A Performance Manual

How to Make Your Transportation System More Efficient and Effective

Fifth Manual in a Series

February, 1982

Prepared for
U.S. Department of Transportation
Urban Mass Transportation Administration
Washington, D.C. 20590

CENTER FOR TRANSPORTATION RESEARCH
BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
How to Make Your Transportation System More Efficient and Effective; A Performance Manual	Feb. 1982
	6. Performing Organization Code
	8. Performing Organization Report No.
7. Author(s)	
Dr. Sandra Rosenbloom	
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
The Center for Transportation Research The University of Texas at Austin, ECJ 2.6 AUstin, Texas 78712	11. Contract or Grant No. DOT-TX-11-0013
	13. Type of Report and Period Covered Final Report
12. Sponsoring Agency Name and Address	
Urban Mass Transportation Administration U.S. Department of Transportation Washington, D.C. 20590	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This Manual focuses on the evaluation and improvement of the productivity and performance of transportation systems in the social service community. The Manual assists social service agencies in turning agency goals into transportation service objectives and then turning those service objectives into both quantitative and qualitative measures and standards of performance and productivity.

The Manual assists social service agencies in developing effective and appropriate recordkeeping systems, in developing monitoring and evaluation systems and schedules and in attempting to address unsatisfactory performance or productivity.

This Manual is the last in a series of five. The series is designed to assist transportation providers to be more efficient and effective and to provide high quality transportation services.

17. Key Words	18. Distribution Statement
elderly and handicapped coordination transportation performance coordination social service agencies	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified		123	

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How to Make Your Transportation System More Efficient and Effective

Dr. Sanda Rosenbloom
Graphics by
Constance Clark

Supported under Urban Mass Transportation Administration Grant DOT-TX-11-0013

Preface

This Manual is the fifth and last in a series of five manuals. The entire series is designed to assist human service agencies and community transportation operators to provide more efficient, more effective, and higher quality transportation services to their riders and clients.

Each Manual in the series covers one specific topic of the many topics that concern such providers. By focusing on one issue or a closely related group of issues at a time, each Manual in the series permits the user to follow one major theme without becoming too sidetracked by other important issues.

At the same time, each of the topics covered by the Manuals is related in an integral way to all the other topics. And each of the Manuals is designed to complement and build upon the others in the series.

A serious effort was made to keep each Manual concise and to-the-point. Therefore, very little material from one Manual is repeated in another Manual in the series; the reader is referred to that Manual in which the primary discussion of a key topic appeared.

In addition, the Manuals have been kept more concise by not including detailed descriptions of real projects and the experiences of actual providers. Full references are made, however, to sources of further information.

Each Manual begins with a brief description of the tools, information, or data which the reader should

already have to fully utilize that Manual. Often these tools or data are available from or through the use of another Manual in the series.

The other Manuals in the series are

Manual One. Cost-Analysis for Social Service Agency Transportation Providers

Manual Two. How to Evaluate the Costs and Benefits of Participating in Coordinated Transportation Services

Manual Three. Predicting Transportation Ridership in a Coordinated Program

Manual Four. Contractual Arrangements for Coordinated Transportation Services; Performance and Assurance Contracting

Acknowledgments

The entire series of Manuals would not have been possible without the guidance and support of Judy Meade and Pat Cass. Thanks are also due to Norm Paulhus, Wanda Dyer, Kenny Hosen, John Schafer, Barri Standish, and Mike Albarelli for their continued interest and enthusiasm.

Special acknowledgement must be made to Alesandro Pio, Henry Dittmar and Carole Schlessinger for their work on the research which led to this series of Manuals.

It would be impossible to overestimate the contributions of Connie Clark and Mary Beth Edinburgh.

Sandra Rosenbloom
Austin, Texas
September, 1981

Introduction

This Manual focuses on one topic in the delivery of transportation services to the clients of community social service agencies -- the evaluation of the performance and productivity of the system.

This Manual is designed to assist social service agencies and community transportation providers

- → to turn agency policies and goals into transportation service objectives,
- → to turn transportation service objectives into both quantitative and qualitative measures and standards of performance and productivity,
- → to develop effective and appropriate record-keeping systems,
- → to develop monitoring and evaluation systems and schedules, and
- → to address unsatisfactory performance or productivity.

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INTRODUCTION

There are very few agencies or transportation providers which do not wish to evaluate how well they are providing service or how they can improve their system. Even agencies which are perfectly happy with their current arrangements suspect that there might be better ways to do some things or techniques available to improve system performance.

This Manual is designed to help agencies to analyze the performance, productivity and efficiency of their current transportation options or systems. The analytical approach followed by the Manual is a comparative one, the approach stresses that agencies must assess their performance against their own specific service and operational objectives. Prior to evaluating their system performance, agencies must specify exactly what they expect of their system and then compare their actual operation to their expectations and goals.

Agencies provide transportation services in order to meet their obligations to their clients and to fulfill agency objectives. It is

important to see that any agency's transportation services do in fact fulfill these obligations. In order to ensure that, systems must be compared to service and performance standards which are actually based on agency policy and client need.

It is also possible for a system to compare its current performance to other systems or to its own operation over time. Both comparisons are valid evaluations of a system but they should be undertaken along with the more comprehensive assessment suggested above. It is possible for a system to be performing better than another system and even better than its own record without meeting agency objectives and goals.

Establishing objectives and performance standards requires careful thought. All three types of comparisons discussed above also require substantial data collection. There is simply no substitute for a thoughtful analysis of agency needs and sound record-keeping. This Manual will attempt to give agencies a way to think through their agency goals and objectives and to develop record-keeping systems which will facilitate system performance evaluations.

This Manual is designed to help both agencies currently providing or purchasing service and those only considering active transportation provision. Even agencies in the midst of difficult operational situations must stop and think through their goals and objectives.

This Manual will focus largely on the non-financial aspects of performance and productivity. A number of key cost-related system data are discussed at length in the first Manual in this series. Certainly cost parameters are important determinants of system performance. Yet one Manual can not cover all system concerns. This Manual should be used in conjunction with the first Manual in order to perform a comprehensive evaluation of a system's operation.

THE CONTRIBUTIONS OF THE WHOLE SERIES OF MANUALS

THE MESSAGES OF EACH MANUAL

This Manual is the concluding Manual in a series of five. It synthesizes the material appearing in the other four manuals which address system performance criteria. This Manual also synthesizes and

presents useful material from a variety of other references, the most important of which are listed in the Appendix.

All four of the other Manuals directly or indirectly address the question of how you should and can evaluate your system and how you should and can improve it. Table One summarizes the important messages and skills presented in the other Manuals in this series. Each Manual can help you address several key performance or service variables.

The first Manual (Ref. 2) in the series can help you to understand your cost and service parameters and to establish some preliminary cost measures to use in evaluating your system's performance. The second Manual (Ref. 5) helps you analyze your potential for buying or selling services to or from other providers in the community; this type of coordination activity is certainly an important way to increase system performance and productivity.

The third Manual (Ref. 13) in the series can help you to predict ridership for new systems or new service arrangements. It can help you increase your productivity by changing your client and service eligibility criteria. The Manual can also help you address your problems if you have too many client demands on your limited resources.

The fourth Manual (Ref. 1) in the series discusses contracting for transportation or transportation related services (like maintenance). The fourth Manual complements the second Manual by addressing the actual operational details involved in purchasing service from community providers. Again contracting for some or all of your transportation related services is another way to improve the performance and productivity of your system.

This Manual is different from the other four in that it cuts across a number of substantive issues to address system performance from a functional perspective. The first four Manuals in the series are organized around one or more specific substantive or organizational issues; cost-accounting, ridership prediction, writing contracts, etc. This Manual will address these issues as either a way to meet your system objectives or as a way to address some specific problem which you are having.

This Manual will present some material from the first four Manuals but packaged in a different way. Agencies currently providing transportation services in their own vehicles or those now considering that

Table One

The Messages and Skills Developed in the First Four Manuals in the Series for Social Service Transportation Providers

MANUAL	MAJOR MESSAGES	SKILLS DEVELOPED
One Cost Analysis for Social Service Agency Transportation Providers "The Costing Manual"	◗ systems must recognize all the resources used and costs incurred by their system whether they pay for them or not ◗ systems must identify all the functions and activities which are associated with the provision of agency service ◗ systems are only marginally comparable at best, but when compared, full-cost data must be used	• how to identify all costs, and all functions and activities performed in providing transportation, and how to link one to the other • how to identify and differentiate between costs and expenses and how to use those data for management and budgetary purposes • how to calculate current or predicted annual system costs and the unit cost figures based on them • preliminary ways to use cost data to evaluate and compare the agency's system
Two How to Evaluate the Costs and Benefits of Participating in Coordinated Transportation Services	◗ systems must understand their current costs and their current level of service in order to make meaningful comparisons with other alternatives	• how to use unit costs to compare current system cost parameters to those offered by community providers when buying service

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MANUAL	MAJOR MESSAGES	SKILLS DEVELOPED
Two "The Coordination Manual"	▶systems entering into coordinated transportation programs must calculate the costs of functions retained when they buy transportation services, and/or, additional system costs generated when they sell services ▶coordination can't offer everything; agencies may have to make service and cost trade-offs	•how to compute total costs to charge when selling transportation services to other agencies or a coordinated system •how to identify and evaluate objective and subjective measures of service when comparing current systems to community alternatives •how to identify and recognize the importance of a range of local factors which impact on the success of a coordination scheme •how to estimate an agency's "coordination potential."
Three Predicting Transportation Ridership in a Coordinated Program "The Ridership Manual"	▶ridership response is determined not only by the client's needs but by the level of service offered, the environment and agency-specific factors ▶all data show that ridership on social service systems across the country comes from existing agency clientele; there is little evidence of latent demand	•explains what is known about how and why clients react as they do to the provision of transportation services •gives aggregate demand estimation methods for community-providers with no pre-existing clientele •gives more refined and comprehensive demand prediction methodologies for agencies with currently affiliated clientele

(Continued)

MANUAL	MAJOR MESSAGES	SKILLS DEVELOPED
Three "The Ridership Manual"	▶clients are sensitive to service factors, administrative delays and complicated eligibility requirements; even the neediest client will not use a service with a poor record on these points ▶many agency screening processes and ridership requirements are unnecessary and may deter ridership; on the other hand, screening and additional restrictions can be used to limit ridership if it exceeds capacity	•how coordinated systems that deal with such agencies can help them predict ridership •how to remove or restructure trip and client restrictions to increase demand to fill existing capacity •how to restrict client or trip patterns in order to reduce demand to fall within existing capacity
Four Contractual Arrangements for Coordinated Transportation Services "The Contracting Manual"	▶agencies entering into any type of contract must understand exactly what they expect, and those expectations must be shared by the contractor ▶a contract should represent to the greatest extent possible an agency's careful identification of its needs and requirements and those requirements should conform to agency policy and goals	•how to establish service objectives, consistent with agency policy, and in a format that can be used during contract negotiations •how to establish responsibility for the remaining activities generally associated with the contracted service •how to establish payment schemes and payment schedules

(Continued)

MANUAL	MAJOR MESSAGES	SKILLS DEVELOPED
Four "The Contracting Manual"	◗ agencies may have to go through an interative decision process; deciding the minimum level of acceptable service after learning what the maximum or ideal level will cost ◗ agencies should determine what acceptable performance standards will be and how they are to be measured; then the agency must allocate resources to monitor contractor conformance with those standards	• how to identify, and convey to the contractor, the data required for billing purposes, and for other agency needs • how to establish, and convey to the contractor administrative and record-keeping requirements • how to identify and evaluate the suitability of various contracts including: · assurance · cost plus fixed fee · fixed unit cost · performance · incentive

option are urged to obtain all five Manuals and make a serious attempt to master their content.

OPERATIONAL ISSUES NOT ADDRESSED BY THESE MANUALS

The entire series of Manuals has been sponsored by the Urban Mass Transportation Administration of the U.S. Department of Transportation. The overall objective of the series was to help local agencies to more effectively use existing community resources and to respond more efficiently to their clients' needs. The DOT was particularly interested in helping agencies with new policy mandates to coordinate resources, such as those funded by the Office of Human Development Services of U.S. Health and Human Services or the Administration on Aging, to meet their objectives.

All of the important issues in transportation provision could not be addressed by only five manuals. Because the focus of the series is on helping local agencies and providers to coordinate resources and work cooperatively together, the Manuals do not address some important, but relatively system-specific operational issues.

Not included in this series is a discussion of vehicle purchasing, vehicle maintenance schedules, routing and scheduling procedures, and personnel management and training. Those readers interested in these important issues are referred to References 4, 6, 7, 10, 11 listed at the end of this Manual. It is obvious that these factors may well impinge on the performance and productivity of a system.

WHAT THIS MANUAL WILL DO

This Manual introduces a simple ten-step evaluation process. The process begins with the specification of your agency goals and policy and ends with an actual assessment of system performance. In between are a number of important analytical steps. The whole process is described in Chapter Two.

Briefly in order to increase the efficiency of your system you must

- establish service expectations based on agency policy and goals

- devise measurements or standards to record those service expectations
- devise recording systems to record them
- compare actual performance to expectations
- work to improve unsatisfactory performance, and/or increase
- goals in areas of satisfactory performance

This Manual is designed to assist you in turning your agency goals into the specific service and performance expectations you have of your system or service. Once you have established those expectations, the Manual will help you to establish actual standards or measurements of those service parameters. The standards you select will be the basis for evaluating and improving the system. For example, if your objective is to deliver a reliable service, a performance measure might be the percentage of times vehicles show up late. A preliminary standard might be that vehicles should be late no more than 10% of the time.

The Manual is designed to help you establish some reasonable ways to measure and to record the service and performance variables of interest. Some measurements can be routinely collected, by your drivers or dispatchers, if they are made aware of the need and your forms and records are designed appropriately. Other service standards can be measured at timely intervals through random surveys, or on-board sampling or spot-checks of certain records. Even to correct current system problems, you must identify your agency objectives and goals and turn those goals into service expectations. If your problem, for example is that service costs too much, there may be some quick-fix solutions. To the extent possible, this Manual will attempt to suggest solutions.

But in the long run there is no one answer to the problem of expensive service. An agency must address the overall problem of limited resources and increasing demands by establishing goals and objectives about what transportation services should accomplish, how and when.

The third and fourth Manuals in this series discuss this point at length in the context of setting ridership restrictions and in contracting for service. (Refs. 1, 13). The point is the same here although the context is different; in order to achieve the highest level of service

you must decide exactly what your services are supposed to accomplish.

For example, if your maintenance costs are very high, you may find that contracting with a local gas station for routine maintenance service may initially reduce your costs. But at some time you should address the overall question of whether the services you are now providing to your clients could be provided in a different manner or in a more cost-effective way. As you seek to "put out" the most pressing "fire" or problem, you should also take the time to investigate where the "flammable" points in your system are, and how to prevent future problems ("fires").

A MESSAGE FOR FIREFIGHTERS

No doubt you have seen a number of documents which tell you how to plan any enterprise; you identify goals and objectives, determine program expectations and devise comprehensive plans. However, if you are running a system right now, and none of your clients ever seems to get anywhere on time, or the costs of insurance have doubled in the last year, or you just lost all your CETA drivers, you probably aren't interested in hearing about the value of the comprehensive planning process.

Agencies who are currently operating a system or purchasing services from a contractor may well see themselves in a different position than those that are not. But the differences are largely psychological. If you are currently operating a system you have some implicit service objectives or standards to which you are performing even if you haven't articulated them.

If you are unhappy with some aspect of your agency's service provision, your dissatisfaction shows that you have some at least sub-conscious goals about the service you wish delivered. It is time to stop and articulate those service objectives and to see if they make sense. Then you can proceed to remedy the problems, or to re-assess your service objectives. It is hard to solve your problems without establishing what exactly you expect instead of your current operation.

Of course, you must be realistic and rational. There is probably

no system in the country which wouldn't like to end client complaints entirely, or cut costs in half, or double productivity. These are rarely sensible goals because it is so unlikely that they can be achieved. You should try to identify your current objectives or determine some reasonable and rational service expectations and strive to meet them. If you do achieve your goals, you can reformulate your objectives to a higher level and strive to even further increase your system performance.

