless there are funding agency-imposed minimum standards. Some states may require, for example, a certain minimum cost recovery, or, as in the case of Pennsylvania's State lottery-funded shared-ride program, a maximum cost per passenger trip. Certainly if such norms or standards exist, the performance analysis must acknowledge them.

In practice, a complete shared-ride performance evaluation will include all three types of comparisons, with the time-series presentation of results being the most common and achievable for all indicators. Peer group comparisons will likely be possible for some indicators, but may not be possible or appropriate for others, such as safety or customer satisfaction measures where data is not collected or reported in the same way for a group of peer systems. Finally, the comparison of performance measures against norms or standards will be very limited since few such norms exist.

PRESENTATION OF RESULTS

Effective presentation of the results of a performance evaluation is an integral part of the evaluation process because it not only helps the manager to interpret the results (the previous step), but it also allows the manager to cogently communicate the results to outside constituencies. Graphical presentations are often the most effective way to accomplish both objectives. While modern microcomputer hardware and software (spreadsheet and business graphics programs) allow for cost-effective production of professional graphics and can greatly speed the analysis and presentation of evaluation results, the techniques described in this guide can also be effectively implemented manually. The case study example presented in chapter 7 demonstrates several graphical formats for presenting performance results.

CORRECTIVE ACTIONS AND MONITORING OF RESULTS

The final and most important step in the evaluation process is the corrective actions that will be taken by the manager and/or policy board to increase the efficiency or effectiveness of the shared-ride system. This step is certainly the most challenging and creative part of the process, but it also may require difficult choices regarding the level of service offered or the resources used to provide the service. Common problems and possible corrective actions for shared-ride paratransit systems are described in chapter 6 and illustrated in the case study described in chapter 7.

Once the corrective actions are implemented, the evaluation cycle begins again with a review of the goals, indicators, and data collection. Then, during the next review cycle, the results of the previously implemented corrective actions are evaluated using the next period's performance results, and additional corrective actions can be taken as needed.

3. DATA COLLECTION PROCEDURES

Collecting and tabulating the operating and financial data required to calculate performance ratios is the most time-consuming performance evaluation-related task. However, this task need not be difficult if the record-keeping system is planned so that it produces the necessary information. While many shared-ride systems now use computers to maintain service records and prepare driver logs, the evaluation framework described in this guide does not require such an automated system to produce the necessary data. A comprehensive, accurate manual system can also yield the necessary statistics. Nevertheless, advanced planning is required to ensure that the basic records of the shared-ride system (e.g., the driver log, the monthly finance report, the complaint log, accident files) are designed to capture the needed statistics at the level of detail required.

This chapter describes how the required data elements can be collected and applied to the shared-ride paratransit evaluation described in chapter 2. Table 1 lists the performance indicators to be calculated, the data elements required to calculate them, and the source used to obtain each element. Certainly the list of indicators presented in table 1 is not exhaustive, and the manager of a shared-ride paratransit system may wish to modify this list to reflect the goals and objectives of the individual system. Nevertheless, the basic data collection and tabulation procedures described in this and the following chapters will illustrate the key issues associated with data collection.

As shown in table 1, the two primary sources for the 13 data elements used to calculate the 10 indicators are the driver log that records the daily activity of each shared-ride vehicle, and the system's financial records--primarily the monthly income statement, which summarizes the system's revenue and expenses. The following section describes how the daily driver log can be used to collect most of the operating data required for the performance analysis. Because the expense and revenue statistics required for the performance evaluation often require special treatment, especially if expenses and revenues are to be assigned to specific vehicles or types of service, a separate chapter is devoted to tabulation of the financial data.

Table 1. Data requirements for shared-ride paratransit evaluation.

Performance Measure	Data Element	Source of Data
Operating Efficiency		
1. Operating expense/vehicle hour (a)/(b)[1]	a. Operating Expense	Finance report
2. Administrative expense/total expense (c)/(a)	b. Vehicle hours	Driver log
3. Live hours/paid driver hours (d)/(e)	c. Administrative expense	Finance report
	d. Live hours	Driver log
Effectiveness	e. Paid driver Hours	Payroll
4. One-way passenger trips/vehicle hour (f)/(g)	f. Total one-way passenger trips	Driver log
5. Senior citizen one-way passenger trips/	g. Senior citizen population	Driver log
senior citizen residents of service area (h)/(g)	h. Senior citizen one-way trips	Driver log
	i. Service-related complaints	Complaint log
Service Quality	j. On-time pickups	Driver log
6. Service-related complaints/1000 one-way	k. Total passenger revenue	Finance report
passenger trips (i)/(f)	l. Avoidable accidents	Accident log
7. On-time pickups/total pickups (j)/(f)	m. Vehicle miles	Driver log
Financial		
8. Operating expense/one-way passenger trip (a)/(f)		
9. Revenue/one-way passenger trip (k)/(f)		
Safety		
10. Avoidable accidents/100,000 vehicle miles (l)/(m)		

[1] Formula and data elements required to calculate performance measure

Four data elements used in the performance evaluation are not derived from financial records or the driver log. These items--avoidable accidents, service-related complaints, paid driver hours, and senior citizen population--must be tabulated from other records. The six data elements derived from the driver log are discussed in the following section along with a brief discussion of the accident, complaint, population, and paid-driver information required. The three data items derived from the financial reports are discussed in the next chapter.

DATA ELEMENTS DERIVED FROM THE DRIVER LOG

The driver log, used by the shared-ride vehicle driver to record daily trip activity, provides the raw data for 6 of the 13 data elements required for the proposed evaluation framework. While the information contained on the driver log varies widely among shared-ride systems due to differences in funding agency data requirements and operating procedures, the driver log shown in figure 2 is typical of those used by specialized shared-ride providers.

Typically, a driver is given a daily log that already lists the trips scheduled for the day, including the scheduled pick-up time, the person's name and the address of the trip origin, and the trip destination. Once the transportation is provided, the driver completes the log by entering times and odometer readings for the pick up and delivery of each passenger. In addition, the driver completes the information at the top of the log that describes the vehicle and driver's activity for the entire day. One common variation to the procedure described above occurs when taxis are used to provide shared-ride service and trip requests are radio-dispatched to drivers rather than provided in advance for the entire day. In this situation, all information is recorded by the driver as the trips are provided. In either case, however, information such as that contained on the sample driver log shown in figure 2 is required for the performance evaluation; therefore, a shared-ride system that does not presently record this information must modify its data collection procedures to obtain these data. To help determine if a driver log in its current form provides the required information, each of the data elements listed on the log are defined in table 2.

CARRIER NAME _____ SHARED-RIDE PARATRANSIT DRIVER'S LOG DATE _____

LOG NUMBER _____ ENDING ODOMETER READING _____ STARTING TIME _____

VEHICLE ID _____ BEGINNING ODOMETER READING _____ ENDING TIME _____

DRIVER NAME _____ TOTAL VEHICLE MILES _____ TOTAL TIME _____

TRIP ID	SCHED. PICK UP	NAME OF PASSENGER	TRIP CLASS 65+	NAM	PURP	ORIGIN	DESTINATION	ODOMETER READING ON	OFF	PSGR MILES	TIME ON	OFF	TOTAL FARE	FARE COL. FROM PSGR	GRIDS/ ZONES
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
****	TOTALS	N/A				N/A	N/A	N/A	N/A		N/A	N/A			

Figure 1. Sample shared-ride driver log.

Table 2. Explanation of driver log entries.

Item	Explanation
1 Carrier Name	Name of service provider.
2 Date	The date that the trips listed on the log were made
3 Log Number	Any unique number that can be used to identify log sheet during the tabulation of data.
4 Vehicle ID	A letter, number, or other unique identification.
5 Driver Name	Enter the driver's name. If log stays with the vehicle rather than with the driver, and a vehicle has more than one driver in a given day, list all drivers.
6 Ending Odometer Reading	The odometer reading of the vehicle once it is parked for the day.
7 Beginning Odometer Reading	The odometer reading of the vehicle at the start of the day.
8 Total Vehicle Miles	Difference of the ending odometer reading (6) and the beginning odometer reading (7).
9 Starting Time	The time, to the nearest five minutes, when the vehicle is first available to provide service.
10 Ending Time	The time when the vehicle is removed from service.
11 Total Time	The total driver hours for the vehicle by determined by calculating the difference between the starting time (9) and ending times (10).
12 Trip ID	An identifier for each trip.
13 Sched. Pick Up Time	The time that the trip was scheduled to be made
14 Name of Passenger	The last name and at least the first initial of the rider
TRIP CLASS	Items 15, 16, 17 allow the shared-ride provider to categorize trips by purpose or characteristic of the rider. The categories listed are typical of the types of designations used but may be modified to a particular system's needs.

Table 2. Explanation of driver log entries (continued).

Item		Explanation
15	65+	Check to identify trips made by persons 65 years or older.
16	NAM	Check to identify trips made by nonambulatory persons.
17	PURP	Enter code for type of trip, e.g. M for medical, S for shopping, etc.
18	Origin	Origin of the trip.
19	Destination	Destination of the trip.
20	Odometer Reading ON	Odometer reading when the passenger boards the vehicle.
21	Odometer Reading OFF	Odometer reading when the passenger gets off the vehicle.
23	Time ON	The time when the passenger gets on the vehicle to the nearest 5 minutes.
24	Time OFF	The time when the passenger gets off the vehicle to the nearest 5 minutes.
25	Total Fare	The total fare due for the trip.
26	Fare Col. From Psgr.	The fare collected from the passenger.
27	Grids/Zones	The number of grids or zones charged (if applicable).

The next section defines each of the driver log-derived data elements and describes how each can be tabulated using information from the driver logs.

DEFINITIONS AND TABULATION METHODS FOR DRIVER LOG-BASED DATA ELEMENTS

Vehicle Hours

Definition: Total time during which a shared-ride vehicle is available to provide service. Lunch breaks, pretrip inspection time, and scheduled or unscheduled maintenance periods are not included as part of the vehicle-hour statistic since the vehicle is not available for service.

Method of Tabulation. Total vehicle hours can be calculated for the overall shared-ride system by summing the number of vehicle hours of service provided by each vehicle each day. Data element (12) on the driver log provides this information for each vehicle each day.

Vehicle hours for specific vehicles or groups of vehicles can be tabulated by totalling individual vehicle hours for the desired vehicles. However, if a specific vehicle provides two or more types of service during the day, a more detailed tabulation method is needed to determine the total vehicle hours required to provide a particular service. For example, in Pennsylvania, taxi operators commonly provide shared-ride as well as exclusive-ride taxi service using the same vehicle and driver. Therefore, to determine the number of vehicle hours devoted to shared-ride service, the time spent on the two types of service must be separated.

If a vehicle is used a portion of the day for one type of service, and then at other times for other services, vehicle hours can be determined by totalling the hours spent in each type of service. However, if shared-ride and other types of trips are intermixed throughout the day, this method will be cumbersome.

One approach used by Pennsylvania operators faced with this problem has been to prorate the vehicle hours devoted to each type of service based on the number of live hours associated with each service. For example, if 30 percent of the live hours (time when passengers are being transported) are associated with shared-ride service, then shared-ride vehicle hours for that vehicle are assumed to be 30 percent of the total. So, if a vehicle is available for 10 hours of service on a particular day, and if 30 percent of the live hours

derive from shared-ride service, then 3 vehicle hours of service (10 hours x 30 percent) are assumed to be provided. This calculation is based on the reasonable assumption that the amount of dead time (time when no passengers are on board) is proportionately the same for both the shared-ride and non-shared-ride service.

Live Hours

Definition: The amount of time vehicles are in use providing shared-ride service when passengers are on the vehicle. Dead time--the difference between total vehicle hours and live time--includes both the time that the vehicle spends enroute between trips, and unproductive time when no trips are requested. This measure is an indicator of dispatcher effectiveness and also gauges how well a system matches its services (vehicle hours) to the demand for the service. The goal of a shared-ride system is to maximize the amount of live time that vehicles and drivers are in service.

Method of Tabulation. Total live hours of service for a shared-ride system are tabulated from a detailed analysis of the driver log. The simplest way to calculate this measure is to examine the driver log to determine the amount of time the driver is not transporting persons (dead time) and subtract it from the total vehicle hours that the vehicle was in service that day. The dead time is determined by scanning the starting and ending times on the driver log to determine when the vehicle did not have passengers on board and noting the number of minutes without passengers in the margin along the edge of the log. The total live time can then be derived by totalling the number of dead minutes, dividing this number by 60 to determine dead hours, and then subtracting this result from the total vehicle hours listed at the top of the log.

One common error that should be avoided when calculating this measure is double counting of live time when more than one person is on the vehicle. This error results from calculating live time by summing the total riding time of all passengers rather than just the total amount of the day that the vehicle was transporting passengers. For example, if four persons were on a vehicle from 9:00 am until 9:20 am, the total amount of live time would be 20 minutes. The incorrect calculation would result in 80 minutes (4 passengers x

20 minutes) being tabulated as live time. The 80 minutes, which represents the number of passenger minutes of service provided, may be a desired performance indicator, but it is not the one used in this analysis.

Total One-Way Passenger Trips

Definition: The total number of individual rides provided to individuals where each separately scheduled segment of a ride constitutes a one-way passenger trip. For example, if a passenger rides from home to a doctor's appointment, from the doctor's appointment to a shopping center, and then home, a total of three one-way passenger trips have been provided. Similarly, if 15 senior citizens are transported to and from a senior nutrition program, 30 one-way passenger trips of service have been provided.