If you have a serious problem right now, you're trying to remedy the situation. But you should also take this opportunity to assess just how serious the problem is and what price you will pay (in time, money, or other service features) to remedy it. This Manual will try to give you enough guidance to solve a specific problem, but you most recognize that things are very rarely determined in a vacuum.

You probably can't have everything that you want; you should make a conscious decision about which things can and cannot be compromised. You have to have service standards and objectives, based squarely on your agency's overall goals and policies to effectively solve your current problems.

Agencies which are not now providing or contracting for transportation services do have more time but also an obligation to be contemplative about their goals and objectives. They have the great luxury of for example setting up an appropriate vehicle maintenance program, of buying the right vehicles in the first place, and in knowing when to contract for service.

If your agency is not now providing transportation services but is actively considering doing so, you have the obligation to do the kind of planning discussed here. Only in that way can you ensure that your system or the service which you buy will have the characteristics which you expect.

TRADE-OFFS IN THE EVALUATION PROCESS

The first step in evaluating your system's performance or in addressing current operational problems is to establish or recognize your service and performance expectations. Then you must determine how to

measure performance against those expectations, and then actually monitor service using the performance standards established. Each of these items will be discussed at length in the Chapters that follow.

Agencies do not have to go through an elaborate process and generate a maze of agency goals. In fact some agencies get too comprehensive and too detailed given their limited knowledge of transportation provision and even of their client's transportation needs. Setting agency objectives in order to evaluate your system is not the time to put together your "wish list" for your clients' welfare or to decide to solve all your community's problems.

Like everything else, establishing agency objectives about transportation service provision implies making trade-offs. Your objectives should be comprehensive and well-thought-out without being all encompassing. Perhaps you'd like to serve all the elderly people in your community; if you operate three vans that seems unlikely. Use the information presented in this series of Manuals and in the references to develop some realistic goals and objectives. If you meet your initial goals you can increase your expectations for the future.

If you are not an experienced operator, you may need assistance in setting realistic performance expectations. That's where you can use the literature and the experiences of other providers to guide you. Note that there's a difference between setting your standards in comparison with another provider, and, using data from that provider to help you establish your own standards.

DEFINING SOME BASIC TERMS

In everyday usage, performance, productivity, and efficiency are often used interchangeably. We will define them in the way that they are most often used in the transportation planning profession, although even there, there are some differences. You need not totally agree with the definitions we have chosen; you need only recognize that we will use these terms as defined here throughout the Manual.

PERFORMANCE

Performance is assessment or measure of the kind and level of service delivered to clients and by the system. Performance has both a qualitative or subjective aspect and a quantitative or objective aspect. Yet both aspects of performance are subject to your agency's policies and your clients' needs. Performance is not usually expressed in monetary terms.

The Qualitative Aspect

Performance as a qualitative measure refers to the kind of service delivered to your clients and the manner in which service is delivered. Do drivers help clients to the door, perhaps carrying their groceries? Or must your clients meet the van or bus at the curb? Are drivers trained in CPR and safety? Must your clients call 24 hours or 48 hours ahead of time? Are clients limited to a given number of trips per month or by time of day?

This type of performance measure must be specified by your agency. If you decide that clients must receive door-through-door service but the drivers instead drop them at the curb, you should be dissatisfied; the system is performing poorly. However if for cost and other reasons you have decided that clients will only be provided with curb service, you're getting adequate performance.

There is very little that can be characterized ahead of time as poor performance, even in the qualitative aspect of service. You must establish the kind and level of service you wish provided in order to evaluate the performance of your system or of your contractor. Since you can't always have all the service you want, you have to establish the minimum level that is acceptable. Table Two summarizes these considerations.

Even those qualitative aspects of performance that can be characterized as inappropriate need some standards by which to be measured. No one wants drivers who are rude to clients. Yet how will you tell if drivers are rude? Complaints, spot checks?

So much of the qualitative aspect of performance is based on

normative decisions by your agency about what services your clients really require. The higher the level of service that you wish provided to your clients the more resources must be committed to service provision. For example it takes much longer to help clients into their house than simply dropping them at the curb. In general you'll get lower productivity if you remove an advance reservation requirement.

The Quantitative Aspects

Performance as a quantitative aspect involves the amount of service provided; the hours of the day, the geographic area served, the timeliness of the service. Again, even though these indicators of performance are more easily measured, they have little meaning without a specification of acceptable levels by your agency. You must choose the hours of the day, and the days of the week service is to be provided. You must define the geographic area to be served.

PRODUCTIVITY

Productivity is a measure of the actual use of your capacity and resources compared to your potential use. There are a number of productivity and capacity measures and they will be discussed in Chapter Three; some examples are shown in Table Two.

The productivity of your system depends on a number of variables. If you serve a large geographic area with low density you'll probably have a different, and lower productivity on several key measures than a system operating in a high density urban setting. If you serve mostly handicapped clients in wheelchairs you will have different utilization of your vehicles than a system providing only congregate meal service to the able-bodied elderly.

Productivity varies with the type and quantity of service which you provide. That is why you must be careful when comparing your system to others; unless those systems are in exactly the same position as you are, serving the same kind of clients for the same kind of trips their utilization figures may have no meaning for you.

Productivity figures are often given as averages. However average

Table Two
Service Parameters and Examples of Appropriate Objectives and Measures

Service Parameters	Examples of Objectives	Examples of Measures for Which Acceptable/Unacceptable Standards Could Be Set
PERFORMANCE		
Community Coverage	• portion of urbanized area served	• ratio of area served to total area
		• percentage of desired trip destinations within area served
	• eligible trip destination	• ratio of actual sites served to sites requested
Clientele Coverage	• eligible clients	• percentage of agency clients served
	• priority clients	• percentage of targeted agency clients served
	• type and number of potential target group in population	• number of one-way passenger trips by client type
Level of Service	• hours of service per day	• as established
	• service per days per week	• as established
	• allowable trip purposes or number of trips per client	• as established
	• priority trip purposes	• ratio of priority trips taken to other trips
	• reservation requirement	• as established
	• responsiveness to client requests	• percentage of requests not accommodated; call never answered
		• percentage of requests not accommodated; capacity problem
		• percentage of requests rescheduled

(Continued)

Service Parameters	Examples of Objectives	Examples of Measures for Which Acceptable/Unacceptable Standards Could Be Set
Level of Service continued		• average telephone wait to get through to agency
	• timeliness of service	• percentage of trips picked up at promised time
	• reliability of service	• vehicle or passenger trips missed; total & percent
		• trips missed by cause
	• frequency of service	• actual as a percentage of desired
Quality of Service	• assistance provided to clients	• as established
		• client complaints
	• attitude toward clients	• as established
		• clients complaints
	• appearance of vehicles	• time before paint/dent repairs
	• appearance of drivers	• meeting dress code required
PRODUCTIVITY		
Resource Utilization	• use of equipment & resources	• passengers per vehicle mile
		• passengers per vehicle hour
		• passengers per service day
		• load factor (passenger miles per vehicle trip)
		• vehicle miles per vehicle
		• vehicle hours per vehicle

(Continued)

Service Parameters	Examples of Objectives	Examples of Measures for Which Acceptable/Unacceptable Standards Could Be Set
PRODUCTIVITY		
Capacity Utilization	• shared utilization patterns	• passengers per seat mile • seat miles per passenger-mile • passenger miles per vehicle hour
EFFICIENCY		
Cost Patterns [1]	• total annual monthly expenses	• as established
	• costs per major cost category - overhead & administration - operations - maintenance - equipment - fuel & oil - insurance & fees	• each cost item as a percent of total expenditure • each cost item as a percent of total expenditure • changes in percentage composition of each cost category
Costs for Services Provided [1]	• cost for vehicles utilized	• cost per vehicle mile • cost per vehicle hour • cost per service day
Costs for Services Utilized [1]	• cost for passengers served	• cost per 1-way passenger trip • cost per passenger mile • cost per loaded vehicle hour
Revenues Produced	• total fares • total subsidies	• operating ratio fare revenues as a percent of cost • revenues collected as expected • collection costs as a percent of total revenues

[1] See Ref. 2, the first Manual of this series for a description of how to determine and calculate these measures.

productivity figures can be misleading and should be used with caution. If your agency provides congregate meal services in the middle of the day you are probably effectively utilizing your existing capacity during that time. However your vehicles may be significantly underutilized for other periods of the day. Still your average vehicle utilization may be higher than other systems in your area serving demand-responsive trips only or a large number of severely handicapped people. The other system should not necessarily be upset; you should not be complacent.

There is a difficult but important distinction between using data from other systems to assist you in setting your own goals and service objectives, and trying to use that data as a test of your system. In the example described above, it would be meaningless for a congregate meal provider to use the productivity data of the demand-responsive system for the handicapped. However the congregate meal provider could use that information to set initial standards for new demand-responsive service to be offered during underutilized periods of the day.

Conversely it would be both meaningless and disheartening for the demand-responsive system to use either congregate meal productivity figures or that system's average productivity figures as a test. However the demand-responsive system could use the information to alert itself to how much group trips can increase productivity. That system could use the congregate meal productivity figures, and not the system averages, to set initial goals for any new group services to be offered. Even there, the demand-responsive system should recognize that the handicapped people which it serves will create different utilization patterns than the seniors served by the first system.

Comparisons between systems are dangerous because they can be misleading. Use data from other systems to help you establish reasonable service and operational goals for your own system. Do not try to use data from other systems as a test of how well you are doing. The problem of using data from other systems is only heightened by the misleading picture that average data can give.

Productivity is not a financial measure of system performance. It is not usually expressed in dollar terms although some of the more complex productivity measures can be. However the majority of the

productivity measures of use to systems like yours are not measured in monetary terms. For an introduction to more complex productivity measures, such as those used by transit systems, see References 9, 15, and 16.

EFFICIENCY

Efficiency is a measure of how much output you obtain from a given input. Efficiency is also a measure of how well you can produce a given output while trying to reduce the input required. Both inputs and outputs can be measured quantitatively and qualitatively.

Efficiency is most often measured in monetary terms. But there is nothing about this measure which prevents consideration of the important qualitative aspects of service delivery. Too many social service agencies disdain examinations of efficiency because all aspects of service cannot be measured in monetary terms. That is true! But efficiency relates to the qualitative aspects of service too.

It is easiest to measure efficiency in monetary terms but all of the performance evaluations briefly discussed above (and shown in Table Two) can be part of an efficiency evaluation. If it is your goal to produce a high quality service with a given dollar expenditure, you would examine both your monetary outlays and the quality of service delivered.

Even when efficiency is measured in largely monetary terms, social service agencies ought to pay more attention than they do. Certainly the cost of service isn't everything but it is a very important "something." No one says that you ought to produce the cheapest service possible, without any consideration of quality. But once you have established the level and kind of service you wished delivered to your clients, why shouldn't you try to produce it in the cheapest way possible?

Considerations of cost and service are not mutually exclusive. Social service agencies ought to overcome their resistance to measuring efficiency. Efficiency is not a heartless financial concern; it is important measure of the type of service you provide and the way in which you provide it.

The purely cost considerations of efficiency have been discussed at length in the first Manual in this series, Cost Analysis for Social

Service Agency Transportation Providers (Ref. 2). That Manual addressed common cost measures of service: cost per one-way passenger trip, cost per vehicle mile, cost per occupied vehicle mile and cost per vehicle hour. The Manual gave data from a variety of providers on some average figures for these measures in 1978-1979 dollars.

This Manual will not break out the qualitative aspects of efficiency. These important qualitative measures will be covered in Chapter Four as the Manual Considers performance criteria and evaluations.

THE MESSAGES OF THIS MANUAL

This Manual makes several major points. They are:

- Your system cannot be evaluated in a vacuum; how well you are doing is determined in large part by how well your system or service meets your agency expectations, objectives and goals.
- You should be very wary of comparing your system or its operating data to that of any other system; comparisons between systems can be misleading.
- It is not sufficient to establish objectives and then turn them into service standards; you must set up monitoring procedures and evaluate how well your system is actually meeting those standards.
- Evaluation and improvements to your system should be seen as an on-going process; if you are performing satisfactorily, you should determine why and act to increase your performance levels.

EVALUATIONS ARE NOT DONE IN A VACUUM

There are very few service or performance criteria which have no normative referent, which are not judged by your standards and goals. Even service standards which seem intuitively obvious must be monitored and evaluated.

Everyone wants clean vehicles, helpful drivers, and safe operations. But you must decide how these service factors will be measured and you must set minimum levels of acceptable service; vehicles can't always be clean and accidents happen occasionally. How clean is clean? How safe is safe?

Even intuitive service standards require trade-offs. If you put a heavy emphasis on helpful and attentive drivers, your overall productivity may drop because the drivers take so much more time with each rider. If you stress clean vehicles drivers may spend time cleaning vehicles which they could more productively use in routine maintenance or driver training.

You may think you know what your problems are. Its extremely unlikely however that just addressing one system component will solve all your problems. Moreover addressing just one component may cause problems in another service area.

PROBLEMS IN COMPARING YOUR SYSTEMS TO OTHERS

The Manual repeatedly makes the point that data from other systems should be used with great caution and respect. Most systems have important service parameters which make them different from you; rarely do they operate in the same climate, over the same terrain, serving the same clients, using the same funding source, using the same vehicles. As these factors vary, other system performance and productivity data become less and less useful to you in judging how well your system is doing.

What this Manual advises, and assists you in doing, is to take operational data from comparable systems and use it, with great caution, to develop your own system expectations and standards. Then, after the standards have been put in place, they can be re-evaluated in light of your specific operational patterns.

YOU MUST MONITOR YOUR SYSTEM PERFORMANCE

It would be a waste of time to determine your agency objectives, turn them into service expectations, devise standards to measure how

well your system lives up to those expectations, and then simply ignore it all. That's why comprehensive planning gets such a bad reputation.

If you are really concerned with your system's performance, and how well you are meeting your obligations to your clients, you should establish practical and meaningful ways to measure that performance and then do so. This means monitoring driver records to make sure that drivers are actually collecting the required data. It means compiling, synthesizing, and evaluating that data in a timely fashion. And it means doing something about your system if you are not performing as expected.

You may have very few resources to carry out all the required analyses. When you devise your expectations and service standards, you should decide which are the very most important service factors. Then develop reliable ways to measure those crucial service factors. You cannot monitor every aspect of service but you must monitor the most important aspects, as you define them. By doing so you convince drivers, staff and/or contractors of the need to address performance in those areas.

EVALUATION IS AN ON-GOING PROCESS

There is probably no such thing as a satisfactory system. If your system is meeting the standards which you initially established, you should change those standards upwards. You should decide what your next highest goal is and work to perform to that level. If your productivity is high, you can decide to focus instead on driver assistance to clients. Or you can work to increase productivity even further.

If your system is not meeting some standard or objective, you should work to do so. At the same time, you should question whether the standard was a reasonable one. Don't give up too easily but try not to spend a disproportionate share of your resources on meeting a very difficult goal.

In short you should be constantly re-assessing and revising your standards and objectives in order to improve your system without imposing undue burdens on it.

ORGANIZATION OF THIS MANUAL

Chapter Two discusses at length the ten-step process designed to improve your systems' performance and productivity. That Chapter helps you determine your service and performance objectives and turn them into reasonable service standards.

Chapter Three focuses on the more qualitative aspects of service and performance. It suggests how agencies can make decisions about the levels of service to be provided and how those service levels might be measured and evaluated.

Chapter Four focuses on how to measure and improve the productivity and efficiency of your system. It discusses common capacity and productivity measures and suggests the situations in which their use is appropriate. The Chapter also shows systems how to organize driver and dispatcher records in order to collect the required data.

Chapter Two.
Establishing Service Standards and Objectives

INTRODUCTION

In order to improve a current transportation system or ensure that a system will operate as anticipated, an agency must establish its goals and objectives and then set appropriate performance standards. Once this has been done, an agency must actively monitor system or contractor conformance with the required standards and act to improve service if the current level is not meeting established standards. This Chapter is designed to help you accomplish four major functions:

- establishing expected service and performance objectives
- establishing standards by which to measure those objectives
- comparing alternative ways to achieve those objectives
- establishing a monitoring system and appropriate monitoring schedule

Accomplishing these major functions will allow you to realistically and reasonably evaluate your system or transportation services both currently and over time. With such an evaluation you can act to make your system more efficient and productive.