Method of Tabulation. Total one-way passenger trips is a very simple statistic to tabulate once the basic definition of the measure is established. Assuming that each entry on the driver log represents an individual one way trip, total one-way trips can be tabulated by summing the number of entries on each log.

Though total ridership as measured by one-way passenger trips is the performance measure used in this evaluation, most shared-ride systems will want to maintain more detailed ridership records that indicate the number of one-way trips provided to different categories of riders or for different trip purposes. These more detailed statistics may be required by funding agencies or may be used by the shared-ride system to describe the benefits derived from the transportation program. For example, systems commonly tabulate the number of elderly, disabled, low-income, or other target population riders that they serve. The trip classification fields on the driver log allow for this recording of subcategories of ridership.

Senior Citizen One-Way Trips

Definition: The number of one-way passenger trips provided to persons 65 years or older. Because a goal of most shared-ride paratransit systems is to provide mobility to the elderly population, this particular subcategory of ridership is specifically identified and reported. However, a system's

effectiveness in serving other target populations may also be measured by adding or substituting other measures such as the number of low-income one-way passenger trips provided, or the number of non-ambulatory one-way trips provided.

Method of Tabulation. The number of one-way passenger trips provided to senior citizens or other specified subgroups can easily be calculated if riders are identified as belonging to the category being studied. The trip classification fields on the driver log allow for this categorization. Total senior citizen one-way passenger trips can be tabulated by totalling from the driver log the number of trips by this category of rider.

On-Time Pickups

Definition: The number of one-way passenger trips where the actual pick-up time is within the tolerance desired from the requested pick-up time. For example, if the shared-ride system established that on-time was within plus or minus 15 minutes, then a trip would be considered on time if the driver arrived for the pick up within the time period 15 minutes before or after the requested time.

Method of Tabulation. The total number of on-time trips is determined by comparing the scheduled and actual pick-up times on the driver log. Because of the time required for this examination and tabulation, one might elect to sample this measure by randomly selecting a day's or a week's set of driver logs (depending on the size of the system) for analysis of this measure. The performance measure that uses this data element, the percentage of on-time trips, requires two statistics, the number of on-time trips and the number of total trips. Therefore, in sampling this statistic, be sure to also determine the total number of one-way trips provided during the sample period so that the percentage statistic can be calculated correctly.

Vehicle Miles

Definition: The miles operated by vehicles are measured by the vehicle odometer. The statistic includes miles operated with and without passengers.

Method of Calculation. Total vehicle miles can be determined in one of two ways. First, vehicle odometer readings at the end of each reporting period can be used to calculate vehicle miles. Second, the number of vehicle miles listed on each driver log can be summed. The second way is preferred since it may be a more accurate measure of vehicle miles of shared-ride service, especially if the vehicles are also used for other purposes and if these miles would be included if the periodic odometer readings were used to tabulate this measure.

If during a given day a vehicle is used to provide services other than shared-ride, and the exclusion of mileage resulting from these other services is desired for analysis, then a procedure similar to the one described above for vehicle hours must be followed to prorate the total daily miles among the various services provided by the vehicle. In the case of vehicle miles, this method requires that total vehicle miles be apportioned in a ratio equal to the proportion of live miles (miles with passengers on board) provided for each type of service. As with the vehicle hour estimate, this method of using live miles to apportion total miles assumes that dead miles (miles driven without passengers on board) are in proportion to live miles for all categories of vehicle use.

MISCELLANEOUS DATA ELEMENTS

In addition to the six driver log-based data elements described above and the three financial data elements considered in the next chapter, the proposed performance evaluation framework requires four data elements derived from other system records. Definitions and tabulations for these measures (paid driver hours, avoidable accidents, service-related complaints, and senior citizen service area population) are presented below.

Paid Driver Hours

Definition: The time for which compensation is paid to drivers to operate vehicles in shared-ride service. For operations using commissioned drivers (e.g., taxi operators), paid driver hours may equal live hours. Paid driver hours will usually exceed vehicle hours due to pretrip inspection time,

paid meal breaks, vacations, and so forth, which result in drivers being paid for time when service is not available.

Method of Tabulation. Paid driver hour data may be obtained from one of two sources. If drivers only provide shared-ride service, or if it is easy to segregate driver hours paid for shared-ride service, payroll records will provide an accurate source for this data element. However, if drivers provide shared-ride service along with other services, and it is not possible to easily document the number of hours spent providing each type of service, then a method of estimating paid driver hours based on live time will be required. Again, as recommended in the section describing the tabulation of vehicle hours, when several services are provided by the same driver, the best way to allocate paid driver hours is to assign them to each service based on the proportion of live hours devoted to that service.

As defined for this evaluation, paid driver hours are those for which the vehicle operator is compensated. If all operators are paid drivers, then this measure will truly reflect the productivity of the shared-ride service. However, if volunteer drivers are used, as is the case for many specialized shared-ride providers, special care must be taken in calculating the performance measures that use the paid driver statistic. Perhaps the simplest way to accommodate volunteer drivers is to modify the definition of "paid driver hours" to include the volunteer time. Doing so will allow valid calculations of one-way trips per hour and live time to paid driver hours. Alternatively, the trips provided by the volunteers and the live time involved in providing these trips should be excluded from the totals for these measures. If the live time and passenger trips provided by volunteers are not excluded, and total trips and live time ar divided by only the paid driver hours, the actual amount of time required to provide the transportation will be understated, thus distorting the values of the performance indicators.

Avoidable Accidents

Definition: All passenger or collision-type accidents involving revenue vehicles, whether in service or on system property, that, as determined by the system manager, police, and other investigators, resulted from infractions of

either motor vehicle law or system policy by the transportation system's operator.

Method of Tabulation. The number of avoidable accidents can be tabulated by simply keeping a count of all such occurrences. The most difficult aspect of this performance measure is not its tabulation. Often the determination of whether an accident was avoidable will be difficult. Such a determination is often important not because the number will be used in a performance indicator, but rather, because employee discipline or other action may be involved. If the police report does not assign fault, or if other circumstances do not present easy identification of the cause of the accident, it may be necessary to seek third-party interpretation of the results.

Because shared-ride systems may define "avoidable" in different ways, care must be taken when making cross-system comparisons of this indicator. Once peer systems are selected for this measure, the system manager should be contacted regarding this definition to ensure that comparable data are evaluated.

Service-Related Complaints

Definition: The number of concerns expressed by riders and nonriders above adverse operating practices and/or equipment. Service-related complaints are distinguished from policy-related complaints in that policy complaints (such as inadequate service hours or service area, or too high a fare) are related to actions taken by funding agencies or policy boards and are not directly within the control of the system manager. Ideally, a shared-ride system should track both types of complaints; however, the quality of service can best be monitored by the more narrowly defined service-related complaint measure.

Method of Tabulation. Again, as for the case of the accident data, the key to obtaining service-related complaint data is to clearly define the meaning of the measure and then set up a system to log and count the number of complaints. A shared-ride system should maintain a written record of all telephone, driver-relayed, and written complaints that not only records the

complaint, but also indicates the follow-up action taken by the system management.

Senior Citizen Service Area Population

Definition: The number of persons age 65 or older living within the shared-ride system service area. Senior citizen population is just one of several target population statistics that might be used. If a primary goal of the shared-ride system is to serve low-income residents, a measure such as number of one-way trips by low-income persons per low-income population in the service area could also be calculated.

Method of Tabulation. Senior citizen population data can be derived from U.S. Census data since shared-ride systems are demand-responsive and usually define their service areas in terms of discrete political subdivisions. Even if the service area boundaries do not follow municipal or county boundaries, census track data can be used to estimate the target population within a service area.

In addition to the 10 data elements described in this chapter that are derived from the driver logs, other system records, and census data, 3 very important financial data elements must also be obtained to conduct the proposed performance evaluation. These measures, total operating expense, administrative expense, and total revenue, are discussed in the next chapter.

4. COSTING PROCEDURES

Four of the performance indicators discussed in this report--operating expense per vehicle hour, operating expense per one-way passenger trip, administrative expense as a percentage of total expense, and revenue per one-way passenger mile--require accurate financial information for the shared-ride operation. Furthermore, a complete performance evaluation requires revenue and expense estimates not only for the shared-ride system as a whole, but also for the individual service components that are being analyzed. For example, to perform a comprehensive diagnosis of a system's operating problems, the shared-ride manager needs a separate analysis of each service sector or type of service within the operation to determine if one part of the operation is dragging down the performance of the whole system. The costing issues that must be considered before applying the performance evaluation methodology described in this guide involve two primary topics: cost determination and cost allocation.

COST DETERMINATION

Cost determination, as considered here, is the process of identifying the total cost of providing the shared-ride service. The goal of this process is to produce a statement of the revenue and expenses for the shared-ride service for a particular period. The basic source of information for this cost determination is the accrual accounting system that will result in a listing of expenses such as that shown in table 3. Though the example expense listing in table 3 is for a 12-month period, performance evaluations also use monthly, quarterly, or semiannual information.

The accrual accounting system, as contrasted to a cash accounting system, records revenue and expenses when they are due or incurred, rather than received or paid. An accurate performance evaluation requires that the accrual system be used so that revenue and expenses can be properly associated with the services provided and consumed. For example, if the accrual system is not used, an annual vehicle insurance bill paid in one month will overstate expenses and the related financial performance measures for the month when the

Table 3. Sample chart of accounts used for cost allocation.

Expense Object Class	Annual Expense
TRANSPORTATION EXPENSE	
Driver Wages & Salaries	$195,000
Driver Fringe Benefits	42,900
Fuel and Oil	45,500
Tires and Tubes	6,500
Vehicle Insurance	39,500
Vehicle Lease	0
Purchased Transportation	46,900
Other	3,460
TOTAL TRANSPORTATION EXPENSE	$379,760
MAINTENANCE EXPENSE	
Mechanic Wages & Salaries	$23,000
Mechanic Fringe Benefits	4,830
Materials and Supplies	14,600
Contracted Maintenance	26,800
Facility Rental	6,000
Utilities	4,000
Contracted Services	8,900
Other	3,350
TOTAL MAINTENANCE EXPENSE	$91,480
CALL TAKING AND DISPATCHING EXPENSE	
Dispatcher Wages & Salaries	$31,500
Dispatcher Fringe Benefits	6,500
Telephone Expenses	6,600
Computer Expenses	4,200
Rent	3,600
Other	5,400
TOTAL CALL TAKING AND DISPATCHING EXPENSE	$57,800
ADMINISTRATIVE EXPENSE	
Administrative Salaries	$69,500
Administrative Fringe Benefits	15,500
Materials and Supplies	4,500
Nonvehicle Insurance	2,200
Professional Services	6,500
Travel	3,000
Office Rental	6,000
Utilities	3,600
Equipment Rental/Service	5,400
Other	3,300
TOTAL ADMINISTRATIVE EXPENSE	$119,500
TOTAL OPERATING EXPENSE	$648,540
TOTAL VEHICLES	14
TOTAL VEHICLE MILES	399,000
TOTAL VEHICLE HOURS	28,500

bill is paid. Likewise,counting revenue in the period when it is received, rather that when it is earned, will improperly represent the true revenue per passenger, or overall cost recovery of the system.

In addition to the operating revenue and expense data provided by the accrual accounting system, the shared-ride system manager may, depending upon the purpose of the evaluation, need to make adjustments to the expense data. The need for such adjustments often arises when the evaluation involves comparing the performance of a privately-operated shared-ride system with that of a nonprofit or public agency-operated system. For this type of comparison, in addition to basic operating expenses, special treatment of costs may be required for costs incurred by the private operator but not by the public on nonprofit agency such as depreciation, profit, and certain taxes.

Because proper treatment of these cost differences is essential to a fair comparison of public versus private transit operations, the Urban Mass Transportation Administration (UMTA) has sponsored several studies of the issues and published a number of reports and guides that explain how to properly determine these expenses. Fully Allocated Cost Analysis: Guidelines for Public Transit Providers,[1] a report prepared by Price Waterhouse, provides detailed information on how to construct fair and accurate cost comparisons of private and public transit services. The Price Waterhouse report describes how the three-variable unit cost model (described in chapter 4 of this report) can be used to estimate total expenses, and it also explains the adjustments that must be made to compensate for differences between the public and private sectors. For those persons interested in using a microcomputer model to estimate total as well as subservice costs, the UMTA-sponsored Public Private Transportation Network (PPTN) has prepared and distributed a cost allocation model[2] that can be used for either fixed-route or paratransit operations. The

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[1]Fully Allocated Cost Analysis: Guidelines for Public Transit Providers, Prepared by Price Waterhouse for the Urban Mass Transportation Administration, April 1987.

[2]"Cost Allocation Model: A Microcomputer Software for Transit Service Costing," The Comsis Corporation, February 1988.

private-sector comparison principles proposed in the Price Waterhouse study are incorporated into the PPTN model. Because the cost determination and cost allocation methods described in the next section of this report are consistent with those presented in these manuals, they are only summarized here and presented in the context of the needs of the shared-ride performance evaluation process. The reader is referred to the other resources for more detailed information on cost allocation and determination of private versus public sector costs.

COST ALLOCATION

Nearly all performance evaluation studies require that total operating expenses such as those listed in table 3 be allocated so that the cost of providing a particular type of service can be determined. The cost allocation process involves distributing each cost element among the service components. For example, to determine the cost of operating a particular vehicle or group of vehicles in a particular service sector, total operating costs must be apportioned among all vehicles and/or services. Individual vehicle or service cost estimates are useful not only to evaluate the operating and financial performance of the service component, but also, such disaggregation of expenses is necessary to evaluate the desirability of private versus public provision of service.