The evaluation approach suggested by the entire Manual is a

combination of the approaches suggested in the major references listed at the end. The Manual helps you to use performance and productivity data from other systems to develop your own service standards and objectives. At the same time the Manual strongly suggests that you do not simply compare your system to other systems as such comparisons can be so misleading.

The approach suggested by the Manual can also help you to compare your system or transportation service to itself over time. Such an analysis can be valuable since the evaluation process should be an on-going one.

But again the Manual cautions against simply monitoring certain indices or measurements over time without any understanding of how they are related to the service expectations and objectives you have for your system. You can, for example, increase productivity over time, as measured by several indices discussed in Chapter Four, without providing better service, or more service, or without even decreasing your costs.

A PRELIMINARY LOOK AT THE EVALUATION PROCESS

This Chapter outlines a ten-step process which allows you to establish service and performance objectives and measures of those objectives. The process is fairly straightforward and is only as involved as it must be to meet your needs.

The entire process should become an integral part of the operation of your system. The first steps are usually taken before your service begins, if you are now planning a system or service. Then as you implement the service, you follow the remaining steps in the process.

If you currently operate a system or some form of transportation service, you must perform the first few steps before you can begin to improve your system. Then you too will implement the other steps as you continue operating the service or system.

The process is an on-going one. Once you adopt certain performance standards, you must establish a monitoring system and a schedule for evaluating the collected data. Then, at specified intervals, you must decide if your system is performing as well as

expected. If it is not, you must take steps to improve performance. And you must also consider if your original standards were too stringent, given local conditions.

If you are performing satisfactorily, you must consider if the original standards were too easy to achieve. You should try to establish new more difficult objectives at which to aim.

Figure 1 illustrates the ten-step evaluation process. Each of the steps shown there will be discussed in the following pages. This Chapter will describe the entire process but it will not discuss the actual performance and productivity measures that could be adopted by your system. These will be explained in the following Chapters. Once you have assimilated that information, you should return to this Chapter and work through the preliminary steps in the evaluation process.

Each of the remaining Chapters in the Manual is directly related to the evaluation process described in this Chapter. The next Chapter discusses how you can develop specific performance standards or indicators. The following Chapter describes common productivity methods suitable for social service systems. As you actually work through the suggested evaluation process, after it has been explained in this Chapter, you will have to turn to the information presented in these Chapters to develop your own system performance and productivity indicators for Steps 2 and 3.

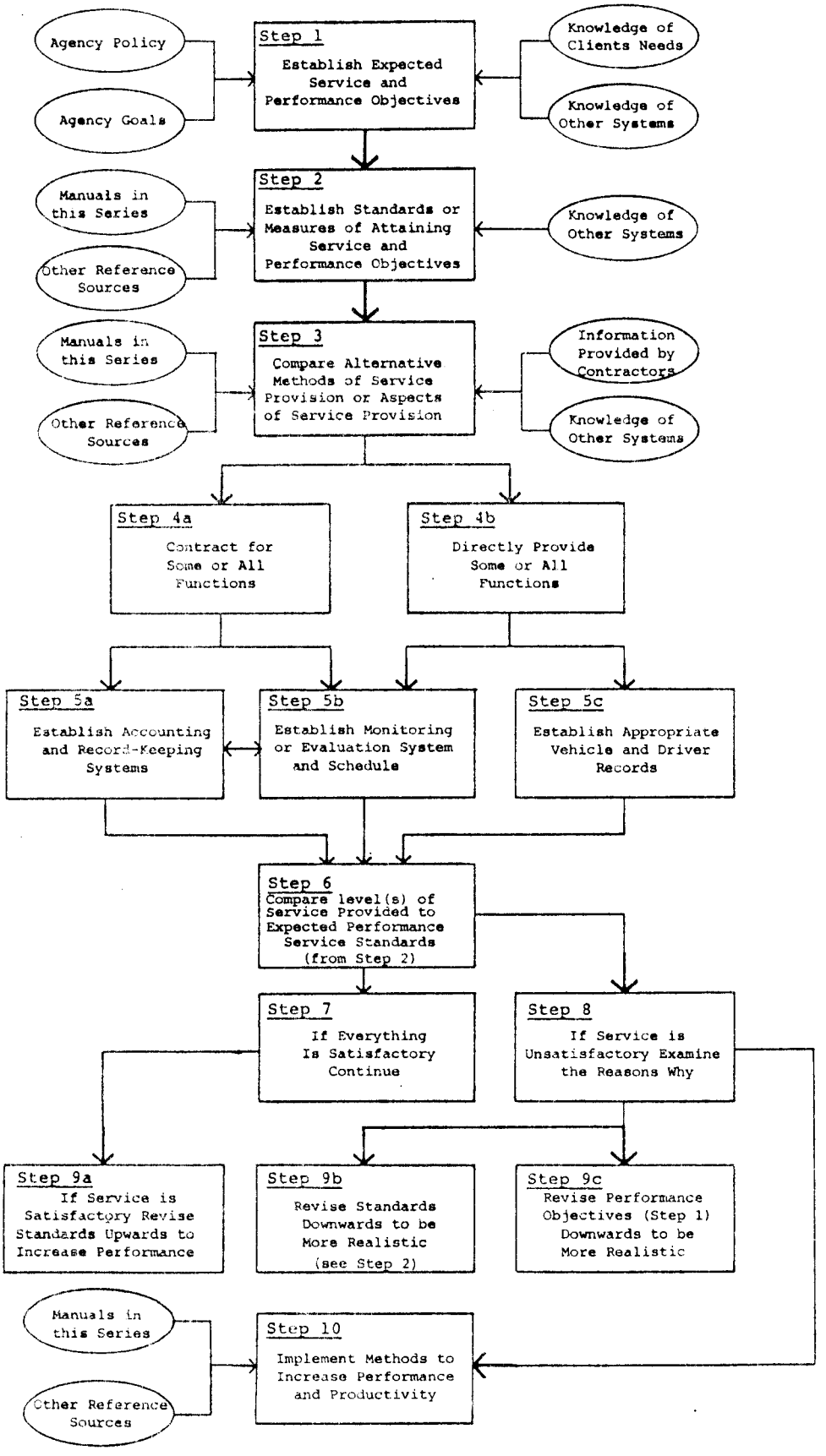
THE VALUE OF THE PROCESS

ISN'T THERE ONE RIGHT WAY?

If you have serious problems now, you may be impatient with such a detailed and comprehensive process. But there is simply no way to make your system "better" without a concrete idea of what better actually means to you. There is no simple way to make your system "more productive" without knowing how much of other service aspects you're willing to give up to obtain higher productivity.

There are very few things which are automatically wrong. Doing your own maintenance is a cost-effective option in some communities; in other communities it would be better to have a contract with local gas stations.

Figure 1
The Ten Step Evaluation Process



Failing to perform routine maintenance is probably wrong no matter what community you're in. But even this example has a policy side. A commentator on this Manual noted that the amount of maintenance an agency should perform on a vehicle is often determined by the ease of obtaining operating funds (from which maintenance costs come) versus the ease of obtaining new vehicles. If it is relatively easy to get new vehicles, agencies might well get rid of aging vehicles that require increasing maintenance attention.

None of this implies that there is no way to increase productivity or decrease maintenance costs or increase performance. After all, it would be senseless to spend time identifying what's wrong with your system without suggesting some ways to remedy those things.

There are ways that problems can often be corrected but their effectiveness is always determined by individual community and system characteristics. This Manual, as well as the other Manuals in the series have made suggestions. The Ridership Manual, (Ref. 13) for example, suggests how you can increase productivity, in some cases, by removing unnecessary client or trip restrictions. The Coordination Manual suggests how you could reduce costs by buying transportation services from community providers, or how you could increase productivity by selling services to other agencies in your community.

In both of the following chapters, this Manual will discuss common operational problems and suggest ways to remedy them. More often, the Manual will suggest sources to which you can turn for further guidance. However you must understand that the effectiveness of any of the suggested solutions depends on your agency and system characteristics, and, upon your goals and objectives.

You can significantly increase productivity, by waiting until you have enough client requests for service to use your vehicle effectively. However that may require clients to wait two or three hours for a ride, or to travel at a very different time than they originally requested. You may imagine some cases (like shopping) where this type of service would be acceptable to you; you can easily imagine other cases where this service would not be acceptable.

Unfortunately most of the significant service and performance aspects of transportation provision imply trade-offs between various goals and objectives. There is no automatically correct response to the question of whether you should increase productivity by dropping your clients at the curb rather than having the drivers help them through their doors. If you carry many kinds of riders, you can increase productivity greatly by carrying fewer people in wheelchairs; the question only your agency can answer is--should you do so?

Some social service systems may consider it a luxury to take the time to perform such a service assessment. But unless you are willing to take the time to identify or re-establish your own objectives or goals, set ways to measure them, and then actually do so, there is little help that anyone can give you.

ACCEPTING SOLUTIONS IMPLYS MAKING TRADE-OFFS

The discussion above suggests that the major reason that there is no simple, automatically correct way to approach a problem is because most solutions imply some trade-offs between objectives. Earlier Manuals in the series noted, for example, that contracting for transportation or transportation related services was one very good way to lower costs. Yet contracting for services means that an agency gives up some direct control over the way the services are delivered. Most agencies would find the cost savings worth the disadvantages but they should make that decision with full knowledge of the consequences.

At a more general level, when you plan a system or attempt to improve an existing system, it is also necessary to make decision that imply trade-offs. The Manual has already suggested that productivity can often be increased by decreasing the personal attention and assistance given by drivers. Is a more productive system an agency goal? Is that goal more important than delivering highly personal service to the clients? Only your agency can decide if the benefits of certain service characteristics, or changes in service, outweigh the costs of such characteristics.

Unfortunately not all the trade-offs can be specified in advance although many can be. It may be necessary for your agency to establish

service parameters and measures; if expected performance is not obtained on one or more measures, you may have to examine whether certain objectives are in conflict in your system.

This Manual will attempt to indicate what the literature and the experiences of many systems like yours have shown about the trade-offs that must be made. You have already been given a few examples; personal service vs. productivity, contracting vs. maintaining control. Where there is some clear evidence about the service variables which may conflict with one another, in certain situations, the Manual will describe the evidence.

THE EVALUATION PROCESS

In the following pages, the entire ten step process illustrated in Figure 1 will be explained. We will use certain terms in ways that may be unfamiliar to you or seem different than other works which you have read. Most of the references listed in the back of the Manual used these terms differently from one another, for reasons that varied.

We will use the terms objective, to mean the qualitative or descriptive expectation which your agency has for your service or system. Objectives are variables like the area which your agency will serve, the kind of clients, the priority with which those clients will be served, how well the system responds to client requests, etc.

We will use the terms standards or measures to mean largely quantitative ways to guage or estimate the service being provided in terms of the objectives discussed above. For example some standards are the measurement of the ratio of priority trips or clients served to total ridership, the average time it takes for a client trying to contact the system to do so, the operating ratio (percent of costs covered by fares or contributions), etc.

You need not agree with our definitions to use this Manual. You may prefer the terms used in some of the other reference material. To use the Manual you need only recognize that we use these terms in the same way throughout.

ESTABLISHING SERVICE OBJECTIVES, STEP 1

Performance Parameters

Exactly what is it you expect your agency transportation services to do or provide? In this Manual the "what" questions are performance concerns. Do you want clients to have easier access to your services? To work? To medical facilities? Do you hope to serve those clients without current transportation options? Do you wish to provide better travel options for those with current options (like depending on children or friends)?

Table Two has already illustrated the most important of the performance variables about which you must specify your objectives. They fall into four general classes:

- community coverage
- clientele coverage
- level of service
- quality of service

Some of your objectives may be purely descriptive ones while others imply comparative values. For example, you may specify that your agency will serve all the elderly in your community for any trips they wish to make. You may also specify however that if resources are at capacity or limited in some way, that the medical trips of the elderly will take priority over the non-medical trips. Or you may wish to specify that the handicapped elderly will receive priority over the non-handicapped elderly.

It is important to specify both absolute or descriptive objectives and priorities among possibly competing objectives. These priorities should reflect your agency goals and objectives and should be based on the best knowledge available about your clients needs.

As you perform this Step, you should be as precise and objective as possible. Your agency may wish to better the lives of the mentally retarded or decrease the institutionalization of the elderly. You may be providing transportation services in order to meet these goals. But the goals just described are really too general to translate into system objectives. You must be clearer about how transportation services

are expected to meet those goals and about the ways in which service must be delivered in order to do so.

You must recognize that you probably can't have everything that you wish from your transportation services. To the extent possible you should establish your objectives identifying those things that are the most important to your agency and your clients. Failing to recognize the need to make trade-offs will only lead to operational and de-facto choices among competing interests.

Example: *The Problem of Not Making Trade-Offs and Not Establishing Priorities.*

An agency serving the elderly decided that its transportation services were to do the following:

- decrease the isolation of the elderly
- enhance the access of the elderly to special services
- prevent the unnecessary instiutionalization of the elderly capable of community living

The agency performed all the remaining steps with further specifying its objectives and it began its system.

Within a few months the system was at capacity most of the day. Agency personnel were trying to find funds for new vehicles and personnel. They were very fearful that so many more people needed services which they couldn't provide.

A student from a local University came by and began examining the ridership and vehicle records of the system. The student also sat with the dispatcher/scheduler for several days.

The student found the following, relatively surprising facts:

- over 80% of the trips were being taken by just 10% of the agency clientele,
- over 60% of all trips were taken for individual social and recreational purposes,
- the system was turning away a number of client requests for morning doctors' appointments because the system was usually at capacity in the morning,

➥

- over 90% of all people using the system had previously taken the trip in question; they were just taking the more convenient mode; 40% had previously driven themselves.

Without specifying anything, this agency got a system that appeared to give priority to social trips over medical trips. Moreover it was largely serving people who were not among the most isolated or vulnerable; rather it was serving the most active of the elderly in the community.

Note that there is nothing wrong with what the system is doing; the elderly need social trips and the active elderly probably need to decrease their dependence on their friends and relatives or the financial burden of keeping a car.

But this agency doesn't have unlimited resources. Is it getting what it wants the most for the resources it does have?

NOTE: This is a true story!

Potential conflicts over the use of scarce resources won't go away because you won't recognize them. They tend to get settled very much in the way suggested by the example above; by accepting all the requests for service without setting limits, a de facto decision was made.

The objectives you specify, whether descriptive or comparative, must be operational ones. You must establish specific objectives so that they can be incorporated into the dispatching and scheduling (and other operational) procedures of the agency. This generally requires specifying priorities among competing needs.

For example, to "decrease the isolation of the elderly" is not a sufficient system objective. You will have no way to ensure that your services are delivered in a manner that supports that goal. And you will have little way to evaluate later whether your services actually did so.

A better way to specify an objective for a transportation system which is aimed at decreasing the isolation of the elderly is to establish what percent of all ridership should be from new agency

clients or from those not formerly making the trip in question by any mode. Then the service might be established in geographic areas without transit or transportation special services or priority could be given to only people living there. The Agency could evaluate its ridership on a regular basis (through on-board or telephone surveys) to see how well this objective was being met.

In summary, use Table Two to guide you on the types of specific ridership, service area, service type, and performance specifications you require of your system. Be realistic. If you are fearful of missing an important agency goal by not developing a transportation system objective, go ahead and develop it. But specify which of several objectives are to receive priority if resources are limited. Worksheet One discussed at the end of this Chapter will help you to establish your objectives.

Remember that your objectives must:

- be capable of being turned into operational guidelines and procedures
- be capable of measurement in either quantitative or qualitative terms

Productivity Parameters

Productivity refers to the use or utilization of all your transportation resources. An objective in this area would be the greatest possible shared utilization of the vehicle fleet.

Productivity objectives are slightly more difficult to set if you are not already running a system. Productivity objectives could be set to conform to your idea of how efficient your system could or should be. Some general guidelines are that you might wish your vehicles to be in use, carrying passengers at all times, or you may desire that more than one passenger be served at most times.

If you are already running a system, you may wish to set as an objective the improvement of the service. You may know what your current vehicle occupancy or "load factor" is and you may wish to improve your productivity.

Note that productivity, like most objectives, implies trade-offs.

The very most productive use of your vehicles might create a service where clients would have to give 3-days advance notice, or wait a long time to be picked up. When you specify your productivity objectives you must have some idea of the kind of service features that might take precedence over those productivity objectives.