The most common method of allocating operating expenses incurred by shared-ride transit systems, and the one recommended here, is called the three-variable unit cost model. The unit cost model assigns actual operating costs experienced by a system to each subservice (vehicle, route, service area, etc.) based on three service variables: vehicle hours, vehicle miles, and vehicles. The underlying assumption behind the allocation model is that the cost of operating a shared-ride transit system is directly related to the number of vehicle hours of service provided, the number of miles traveled, and the number of vehicles required to provide the service. Therefore, the expense of providing service in a specific service sector can be determined by

apportioning total expenses of the organization in proportion to the number of vehicle hours, miles, and vehicles required to provide the particular service.

The model can be described as follows:

$$\begin{aligned}\text{Annual Total Expense} = {} & (\text{Vehicle Hour-Related Expenses} \times \text{Vehicle Hours}) + \\ & (\text{Vehicle Mile-Related Expenses} \times \text{Vehicle Miles}) + \\ & (\text{Fixed Expenses/Vehicle} \times \text{Vehicles})\end{aligned} \quad (1)$$

This cost expression can be used to represent the entire shared-ride operation for the entire year, or it can be used to calculate the operating expenses for a subservice and/or for a shorter time period.

The remainder of this section presents a simplified example that applies the unit cost model to the data presented in table 3. A more detailed explanation of the unit cost model and various refinements can be found in the sources listed earlier in this chapter. Also, a recent report prepared for the Maryland Department of Transportation[3] provides a thorough explanation of how to apply the unit cost model to demand-responsive transportation services. The reader should consult this report for step-by-step instructions on applying the unit cost model to a variety of situations faced by demand-responsive operators.

The unit cost model is applied by completing three steps. The first, assembly of the data, has already been accomplished by the effort required to produce the line-item expense data shown in table 3. Also, table 3 lists the operating data required in addition to the financial data. To apply the model, total vehicle miles, vehicle hours, and vehicles must be known. Also, the quantity of these variables associated with subservice components must also be known. For example, for the sample data shown in table 3, the shared-ride system operated 14 vehicles a total of 28,500 vehicle hours and 399,000

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[3] Cost Analysis Methodology for Demand-Responsive Service, Prepared for the Maryland Department of Transportation Mass Transit Administration by Comsis Corporation, October 1988.

vehicle miles. This operating data can be obtained using the procedures described in chapter 3. The most important factors to remember concerning this first step are that the expense data and the operating data must represent the same service and for the same time period. That is, the operating expense listing should include all of the costs associated with operating the 14 vehicles for the number of miles and hours listed for the period included with these statistics.

Once the financial and operating data have been assembled, the second step required to apply the unit cost model is the assignment of each expense line item to one of the unit cost variables (vehicle hours, vehicle miles, or number of vehicles). The line items are assigned to the unit cost variables based upon the service variable that most closely controls or determines the expenses for the line item. For example, driver salaries, wages, and fringe benefit expenses are most closely related to the number of vehicle hours of service provided. Likewise, fuel, maintenance, and tire expenses are most closely linked to the number of miles operated. Finally, many costs, including most administrative expenses, are fixed, and therefore are arbitrarily allocated based on the number of vehicles associated with a service. (An alternative approach to assigning fixed costs is discussed later in this section.) Table 4 presents a suggested assignment of the line items to the unit cost variables.

The third step is calculation of the average unit costs and application of the model to subservice cost estimations. Unit costs are calculated by summing the expense items assigned to each of the three cost variables and then dividing the total expenses for each category by the service variable. For example, the total cost due to driver hours is $288,260, and the number of vehicle hours is 28,500 so that the vehicle hour-related expense is $10.11 ($288,260/28,500). Table 5 lists the expense data by category and shows the calculation of each unit cost.

Applying these unit costs to the annual cost model results in the following equation, which can be used to estimate the cost associated with each portion of the sample system's operation.

Table 4. Recommended expense assignment for three-variable cost model.

Expense Object Class	Assignment Variable		
	Vehicle Hours	Vehicle Miles	Vehicles
TRANSPORTATION EXPENSE			
Driver Wages & Salaries	X		
Driver Fringe Benefits	X		
Fuel and Oil		X	
Tires and Tubes		X	
Vehicle Insurance			X
Vehicle Lease			X
Purchased Transportation	X		
Other	X		
MAINTENANCE EXPENSE			
Mechanic Wages & Salaries		X	
Mechanic Fringe Benefits		X	
Materials and Supplies		X	
Contracted Maintenance		X	
Facility Rental			X
Utilities			X
Contracted Services			X
Other			X
CALL TAKING AND DISPATCHING EXPENSE			
Dispatcher Wages & Salaries			X
Dispatcher Fringe Benefits			X
Telephone Expenses			X
Computer Expenses			X
Rent			X
Other			X
ADMINISTRATIVE EXPENSE			
Administrative Salaries			X
Administrative Fringe Benefits			X
Materials and Supplies			X
Nonvehicle Insurance			X
Professional Services			X
Travel			X
Office Rental			X
Utilities			X
Equipment Rental/Service			X
Other			

Table 5. Unit cost calculation for sample data.

Expense Object Class	Vehicle Hour Expenses	Vehicle Mile Expenses	Vehicle Expenses
TRANSPORTATION EXPENSE			
Driver Wages & Salaries	$195,000		
Driver Fringe Benefits	$42,900		
Fuel and Oil		$45,500	
Tires and Tubes		$6,500	
Vehicle Insurance			$39,500
Vehicle Lease			$0
Purchased Transportation	$46,900		
Other	$3,460		
MAINTENANCE EXPENSE			
Mechanic Wages & Salaries		$23,000	
Mechanic Fringe Benefits		$4,830	
Materials and Supplies		$14,600	
Contracted Maintenance		$26,800	
Facility Rental			$6,000
Utilities			$4,000
Contracted Services			$8,900
Other			$3,350
CALL TAKING AND DISPATCHING EXPENSE			
Dispatcher Wages & Salaries			$31,500
Dispatcher Fringe Benefits			$6,500
Telephone Expenses			$6,600
Computer Expenses			$4,200
Rent			$3,600
Other			$5,400
ADMINISTRATIVE EXPENSE			
Administrative Salaries			$69,500
Administrative Fringe Benefits			$15,500
Materials and Supplies			$4,500
Nonvehicle Insurance			$2,200
Professional Services			$6,500
Travel			$3,000
Office Rental			$6,000
Utilities			$3,600
Equipment Rental/Service			$5,400
Other			$3,300
TOTAL OPERATING EXPENSE	$288,260	$121,230	$239,050
TOTAL VEHICLES			14
TOTAL VEHICLE MILES		399,000	
TOTAL VEHICLE HOURS	28,500		
VEHICLE COST FACTOR			$17,075
VEHICLE MILE COST FACTOR		$.30	
VEHICLE HOUR COST FACTOR	$10.11		

Annual Total Expense = ($10.11 x Vehicle Hours) + ($.30 x Vehicle Miles)
+ ($17,075 x Vehicles) (2)

The cost of providing a particular service is estimated by substituting the number of miles, hours, and vehicles associated with the service and then calculating the resulting cost. For example, if the shared-ride service in a particular community within the overall system's service area requires 3 vehicles to provide it, and these 3 vehicles travel 90,000 miles in 6,000 hours, then the cost of this community's service would be:

Cost for Community Service = $10.11 x 6,000 + $.30 x 90,000 + $17,075 x 3
$138,885 = $60,660 + $27,000 + $51,225 (3)

This expense estimate would then be used to calculate the financial performance indicators requiring the operating expense information.

While the three-variable unit cost model is the most widely used cost allocation method, if the shared-ride performance evaluation proposed in this report is to be used to evaluate a specific service sector of a shared-ride operation, then a simpler version of the model may be appropriate. This simpler, two-variable version includes only vehicle miles and vehicle hours variables. To convert the three-variable model to the two-variable one, the administrative and other expenses assigned to vehicles are transferred to the vehicle-hour column so that, in the example shown in table 5, the total vehicle-hours expenses would increase from $288,260 to $527,310. The hour-related unit cost would then be $18.50 ($527,310/28,500). The cost calculation for the community service example listed above would then be:

Cost for Community Service = $18.50 x 6,000 + $.30 x 90,000
$138,000 = $111,000 + $27,000 (4)

The resulting cost estimate is almost identical to that obtained with the three-variable model. This result would be the usual case if each vehicle in the fleet were used about the same number of hours a year so that the vehicle hours and number of vehicles are proportional to each other.

The two-variable model is likely to be more useful in shared-ride cost estimation since two or more of the subservices being evaluated will be provided by the same vehicles; in this case, the vehicle expenses will have to be prorated. For example, if a shared-ride system provides transportation to a sheltered workshop or senior center during the morning and afternoon peak periods, and also provides general public shopping transportation during the midday, the purpose of the evaluation may be to analyze the performance of each of these two types of service. The vehicle-hour and mile costs can be directly assigned to each service; however, the fixed vehicle costs will have to be prorated between the two types of service, because the cost model requires that the large fixed cost be assigned to a whole vehicle. One way to prorate these expenses is to divide them between the two services in proportion to the number of hours the vehicle spends providing each service. If this technique is used, then the three-variable method becomes a two-variable one, so that the simpler, two-variable method could be more efficiently used in the first instance. Obviously, either method will produce satisfactory results; however, the two-variable model may be easier to calculate and apply.

ADMINISTRATIVE EXPENSES

The performance evaluation framework presented in figure 1 includes the administrative expense/total expense indicator. This indicator is included to gauge the efficiency of the shared-ride system's administrative operation. The goal of the system manager is to minimize this expense category consistent with providing quality supervision and overall management. While this performance indicator is very useful for tracking this efficiency level, wide differences in the expense items included in the administrative expense category make it difficult to compare this indicator across systems unless the same definitions are used. Since funding agencies often require uniform expense item definitions for their programs, shared-ride systems may be able to compare performance on this indicator among systems reporting to the same agency.

The expense items listed under the administrative expense category are typical of those found in most charts of accounts; however, separation of call

taking and dispatching expenses, as shown in table 4, is not usual. This separation is proposed to exclude the operating expenses associated with a shared-ride system scheduling demand-responsive rides from the general administrative expenses that are not directly related to vehicle and passenger operations. Separating these expenses provides a truer picture of the actual "overhead" administrative expenses, and it allows these costs to be identified when evaluating subcontracting options that involve centralized or decentralized dispatching. For example, a shared-ride system may wish to evaluate the option of contracting for transportation services while retaining the responsibility for call taking and trip dispatching. By separately identifying these expenses, the analyst is better able to evaluate this option.

OPERATING REVENUE STATISTICS

The performance framework presented in figure 1 also requires passenger revenue data to calculate average fares (revenue/one-way passenger trip). The shared-ride system manager can also use revenue information to track the cost recovery of the system as a whole or for subservices. The basic accounting system described earlier in this chapter should provide total revenue data for the entire system; however, many systems may not track revenue by service sector or vehicle. If the accounting system does not allow revenue to be tabulated by subservice, either the system can be revised to collect this information, or certain assumptions can be made to provide a workable estimate for the performance evaluation process.

If a shared-ride system charges a single, uniform fare, then the revenue associated with each subservice can easily be calculated assuming that total one-way trips for each service is recorded. However, if a complex fare structure is used, or if the system has no fare structure, but rather, bases charges to riders on costs (such as is often the case when contracting with human service agencies), an alternate, less accurate method must be used. The simplest way to estimate revenue in this case is to calculate a system-wide average revenue per passenger and multiply that result by the number of trips. Since this method may not be accurate if fares charged for various services

vary widely, every effort should be made to track revenue by service type so that accurate performance measures can be calculated.

SUMMARY

This chapter has described procedures that can be used to obtain the data needed to calculate the proposed financial performance indicators. At a minimum, these financial indicators require total operating expense, administrative expense, and revenue data for the entire shared-ride system. Because in most cases the performance analysis also will consider the efficiency and effectiveness of subservices such as service sectors, service type, or individual vehicles, cost allocation techniques are also required to determine the costs of these activities. The two and three-variable unit cost model has been proposed to provide this disaggregate information.

The next step in the performance evaluation process is the combination of the financial data with the other performance data and presentation of the results of the analysis. Procedures that can be used for this task are described in the next chapter.

5. REPORTING OF RESULTS

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 chapter 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 using time-series analysis. All three methods may be used for both internal management analysis of performance results and presentation of the performance information to external audiences.

This chapter 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. Suggested formats for this type of presentation are discussed in this chapter.

On the other hand, if the results are only to be used for internal management evaluation, then more detailed statistical analysis and tabular presentation of the results may be the most useful. Approaches to this type of interpretation and presentation are included in chapter 6 as part of the interpretation of performance measures for internal management use.

INTERPRETATION OF RESULTS

Performance indicators alone have little value to either the shared-ride 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 effectively interpret and communicate the results of evaluation efforts; however, each method has limitations which 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. Suggested methods for presenting results are also provided.