Like many other aspects of transportation provision, your choice of productivity objectives may be an interactive one. That is, you may wish to have your vehicles extensively utilized all day long, and, you may set a performance objective that clients should receive service within two hours of calling in. Once you implement, or try to implement these objectives (in later Steps) you may find that, given your clients and your community, attaining both objectives isn't possible. Then you'll have to go back and re-assess your priorities and your agency goals.

In the Chapters that deal with specific productivity and performance measurements we will try to give you an idea of the conflicts between objectives that have been encountered in other systems. But all objectives are not in conflict with other objectives in every system. Rather conflicts and trade-offs where they exist are created by client and community characteristics, and agency and transportation resources.

In short, your productivity objectives should be expressions of the way you wish your resources--drivers, vehicles, facilities, etc., to be used. Productivity objectives too must:

- be capable of being turned into operational guidelines and procedures
- be capable of measurement in largely quantitative terms

ESTABLISHING STANDARDS OR MEASURES, STEP 2

If you've done Step 1 correctly, your objectives have already been "intuitively" tested for how well they can be turned into standards. When you established those objectives, you were questioning whether your important goals could be stated in a way that could be operationalized and measured.

Step 2 is really a two-part process. First, turn your service

objectives into measurements and standards. Second, turn your service objectives into operational, scheduling, and maintenance procedures if you operate your own system, or into specific performance and cost standards for your contractors if you contract for all or part of your service.

Table Two gave some examples of the way service objectives could be turned into service standards and measures. For example, the service objective of serving people with no previous transportation options could be measured by examing the ratio of riders who do have other options to those who don't have other options. You could obtain that data from on-board surveys or telephone surveys taken periodically. (We caution against assuming that you know that clients have no options because you know how needy they are.)

Your standards or measures can be largely descriptive, such as specifying the size of the geographic area which you will serve. Or the standards can be quantitative ones such as specifying the desired shared-riding characteristics of the riders or the average vehicle occupancy. The standards can even be non-quantitative ones like requiring drivers to wear uniforms or keep clean buses.

In any of the examples suggested above, you could set a desired range, for example that vehicle average occupancy would be between 2.5 and 3.0 passengers per vehicle mile. Or you could set an absolute standard; that drivers will provide all requested assistance to clients.

It may be easier to operationalize some of these standards than it will be to measure conformity to them. For example, you can tell your dispatchers and drivers to accept no passengers from outside the city limits, you can require that all drivers wear uniforms, and you can institute dispatching and advance reservation procedures that tend to increase average vehicle occupancy. But, if drivers do pick-up people from outside the city, don't wear their uniforms, and don't achieve the desired vehicle occupancy it may be hard to find out these facts.

The first step in achieving your objectives is to let your staff, your clients, and/or your contractors know that such things are important to you and that you will be making an attempt to measure their

ability to comply. It is obvious, that there is a relationship between setting service measures and standards and achieving them. If you don't ever set the standards, and enact operational procedures designed to accomplish them, its likely that you will never achieve them.

The actual development of a monitoring system is done in Step 6, after you have determined the best way for transportation services to be provided. Chapter Three and Four will suggest some concrete ways that you can measure and monitor performance and productivity.

You shouldn't back away from an important objective because it is hard to turn into a service standard. On the other hand, it is pointless to specify a great many service standards which you will be unable to verify.

In general, you should develop service standards and measures that can be measured, at least periodically, without great financial sacrifice or the commitment of many staff hours. But again there is a trade-off; if you never expend resources to collect data on the service standards of key important to you, you will never be assured of their achievement. Isn't it worth some expenditure of resources to measure how well your system is meeting your objectives and standards?

COMPARING ALTERNATIVE METHODS, STEP 3

Once you have adopted service objectives and standards, your agency should consider the best method or methods of transportation provision.

If you already own a fleet of vehicles, you may not be in a position to consider buying service from a community coordinated system.

But you may well be in a position to sell your excess capacity to other agencies or the coordinated system.

You may have a few trips which are extremely expensive to serve; handicapped people in wheelchairs going to a variety of sites is one example. You might be able to increase overall productivity or decrease costs, measured by several standards, by contracting for some of those client trips, even if not all. The second Manual in this series spends considerable time discussing these three coordination options.

You may be able to better meet some of your performance and

productivity objectives by contracting for transportation-related services like dispatching or client screening or vehicle maintenance. How useful any of these options would be for your particular systems depends of course on your client and system characteristics, and your needs and resources. However once you have set your service objectives you can determine how well other providers and contractors might help you meet them.

Of course, if you decide to contract for some or all of your services, you may have to establish new or different performance and productivity standards. You probably won't need to be as detailed about certain service aspects as you are about your own system; for example, you might not need to set standards for productivity if you are paying a flat rate per one-way client trip.

On the other hand, many of the service standards which you would expect of your own system, you would expect of a contractor. Service area, driver assistance, response time, etc. are all factors which you might equally expect of yourself with direct provision or of another provider with contract provision.

However, Manual Four makes the point that imposing a variety of service standards on a contract provider may increase the cost of the service, directly or indirectly. Of course, such standards imposed on your own system generally have an impact on your costs too. But a contract provider may be more conscious of the cost impacts and may ask for additional revenues to compensate him/herself for providing the "extra-cost" service and performance items. Therefore you should be very serious about the constraints which you impose on yourself and on contract providers.

CONTRACTING FOR OR PROVIDING SERVICES, STEPS 4A and 4B

Once you have decided which model or models of service provision best meet your needs, you will proceed to implement it or them. If you are currently directly providing client transportation services in your own vehicles, you may begin contract service for other agencies or you may begin to purchase routine maintenance and vehicle repair services from local gas stations.

If you do not have a fleet, or your existing fleet is unserviceable, you may begin purchasing transportation services for your clients from the local taxi operator, from the special service system operated by the transit system, or from a social service coordinated system.

ESTABLISHING EVALUATION AND MONITORING SYSTEMS, STEP 5

Steps 5a-c must be undertaken at the same time, or before Steps 4a-b are completed. At the time you decide to deliver services in a certain way, or to purchase services from given providers, you should incorporate the relevant performance and productivity measures and standards into the service developed in Step 2.

Although it is sometimes necessary to add new requirements and restrictions after a contract has been signed or service has begun, it is not a wise policy to pursue if it can be avoided. As you begin direct or contract service, you must establish a recording and monitoring system. Everyone involved must be aware of the importance of the standards and of the existence of the monitoring system.

Chapters Three and Four will discuss how service and performance standards can be measured, monitored and evaluated. As you read those Chapters and begin developing your monitoring systems, it is wise to remember several important things.

Any record-keeping system must collect the required information without being too detailed or burdensome. You should try to distribute the burden of data collection to people who do not necessarily have a direct interest in the evaluation process, and to those who have the time and resources to adequately perform their assigned functions.

Drivers are the best, and sometimes the only possible collector of certain data but they often get very busy and simply forget. Moreover some of the data which you require might reflect badly on them. To the extent possible you should design your dispatching and scheduling procedures so that people handling those responsibilities obtain as much information as possible.

Your record-keeping system should respond to the needs of your funding source(s), your auditing agency, any agency which you bill for service, and any agency which bills you for service. Rather than keeping

a hodge-podge of individual records for all the agencies with which you deal, it is wisest to keep your records at the highest common denominator. If for example, only one funding agency wants to know the number of unduplicated travellers as well as the number of one-way trips, you should keep the more comprehensive record of all trips.

Keeping consistent records is a very important requirement of a good monitoring system. Consistent trip recording requirements are more likely to be followed by drivers, dispatchers, and other staff. If you only ask your drivers, for example to keep comprehensive data on a few agency clients, you are very likely to get very poor information on all clients. Drivers and other staff simply won't remember, or care to bother with, your recording needs for only part of the riders.

Several agencies have commented on how difficult it is to get drivers to keep good records. Yet there are many systems with drivers of equivalent training and background, where drivers routinely keep very detailed records. There are two reasons why some systems are so much more successful at getting drivers and their staff to keep required records. First the record-keeping requirements were initiated at the beginning of the service; staff and drivers were trained to use them from the first day. Second, those systems that actually monitor the records and let drivers know when they have failed to obtain sufficient data, have better-kept records.

The experience of many agencies should not be ignored. If agency staff and drivers really feel that record-keeping is important and has a purpose they will be much more likely to cooperate. If you implement sensible recording practices, as close to the beginning of service as possible, and it is known that collected data is of concern to agency staff, the records will be kept and in the format you intend.

In order to establish reasonable recording requirements you must carefully think through the standards and measures established in Step 2. You must decide when and where data can and should be collected, and you must implement record systems in support of these decision. You should not collect data simply to collect data; if certain data are not required by your funding source or auditor, and are not to be used to

monitor your performance or productivity measures, it is pointless to collect them.

No doubt there are some data which will become necessary later. If so, you can simply change your recording system at that time. For every bit of data which you could conceivably need in the future there are probably ten pieces of data that you have the urge to collect that you will never need or use.

If another system collects information which seems interesting, analyze it carefully. Perhaps you are really interested in the service standard or objective which caused the agency to collect the information in the first place.

Establishing Monitoring Systems, 5b

Once you have established both your service standards (Step 2) and have decided on the best method of service provision (Step 3) you must establish a series of monitoring systems which are appropriate to these decisions. If you are directly providing transportation services you will have to establish a different monitoring schedule than if you contracted for all your services. The issues over which you have concern may be the same but the system and schedule may well be different.

If you are directly providing services, or some services, you will have to establish one set of recording and monitoring details. You may need quite another set to make sure that the contractor is doing his or her job.

You must decide where, when and how data and information relating to the performance and productivity standards you set will be collected and will be analyzed. Note that there is a difference between collection and evaluation. While it is impossible to do a meaningful evaluation without data collection, it is possible, though very foolish, to collect data without analyzing it.

Chapter Three and Four will suggest where you can or should obtain data for monitoring purposes. Some data is easily obtained and should be collected by dispatchers and perhaps verified by drivers. Other data can only be collected by drivers. Some information can be easily

collected by other agency personnel. And some data, particularly, qualitative performance assessments may have to be individually done in client interviews or on-board surveys.

Some data, particularly trip and client data which are generated daily, ought to be synthesized and tabulated at least weekly. A full-scale evaluation is not required. However, if data are not computer-coded and must be done manually, it will be very difficult to go back through a month of daily records to compile needed totals for a monthly analysis. Moreover, synthesizing data at least weekly is a way to make sure that drivers and other personnel understand the importance of the data collection effort and are keeping records correctly.

ESTABLISHING VEHICLE AND DRIVER RECORDS, STEP 5C

You will probably only establish these kinds of records if you have opted for direct service provision. If you are directly providing transportation services in your own vehicles you will have to be sure that your records are kept in the format that will allow the evaluation of the key performance and productivity standards which you have set.

Most of the discussion above will prevail. We separate the records discussed here only to suggest that recording and reporting requirements, and monitoring and evaluation systems, may vary with the method of service provision chosen.

COMPARING ACTUAL TO EXPECTED PERFORMANCE AND PRODUCTIVITY STANDARDS, STEP 6

With your system or contract underway, you should begin collecting, synthesizing, and evaluating the data specified in your monitoring schedule and plan.

Some data are collected daily; the number of trips, passengers per trip, average vehicle occupancy, etc. You need not analyze these data every day, of course; you need only analyze them as often as called for in the evaluation schedule established in Step 5. It is important however, to check every day or so, at least at the beginning of service (or the initiation of new records) to see that drivers and other staff are indeed collecting the required data.

Some of the required data will only be collected at set intervals. You should be ready to survey riders, or send-out questionnaires, or to make spot checks as planned, following the monitoring guidelines. You should then perform the analyses required.

The important point is: watch for trends. Don't use any one evaluation period as the total indicator of your system's or contractor's performance. You should monitor and evaluate data sufficiently often that you won't have to take only one evaluation. You should have enough data to make several evaluations and see if there are continuing problems or very clear trends. Certainly a bad performance rating, or low productivity should alert you to a possible problem. Use that information to more carefully watch the affected area of service until the next evaluation period.

This Step, is of course the single most important step in the entire evaluation process. None of the work you have done before this Step, and none that you will do after, has much meaning if you don't actually monitor and evaluate how well your system is doing.

CONTINUING SATISFACTORY PERFORMANCE, STEP 7

If you are performing as expected, and your productivity is as you wished, you should continue what you are doing. Congratulations! But you should also spend time thinking about how you will continue providing that level of service in the future given budgetary constraints, rising costs, and expanding client needs.

Later, in Step 9a, you should reconsider your original service and performance objectives. They weren't necessarily too easy but you should try to better your performance. You should always work to improve your system.

EXAMINING THE REASONS FOR UNSATISFACTORY PERFORMANCE, STEP 8

If you are unhappy with your system's actual performance and productivity record, you should take steps immediately to identify the source of the problem. If you can pinpoint the source of your problem or problems you should act immediately to fix it (Step 10).

If maintenance costs have been rising rapidly or the reliability record has been low, you should examine all facets of your maintenance program. Are you performing adequate preventive maintenance? Are you expecting too much mechanical ability from your drivers? Are vehicles being serviced when called for by the manufacturer? Are drivers reporting the small mechanical problems that arise when they return the vehicles for the day, or are vehicles driven until the small problems become big ones?

You must examine all facets of your service to fix a problem in only one area. Maintenance problems for example, are not only related to your vehicle repair program, but also to your driving training program, to the types of clients whom you serve, to the types of trips you make (for example a few long trips or many short, stop-n-go trips), etc. A change in your reservation requirements or trip screening process can have profound impacts on your maintenance record. Your maintenance record can have profound impact on your reliability and vehicle productivity.

REVISING STANDARDS, STEP 9

If you are performing satisfactorily on all or most of your performance and productivity measures, you should then turn your attention to improving your services or expanding your objectives. Step 9a requires you to increase your expected performance and productivity standards, where appropriate, to set a higher goal for your system. Or you may wish to expand the total objectives of your system; perhaps you can service a different client group or a new trip purpose or an additional community.

Ideally you would not perform any of the tasks in Step 9b or 9c without first trying to implement a solution (Step 10). You should try to increase your actual record against your service standards before changing those standards, or the objective which supports them. However, realistically, once you have made an informed assessment of your system's environment and resources, you may feel that no other option exists.

If you are not performing satisfactorily, and you have done every-

thing possible, including analyzing alternative ways of service provision, you may have to admit that you set your original standards too high. You may have to return to Step 2 and re-establish and modify the service standards which you initially chose.

Perhaps you set a standard of vehicle occupancy, but did not meet it. Perhaps you expected to provide more than 1000 one-way trips per month and only achieved half that number. You may simply have to change those standards downwards.

In the extreme case, you may have to re-think your objectives (Step 9c). It is possible to serve all the trips of your clients or must you limit your services to medical trips only? Can you serve all your clients or must you limit your services to the handicapped? These are difficult and disheartening decisions but nothing is accomplished by avoiding them. It may be that you simply set your expectations too high, given your resources and your clients' needs.

IMPLEMENTING METHODS TO INCREASE PERFORMANCE AND PRODUCTIVITY, STEP 10

If you have found that your actual service has not met your expectations, but you feel that you have identified the source of at least part of the problem, you should work to overcome that problem. All of the Manuals in this series and many of the references listed at the end of the Manual, are designed to help you address specific problems.

Where possible we will suggest appropriate solutions to specific problems or suggest references sources which will address the problems. However many of the problems you will have to think through carefully yourself.

One or even two bad evaluations don't necessarily call for drastic action. You should make sure that there is a definite trend or problem, particularly with a new system. New systems often have break-in problems and high start-up costs.

On the other hand, don't wait too long before initiating service or operational changes. If you think you know why your system or contractor is performing less than satisfactorily, you should act to solve the problem.

Avoid very severe changes initially. Try the simplest solution to the problem and then wait for results from the next evaluation. Don't change services or procedures again in the middle of two evaluation dates, if you have any choice. Wait to see if there has been some positive reaction to your initial solution.

If a problem continues, one or more solutions may suggest themselves. Sometimes calling the manufacturer about vehicle or lift or radio problems will bring guidance. Often a call to other providers in the community will bring useful advice on how they solved similar problems. Attend regional and local workshops; keep up on recent reports prepared by your State Department of Transportation and the U.S. Department of Transportation.