STANDARDS OR NORMS

The first method of interpreting performance indicators is to compare the results for the particular shared-ride 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 shared-ride 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, using the Pennsylvania experience, recent State funding legislation requires 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, Cincinnati's Queen City Metro transit system had adopted annual goals for a wide range of performance measures. Figure 3 shows the system's elderly and handicapped service's (Access) 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 shared-ride system may be required to cover a certain percentage of expenses from passenger revenue, or as in the case of private for-profit

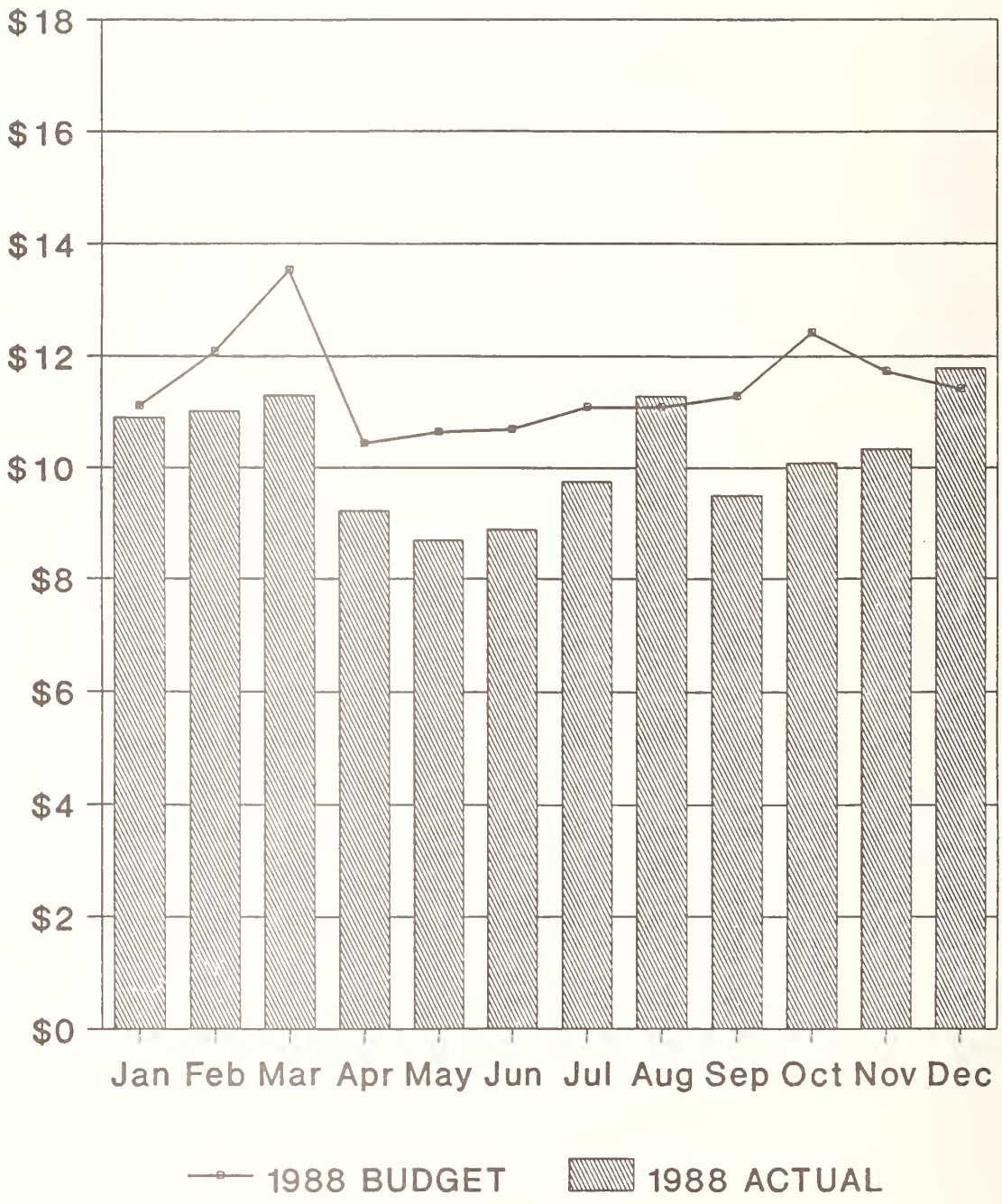


Figure 3. Example of performance measure compared to budget goal. Courtesy of Queen City Metro, Cincinnati, OH.

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 shared-ride systems such as that reported in the appendix, 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.

PEER GROUP COMPARISON

Shared-ride 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 shared-ride paratransit systems. System managers routinely select performance statistics on other systems within the State that they consider to be 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:

- Population of area served
- Type of area (e.g., urban, rural, suburban)
- Type of population served (e.g., general public or specialized clientele, ambulatory or nonambulatory ridership)
- Type of service (e.g., random trips or regular scheduled, subscription trips)
- Type of organization (e.g., for-profit, non-profit, or public agency)
- Type of operation (e.g., brokerage, direct provider)
- 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.

The appendix contains performance data on more than 60 shared-ride providers in Pennsylvania. The first table provides background information on the systems to permit identification of comparable systems. The second table reports several of the performance indicators used in the recommended 10-indicator framework.

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. For example, the Pennsylvania data presented in the appendix was obtained from reports filed by shared-ride systems participating in the State's reduced-fare for senior citizens program. 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 shared-ride 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 4 and 5 present examples of time-series reporting of performance data. Figure 4 shows monthly total and senior citizen ridership for a shared-ride 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 shared-ride 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 4 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 5 shows how the Queen City Metro 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 to not only 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 shared-ride 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

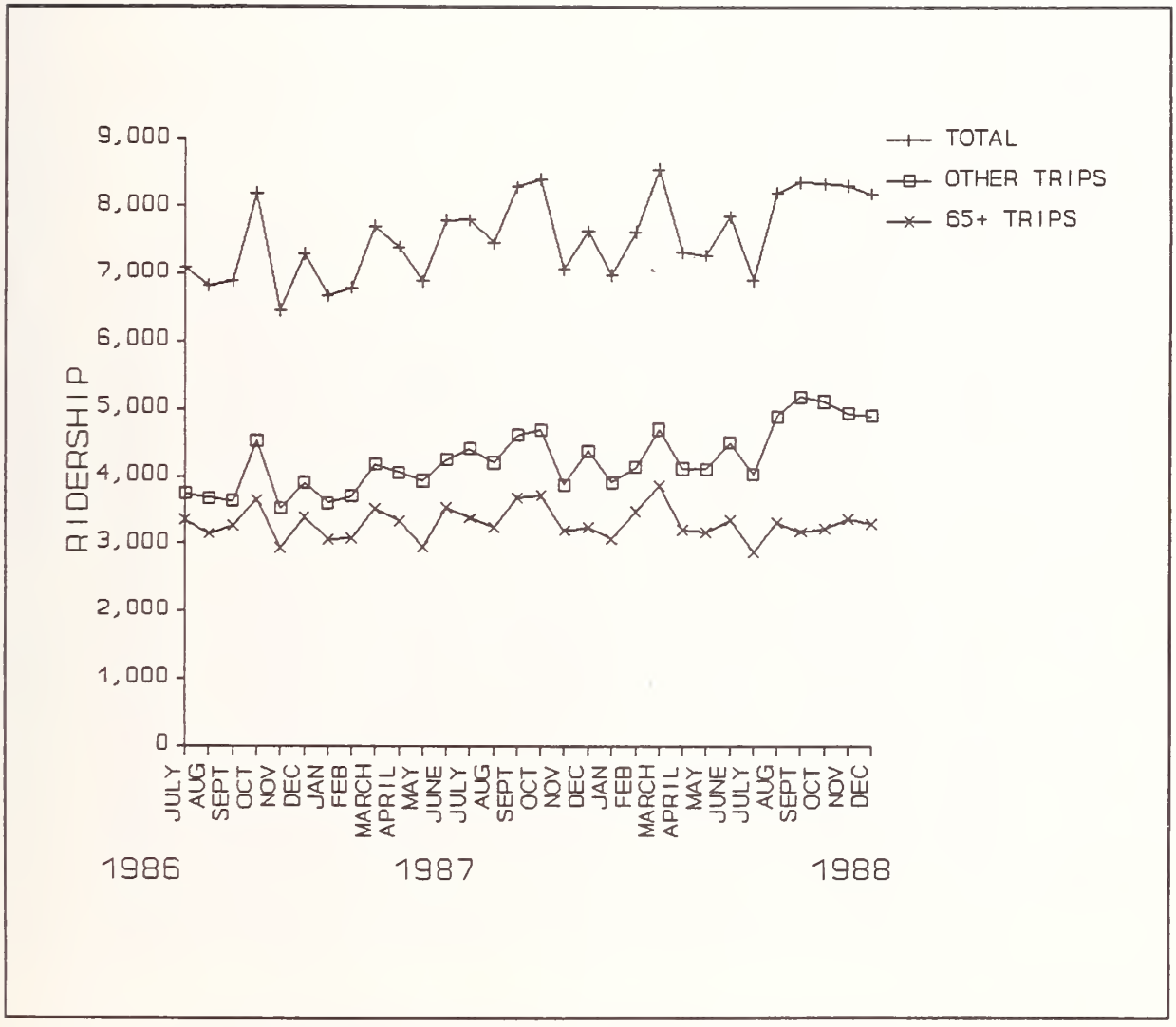


Figure 4. Example of time-series presentation of ridership data.

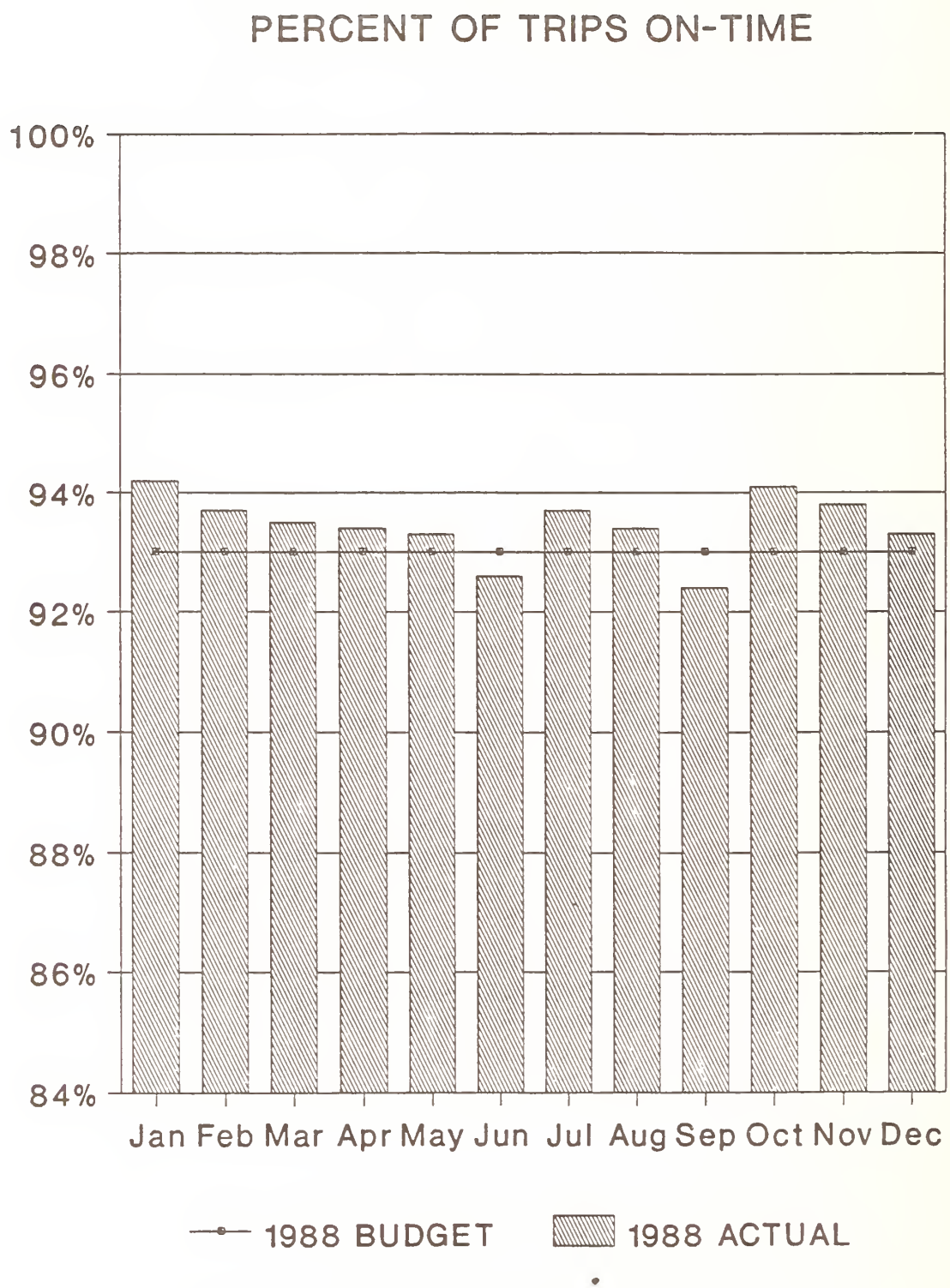


Figure 5. Example of time-series presentation that includes performance standards.

Courtesy of Queen City Metro, Cincinnati, OH.

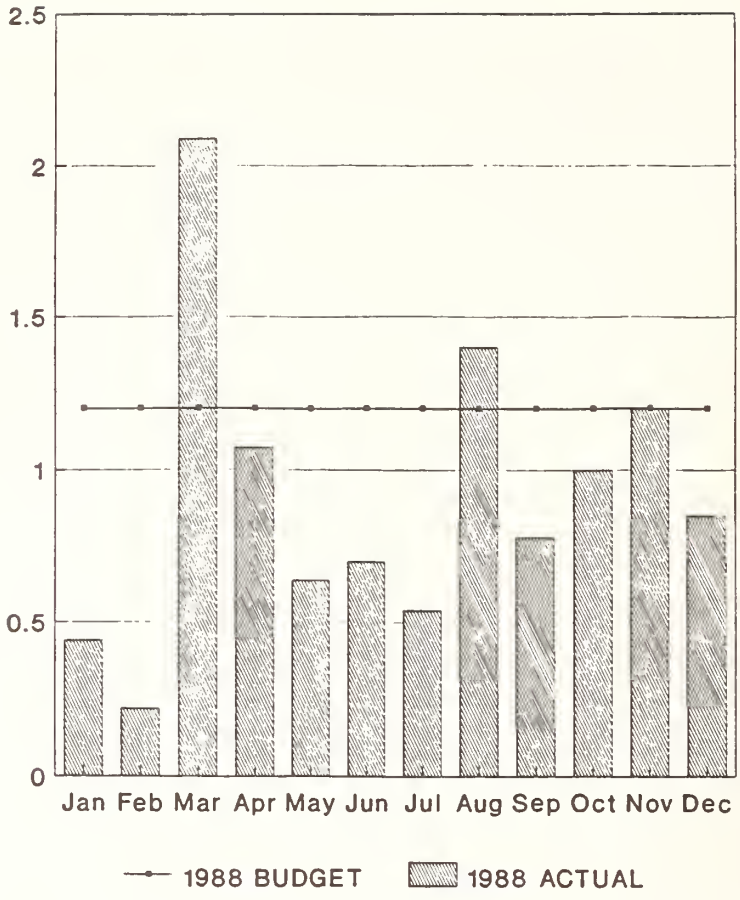
desirable practice, then the time-series data can be compared to the goals. Also, if funding agencies or other external agencies have established mandatory or suggested performance standards, these benchmarks can be incorporated into the analysis. Finally, if reliable, comparable data from similar peer systems can be obtained, the system's performance can be compared to that of other systems.

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. As will be discussed in chapter 6, use of performance indicators for internal management analysis and decisionmaking 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 shared-ride 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 shared-ride operation's efficiency and effectiveness.

For external reporting, a simple graphical presentation format is recommended. Figure 6 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



ACCESS COMPLAINTS/1000 PASSENGERS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CURRENT MONTH												
1988 Actual	0.44	0.22	2.09	1.07	0.64	0.70	0.54	1.40	0.78	1.00	1.20	0.85
1988 Budget	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
1987 Actual	1.66	0.81	0.29	1.38	1.41	0.49	0.66	0.68	0.58	0.68	0.75	0.52
YEAR-TO-DATE												
1988 Actual Average	0.44	0.33	0.92	0.96	0.89	0.86	0.81	0.89	0.88	0.89	0.92	0.91
1988 Budget Average	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
1987 Actual Average	1.66	1.24	0.92	1.04	1.11	1.01	0.96	0.92	0.88	0.86	0.85	0.83

Definition:
The number of service delivery and/or equipment complaints per 1000 one-way passenger trips per month.

Figure 6. Example of graphical presentation of performance results with definitions and back-up data.

Courtesy of Queen City Metro, Cincinnati, OH.

includes a series of the type of graph and table shown in figure 6. Note that the graph includes time-series data for the fiscal year as compared to the goal for the particular statistic. Monthly and year-to-date data for the current and previous years are included in a table which accompanies the graph. Also included with each table and graph is a definition of the performance measure, and in some cases, the source of the data used to calculate the indicator.

Additional examples of presentation formats are included in chapter 7, which presents 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.

6. DIAGNOSIS OF THE RESULTS AND CORRECTIVE ACTION

Chapter 5 described ways to effectively present the results of the performance evaluation with a primary emphasis upon external communication of the results. This chapter focuses upon the use of the indicators by the system manager to diagnose system problems and make changes in the operation to improve performance. The 10 performance indicators recommended in this guide represent the starting point in a more detailed analysis of the shared-ride system's operation. This analysis usually involves examining additional, secondary indicators in order to fully diagnose the cause of problems first identified by one of the 10 primary indicators. The remainder of this chapter 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 effectively manage a shared-ride system are included with the case study example presented in chapter 7.

OPERATING EFFICIENCY INDICATORS

The following three operating efficiency indicators measure the amount of resources required to provide shared-ride 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 shared-ride 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 shared-ride operator's objective should be to minimize the operating expense per hour. At the time of this report, shared-ride systems typically reported operating expense-per-hour rates between $14.00 and $25.00. 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 shared-ride 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 shared-ride system operates so that, to a great extent, this factor is out of the control of the shared-ride 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 shared-ride 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 shared-ride operation. Small, publicly-owned shared-ride 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, shared-ride systems typically devote 8 to 15 percent of their expenses to administration. Values in excess of 15 or 20 percent suggest that the shared-ride 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 shared-ride systems are usually not burdened with labor work rules that mandate full shifts or payment for nonrevenue 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 shared-ride 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 shared-ride 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 shared-ride system can 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:

4. One-way passenger trips per vehicle hour
5. 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 shared-ride system. It indicates how successful the shared-ride 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 shared-ride system statistics, as well as reports on other shared-ride systems around the United States indicates that shared-ride 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 shared-ride 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 shared-ride 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, shared-ride 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 shared-ride 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 shared-ride 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 shared-ride 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 shared-ride 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 shared-ride 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 shared-ride service provided, the availability of other public and specialized transportation services in the community, the quality of the shared-ride 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 shared-ride 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 shared-ride 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 shared-ride 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 shared-ride 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 subservices. The cost allocation method described in chapter 4 can be used to estimate the cost of providing particular subservices. The revenue earned by each subservice can best be calculated using the methods described in chapter 4.

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 shared-ride system is to cover all expenses from fares, then the operating expense and passenger revenue per passenger should be equal. If the shared-ride 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 shared-ride costs $5.50 to provide, but an exclusive taxi ride for the same distance would cost $4.50, then the shared-ride 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 shared-ride 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 subservices 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 shared-ride systems would experience only a few accidents systemwide 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 subservices.

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 and correct problems will be presented in the case study in chapter 7.

7. CASE STUDY EXAMPLE

This chapter presents a hypothetical case study example to illustrate how the performance evaluation methodology described in this guide can be applied. Shared-Ride Transportation System (SRTS), a small, publicly-owned and operated paratransit organization, was chosen as the example system since the evaluation described in this manual is typically applied to public or nonprofit organizations. However, the methodology could be applied equally well to a private for-profit firm, even though the set of objectives would be modified to include the profit objective. The other efficiency and effectiveness measures are equally applicable to all forms of shared-ride operations.

SYSTEM OVERVIEW

The Shared-Ride Transportation System (SRTS) is a small, rural shared-ride transportation system that offers general public transportation services to a service area with a population of 55,000 persons. Approximately 16 percent of the population (9,000 persons) is over 65 years old. SRTS operates three small buses and two vans to provide the service. The two buses operate within the small urban areas of the county and provide transportation to senior action centers as well as for shopping and medical trips. One bus operates a rural loop service that offers deviated fixed-route service one day a week to each of four areas of the county. The fifth day the bus is used for special shopping trips for senior citizens. One of the vans provides medical services in and around the two small towns in the county; the other van is used for medical trips to a major hospital/medical complex that is 60 miles from the county.

All trips on the SRTS service must be scheduled at least the day before the trip is to be made; many riders have standing appointments for regular trips. Transportation is available five days a week from 7:00 a.m. until 5:30 p.m. Over 80 percent of the riders on the SRTS are senior citizens. Most senior citizens ride the SRTS free because state and local agencies pay for the rides. Non-senior citizen riders include other human service agency

clients whose rides are paid for by the agencies, and some general public riders who pay the full fare.

SRTS charges both its public and agency-sponsored riders for the transportation it provides using a zone fare structure based on the distance traveled. Overall, the average fare in 1986-87 was $3.69; the lowest fare, $3.00, is charged for rides within the small towns. The highest fare is $15.00/one-way trip for rides to the major out-of-county medical facilities.

The SRTS service is managed by an executive director who reports to a policy board. The SRTS Board of Directors, concerned with rapidly increasing costs and increasing demands for service, adopted the set of goals and objectives listed in figure 7 as a means of measuring SRTS's performance, and as a tool to better communicate with the general public and with the agencies that support it. These goals and objectives are used in three ways:

1. The executive director prepares a monthly report for the board that tracks the performance of the SRTS operation relative to the 10 performance measures.

2. The SRTS Board issues an annual report to the public and funding agencies that publicizes the system's achievements relative to the stated goals and objectives.

3. The SRTS Executive Director and staff use the performance goals as the basis for internal evaluation of the performance of each part of the SRTS service. The internal analysis also includes a comparison of SRTS's performance with that of four other shared-ride systems in surrounding counties that are similar to SRTS.

Each of these uses of the performance evaluation methodology is described in the following sections of this chapter.

TABULATION OF INDICATORS

Most of the data required to tabulate the 10 performance indicators are readily available from the SRTS monthly operations reports that summarize data from driver logs. Table 6 presents most of the monthly operating and financial data needed for the evaluation. The one-way passenger trip, vehicle

1987-1988 Goals for the Shared-Ride Transportation System (SRTS)

Operating Efficiency

1. Operating expense per vehicle hour should not exceed $17.00 per hour.

2. Administrative expense as a percentage of total operating expense should not exceed 15 percent.

3. The percentage of live hours (when passengers are in the vehicle) to total paid driver hours should be at least 50 percent.

Effectiveness

4. A minimum of 4.5 one-way passenger trips per vehicle hour should be provided.

5. A minimum of 4.0 one-way passenger trips by senior citizens should be provided annually for each senior citizen within the service area.

Service Quality

6. Service-related complaints by customers should not exceed one complaint per 1,000 one-way passenger trips.

7. Ninety-five percent of all pickups will be made within ± 15 minutes of the promised time.

Financial

8. The expense per one-way passenger trip should increase by no more than the Consumer Price Index, and should not exceed $4.00/trip.

9. The revenue per one-way passenger trip should be set to recover, on average, 100 percent of the operating expense per trip.

Safety

10. The system should have no more than one avoidable accident per 100,000 vehicle miles.

Figure 7. Proposed goals and objectives for the Shared-Ride Transportation System (SRTS), 1987-1988.

Table 6. SRTS performance evaluation input data.

Month	Total One-way Psgr Trips	65+ One-way Psgr Trips	Vehicle Hours	Vehicle Miles	Total Revenue	Total Expense	Service Complaints	Avoidable Accidents
July 1986	3,300	2,760	902	11,500	$12,276	$12,123	2	0
August	3,500	2,960	890	11,850	12,718	13,200	0	0
September	3,200	2,640	813	11,010	11,682	12,300	1	0
October	3,700	3,050	960	12,650	13,200	11,900	3	0
November	3,100	2,870	740	9,870	11,088	11,850	3	2
December	3,600	3,100	875	11,650	13,002	12,540	4	0
January 1987	4,200	3,540	958	12,700	15,591	14,952	5	0
February	3,700	3,000	773	10,920	13,471	14,521	1	0
March	3,200	1,650	690	10,930	11,966	12,632	2	0
April	3,700	3,150	775	12,320	13,894	14,235	4	1
May	3,400	2,960	710	11,380	13,141	14,026	2	0
June	3,300	2,710	735	11,604	12,700	13,524	2	0
Total Fiscal Year	41,900	34,390	9,821	138,384	$154,729	$157,803	29	3
July 1987	3,450	2,760	750	10,568	$11,816	$12,255	1	0
August	3,257	2,640	810	11,515	12,923	12,287	0	0
September	3,199	2,590	770	11,011	12,404	13,210	1	0
October	3,598	3,210	772	11,089	12,551	14,005	2	0
November	2,930	2,540	690	9,985	11,395	11,985	4	0
December	3,410	2,970	750	10,933	12,477	12,547	2	0
January 1988	3,987	3,350	890	13,080	14,957	13,589	3	0

hour and vehicle mile data were taken from the summaries of driver logs; the revenue and expense information was obtained from the system's financial records. The service complaints and accident information were obtained from separately maintained logs.

Because of the time required to collect and tabulate live-hour data and on-time performance, SRTS calculated these measures based on sample data. For example, live-hour data were collected from four 1-week samples of driver logs taken about every 3 months throughout the year. On-time performance was also calculated by a detailed examination of requested and actual pick-up times as recorded on these logs. Paid-driver-hour statistics for these sample periods were collected from payroll records so that the live-hour and paid-driver-hour statistics from the same period were used to calculate the percent live-hour statistic.

The administrative expense percentage was tracked annually based on an analysis of SRTS's annual financial report, as shown in table 7. Finally, the per-capita senior citizen ridership was calculated using 1980 census data and the senior citizen ridership data as listed in table 6. Table 8 summarizes the desired and actual SRTS performances for fiscal year 1986-1987.

MONTHLY REPORT TO BOARD OF DIRECTORS

The executive director prepares a monthly report for the SRTS Board of Directors. This report advises the board of significant events in the operation of the system, present or potential problems that may require board action, and current SRTS performance relative to the goals and objectives established at the start of the year. The performance evaluation report accompanies the monthly financial and ridership report that is presented to the board.

Not all of the performance indicators are reported each month since some are only collected on a sample basis, while others are more logically reported on an annual basis. For example, the live-hour to paid-driver-hour

Table 7. Financial report for the Shared-Ride Transportation System, 1986-87.