Solutions are many and varied. Perhaps you should contract for routine and preventive maintenance with a local gas station, the County Highway Department or other suitable providers. To address a reliability or maintenance problem perhaps you should buy a back-up vehicle to use when maintenance is needed; this might remove the incentive not to report or to fix potentially dangerous problems while they are still small. Perhaps your drivers need better training in how to handle the equipment or how to recognize problems.

Sometimes solutions are obvious but unpleasant. Perhaps the only way to cut vehicle maintenance expense, for example, is to buy new vehicles or to provide less service. Any other option may only create ever rising maintenance expenses (and deteriorating service as a result).

Above all, you may have to reconsider that the choice of alternative service models, made in Step 3. Perhaps it is simply no longer cost-effective to provide transportation services in your vehicles without seriously undermining your other service programs.

SUMMARY

Figure 2 is a written summary of the evaluation process shown in Figure 1 and discussed here. Once you have mastered the performance and productivity measures discussed in the next two Chapters you can return to use Worksheet One. Worksheet One is a useful way to carry out the analytical tasks required in the evaluation process.

Figure 2
Another View of the Evaluation Process

STEP 1

- Identify agency goals and objectives
- Turn agency goals into expectations for the transportation services provided
- Develop performance objectives
- Develop productivity objectives
- Establish priorities for possibly competing objectives

STEP 2

- Develop service standards based on performance and productivity objectives
- Set definitive or quantifiable measures of the performance and productivity objectives from Step 1
- Establish operational and service guidelines and procedures based on service objectives
- Inform staff, drivers and clients of service objectives and standards

STEP 3

- Compare alternative methods of meeting service objectives, including coordination and contracting for service
- Revise service standards and measures to more appropriately fit the service model chosen (if necessary)

STEP 4

- Contract for appropriate transportation or transportation related services
- Provide directly appropriate transportation services

STEP 5

- Establish accounting and record-keeping systems consistent with agency standards, and the requirements of funding, auditing, contracting, and service agencies.

➥

FIGURE 2 CONTINUED

- Establish appropriate monitoring systems for contract system
- Establish appropriate monitoring systems for direct service provision
- Establish monitoring schedules for each service standard or measure
- Establish evaluation schedules

STEP 6

- Check to see that drivers and other staff are collecting required information
- Perform periodic monitoring in a timely fashion
- Compare actual performance to expected performance and productivity standards
- Pinpoint problem areas and watch for trends

STEP 7

- Continue satisfactory performance
- Consider how to maintain current satisfactory levels with changes in external variables

STEP 8

- Analyze all facets of service provision for their impact on problem area(s)
- Seek advice from other providers, reference sources, and state and national transportation departments
- Consider alternatives to your current method of service provision

STEP 9

- Revise service standards upwards to increase system performance
- Revise service standards downwards to reflect the difficult of meeting initial standards
- Revise service objectives to reflect greater understanding of system resources and capability

➥

FIGURE 2 CONTINUED

STEP 10

- Watch for trends that indicate seriously unsatisfactory performance or the continuation of observed problems
- Avoid severe changes in current operations initially to remedy problems
- Implement strategies and techniques designed to address unsatisfactory performance and productivity

Worksheet One

Facilitating the Evaluation and Improvement of Your System

Agency Goal or Objective	Transportation Service Expectations or Objectives	Specific Priorities	Specific Measures or Standards	Desired Standard	Evaluation Schedule	Source of Evaluation Data
	PERFORMANCE Community Coverage Clientele Coverage Level of Service Quality of Service					

WORKSHEET ONE CONTINUED

Worksheet One

Facilitating the Evaluation and Improvement of Your System

Agency Goal or Objective	Transportation Service Expectations or Objectives	Specific Priorities	Specific Measures or Standards	Desired Standard	Evaluation Schedule	Sources of Evaluation Data
	PRODUCTIVITY Resource Utilization Service Utilization					

Chapter Three.

How to Improve the Quality of Service

INTRODUCTION

Performance is a measure of the way in which your services are delivered to your clients. Performance involves both qualitative and quantitative aspects of service delivery. Some performance characteristics are both easy to set and easy to measure. Other aspects of performance may be relatively easy to establish but may be far harder to monitor or measure.

There are four major areas in which you must develop performance objectives and then turn those objectives into measures and standards. The four major areas are

- Community coverage
- Clientele coverage
- Level of service
- Quality of service

Some references make a distinction between absolute performance standards and comparative standards. This Manual does not make such a distinction. Some of the objectives you will establish are absolute ones initially; for example that you will serve only the handicapped elderly or only residents of a certain neighborhood. But when you establish standards and measures in support of these objectives, and then evaluate them you cannot help but be comparative.

You will either compare your actual performance to the absolute standards which you have set, or you will compare your actual performance on certain measures to expected or hoped for measures. In either case you will be analyzing your performance by comparing your actual operation to the performance you expected.

It is easier to set absolute standards at the onset of a new service or program, of course. But if you find that your system has not met those standards, you will have to determine why this is so and act to correct any problem. And just as with the more comparative standards you may have to lower your sights a bit, and drop your expectations.

It is also possible to compare your performance to other systems or to your own record over time. Both of these performance evaluations can be useful to you. Comparisons of your own system data will show you trends in service over time. Comparisons with other systems may show you new and helpful techniques, give you good ideas, and even dissuade you from trying ideas that haven't worked elsewhere. But above all you must compare your actual performance to the objectives and expectations that your agency itself actually has set for your transportation services.

This Chapter is designed to allow you to follow the ten part evaluation process discussed at length in Chapter Two. In particular this Chapter is designed to assist you in

- Developing performance objectives (Step 1)
- Developing measures and standards based on those objectives (Step 2)
- Comparing alternatives to ways to meet your service expectations (Step 3)
- Establishing monitoring systems and schedules (Step 5)

- Comparing your expected performance against your actual performance (Step 6)
- Implementing methods to increase system performance (Step 10)

DEVELOPING PERFORMANCE OBJECTIVES (STEP 1)

Performance objectives are slightly different from the productivity objectives discussed in the next Chapter and the efficiency measures discussed in the first Manual (Ref. 2). In general they are more reflective of your opinions and your agency policy about why and how services should be delivered to your clients.

You establish performance objectives in part to ensure that your clients receive the very best service possible with the resources available. Setting certain standards, particularly qualitative ones, ensures that agency personnel and drivers will accord your clients the treatment that you wish them to receive. If you do not make clear in advance the kind of service which clients deserve they may receive less than that your agency thinks desirable.

You will also establish performance objectives to limit the kind and even the quality of service which you will provide to your clients. Sometimes you are forced to limit service because of funding constraints. Sometimes it is necessary to limit service to certain areas, or clients, or trips because of statutory or policy mandates. Sometimes you feel that you must impose constraints in order to ensure that the neediest clients receive service before other clients use up all the limited resources.

Performance standards therefore can be instituted to either increase or limit service. When you monitor conformity to your performance standards, it is important to remember the reason why you instituted each service restriction. If for example, you instituted service restrictions to keep service quality high you should work to make sure that actual performance comes up to that standard.

On the other hand, perhaps you instituted a service restriction because you were afraid of excess demand and wanted to ensure that

priority clients did get service. If in fact priority clients got all the trips they requested, leaving excess capacity, you might want to re-think your original service restriction. If you now know that the important needs of priority clients are being served, why should you continue to restrict your service if you have available capacity? [Manual Three (Ref. 12) discusses this topic at length.]

DEVELOPING PERFORMANCE MEASURES AND STANDARDS (STEP 2)

Table Three illustrates the most commonly used performance measures and standards. The Table illustrates how agency goals can be turned into transportation service objectives (Step 1) and how those service objectives can be turned into performance measures and standards (Step 2).

It is difficult to suggest appropriate measures or levels of service (as we will do with some productive measures). Most performance measures can only be set and evaluated from the perspective of your agency and its goals and resources. Comparing your services to other systems on most of these standards is not a very useful activity.

A very necessary part of Step 2 is turning your performance measures and standards into the operating rules and functional procedures of the agency or contractor transportation services. It is not enough to establish such standards, and even monitor them. All agency personnel must be aware of their existence and must incorporate those standards into their daily activities.

COMPARING ALTERNATIVE WAYS TO MEET YOUR SERVICE EXPECTATIONS (STEP 3)

Chapter Two suggested that you should consider how a variety of alternatives to direct provision of transportation services to your clients might meet your efficiency, productivity and performance expectations. Generally you will have to compare the bundle of service and performance features that you seek (Step 2) to

- Those that would be offered by other community providers (taxis, transit, community coordinated systems, etc.)

Table Three

Guide to Establishing and Monitoring Performance Standards and Measures

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
	Community Coverage				
•To prevent unnecessary institutionalization of clients	→urbanized area to be served	Served area as % of total area	weekly	monthly or quarterly	(1) Dispatchers' records of areas or clients served
•To facilitate client integration into community	→inter-city destinations to be served	Served area as % of requested areas	weekly	monthly or quarterly	(2) Reservation records of requested origins or destination and disposition of requests
•To increase client access to social and human services	→eligible trip destinations	Sites served as % of all permissable sites	weekly	monthly or quarterly	(1), (2)
•To facilitate clients access to specific activities or sites		Sites served as a % of requested sites	weekly	monthly or quarterly	(1), (2)
	Client Coverage				
•To remove the financial, emotional or psychological burdens involved in travel	→clients eligible for service	•clients served as % of total clients	weekly	monthly	(1), (3) Agency records on all clients
		•clients served as % of eligible clients	weekly	monthly	(1), (3)
•To increase independence of clients		•number of one-way trips per individual clients served	weekly	monthly	(1)

Continued

GUIDE TO ESTABLISHING AND MONITORING
PERFORMANCE STANDARDS AND MEASURES

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
		·average number of trips per client	weekly	monthly	(1) (5)
		·changes in clients travel patterns	monthly	monthly or quarterly	special client survey
		·change in clients primary service utilization	monthly	monthly or quarterly	(5)
	→priority clients	·priority clients as a % of clients served	weekly	monthly	(1)
		·average number of one-way trips by priority clients	weekly	monthly	(1)
		·number of one-way trips per individual priority clients served	weekly	monthly	(1)
		·number of priority clients trips refused	monthly	monthly	(3)

Continued

GUIDE TO ESTABLISHING AND MONITORING
PERFORMANCE STANDARDS AND MEASURES

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
		· change in priority clients trip patterns or service use	monthly	monthly org.	(5)
	Level of Service				(4)
	→ hours of service per day	· actual hours as % of expected	weekly	weekly	driver vehicle logs
		· number of client out-of-hours trip requests refused or re-scheduled	weekly	weekly	(2)
	→ service days per week	· actual service days as % of expected	weekly	monthly	(4)
		· number of client off-service trip requested refused	weekly	monthly	(2)
	→ allowed trip purposes	· allowable purposes as % of trips requested	weekly	monthly or quarterly	(2)

Continued

GUIDE TO ESTABLISHING AND MONITORING
PERFORMANCE STANDARDS AND MEASURES

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
	→ allowed number of trips per client	· actual individual trips as % of allowable number	weekly	monthly	(1)
	→ priority trip purposes	· priority trips taken as a % of all trips	weekly	monthly	(1)
		· number of non-priority trips refused as % of all trips	weekly	monthly	(2), (1)
	→ reservation requirement	· actual or average advance reservations compared to system requirement	monthly	monthly or quarterly	(2)
		· percentage of trips served not meeting requirement	monthly	monthly or quarterly	(2)
		· number of trips refused for not meeting requirement	monthly	monthly or quarterly	(2)

GUIDE TO ESTABLISHING AND MONITORING
PERFORMANCE STANDARDS AND MEASURES

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
	→ responsiveness to clients requests	·percent of calls never received by system	monthly or quarterly	monthly or quarterly	(5) (6) agency survey
		·number of trips not accommodated capacity problem as a % of all trips	weekly	monthly	(2) , (5) , (1)
		·number of trips re-scheduled as a % of all trips	weekly	monthly	(2) , (5) , (1)
		·average wait on telephone	monthly monthly	monthly or quarterly quarterly	(5) , (6)
		·average wait to obtain service	monthly	monthly or quarterly	(5) , (6)
	→ timeliness of service	·% of all trips picked up within 15 minutes 30 minutes 45 minutes of promised time	weekly	monthly	(1) , (5) , (4)

Continued

GUIDE TO ESTABLISHING AND MONITORING
PERFORMANCE STANDARDS AND MEASURES

Sample Agency Policy Objectives	Transportation Service Objectives (Step 1)	Possible Measures or Standards (Step 2)	Monitoring Schedule (Step 5)		Source of Data
			Data Collection	Data Evaluation	
	→ reliability of service	· % of all trips missed	weekly	weekly	① , ④
		· % of trips missed by cause · mechanical failure · driver error · dispatcher error	weekly	weekly	① , ④ , ⑥
	Quality of Service				
	→ assistance to clients	· client commendation or complaint	monthly	monthly	⑤ ⑦ record of client comments
	→ attitude toward clients	· client commendation or complaint	monthly	monthly	⑤ , ⑦
		· time required to repair vehicles · driver status reports · clients comments	monthly	monthly or quarterly	⑤ , ④ , ⑥ , ⑦
	→ appearance of drivers	· dispatcher status reports clients comments	monthly	monthly or quarterly	⑤ , ⑥ , ⑦

- The costs of obtaining each or all of those expectations

First, you will have to see if other providers in the community can provide levels of service equivalent to those you seek. Then you should determine how much it will cost you to obtain those service features through contract and other coordinated options. Then you can compare your costs to provide the same level of service to those offered by community providers.

If community providers cannot offer exactly the levels of service you wish, you should still consider how much you can save in money and staff resources by purchasing the level of service which they can offer. Both the Coordination Manual, the second in the series, and the Contracting Manual discuss this issue at length.

The discussion above leads into the second comparison which you must make; can you afford all the performance standards which you seek? Whether you will directly provide service to your clients in your own vehicles, or contract for all or some of your service, you must face the fact that you can't always have everything you want.

If you can't afford all the services features which you seek, you should decide, at the onset of the service if possible, which service features are to have priority. Is it more important to operate six days a week or 16 hours a day? Is it more important to serve all the elderly clients or only those who need assistance for medical trips?

Some performance standards can be met through separate contracts or delivery. Other standards can only be considered as a package. You can purchase escort services to increase the assistance offered to your clients. You may improve the level of service offered if you contact for dispatching or maintenance or marketing services. On the other hand you may have to consider how well contracting for transportation services meets many priority performance standards when you consider your community options.

ESTABLISHING MONITORING SYSTEMS AND SCHEDULES (STEP 5)

For ease of discussion this Manual has separated performance and productivity issues into two separate Chapters. However, it is important to remember that the recording systems and schedules for both sets of standards should be as consistent and integrated as possible.

Table Three suggests desirable monitoring and evaluation schedules for the measures and standards set in Step 2. These recommendations are based on the experiences of other systems. You may find that these schedules are too infrequent; if so, simply increase your evaluation activities.

On the other hand, be careful about cutting down the number of evaluations or increasing significantly the time between evaluations. Letting problems or emerging difficulties continue too long is not wise. If you are not monitoring your system sufficiently frequently, you may not notice undesirable trends until it is too late.

Table Three also suggests sources of the data that are required to evaluate conformity to performance standards. Chapter Four will discuss a sample driver/dispatcher sheet which can capture most of the productivity data required by your system. Some performance standards can be captured by that form as well and they will be discussed in the next Chapter. Those performance measures which must be recorded by other means are shown in Table Four.

KEEPING SERVICE REQUESTS AND RESERVATION RECORDS

If you do not currently keep separate and organized information on the actual requests for your service, we suggest that you do so. If you are just initiating service you could adopt such a record-keeping system from the beginning. If you feel that such record keeping is burdensome why not try it for the first few months of operation or service evaluation to allow you to see if it is useful? Many systems keep information only on trips that are actually accomodated. They often know <u>when</u> trips are actually delivered but not when such trips were requested nor how close the actual service is to that originally requested.

Keeping reservation request information will allow you to gauge

- The number of callers turned away, and the reason for service refusal
- The number and kind of trips that were not served at the time originally requested and the reasons for re-scheduling
- The number and type of callers who were not served immediately but were asked to wait until there was an opening in a congested time slot.