Expense Object Class	Annual Expense
TRANSPORTATION EXPENSE	
Driver Wages & Salaries	$54,900
Driver Fringe Benefits	10,280
Fuel and Oil	12,541
Tires and Tubes	1,788
Vehicle Insurance	8,500
Other	870
TOTAL TRANSPORTATION EXPENSE	$88,879
MAINTENANCE EXPENSE	
Materials and Supplies	$4,015
Contracted Maintenance	12,400
Facility Rental	1,200
Utilities	500
Contracted Services	1,200
Other	850
TOTAL MAINTENANCE EXPENSE	$20,165
CALL TAKING AND DISPATCHING EXPENSE	
Dispatcher Wages & Salaries	$8,663
Dispatcher Fringe Benefits	1,788
Telephone Expenses	1,815
Computer Expenses	1,155
Rent	990
Other	1,485
TOTAL CALL TAKING AND DISPATCHING EXPENSE	$15,896
ADMINISTRATIVE EXPENSE	
Administrative Salaries	$19,113
Administrative Fringe Benefits	4,263
Materials and Supplies	1,238
Non-Vehicle Insurance	605
Professional Services	1,788
Travel	825
Office Rental	1,650
Utilities	990
Equipment Rental/Service	1,485
Other	908
TOTAL ADMINISTRATIVE EXPENSE	$32,864
TOTAL OPERATING EXPENSE	$157,803

Table 8. Tabulation of desired and actual performance objectives for the Shared-Ride Transportation System, 1987-88.

Performance Measure	Desired Performance	Actual Performance
Operating Efficiency		
1. Operating expense/vehicle hour	$17.00	$16.06
2. Administrative expense/total expense	15.0%	20.8%
3. Live hours/paid driver hours	50.0%	42.0%
Effectiveness		
4. One-way passenger trips/vehicle hour	4.5	4.3
5. Senior citizen one-way passenger trips/ senior citizen residents of service area	4.0	3.8
Service Quality		
6. Service-related complaints/1000 one-way passenger trips (i)/(f)	1.0	.7
7. On-time pickups/total pickups (j)/(f)	95.0%	92.0%
Financial		
8. Operating expense/one-way passenger trip	$4.00	$3.77
9. Revenue/one-way passenger trip	$4.00	$3.69
Safety		
10. Avoidable accidents/100,000 vehicle miles	1.0	2.17

statistics were only reported after the quarterly sampling study. On-time performance is also reported at this time. The percentage administrative expense is only reported once a year because of the unevenness of some administrative expenses such as audit fees that would reduce the meaning of month-to-month ratios. Senior citizen per capita ridership is only reported once a year since the more meaningful total senior citizen ridership statistic is reported monthly. Finally, the accident indicator is also reported only annually since so few accidents are expected, thus causing wide month-to-month variations in the ratio.

Five of the 10 performance indicators are tracked and graphically reported to the board each month along with a graph showing monthly total ridership for the previous year and the year to date. Examples of these graphs are presented in figures 8 through 12.

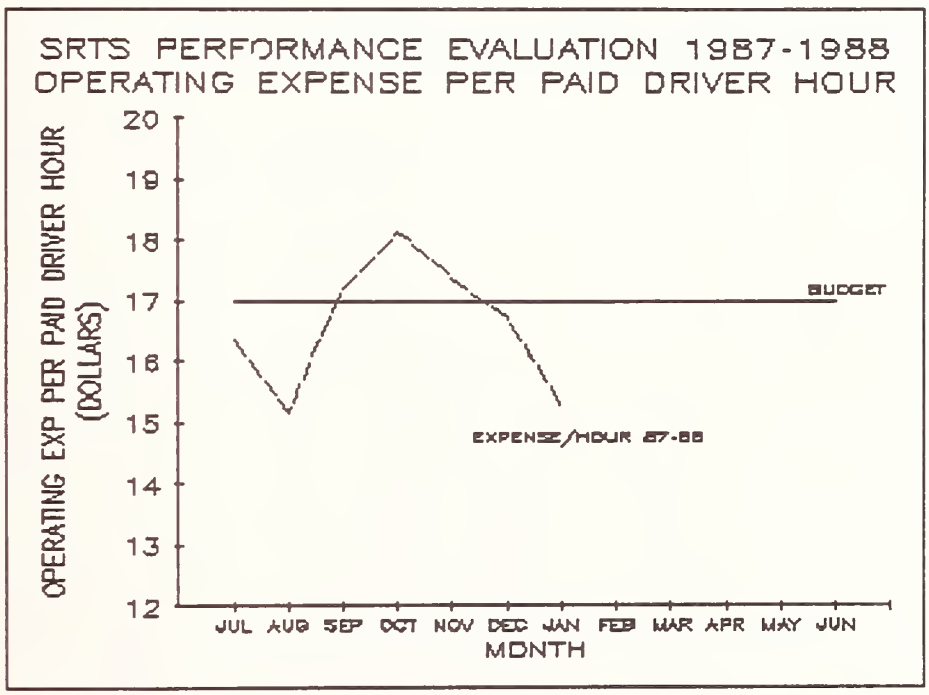


Figure 8. SRTS operating expense per vehicle hour.

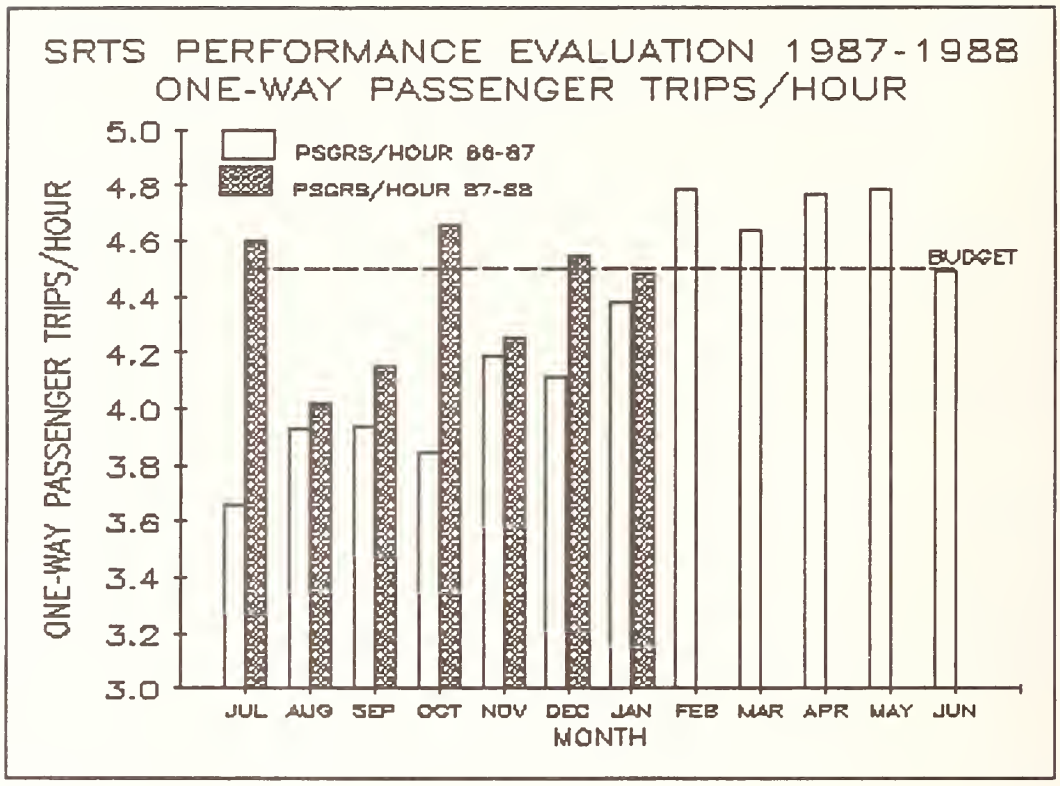


Figure 9. SRTS one-way passenger trips per vehicle hour.

These graphs show that SRTS is operating its service at an hourly cost that, for most months, has been less than the budgeted goal of $17.00 per vehicle hour. On the other hand, ridership per vehicle hour, while improved over the previous year, for most months, still lags behind the target productivity of 4.5 one-way passenger trips per hour. SRTS's revenue and expense per passenger, as shown in figure 10, are also less than the budget goal; however, expenses have exceeded revenue in 5 of the 7 months of the 1987-88 fiscal year. This situation is cause for concern. The causes of this shortfall will be examined more fully as part of the in-depth look at each service sector. Finally, as figure 11 indicates, service-related complaints, except for the month of November, are generally less frequent during the current year than in the previous year, a positive sign related to the quality of the SRTS service.

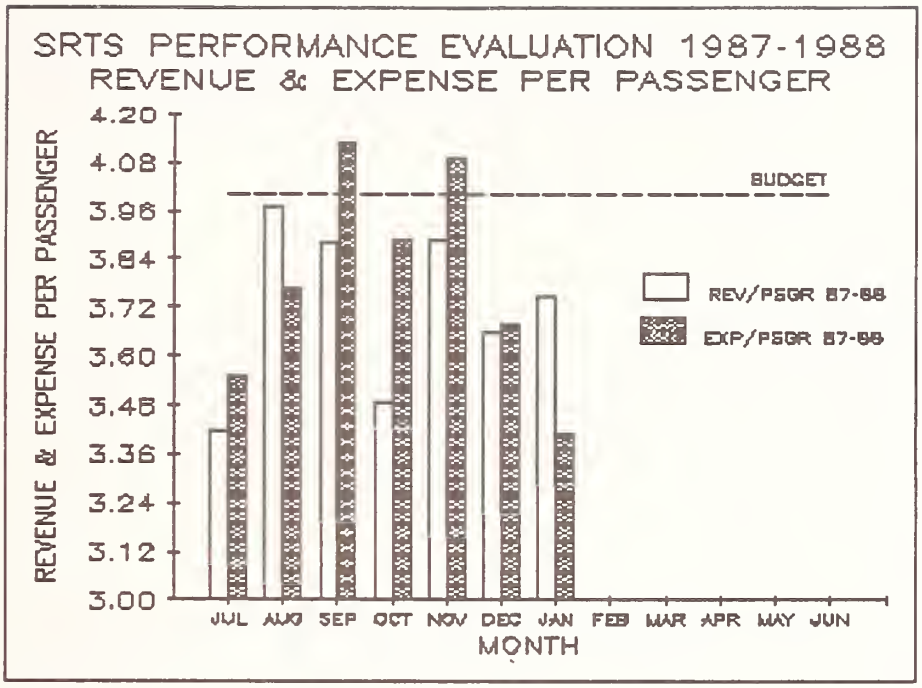


Figure 10. SRTS revenue and expense per one-way passenger trip.

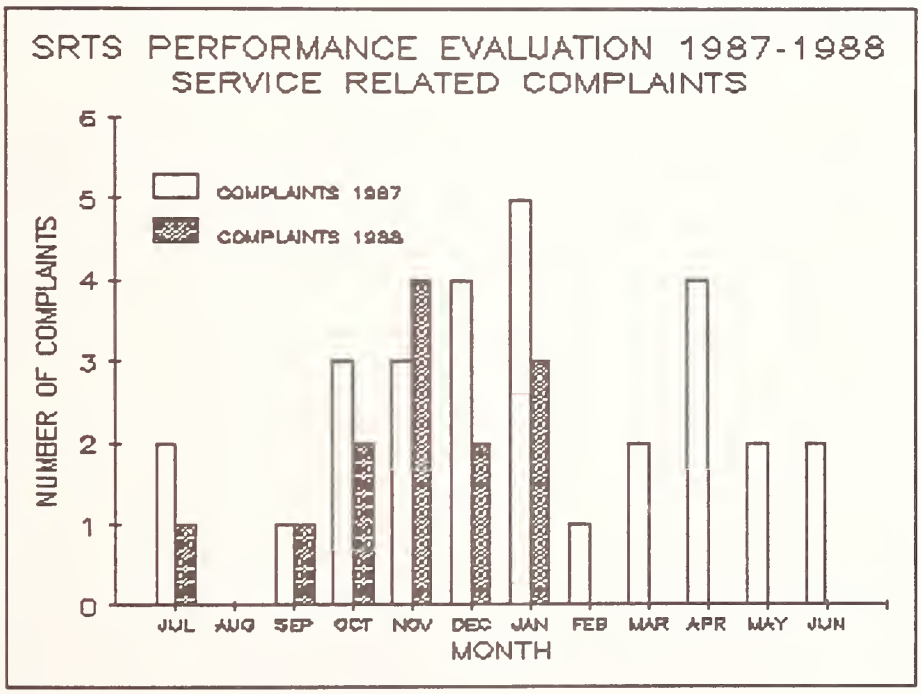


Figure 11. SRTS service-related complaints.

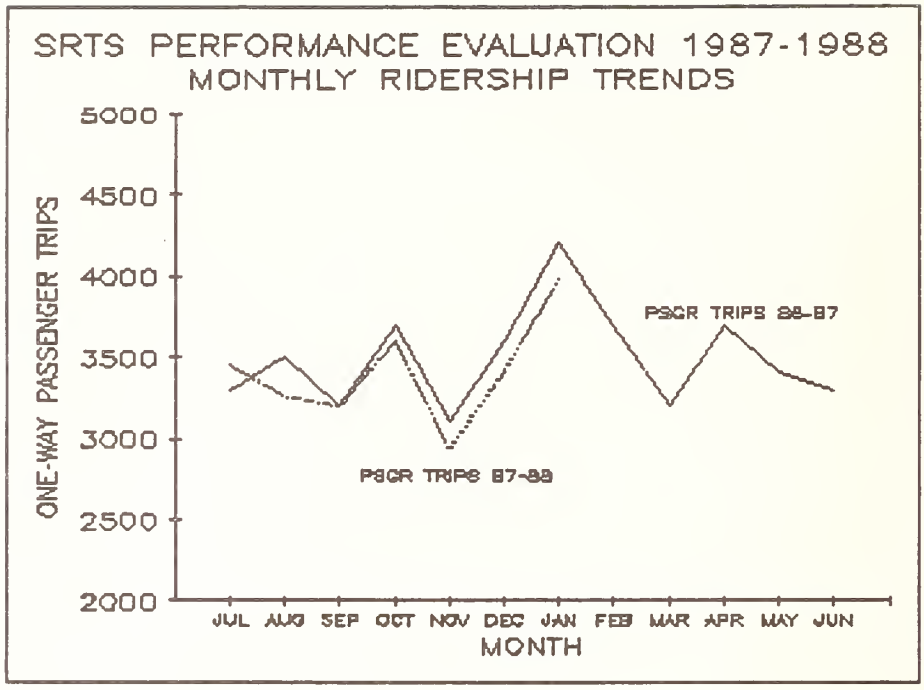


Figure 12. SRTS monthly ridership trends.