In addition, reservation records will allow you to see if people are actually observing any advance reservation requirements, and if in fact such requirements are needed at all. Conversely, such information will allow you to see if your advance reservation and other requirements are not strict enough; perhaps people who actually call within your formal limits still cannot be accomodated.

Figure 3 is a suggested reservation record; it asks the kind of information that most systems would ask of any callers. In contrast to the practice in some systems, however, this form records trips not served, and the reasons why such trips were not served.

Figure 3, again in contrast to some systems, provides a permanent record of service requests even after service has been provided, refused or re-scheduled. Many systems record callers requests on individual slips of paper which then become part of a dispatching process or a scheduling board. Once these trips are scheduled the call-records are often destroyed.

We don't suggest changing your scheduling procedure. Figure 3 is just a way to keep a permanent record of the kind of information that is often lost in dispatching and scheduling procedures.

A look at the filled in sample of Figure 3 illustrates how this record can tell you how long people may be waiting to access your service (Caller No. 3), how often your reservation requirement is not enforced because it is not needed (Caller No. 6) and several other important performance parameters.

The column on Figure 3 labelled Client Code Number can be used in a number of ways. All clients can be given a code which reveals

Figure 3
Reservation Trip Request Sheet

Call-Taker A _____

B _____

Day and Date _____

No. Time of Call	Client: Name	Address and Phone No.	I.D. Code Number	Proposed Travel: Day and Time	Destination	Purpose	Assist. Needs	Disposition and Reason
1								
2								
3								
4								
5								
6								
7								
8								
9								

Call-Taker A [illegible]

B Johnnie

Day and Date Monday, Sept. 24

Reservation Trip Request Sheet

SAMPLE

No. / Time of Call	Client: Name	Client: Address and Phone No.	Client: I.D. Code Number	Proposed Travel: Day and Time	Proposed Travel: Destination	Proposed Travel: Purpose	Assist. Needs	Disposition and Reason
1 8:45 by A	Sally Smith	102 Pine St. 555-1864	22-31-111	11:00 AM Tues. Sept 25	Golden Age Senior Ctr. 1st & Main	Congregate Meal	w/c lift	Scheduled, see driver log
2 9:20 AM by A	Susi Brown	1437 Major Ave 555-1564	22-39-71	11:00 AM Tues. Sept 25	Golden Age Senior Center 1st & Main	Congregate Meal	No	Scheduled, see driver log
3 10:00 AM by B	George Carvel	6431 Blackmoor St., Apt B, 555-0011	23-39-04	Wants scheduled Hospital	M-W-F 9:00 AM appt. to City 4th & West	Dialysis	No	No space; will hold his name for opening
4 10:30 AM by B	Linda Jones	1211 Carter Ave 643-1212	22-39-04	9:00 AM Sept 25	Grocery Store 3rd & Main	Shopping		Refused; not allowable trip
5 11:00 AM by A	Herman Warren	13617 Main St. 555-1641	21-31-111	9:30 AM Sept 25	City Hospital 4th & West	Doctor's Appt.	w/c lift	Asked to re-schedule because no room, he couldn't
6 2:00 pm by A	Marion Williams	1207 West St. 555-1927	21-39-117	11:00 AM Sept 25	Golden Age Senior Center	Congregate Meal	No	told her to call 24 hrs ahead scheduled her this time
7								
8								
9								

the agency paying for their travel, any trip restrictions those agencies have put on their clients, the clients physical and emotional condition (e.g., needs an escort or a wheelchair lift) and any other data you think relevant.

This kind of client coding can be a very useful way to reveal quickly a lot of needed information about a client as they call in. This type of coding is discussed at greater length in Chapter Four.

Note again the difference between gathering and synthesizing required data, on one hand, and actually analyzing the performance of your system on the other hand. To keep collected data from becoming overwhelming, it is important to see that data generated daily or weekly is tabulated and stored in an appropriate format. It will then be ready for use when needed for the evaluation process.

QUANTITATIVE PERFORMANCE

Performance standards are often capable of quantitative measures. You can rate the reliability of your system by watching the percentage of trips delivered late or not at all. You can evaluate the responsiveness of your service by looking at how often clients are refused service, asked to re-schedule travel or simply by how long they have to wait on the telephone to get through to the reservations person.

Table Three gives a fairly comprehensive listing of the types of quantitative measures which can be established for most of the important service and performance objectives. Table Four illustrates how the data necessary to develop these measures can and should be gathered.

Certainly numerical measurements and percentages don't tell the "whole story" about your service or system. And such measures are meaningless without some expectations about what an acceptable level would be. For example, what does it mean to your agency that "only" 3% of all trips are missed? Is that an acceptable reliability standard for your system? How acceptable is it if your system refuses 25% of all requested trips because of capacity problems?

You can probably imagine situations where both of these quantitative measures would be unacceptable. You might also imagine situations

Table Four

Sources of Data for Performance Monitoring and Evaluation

Type of Record	Data To Be Collected	Person(s) To Collect Data	Specific Data To Be Developed
(1) DISPATCHER'S RECORD OF AREAS, SITES, CLIENTS SERVED	See Chapter Four		• sites served as % of all permissable sites • priority trips as % of all trips • numbered and average one-way trips/client
(2) RESERVATION RECORDS	• Name of client & relevant client information • Day, time, date of call • Requested Trip Information: ·day, time ·purpose ·origin & destination • Disposition of trip; ·refused ·scheduled to travel as requested ·asked to re-schedule • Reason for disposition; ·not eligible client or trip ·not priority trip	Reservation taker Dispatcher	Area Served (1) as a percentage of requested areas Sites served (1) as a percentage of requested sites Number of non-priority trips refused as a percentage of all trips (1) actual or average advance reservation of clients actually served (1) percentage of all trips served (1) not meeting reservation requirement number of trips refused for not meeting advance reservation requirements . as a % of all calls

Continued

"SOURCES OF DATA FOR PERFORMANCE MONITORING AND EVALUATION"

Type of Record	Data To Be Collected	Person(s) To Collect Data	Specific Data To Be Developed
(2) (continued)	• Reason for disposition (cont'd); ·not eligible origin or destination ·not meeting advance reservation requirements		• number and percentage of trips not accommodated, by reason for refusal
(3) AGENCY CLIENT RECORDS (See Manual Three)	• Client name, address & phone number • Client disability • Client need for assistance while traveling • Client living arrangements; ·people in household ·cars in household • Client income	In-take worker caseworker	• clients served (1) as percentage of total clients • clients served (1) as a percentage of eligible clients • number and percent of priority clients refused service (2)
(4) VEHICLE LOGS (See Ref. 14)	• Condition and status of vehicle • Total and daily vehicle mileage • Actual or average vehicle mileage per trip or run • Total and daily hours in service per vehicle	driver maintenance supervisor	• actual hours and days of service as a percentage of expected • number and percentage of vehicle runs missed by cause • number and percentage of trips (1) missed by cause • appearance of vehicle

Continued

"SOURCES OF DATA FOR PERFORMANCE MONITORING AND EVALUATION"

Type of Record	Data To Be Collected	Person(s) To Collect Data	Specific Data To Be Developed
(4) (continued)	• Out-of-service record by reason; ·routine maintenance ·lift repair ·engine repair ·license or insurance problems • Average time out of service by reason		
(5) SPECIAL CLIENT SURVEYS	• Client views of service, drivers, dispatchers, vehicles, etc. • Client agency and human/social service utilization before and after service initiation • Client travel patterns before and after service initiation, by ·time of day ·travel mode ·cost to client • Client reports of average wait to obtain service ·in general ·on telephone	agency staff consultants	•number and percent of calls never received by system •number and percent of trips not accommodated by reason (2) •average wait on telephone •average wait to obtain service •number and percent of trips rescheduled (2) •change in client trip patterns or primary service utilization •change in priority client trip patterns or primary service utilization

Continued

"SOURCES OF DATA FOR PERFORMANCE MONITORING AND EVALUATION"

Type of Record	Data To Be Collected	Person(s) To Collect Data	Specific Data To Be Developed
(5) (Continued)			• client comments on driver assistance, attitude and appearance • client comments on appearance of vehicles
(6) AGENCY EVALUATIONS OR SURVEYS	• As needed: · on-site evaluations of; · driver performance · vehicle appearance and performance · driver assistance · mock calls for service to evaluate; · wait to get through · staff attitude · timeliness and service reliability	Agency staff	• percentage of calls not received by system (a sample) • average wait on telephone (a sample) • average wait to obtain service (a sample) • appearance of drivers and vehicles
(7) RECORD/FILE OF CLIENT COMMENTS	• Client views of service, drivers, vehicle conditions, etc.	--	• trends in service • client commendations or complaints • client views of driver attitude, appearance, driving ability • client views of dispatcher and other staff attitude and assistance

Key for 4th Column; numbers listed mean that these sources must be used to develop data in question.

where such measures were perfectly acceptable given community characteristics and system resources.

Only your agency can specify acceptable limits for quantitative performance measurements. However, these measures are still a valuable way to evaluate your service against your agency expectations, and against your own record over time.

QUALITATIVE PERFORMANCE MEASURES

Some performance measures cannot be expressed in quantitative terms. Some examples shown in Table Three are driver attitude, driver assistance, and vehicle condition. It is extremely important to be very clear and precise about the kind of performance assessments which can be made only qualitatively.

It is necessary to gather accurate, logical and consistent information on measures that cannot be expressed quantitatively. Only if information about these measures is clear and precise can meaningful comparisons and evaluations be made.

As Table Four shows, some data needed to perform service evaluations can only be gathered by surveying clients or staff personnel or by monitoring complaints. In order to be able to use data and information gathered through such means, it is necessary to make sure that all respondents are 1) asked the same questions and 2) asked specifically about the relevant aspects of service.

For example, before beginning surveying or interviewing, you should be very clear about the questions that you will ask and the judgements which you seek. It would be best to have an actual survey form or a written set of questions, even if you are only asking judgmental questions. If clients simply report themselves to be "unhappy" with your system, you will be hard pressed to correct the problem because you won't have any idea of what aspect(s) of service displeases them.

Table Four suggests the kind of data that should be collected to ensure that both formal and repetitive record-keeping devices, as well as periodic surveys or service assessments, are

- Consistent
- Logical
- Designed to capture relevant and appropriate information

Worksheet One was originally introduced in Chapter Two to show you how you could begin the ten step evaluation process. A filled-in sample of Worksheet One follows to show how you can use the material in Tables Three and Four to directly or indirectly carry out Steps 1 through 6 for performance standards only.

COMPARING YOUR ACTUAL PERFORMANCE TO EXPECTED (STEP 6)

Performance evaluations should be conducted as described in Chapter Two. Following the prescribed monitoring and evaluation schedules, your agency should check to see how well your system is living up to your original expectations for it. You should watch for trends and follow closely those areas where service has fallen short of expected standards.

When evaluating conformity to expected performance standards, it is important to keep in mind the original reason for the implementation of certain standards. Some standards are designed to elevate service levels or increase the quality of service. You should be very concerned if expected levels are not met.

For these kind of performance standards you should immediately act to increase performance and/or to resolve problems causing less than satisfactory performance. Only after being sure that there are no possible solutions, given your needs and resources, should you consider changing your performance objectives (Step 9c) or your performance standards (Step 9b).

Other performance standards, however, are designed to limit ridership, reduce demand on the service, or facilitate productivity. If you find that there is no excess demand on the system, at least during

Worksheet One

FACILITATING THE EVALUATION AND IMPROVEMENT OF YOUR SYSTEM

Agency Goal or Objective	Transportation Service Expectations or Objectives	Specific Priorities	Specific Measures or Standards	Desired Standard	Evaluation Schedule	Source of Evaluation Data
° To increase use of existing social services by the elderly ° To increase the independence of the elderly	PERFORMANCE Community Coverage · Entire city limits · Pick-up outside city with destination inside city	1) Serve hospital and agency destinations first 2) Serve low income neighborhoods first 3) Serve outside city pick-ups only if space is available	% of major priority sites served % of trips w/in city limits	50% of trips to priority sites	Monthly	Info. from driver/dispatcher log on clients + sites served matched with agency info. on clients
	Clientele Coverage · all elderly people (60+) in city (or surrounding area)	1) Serve handicapped first 2) Serve those w/o other alternatives 3) limit trip making to 10 trips/month/person	· actual + average no. of trips/client · number of clients as % of all elderly · trips by handicapped · trips by those not previously traveling	3-5 trips/month 15% of all elderly 50% of all trips by handicapped 20% new trips	Quarterly	Above plus rider or client survey of travel patterns
	Level of Service · 5 days, 8am – 7pm · only medical, work, agency trips · 24 hour reservation · respond to need · allow people to make appointments in time	1) Serve those w/ recurring medical trips first 2) Serve medical + agency trips first 3) make sure appointments are kept 4) Re-schedule trips last	· Number/kind of trips refused · priority trips as a % of all trips · % of trips not meeting reserve requirement · % of calls not received	5% of trips refused by purpose 50% of all trips No more than 10% of all trips Not more than 5% of all calls	Monthly	Ditto plus agency reservation records
	Quality of Service · door through door service · assistance on request · drivers in uniform	· all clients should receive all assistance requested · drivers should have same routes + get to know clients	· % of client complaints reported at the office	5% of clients report complaint	Quarterly	· Client complaint file · Client Surveys

SAMPLE

certain times of the day, or that long advance reservation requirements are not needed to effectively group passengers together, you should consider relaxing or removing such limiting performance standards.

Some standards are established to give priority to those assumed to be most in need. Examples are those living in certain areas or suffering from certain disabilities, or those needing certain kinds of trip assistance. If you find that you are getting more requests for non-priority trips or clients than for those having priority you might examine your assumptions. Perhaps your clients need other trips more than those you have given priority. Perhaps those clients thought to be the most needy are not.

You should also remember that performance and productivity measures are often linked to one another although we have separated them here for convenience. It is possible for you to be meeting or exceeding some of the performance standards discussed here, but fail to meet one of the productivity standards discussed in Chapter Four. In some situations the only way to ensure conformity to an important productivity measure is to reduce some of your performance standards.

IMPLEMENTING METHODS TO INCREASE PERFORMANCE (STEP 10)

The discussion above suggested that you may find four situations as you evaluate how well your actual performance meets your expected standards. These four situations are

- You failed to meet performance standards set to ensure service and increase the quality of service;
- You failed to meet performance standards designed to limit or control ridership;
- You failed to meet performance standards designed to ensure priority to those clients defined as most in need;
- You meet your performance standards but you should make sure that these performance standards are not interfering with equally important productivity measures (to be discussed in Chapter Four).

Figure 4 is a compilation of the most common performance problems and some solutions adopted by agencies or found in the literature. How effective such solutions will be for your system depends on so many factors that we can't discuss them all. Figure 4 also gives some references that discuss problems such as the ones listed or potential solutions to such problems.

The problems suggested in Figure 4 cut across the four types of situations discussed above. The suggested solutions often reflect different aspects of those situations. Each will be briefly discussed below.

FAILING TO MEET PERFORMANCE STANDARDS SET TO ENSURE QUALITY

A number of problems fall into this category. Missed trips are one type of problem. Unreliable service and untimely service (as you define) are still other performance problems.

Unfortunately, many of these types of problems are linked to operational and scheduling procedures which are better discussed in Chapter Four. We will limit ourselves to those problems, which while not unrelated to productivity, can be discussed in this context.

A very common problem is driver inattention and client complaints about drivers. Proper training and adequate supervision of new drivers and continuing supervision of experienced drivers is one answer. Another solution is to look at the reason behind the complaints. Many systems have found that their clients become disoriented and confused if they must travel with a new driver or in different vehicles each day. Fill-in drivers with excellent records are often "reported" by clients when they take over another's run or serve different clients.