PEER GROUP COMPARISON

In addition to the monthly performance report, the executive director also compares SRTS's performance each year with that of three other shared-ride systems in nearby counties. Data for this peer group comparison is taken from a statistical report published by the State Department of Transportation. Over the years, the executive director regularly talks with the managers of the three systems and has determined that these systems are similar to SRTS in ways that make them comparable to it for a performance analysis. Table 9 summarizes key operating and performance statistics for SRTS and the three peer systems.

SRTS compares favorably to the three peer systems in most measures; however, SRTS's performance significantly differs from the other three on two measures. The system's three avoidable accidents in 1986-87 resulted in an

Table 9. Peer group comparisons for the SRTS, 1986-87.

Measure	Shared-Ride Transportation	Bradford Community Transit System	Reedsville Shared-Ride System	Tinker County Transportation
Type of Area	Rural	Rural	Rural	Rural
Population (1980 Census)	55,000	35,800	66,454	72,145
65+ population	9,000	4,296	13,200	11,300
Area (Sq. Miles)	750	557	1,225	805
Density (Pop./Sq. Mile)	73.33	64.27	54.25	89.62
Total shared-ride trips	41,900	29,500	64,200	78,560
65+ shared-ride trips	34,390	28,450	54,600	75,201
Vehicle hours	9,821	9,320	14,300	17,500
Vehicle miles	138,384	154,200	257,400	227,500
Total expenses	$157,803	$135,140	$236,665	$332,500
Total revenue	$154,729	$136,400	$210,331	$345,040
Operating expense/vehicle hour	$16.07	$14.50	$16.55	$19.00
One-way trips/vehicle hour	4.27	3.17	4.49	4.49
Senior citizen rides/capita	3.82	6.62	4.14	6.65
Operating expense/one-way trip	$3.77	$4.58	$3.69	$4.23
Revenue/one-way trip	$3.69	$4.62	$3.28	$4.39
Avoidable accidents/100,000 miles	2.2	None	1.2	.9

accident rate that is nearly double that of the other systems. By comparison, the Bradford Community Transit System had no accidents. Because two of the accidents were caused by a driver that no longer works for SRTS, the executive director expects performance in this area to improve next year. However, SRTS intends to review its driver selection and training programs so that it can avoid the problem it had last year.

The other SRTS performance indicator that differs from the peer group is the senior citizen rides per senior citizen resident. SRTS provides the fewest senior citizen rides per capita of the four systems. A number of factors may be responsible for this situation, the most obvious of which is the presence of a Section 18-funded fixed-route transit system in the SRTSs service area, whereas the other three communities lack of fixed-route transportation. The availability of other public transportation reduces the senior citizens' need for shared-ride service.

The SRTS Executive Director would like to compare SRTS's performance on other measures such as on-time performance, complaints, and percentage live hours to driver hours; however, the DOT statistics do not contain this information. Furthermore, the SRTS Executive Director is not sure that the other systems use common definitions for these statistics, so any system-to-system comparisons attempted may be not be valid. The executive director plans to discuss the need for uniform reporting of such information at the next State transit association meeting, so that other systems might report information in a way that can be beneficial to all systems trying to conduct peer comparisons.

INTERNAL PERFORMANCE ANALYSIS

The time-series and peer group analyses performed by the SRTS staff indicate that the shared-ride system is meeting most of its established goals and objectives, and it compares favorably with similar systems. However, SRTS needs to improve its performance on two service-related and two financial indicators. As previously discussed, SRTS's recent accident experience has been unsatisfactory relative to both its internal standard and compared to peer systems. Through increased selectivity in driver recruitment, and

through continued emphasis on defensive driving and other training programs, SRTS hopes to reduce the number of avoidable accidents. It plans to work with its insurance carrier and the State's RTAP program to carry out additional training activities.

The other service indicator that did not meet the system's expectation was on-time performance. A detailed analysis of trip sheets indicated that the primary problem area was the in-county medical trips, which were often late due to delays at doctors' offices that disrupted return trip scheduling. The SRTS dispatchers plan to make a renewed effort to work with local doctors to better schedule appointments, and to improve communication between the doctors' offices and the SRTS dispatcher. Also, the SRTS dispatchers are going to limit the number of calls during peak times to increase the system's ability to respond to late trips and improve on-time performance.

SRTS's overall operating expense per vehicle hour is less than the budgeted goal of $17.00; however, administrative expenses account for a greater than desired proportion of total expense (20.8 percent versus a 15.0 percent target), and expenses exceed revenue by approximately $3,000. Since SRTS's administrative staff consists only of the executive director and a secretary who also serves as the bookkeeper and dispatcher, SRTS seems to have little opportunity to reduce administrative expenses. Because even the smallest shared-ride system requires staffing levels similar to those found at SRTS, perhaps the 15 percent administrative expense goal was too optimistic for a system of its size. In future years SRTS can modify its goal to a more realistic 20 percent, or hope that increased ridership will result in an administrative expense that is a smaller percentage of the overall operating expense.

A more serious problem facing SRTS is that revenue from riders does not cover expenses. Since the system must break even, even this small loss cannot be tolerated. Further, since expenses will likely escalate in future years, the SRTS Board of Directors must consider how to bring revenue into line with expenses. One way would be to reduce expenses; however, based upon the peer comparison with similar systems, SRTS's operating expenses appear to be reasonable. Therefore, the SRTS Board plans to consider a change the fare structure that will allow SRTS to cover expenses.

SRTS operates four types of service: in-town service that provides group rides to senior centers and sheltered workshops as well as medical and shopping transportation; rural, deviated-fixed routes that provide one-day-a-week service to rural sectors of the county; and medical transportation both within the county and to a major medical center outside the county.

Fares vary for each type of service, with the lowest fare charged for the in-town service and the highest fare for the out-of-county medical trips. The SRTS Board is concerned that these fares are not in line with the cost of providing the various services. Therefore, the SRTS Executive Director prepared the detailed analysis shown in table 10 that tabulates the performance of each of the four services based on key financial and operating characteristics.

As would be expected, the different types of service display markedly different performance results. The in-town service transports a large number of passengers per hour; however, it operates at a relatively low speed due to congestion and short trip lengths. On the other hand, the rural loops and the out-of-county medical trips travel at relatively high average speeds, but transport fewer riders per hour because of the random nature of trip patterns and long waiting times at doctors' offices and hospitals.

The analysis shown in table 10 indicates that the in-county medical service is the poorest performing service in the system and is losing an average of $6.00 per trip. While the SRTS Board of Directors does not expect each service to cover its own cost, and assumes that gains on productive services such as the rural loops and in-town service will help offset losses on the medical transportation, losses on the in-county medical are still too great. Therefore, SRTS plans to consider an increase in the in-county medical trip rate from $5.00 to either $5.75 or $6.00 in order to eliminate the systemwide deficit.

The SRTS Executive Director is also concerned about the poor ratio of live vehicle hours to driver hours exhibited by the in-county medical service. The 21 percent live hour to paid driver hour statistic is well below the desired system average. Again, the SRTS Board does not expect that all

Table 10. Service sector evaluation for the SRTS Program, 1986-87.

Performance Measure	Service Area: In-Town/ Local	Rural Loops	In-County Medical	Out-of-County Medical	Total SRTS Operation
Total One-Way Trips	24,050	12,125	4,245	1,480	41,900
Vehicle Miles	44,560	38,018	32,505	23,301	138,384
Vehicle Hours	3,850	1,670	3,051	1,250	9,821
Paid Driver Hours[1]	4,004	1,737	3,173	1,326	10,240
Live Hours[1]	2,122	1,129	666	383	4,301
Total Revenue	$72,150	$42,438	$21,225	$18,917	$154,729
Total Expense[2]	$59,707	$30,051	$46,692	$21,353	$157,803
Operating expense/vehicle hour	$15.51	$17.99	$15.30	$17.08	$16.07
Percent live hours	53.00%	65.00%	21.00%	28.90%	42.00%
One-way trips/vehicle hour	6.25	7.26	1.39	1.18	4.27
Average Speed	11.57	22.77	10.65	18.64	14.09
Expense/one-way trip	$2.48	$2.48	$11.00	$14.43	$3.77
Revenue/one-way trip	$3.00	$3.50	$5.00	$12.78	$3.69
Gain or (loss) per trip	$.52	$1.02	$-6.00	$-1.65	$-.07

[1] Based on quarterly, one-week sample data that has been annualized
[2] Based on two-variable unit cost model: Expense = $12.937 x vehicle hours + $.22216 x vehicle miles

services will perform equally well; however, the in-county medical transportation service performs at less than half the desired productivity.

SRTS has examined the cause of this poor use of driver time and determined that although one of the two vehicles assigned to this service is used effectively only 2 days a week, a full-time driver is assigned to the service. The SRTS staff plans a renewed effort to increase demand for this service during low-use periods; if productivity does not significantly increase after three months, SRTS plans to reduce the driver of this vehicle to part-time status.

SRTS plans to prepare an annual internal performance evaluation and report the results and recommendations to the board. In this way, the board can more effectively guide the overall system and understand the implications of its policy decisions. In addition, the staff can monitor key statistics and make internal management decisions and policy recommendations to the board to ensure the effective operation of the shared-ride system.

APPENDIX

Tables 11 and 12 contain descriptive and performance data for 83 Pennsylvania shared-ride paratransit providers for the period from July 1, 1988 through June 30, 1989. These private for-profit, nonprofit, and government organizations provide shared-ride services to senior citizens and the general public as part of Pennsylvania's Reduced Fare for Senior Citizens Program. Although these tables do not include data for all of the performance indicators listed in this guide, they provide up-to-date statistics on several key performance factors.

Table 11 provides some descriptive information about each system to help the user of this manual identify systems that might be considered peers of the one being evaluated. The column labeled "Type of Grantee" indicates whether the shared-ride service is provided by a Transit Authority ("TA"), a for-profit taxi or paratransit firm ("For Profit"), a private, nonprofit corporation ("Nonprofit"), or a county government agency ("County"). The designation "CTS" refers to systems operated by county governments that provide transportation only to human service agency clients and not to the general public. All other categories of grantees offer public service.

The population and area in square miles served by each system will allow comparison of service areas and service area population densities. The "Total Shared Ride" column indicates the total annual ridership on the shared-ride system for fiscal 1989. The "Percent Agency Sponsored Rides" column indicates the proportion of the total shared-ride trips that were sponsored by human service agencies who paid the 10 percent of the fare not reimbursed by PennDOT. The grantees listing 0.00 percent agency ridership depended totally on general public ridership and most often provided randomly-scheduled trips. By contrast, the grantees that provided a high percentage of agency-sponsored trips generally provided group rides to senior centers and sheltered workshops. This distinction is important when considering the service productivity factors such as one-way trips per vehicle hour, since the providers of random trips are likely to achieve lower trip productivity than those who provide group rides.

Table 12 reports total operating revenue for the fiscal year along with the average fare (total revenue/total one-way trips). The table also reports two of the indicators included in the proposed evaluation framework, rides per hour and percent live time. Finally, average speed and average trip length information is provided to allow comparison between these systems and the system being evaluated.

Table 11. General characteristics of Pennsylvania shared-ride transportation systems, 1988-89.

Grantee	Type of Grantee	Type of Area	Population (1980)	Square Miles	Total Shared-Rides	Pct. Agency-Spons'd Rides
PAT-ACCESS	TA	Pittsburgh	1,450,085	727	1,879,390	34.94
KETRON-PHILA	For Profit	Philadelphia	2,243,217	320	1,198,257	30.35
Bucks County Transport	Nonprofit	Sub. Philadelphia	643,621	610	162,923	73.57
Chester County	County	Sub. Philadelphia	316,660	758	128,845	96.32
Chester Harp	For Profit	Sub. Philadelphia	NA	NA	17,063	0.00
Chester Tolsdorf (Paratransit)	For Profit	Sub. Philadelphia	NA	NA	14,876	0.00
Chester Tolsdorf (Rainbow Cab)	For Profit	Sub. Philadelphia	68,667	80	44,406	0.00
Delaware Cnty Trans. Consortium	Nonprofit	Sub. Philadelphia	555,007	184	264,308	75.61
Montgomery County Parat. Assoc.	Nonprofit	Sub. Philadelphia	643,621	486	360,497	45.62
Montgomery Harp	For Profit	Sub. Philadelphia	NA	NA	25,908	0.00
Montgomery Medi-Call	For Profit	Sub. Philadelphia	NA	NA	1,196	0.00
Montgomery Walsh-Jenkintown	For Profit	Sub. Philadelphia	NA	NA	86,399	0.00
ATA (18/10)	TA	Rural	245,254	5,094	172,995	48.86
ATA (Primary)	TA	Rural	245,254	5,094	21,296	89.64
Allied Coor Trans (ACTS)	Nonprofit	Small Urban	107,945	363	63,974	95.34
Apple Lines, Inc.	Nonprofit	Rural	68,292	521	46,008	78.55
BARTA	TA	Urban	312,509	861	329,782	25.54
BARTA Harp	For Profit	Urban	NA	NA	49	0.00
Barnes-Kasson Hospital	Nonprofit	Rural	37,876	826	20,363	85.05
Beaver County TA (Rural)	TA	Rural	204,441	436	11,299	87.04
Beaver County TA (Urban)	TA	Small Urban	204,441	436	119,856	78.98
Blair County	Nonprofit	Urban	136,467	527	165,806	87.11
Butler County	County	Rural	147,918	789	46,175	100.00
Cambria County (AAA)	County	Rural	183,417	691	77,097	100.00
Cambria County (CART)	TA	Urban	183,417	691	39,442	89.16
Carbon County	CTS	Rural	53,285	384	58,320	100.00
Carbon Harrisburg Yellow Cab	For Profit	Urban	53,285	384	11,587	0.00
Carbon Herlihy (Lehighton Taxi)	For Profit	Rural	25,124	91	18,039	0.00
Centre Area TA	TA	Urban	67,598	126	19,130	0.00
Centre County	CTS	Rural	112,760	1,106	125,642	100.00
Clarion County	CTS	Rural	43,349	607	108,999	100.00

Table 11. General characteristics of Pennsylvania shared-ride transportation systems, 1988-89 (continued).

Grantee	Type of Grantee	Type of Area	Population (1980)	Square Miles	Total Shared-Rides	Pct. Agency-Spons'd Rides
County of Lebanon (Colt)	TA	Small Urban	108,582	363	53,270	98.17
Crawford Area TA	TA	Rural	88,869	1,011	43,651	76.62
Crawford Kilburn (Lafayette Taxi	For Profit	Rural	27,482	58	28,432	3.14
Cumberland County	County	Urban	178,037	547	98,921	93.65
Dauphin County	CTS	Urban	232,317	528	185,682	100.00
Dauphin Harrisburg Yellow Cab	For Profit	Urban	232,317	528	23,996	9.13
Diamond S Taxi	For Profit	Urban	NA	NA	20,297	100.00
Endless Mountains TA	TA	Rural	110,241	2,734	66,075	97.61
Erie County	County	Urban	279,780	804	189,362	93.17
Fayette Connellsville Taxi	For Profit	Rural	159,417	794	35,572	0.00
Fayette County	County	Rural	159,417	794	80,667	61.25
Forest County	CTS	Rural	5,072	428	19,151	100.00
Franklin County	CTS	Rural	112,744	774	73,899	100.00
Greensburg Yellow Cab	For Profit	Rural	NA	NA	57,692	48.75
Huntingdon Bedford Fulton AAA	CTS	Rural	101,879	2,332	111,939	100.00
Indiana County TA	TA	Rural	92,281	829	45,448	97.43
Jeannette Taxi	For Profit	Small Urban	NA	NA	41,262	43.90
LANTA	County	Urban	273,582	348	350,524	83.36
LISTS - Lancaster County	Nonprofit	Urban	362,346	952	333,952	81.62
Lackawanna County	CTS	Urban	227,908	461	78,196	100.00
Luzerne-Wyoming Counties	County	Urban	369,512	1,290	106,755	73.02
Manor Valley Taxi	For Profit	Small Urban	NA	NA	9,335	61.36
Mercer County	Nonprofit	Rural	128,299	672	98,124	87.13
Mid-County TA	TA	Rural	77,768	646	58,271	99.73
Mifflin Juniata (CARS)	County	Rural	66,096	805	106,065	88.84
Mon Valley Taxi	For Profit	Small Urban	49,889	214	43,110	0.00
Monroe County TA	TA	Rural	69,409	609	36,576	80.80
Montour County	County	Rural	16,675	131	24,092	96.43
Mt Pleasant Yellow Cab	For Profit	Small Urban	NA	NA	35,686	66.24
New Kensington Taxi	For Profit	Small Urban	NA	NA	53,598	43.62
Northumberland County	County	Rural	100,381	461	66,339	99.97

Table 11. General characteristics of Pennsylvania shared-ride transportation systems, 1988-89 (continued).

Grantee	Type of Grantee	Type of Area	Population (1980)	Square Miles	Total Shared-Rides	Pct. Agency-Spons'd Rides
Perry County	TA	Rural	35,718	557	29,915	100.00
Pike County	County	Rural	18,271	557	18,628	92.58
Regional Development (Schuylkill	Nonprofit	Rural	160,639	782	155,746	89.38
Remley/K Cab	For Profit	Rural	36,437	118	60,112	8.76
S & N Transit	For Profit	Rural	200,762	437	24,516	57.74
S & S (Westmoreland)	For Profit	Small Urban	NA	NA	13,924	41.73
STEP (Lycoming-Clinton)	Nonprofit	Urban	157,387	2,128	139,455	61.23
Somerset County	County	Rural	81,243	1,073	53,579	92.18
Union-Synder Trans. Alliance	Nonprofit	Rural	66,454	646	117,606	85.86
Valley Limo	For Profit	Small Urban	NA	NA	8,355	96.51
Venango County	County	Rural	64,457	679	39,920	95.06
Veteran's Cab	For Profit	Small Urban	50,510	169	33,421	46.70
Warlene (Empress Taxi)	For Profit	Rural	64,309	1,225	0	0.00
Warren County	TA	Rural	47,449	885	28,847	95.84
Washington County	County	Rural	217,613	858	170,189	55.62
Washington Mon Valley	For Profit	Small Urban	NA	NA	748	0.00
Washington-Greene CAC	Nonprofit	Rural	258,089	1,435	46,380	84.35
Wayne County	CTS	Rural	35,237	731	33,965	100.00
York Cab	For Profit	Urban	NA	NA	52,332	0.00
York McCarthy	For Profit	Urban	NA	NA	10,752	0.00
York Transportation Club	Nonprofit	Urban	312,963	906	192,557	83.64

Table 12. Operating and performance data for Pennsylvania shared-ride transportation systems for period from July 1, 1988 through June 30, 1989.

Grantee	Total Revenue	Average Fare	Rides/ Hour	Percent Live Hours	Average Speed	Average Trip Length
PAT-ACCESS	$10,564,717	8.48	2.30	56.14	15.05	5.27
KETRON-PHILA	6,100,487	11.82	1.86	44.43	9.32	6.92
Bucks County Transport	963,325	6.64	4.07	39.21	18.01	0.00
Chester County	888,979	8.92	3.24	67.76	23.51	8.51
Chester Harp	78,601	4.95	NA	NA	NA	NA
Chester Tolsdorf (Paratransit)	368,833	27.11	NA	NA	NA	NA
Chester Tolsdorf (Rainbow Cab)	201,623	4.95	NA	NA	NA	NA
Delaware Cnty Trans. Consortium	1,604,224	6.66	2.29	57.39	9.54	9.64
Montgomery County Parat. Assoc.	2,234,997	6.82	NA	NA	NA	NA
Montgomery Harp	128,245	4.95	NA	NA	NA	NA
Montgomery Medi-Call	17,354	15.68	1.52	46.04	11.52	10.45
Montgomery Walsh-Jenkintown	572,132	7.26	3.89	52.47	17.33	5.87
ATA (18/10)	356,671	2.24	4.84	75.48	11.31	6.40
ATA (Primary)	78,369	4.04	3.50	58.14	10.12	8.35
Allied Coor Trans (ACTS)	291,032	4.97	2.76	42.94	12.70	0.00
Apple Lines, Inc.	163,073	3.81	2.25	41.68	13.42	4.20
BARTA	718,281	2.36	8.80	69.57	12.89	6.65
BARTA Harp	188	4.95	NA	NA	NA	NA
Barnes-Kasson Hospital	124,487	6.74	2.56	40.83	17.24	7.88
Beaver County TA (Rural)	29,930	2.93	3.27	0.00	0.00	0.00
Beaver County TA (Urban)	206,863	2.59	4.34	0.00	0.00	0.00
Blair County	641,398	4.24	3.61	50.61	13.29	0.00
Butler County	200,588	4.75	2.92	47.29	19.34	0.00
Cambria County (AAA)	247,167	3.50	4.68	86.70	9.07	0.00
Cambria County (CART)	82,033	2.49	3.58	63.51	15.84	0.00
Carbon County	242,483	4.59	4.58	51.22	18.42	5.28
Carbon Harrisburg Yellow Cab	53,938	4.98	2.29	52.90	9.16	5.52
Carbon Herlihy (Lehighton Taxi)	54,164	3.27	2.43	45.71	15.30	3.71
Centre Area TA	65,103	3.72	7.49	0.00	0.00	0.00
Centre County	415,688	3.64	8.44	41.23	12.50	0.00

Table 12. Operating and performance data for Pennsylvania shared-ride transportation systems for period from July 1, 1988 through June 30, 1989 (continued).

Grantee	Total Revenue	Average Fare	Rides/ Hour	Percent Live Hours	Average Speed	Average Trip Length
Clarion County	$258,971	2.85	5.25	69.03	20.64	12.84
County of Lebanon (Colt)	233,458	4.83	3.75	52.82	15.26	4.71
Crawford Area TA	230,737	5.77	5.37	69.65	16.79	8.52
Crawford Kilburn (Lafayette Taxi	95,352	3.65	1.92	40.28	12.48	2.69
Cumberland County	431,874	4.78	3.68	69.92	19.23	0.00
Dauphin County	926,157	5.48	3.20	47.33	14.77	7.42
Dauphin Harrisburg Yellow Cab	91,786	3.83	10.80	56.19	21.46	4.68
Diamond S	29,812	4.47	4.11	63.74	13.12	7.08
Endless Mountains TA	335,019	5.52	2.26	84.66	22.14	9.34
Erie County	875,333	5.03	3.00	67.08	15.26	8.36
Fayette Connellsville Taxi	123,047	3.46	2.57	37.73	19.52	4.72
Fayette County	386,793	6.09	NA	NA	NA	NA
Forest County	131,678	7.51	2.14	42.32	15.01	13.95
Franklin County	221,084	3.28	3.22	45.10	17.78	0.00
Greensburg Yellow Cab	249,470	4.71	3.40	45.36	13.13	0.00
Huntingdon Bedford Fulton AAA	599,560	5.88	2.17	46.48	16.96	0.00
Indiana County TA	195,239	4.65	5.33	49.22	13.51	7.94
Jeannette Taxi	136,320	3.62	NA	NA	NA	NA
LANTA	1,635,821	5.21	6.07	74.07	47.36	5.13
LISTS - Lancaster County	1,192,777	3.91	5.29	41.97	15.02	6.64
Lackawanna County	518,015	7.30	2.41	65.10	10.52	3.56
Luzerne-Wyoming Counties	321,061	3.28	1.11	59.43	16.49	3.87
Manor Valley Taxi	69,066	8.09	1.83	49.61	18.48	11.60
Mercer County	488,865	5.50	4.08	53.11	15.91	0.00
Mid-County TA	291,537	5.46	4.65	50.98	14.33	0.00
Mifflin Juniata (CARS)	408,351	4.19	3.93	45.01	16.79	0.00
Mon Valley Taxi	185,014	4.67	4.42	49.12	15.27	3.80
Monroe County TA	227,292	6.78	3.18	52.59	16.04	10.85
Montour County	63,453	2.89	3.02	29.12	8.91	6.17
Mt Pleasant Yellow Cab	151,373	5.67	3.78	34.08	21.29	5.24

Table 12. Operating and performance data for Pennsylvania shared-ride transportation systems for period from July 1, 1988 through June 30, 1989 (continued).

Grantee	Total Revenue	Average Fare	Rides/ Hour	Percent Live Hours	Average Speed	Average Trip Length
New Kensington Taxi	$131,404	2.68	NA	NA	NA	NA
Northumberland County	238,100	4.49	2.96	31.34	10.41	0.00
Perry County	146,850	5.96	2.86	48.07	17.40	0.00
Pike County	92,027	5.40	3.49	56.40	13.26	0.00
Regional Development (Schuylkill	955,066	6.70	6.72	56.35	17.21	6.20
Remley/K Cab	217,433	4.00	8.13	76.92	53.29	4.33
S & N Transit	57,113	2.53	6.12	51.83	13.45	4.17
S & S (Westmoreland)	85,339	6.65	1.37	34.56	17.14	6.25
STEP (Lycoming-Clinton)	615,753	4.81	4.11	60.50	23.64	5.39
Somerset County	199,588	4.50	4.29	46.90	12.21	5.25
Union-Synder Trans. Alliance	434,294	4.00	3.29	0.00	0.00	10.62
Valley Limo	50,211	7.64	2.50	36.27	13.56	12.15
Venango County	169,962	4.65	4.30	75.41	23.55	5.32
Veteran's Cab	162,958	5.38	5.16	59.06	26.92	6.19
Warlene (Empress Taxi)	0	0.00	NA	NA	NA	NA
Warren County	140,541	5.35	4.02	42.07	13.10	2.88
Washington County	941,433	6.05	3.05	45.19	12.06	5.45
Washington Mon Valley	2,970	3.97	3.45	0.00	0.00	0.00
Washington-Greene CAC	192,654	5.02	2.86	43.09	16.39	9.28
Wayne County	141,438	5.35	4.45	46.11	17.35	10.10
York Cab	207,376	4.40	1.23	44.51	13.37	4.57
York McCarthy	47,309	4.40	1.31	48.05	6.18	3.36
York Transportation Club	634,869	3.97	2.36	61.04	15.23	0.00

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