To the extent that you can use the same drivers and the same vehicles on the same routes or for the same clients, such a procedure is often advisable. Besides reducing client complaints, drivers familiar with a route or the clients are less likely to miss trips or encounter

Figure 4
Possible Solutions to Performance Problems

Observed Problem/Difficulty	Possible Solution	REFERENCE SOURCES OF ASSISTANCE		
		Directly Addresses Problem	Indirectly Addresses Problem	Possibly Related to Problem or Solution
• Rude or inattentive drivers	• Keep the same drivers on the same routes or serving the same clients; reduces such complaints • Driver training or re-training programs		6 14	7
• Poor driver appearance, client failure to recognize drivers on pick-up	• Put drivers in full uniforms or uniform shirts and jackets • Inspect drivers before they go out on duty and record their appearance		14	6,7
• Low percentage of priority trips	• Re-assess clients needs if appropriate remove priority trip or site restrictions • Examine existing service characteristics; are they appropriate to serve priority trips?	Ridership Manual 13	10	9,12

Figure 4 Continued,

Observed Problem/Difficulty	Possible Solution	REFERENCE SOURCES OF ASSISTANCE		
		Directly Addresses Problem	Indirectly Addresses Problem	Possibly Related to Problem or Solution
• Large number of trips by only a few clients	Re-assess clients needs • Establish maximum number of trips per month per client	Ridership Manual 13	10	9, 12
• Low use of service by most clients	• Re-assess trip restrictions and advance reservation requirements; they may be deterring ridership	Ridership Manual 13	10	9, 12
• Little or no change in clients travel patterns after service initiation	• Re-assess clients needs • Re-assess client need for transportation; consider impact of your service constraints on client choices	Ridership Manual 13 Ridership Manual 13		
• Disparities between intended service days and hours and actual service	• Re-assess your ojbectives in light of your resources and skills	11	6, 12	10
	• Evaluate your maintenance record and procedure; see Table ___	14, 6, 4	9	

Figure 4 Continued,

Observed Problem/Difficulty	Possible Solution	REFERENCE SOURCES OF ASSISTANCE		
		Directly Addresses Problem	Indirectly Addresses Problem	Possibly Related to Problem or Solution
• Unsatisfactory percentage of trips refused	• If at capacity, re-assess your priority and trip restrictions and make sure that you are serving the people you most want to serve	Ridership Manual 13		
	• If not at capacity, at least during certain times, re-assess your trip restrictions and reservation requirements	Ridership Manual 13		
	• If not at capacity, institute measures to increase use of low-demand times and to shift trips to those periods	Ridership Manual 13		
	• Examine need for additional resources	11	3, 9, 12	
• Unsatisfactory number or percentage of client trips missed	• Examine possibility of contracting for additional services or joining coordinated system	Coordination Manual, 5	Contracting Manual, 1, 14, 15	

Figure 4 Continued,

Observed Problem/Difficulty	Possible Solution	REFERENCE SOURCES OF ASSISTANCE		
		Directly Addresses Problem	Indirectly Addresses Problem	Possibly Related to Problem or Solution
	• Re-examine driver and dispatcher communication process; look for difficulties that create problems			
	• Evaluate causes; if vehicle problems, evaluate maintenance procedures;	4, 6, 14	9	
• Unsatisfactory percent of calls not received or; average phone wait too long	• Examine intake and phone system; discuss different equipment possibilities with phone company			
• Average wait to obtain service initially is unsatisfactory	• Assess current trip patterns; are they representative of your priorities?	Ridership Manual 13		
	• If not at capacity, during certain times, institute measures to increase use of low-demand times	Ridership Manual 13		
	• Examine need for additional resource	11	3, 9, 12	

Figure 4 Continued,

Observed Problem/Difficulty	Possible Solution	REFERENCE SOURCES OF ASSISTANCE		
		Directly Addresses Problem	Indirectly Addresses Problem	Possibly Related to Problem or Solution
• General client complaints about service	• Examine possibilities of contracting for additional service as needed • Make sure clients understand service availability and eligibility rules • Re-assess actual service patterns; is service as delivered significantly different from that promised; are operational and capacity constraints creating defacto trip restrictions?	Coordination Manual, 5	Contracting Manual 1, 14, 15	

delays. You should note, however, that there may be a trade-off here between performance and productivity; it may be less efficient to use the same driver or vehicle each day.

Another solution to these types of complaints is to put drivers in uniforms, or uniform shirts or jackets. The analogous vehicle solution is to make sure that all your vehicles are the same color and have a prominent logo. This reduces client confusion as well as giving your service a better appearance.

A major source of client criticism of a system is the uneven application of restrictions and requirements. You may find as you operate your system that it isn't really necessary to restrict the number of trips per person or to limit travel to medical trips only. In order to use existing capacity more productively, you may serve other trips.

But if your original restrictions remain in force, it can appear to many clients that you are being arbitrary and unfair. In such cases you ought to remove the restrictions or turn restrictions into priorities which apply only when capacity constraints are reached.

The same situation can arise when your existing restrictions are not severe enough. Perhaps you have only a 12 hour advance reservation requirement, but in reality clients need to call two or three days ahead because the demand is so heavy. It is very discouraging to clients to observe your requirements, only to be told that they really should have called earlier.

Your system may be at capacity and perhaps there is little you can do about refusing trips. In that case, while you examine if there are other ways to meet your clients' needs, you should institute stricter travel and trip restrictions. This is really much fairer than applying de facto restrictions on a random (from the view of the client) basis.

FAILING TO MEET PERFORMANCE STANDARDS DESIGNED TO LIMIT RIDERSHIP

Many systems begin service with the fear that they will be overrun with demands for service. Sometimes such demands materialize; other times they do not or at least the demands are not high for the entire service day.

If you have instituted any kind of trip, client, or destination restriction or advance reservation requirement in order to allow you to manage or control demand, you should assess how well such measures are working. In particular, you should assess if such restrictions are discouraging trips by those in need without enhancing the ridership of others.

The third Manual in this series spends considerable time discussing how trip, client and reservation restrictions can create client confusion, and agency uncertainty. If there is no statutory reason to require lengthy reservations or trip restrictions you should consider removing them if they do not appear to be needed for all or part of the day.

For example, if you do not really require 24 hours notice, and clients can and are accomodated with less notice, you should drop such restrictions. The very fact that you have such a requirement may be preventing other people from calling on your system.

Perhaps you have established restrictions on the sites that you will serve but you still have extra capacity. If there are requests for other sites, you should consider removing the restrictions, or turning the restrictions into priorities only to be used when there is no extra capacity.

A common situation found by many agencies is that clients need to make a number of trips in addition to those most often given priority - medical or agency travel. Some systems refuse other trips while still having extra capacity during certain times of the day. Even if <u>your</u> agency will serve other than priority trips, the fact that you have established a formal restriction may prevent eligible clients from calling for assistance. Note that these situations are often related to client complaints. If you have restrictions and rules which you don't always enforce, or which aren't really needed, clients can become confused and angry.

FAILING TO MEET PERFORMANCE STANDARDS DESIGNED TO ENSURE PRIORITY

Sometimes your service is simply not appropriate for the needs of even the most disadvantaged of your potential riders. Long reservation requirements and the days and hours of service may prevent needy clients from using your system. Even if your system is performing well, within the limits of your resources, it may not be adequate for their needs. As disadvantaged as some clients are, most have other ways to get around, if they really have to do so. Only if your system is consistently better than their other options will clients frequently use your services.

If you have excess capacity during all or some of the day, you might consider removing some or all client restrictions. There is no reason to refuse other people service, if you have the resources, and the clients to whom you've given priority have other means to travel.

MEETING PERFORMANCE STANDARDS WHICH MIGHT CONFLICT WITH PRODUCTIVITY

Chapter Two discussed a number of situations where your objectives for the quality and quantity of service might reduce the productivity of your system. In general those performance standards which increase trip time per client, or reduce your ability to group trips, tend to reduce the productive use of your resources. These issues will be discussed in the next Chapter.

SUMMARY

This Chapter has attempted to show how you can turn your agency policies and goals into the performance expectations you have for your transportation services. These expectations can be turned into standards and measures which can be assessed and evaluated. The Chapter has suggested some ways to deal with less than satisfactory performance.

In Chapter Four we will discuss common measures and standards of productivity.

Chapter Four.

How to Improve Efficiency and Productivity

INTRODUCTION

Productivity is a measure of how well you utilize the resources you have committed to transportation provision. Productivity is also a measure of how often your clients use the service which you provide for them.

Most systems know that they want to make the most productive use of their resources, but they are uncertain how to set standards for such objectives. This Chapter will discuss the most commonly used productivity measures. The Chapter will define those productivity measures, and show where to get the data necessary to develop them. Lastly, this Chapter will explain how to use productivity measures to evaluate your own system.

You will use and develop productivity measures and standards in the same way suggested in Chapter Three for performance measures. Once you understand and can work with various measures of capacity utilization, you should follow the same ten-step process discussed in previous Chapters.

As part of that ten-part process you will want to better your productivity (Step 10) if it is or has fallen below the expectations you have set (Step 2). This Chapter will suggest solutions to the most common productivity problems as well as suggesting other reference sources for you to consult.

THE NEED TO DEVELOP BASIC SYSTEM DATA

In order to develop productivity standards and measures, it is necessary for you to keep records on several service variables. You must know how often and when your vehicles and drivers are used. You must know how often, when and where your clients go.

A BASIC RECORD-KEEPING SYSTEM

Figure 5 is a sample dispatcher-driver log which is designed to collect and "capture" the most important service and utilization variables. This sample form is very similar to forms used by paratransit systems across the country.

In general, the first or original copy of the form is filled in by the reservation-taker or scheduler and a copy given to the driver as s/he starts a run. Some data (indicated by the shaded areas) are to be filled in by the driver. Naturally if there is a change of some kind in the schedule the driver would cross out the data put in originally by the dispatcher and put in the new or correct information.

Pre-Coded Client Information

The sample driver-dispatcher form suggests several columns which could be used for pre-coded information. There is no need to develop a fancy coding system; however a simple system might be very useful to you even if you do all your data processing manually.

One suggestion, made in the discussions in Chapter Three, is to give each client a coded identification number as they become certified to use your system, or as they call in for service the first time. Your certification and eligibility process would determine the time at which you assigned an I.D. number.

Figure 5
Driver/Scheduler Log

Vehicle # _____

Driver _____

Date _____

	Mileage	Time
On		
Off		

PICK-UPS													DROP-OFFS		
Time								Relevant Codes					Time		
Scheduled	Actual	Mileage	Location	Service Type	Passenger Name	Code No.	Telephone #	a.	b.	c.	d.	Fare	Destination	Scheduled	Actual	Mileage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

DRIVER/SCHEDULER LOG
Continued

Figure 5 Continued,

Potential Codes for

a. Trip Purpose, to

01 Work, school
02 Social/Recreational
03 Personal Business
04 Medical
05 Congregate Meals
06 Agency Activity
07 Other
08 Other
09 Other

Return trip (to home), from:

11 Work, school
12 Social/Recreational
13 Personal Business
14 Medical
15 Congregate Meal
16 Agency Activity
17 Other
18 Other
19 Other

b. Sponsoring Agency

21 Agency A
22 Agency B
23 Agency C

d. 40 Subscription trip
41 Charter
42 Group trip
43 Demand-responsive
44 Other
45 Other

c. Client Characteristics

31 Handicapped w/aid
32 Wheelchair; can transfer
33 Wheelchair; can't transfer
34 Requires Assistance
35 Blind
36 Hearing Disability
37 Ambulatory
38 Mentally/Developmentally Disabled

Demographic Characteristics

60 Lives alone
61 Over 60
62 Low income
63 Black
64 White
65 Latin-surnamed

A coded I.D. number could contain any type of information which you think is relevant. Examples of the kind of client information which could be contained in a client code are

- Agency referring the client to your system
- Agency paying for the transportation of the client
- The disability or disabilities of the client
- The disabilities of the client that call for changes in your service, such as requiring a wheelchair lift, an escort, or door-through-door service
- The kinds of trips the client can be allowed to take and/or the kinds of trips for which the sponsoring agency will pay
- Client demographic characteristics (race, age, sex, household arrangements, income, presence of driver's license, etc.)

Some of these data can be used in evaluating key performance measures as discussed in Chapter Three. For example, the demographic data could be used to see if the clients to whom you assigned priority were using the system as much as expected.

Some of the data can be used for accounting and billing purposes. If you are selling transportation services to other agencies the information contained in a client's code can tell you immediately if they are requesting an allowable trip. After the trip has been taken the code numbers can be used for billing purposes.

You can actually use the client code in one of several ways. First you can ask the client to read their code number over the phone when they call for service. If this seems too demanding of your clients, you can simply display the client code numbers prominently on their file card. When clients call in, most systems have their reservation taker check file cards or other records for just the kind of information we have suggested you put in the pre-coded I.D. number; that is allowable trips, agency paying, etc. The code number would immediately tell this information to the reservation taker or dispatcher.

After the drivers' logs are turned in each day, the code number will be an easy and quick source of important information without returning to the files.

Example: *Establishing a pre-coded client I.D. number.*

You are a system which will be serving the clients of three different agencies. The local senior citizens center is buying both congregate meal service and medical trips for their clients. The local Lighthouse for the Blind and the local chapter of United Cerebral Palsy are buying sheltered workshop and work trips only.

You might want to set up a code which began with a number identifying the sponsoring agency:

21 = senior citizen center
22 = Lighthouse
23 = UCP

Then you might want to add a number that indicated the trips for which clients were eligible:

1 = work, school
4 = medical trips
5 = congregate meals

Then you might want to add a number indicating the disability or assistance need of the client:

31 = handicapped with walker, aid or cane
32 = wheelchair; can transfer
33 = wheelchair; can't transfer

If you also transported your own clients you might want to have some demographic data on them. Or the agencies purchasing service from you might like to have some demographic data on the clients readily available. So you might establish a code for that:

60 = lives alone
61 = over 60
62 = low income
63-666 = race or ethnic background

If a client's travel were paid for the Lighthouse for the Blind, the client used a cane, was only allowed to make workshop trips and was low-income (however defined), his or her code number could be

22-1-31-62-#1 (the agency designation)

➥

A senior citizen subsidized for both medical and congregate meals by the senior citizens center might get a number like:

21-4-5-31-61-#1

You could either make all that information part of the client I.D. code number or you could just make some of the information part of the I.D. number. The rest of the information could just be coded on the client's file card so that it would be easy to pull together when needed.

Pre-Coded Trip Information

It is also possible to develop a code which can be used to describe the trips made by vehicles and clients over the service day. Included in the kind of information which could be pre-coded and would appear in Cols. 9-12 on the Sample Driver/Scheduler log are:

- Trip purpose (work, school, congregate meal, medical, etc.)
- Client disability or special need
- Sponsoring agency
- Kind of trip (group, individual demand-responsive, subscription, etc.)
- Who made the reservation (client or social worker)

You would not want to duplicate information already available in the client identification numbers. On the other hand, if you didn't have such information about the clients or it doesn't appear in the client's code you would want to make sure it appears on the vehicle log.

You may feel that much of this information is "obvious" to anyone running a system for some time. You may know all your clients, know their disabilities, and know that a certain address is the local clinic or senior citizens center. But having such a simple code gives you an easy way to daily collect and collate this information.

The pre-coding is not suggested here as a "magical" process. It does eliminate a lot of counting and searching through the files to prepare reports or system evaluations. It does give you a fairly simple and easy way to monitor and scrutinize important aspects of your service. (Also remember that system personnel do change and the person who "knows" all the needed client information may be gone when you need that information.)

Using such codes will require you to train your dispatchers initially. But often dispatchers get to know all about individual clients. They will also come to know the appropriate codes and use them with facility.

Of course, the success of such a process depends on the dispatchers and schedulers. You must check and compile the data in a timely fashion and use it to monitor your system according to the schedule(s) you establish in Step 5. Then staff and drivers will have the necessary interest and incentive to use the codes and to collect the required information.

DEVELOPING BASIC SYSTEM INFORMATION

Most productivity measures are developed from just a few basic measurements or service parameters. Each of these parameters is easily obtained from a well-designed dispatcher/driver log. The most important system characteristics for analyses of productivity are:

- The number of hours each vehicle is in service
- The number of hours each vehicle is in service with passengers aboard
- The number of miles travelled by each vehicle
- The number of miles travelled by each vehicle with passengers aboard
- The number of miles travelled by each passenger

Vehicle or Service Hours

This is the total number of hours per day that each vehicle is actually available to provide service. To obtain an average for all the

vehicles you operate, divide the total service hours by the number of vehicles. Vehicle or service hours for each vehicle are obtained from the box at the upper right hand of the driver/dispatcher log. If more than one log covers a vehicle, the hours of service for each individual vehicle should be compiled from all logs covering that vehicle.

If you have vehicles that are very different from one another, you should compute individual statistics for each class of vehicle. For example, if you have both lift-equipped and non-lift-equipped vehicles, you may operate them very differently. If so, an average figure for your entire vehicle fleet would be misleading.

Loaded or Occupied Vehicle Hours

Sometimes called passenger hours, this is a measure of the number of hours when a vehicle was available for service and a passenger was actually aboard.

Loaded or occupied vehicle hours are a sub-set of vehicle hours. You will obtain the data necessary to calculate this standard from the two sets of columns dealing with time (1 & 2 , 15 & 16). Each day for each vehicle you will be able to identify the time during which no passenger was aboard the vehicle.

You can then develop a daily total, sum the number for each vehicle and divide by the number of vehicles to obtain an average loaded vehicle hour figure. Remember to compute different figures for vehicles which are used very differently or which are inherently different.

Dead Vehicle Hours vs. Dead-Head Vehicle Hours

You may have recognized that there are two major reasons why a vehicle in service may not have any passengers aboard. The first is that the vehicle may be on the way to pick up somebody, or may be returning from dropping off somebody. This is often called "dead-heading."

The second reason why a vehicle in service may not have any passengers on board is that it is simply sitting somewhere waiting to be called. Vehicles not in use at all, although fully available for service generate dead hours.

Note that there is a significant difference between dead-vehicle hours and dead-head hours. The latter may be a function of very long trips and low densities. Dead hours are a function of no demand for the period of time in question.

Dead-vehicle hours are also calculated from the time columns, 1 & 2, 15 & 16. You will have to look at all the time vehicles had no passengers on board but were not en route to or from a trip.

Although precise standards are hard to set, dead-hours are a cause for concern. Even if you are showing up well on the other productivity measures to be discussed, if you have any significant dead-hours you should consider ways to increase your vehicle use during the time in question.

Following is a filled-in sample of a driver/scheduler log.

Figure 5
Driver/Scheduler Log

SAMPLE

Vehicle # 11 (with lift)
Driver Cindy Lewis
Date Tuesday, 25 Sept

	Mileage	Time
On	14,806	8:30 AM
Off	14946	5:00

Sheet Two

PICK-UPS Time Scheduled (1)	Time Actual (2)	Mileage (3)	Location (4)	Service Type (5)	Passenger Name (6)	Code No. (7)	Telephone # (8)	Relevant Codes a. (9)	b. (10)	c. (11)	d. (12)	Fare (13)	Destination (14)	DROP-OFFS Time Scheduled (15)	Time Actual (16)	Mileage (17)
8:45 AM	8:50	14,812	1211 Pine Street	42	George Collins	21-33-9	555-6471	01	60			—	Sheltered Workshop 4th & Main	9:30	9:25	
8:55 AM	9:00	14,814	3110 Major St.	42	Mary Smith	21-33-14	556-9181	01	33			—	Sheltered Workshop 4th & Main	9:30	9:25	
9:10 AM	9:09	14,817	1107 Mayfair #D	42	Cleo Jones	21-33-24	555-9448	01	33			—	Sheltered Workshop	9:30	9:25	14,824
10:00 AM	9:58	14,827	1407 Pear #5	43	Jack Brown	23-34-101	No phone	04				50¢	City Hospital 4th & West	10:30	10:20	14,831
10:30	10:35	14,842	1474 Oak St	43	Sally Carter	29-34-12	555-8111	04	41			50¢	City Hospital 4th & West	11:15	10:50	14849
11:00	11:10	14854	8417 Ave A #3	40	Mary Warren	22-37-01	555-8413	05	61	62		—	Golden Age Senior Center, 1st & Main	11:30	11:40	
11:00	11:20	14860	102 Pine Street	40	Sally Smith	22-31-111	555-1864	05				—	Golden Age Senior Center	11:30	11:40	
11:00	11:30	14862	1437 Major Ave	40	Susi Brown	22-39-71	555-1564	05				—	Golden Age Senior Ctr	11:30	11:40	14868
To garage	11:50	14874	at office/garage												12:20	14874
12:30	12:30	14877	5718 Bleak St.	43	Sara Lilly	23-39-80	555-1891	04				50¢	Blue Valley Dental Clinic	1:15	12:55	14879
To garage	14882		at office/garage												1:20	14882
1:30	1:30	14888	Golden Age Senior Ctr	40	Mary Warren	22-37-01	—	15				—	8417 Ave A, Apt 3	2:00	1:47	14890
1:30	1:30	14889	1st & Main	40	Sally Smith	22-31-111	—	15				—	102 Pine Street	2:00	1:57	14896
1:30	1:30	14888	"	40	Susi Brown	22-39-71	—	15				—	1437 Major Ave	2:00	2:10	14902
To garage	2:20	14908	at office/garage (Lunch 30 min break for Cindy)												2:50	14908

SAMPLE

Vehicle # 11 (w/lift) Sheet Two

DRIVER/SCHEDULER LOG

Driver Cindy Lewis

Date Tuesday, 25 Sept

	Mileage	Time
On	(14908)	(2:10)
Off	14946	5:00

See sheet One

PICK-UPS Time Scheduled	PICK-UPS Time Actual	Mileage	Location	Service Type	Passenger Name	Code No.	Telephone #	Relevant Codes a.	b.	c.	d.	Fare	Destination	DROP-OFFS Time Scheduled	DROP-OFFS Time Actual	Mileage
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰
3:00	3:00	14911	1224 Oak Ave	43	Leslie Tarr	23-34-81	555-6471	04				50¢	Blue Valley Medical Group, 3rd & Hill	3:30	3:15	14914
	To garage	14918	at office/garage												3:25	14918
3:30	3:30	14924	Sheltered Workshop 4th & Main	42	Cleo Jones	21-33-24		11	33			—	1107 Mayfair #D	4:15	3:50	14928
3:30	3:30	14924	"	42	Mary Smith	21-33-14		11	33			—	3110 Major St.	4:15	4:05	14933
3:30	3:30	14924	"	42	George Collins	21-33-9	-	11	60			—	1211 Pine St.	4:15	4:15	14940
	4:25	14946	-Off-													
	To	garage	- No more requests													

Service or Vehicle Hours = (as established) = 8 hours (Not counting lunch break)

Vehicle Miles = 140 (14946 - 14806)

Occupied VH = 4.1

Dead-head VH = 2.3

Dead VH = 1.6

Occupied Vehicle Miles = 72

Dead Head Miles = 68

One-Way Passenger Trips = 16

(Unduplicated riders = 10)

Example: *How to compute major vehicle hour measures.*

Using data from Fig. 5, the filled-in sample of a driver/scheduler log, you can easily calculate:

Service or Vehicle Hours = 8.0

Occupied Vehicle Hours = 4.1 Hours
+
Dead-Head Vehicle Hours = 2.3 Hours
+
Dead Vehicle Hours = 1.6 Hours

Service/Vehicle Hours = Vehicle ON Time 8:30 am
Vehicle OFF Time 5:00 pm
Lunch for Driver 2:20-2:50
(vehicle unavailable)
8.0 Hours

Min.	Occupied Vehicle Hours*	Dead-Head (Unoccupied)*	Min.	Dead-Hours	Min
40	8:45-9:25	8:30-8:45	15		
20	10:00-10:20	9:25-10:00	35		
20	10:30-10:50	10:20-10:30	10		
40	11:00-11:40	10:50-11:00	10		
25	12:30-12:55	(11:40-11:50)	10	11:50-12:20	30
40	1:30-2:10	11:20-12:30	10	12:55-1:20	25
15	3:00-3:15	1:20-1:30	10		
45	3:30-4:15	(2:10-2:20)	10	(2:20-2:50 lunch)	
$\frac{245}{60}$ = 4.1 hrs.		2:50-3:00	10		
		3:15- 3:20	5		
		3:25-3:30	5	3:20-3:25	5
		4:15-4:25	10	4:25-5:00	35
		$\frac{140}{60}$ = 2.31 hrs.		$\frac{95}{60}$ = 1.6 hrs.	

Example: *How to compute major vehicle miles measures.*

Using data from Fig. 5, the filled-in sample of a driver/scheduler log, you can easily calculate:

Service or Vehicle Miles = Miles Off - Miles On
= 14806 - 14946
= 140 v.m.

Occupied Vehicle Miles
+
Dead-Head Vehicle Miles
+
(Dead Miles, if any)

Occupied Vehicle Miles*		Dead Head Miles*	
14812-14824	12	14806-14812	6
		14824-14827	4
14827-14831	4	14831-13842	11
14842-14849	7	14849-14854	5
14854-14868	14	14868-14874	6
		(14874-14877)	3
14877-14879	2	14879-14882	3
		(14882-14888)	6
14888-14902	14	14902-14908	6
		14908-14911	3
14911-14914	3	14914-14918	4
		14918-14924	6
14924-14940	16	14940-14946	6
	72		68

*Note that we're introducing a slight error by showing the same mileage in the off and on cols. (e.g., 14812 is in both cols.)

The examples above made rather generous assumptions about which trips were dead-heading. For example, the driver/scheduler log shows that the vehicle returned to the office/garage several times during the day because it was not needed. This time and mileage could be considered as dead-time because the vehicle was not really on the way to or from a trip. However, we have calculated such times as dead-heading.

Average Passenger Trips; Number and Mileage

You can calculate the number of one-way passenger trips by simply counting the passengers listed in Col. 6 who were actually transported. Note that you will count some people twice; if someone goes and returns on your system, they will count as two one-way passenger trips.

Some agencies are required to know the number of unduplicated passengers. If you need to calculate this measure you would simply count the names of the people transported regardless of the number of trips they made.

Usually, however, agencies which want unduplicated rider data require a record of the names and the actual number of trips made by each rider. You can easily obtain this information from your daily logs. Be careful not to confuse unduplicated riders (whether by name or not) with the number of one-way passenger trips which you deliver.

Example: *Calculating one-way passenger trips and unduplicated riders.*

Using the sample driver/scheduler log you can easily develop this information.

To calculate the number of one-way passenger trips, simply count the number of people listed in Col. 6 who actually were transported; count people twice if their names appear twice. There were 16 one-way passenger trips delivered by the sample system.

➡

To calculate unduplicated riders, only count each person once no matter how many times they were transported. Ten (10) unduplicated riders were served.

You could keep a list of the number of individuals who made multiple trips and the actual number of trips they made. This is sometimes a useful fact to know whether or not you are required to keep records of individual travelers.

Vehicle Trips

A concept used by some systems is the vehicle trip; this is defined as the journey made by a single vehicle from the time it leaves the garage or central dispatching point until it returns. For some systems this is an important service measure; for others it is not.

The vehicle on the sample filled-in driver/scheduler log made four vehicle trips in the service day in question. This data was found by counting the number of times the vehicle destination was listed as "garage/office" in either Col. 4 or 14.

Summarizing the Basic Definitions

Table Five summarizes the definitions of the basic system measures discussed above. It shows where the data and information needed to calculate these measures can be found on the sample driver/scheduler log.

USING BASIC DATA TO CALCULATE AND USE PRODUCTIVITY MEASURES

The data which you developed in the previous section can be used to prepare most of the productivity measures of use to small transportation systems. References 3, 9, 11, 16 and 17 discuss a number of more sophisticated productivity measures.

You should develop and use productivity measures and standards in

Table Five
Basic System Information

INDIVIDUAL	SYSTEM AVERAGE	DATA SOURCE
VEHICLE OR SERVICE HOURS		
Number of hours/time period each vehicle is availble for service	Total of individual vehicle hours / divided by / Total number of vehicles	Time Off & On Time Columns 1 & 2, 15 & 16
LOADED OR OCCUPIED VEHICLE HOURS		
Number of vehicle hours/time when a passenger is on board	Total of individual vehicle hours / divided by / Total number of vehicles	Time Columns 1 & 2, 15 & 16
DEAD-HEADING VEHICLE HOURS		
Number of vehicle hours/time period when no passenger is aboard, vehicle en-route	Total of individual vehicle hours / divided by / Total number of vehicles	Time Columns 1 & 2, 15 & 16
DEAD VEHICLE HOURS		
Number of vehicle hours/time period when no passenger is aboard	Total of individual vehicle hours / divided by / Total number of vehicles	Time Columns 1 & 2, 15 & 16

VEHICLE HOURS = Loaded Vehicle Hours
+
Dead-Heading Vehicle Hours
+
Dead Vehicle Hours

Table Five Continued,

VEHICLE MILES		
Miles travelled by a vehicle in service	Total of individual vehicle miles / divided by / Total number of vehicles	Mileage On & Off Mileage Columns 3 & 17
LOADED OR OCCUPIED VEHICLE MILES		
Vehicle miles when a passenger is on board	Total of individual vehicle miles / divided by / Total number of vehicles	Mileage Columns 3 & 17
DEAD-HEAD VEHICLE MILES		
Vehicle miles when no passenger is on board	Total of individual vehicle miles / divided by / Total number of vehicles	Mileage Columns

VEHICLE MILES = Loaded Vehicle Miles
+
Dead-Heading Vehicle Miles

AVERAGE PASSENGER TRIP LENGTH		
The miles of travel consumed by each one-way passenger trip	Total number of occupied vehicle miles / divided by / Total number of one-way passenger trips	Mileage Columns 3 & 17

Table Five Continued,

VEHICLE TRIP		
The number of miles consumed by each vehicle in a circuit/route beginning and ending at the dispatch point	Total number of vehicle trips / divided by / Total number of vehicles in service	Mileage Columns 4 & 14
DEAD-MILES		
The number of miles consumed by each vehicle not carrying passengers nor dead-heading	Total number of dead-head miles / divided by / Total number of vehicles in service	Mileage Columns 3 & 17
SEAT-MILES		
The number of available seats per vehicle times the number of vehicle miles	Total number of seat miles / divided by / Total number of vehicles in service	Mileage Off & On

the same way you used performance measures. You should set some objectives, establish standards where possible, develop monitoring and evaluation systems and schedules, and actually monitor your operations. If you fail below your expectations, you should carefully examine the reasons.

If you can change some aspect of your service to improve productivity, you should. If you cannot, you should re-examine your original standards and goals. These activities are the essence of the ten-step evaluation process described earlier.

DEVELOPING AND USING RESOURCE UTILIZATION MEASURES

Certain productivity measures are determined by how well you use the resources which you have available. We have characterized these measures as resource utilization. Not all commentators in this field use exactly the same terminology and you need not either. Again, you need only recognize how we use these terms in the series of Manuals.

Measures Using Occupied Vehicle Mile Data

In general you would hope to have your vehicles occupied as much as possible. Therefore two common measures of vehicle occupancy as a type of productivity are:

Occupied Vehicle Miles per Total Vehicle Miles

Occupied Vehicle Miles per Vehicle Trip

Each of these measures can tell something different about your use of your resources.

Note, however, that these measures should not be used alone. It is possible to generate many Occupied Vehicle Miles by simply driving around a great deal with passengers on-board. You should also compare Occupied Vehicle Miles to Total Vehicle Hours for a better combination of capacity measures:

Occupied Vehicle Miles per Vehicle Hour

Even this measure however can be inflated by circuitous routing.

Ideally you would like to have a very high percentage of Occupied Vehicle Miles to Total Vehicle Miles in some time period (day, week, month) and to Vehicle Trips. Most systems run about 50%.

Your figure will depend on your average trip lengths, as well as the extent to which you can group trips by time as well as location. If you have many individual trips of some length, you might find a much lower percentage of Occupied Miles to Total Vehicle Miles or to Vehicle Trips.

You should try to increase group riding if it will not generate appreciable curcuitous routing. However you may have many individual trips of great length with no practical or acceptable way to group them. If so, you may not be able to increase your percentage of Occupied Vehicle Miles.

Note that this is one of the many instances in which performance and productivity may clash. You might be able to more effectively group trips and so increase the percentage of Occupied Miles to Total Miles. However the necessary procedures might put undue burdens on your clients or create trip restrictions which are not acceptable to your agency.

Conversely, you may be able to cut average trip lengths by refusing lengthy trips or making the client pay for distances above some maximum. This would generally increase the percentage of Occupied Miles. However, these solutions might be unacceptable to your agency.

Measures Using Dead-Head Vehicle Miles

Dead-Head Miles are the reciprocal of Occupied Miles; together they generally add to Total Vehicle Miles. However it is possible to have Dead-Miles as well. Generally you would not incur dead-miles as you incur you could incur dead-hours. If there is no need for a trip in the service day, vehicles usually stay put and did not generate mileage.

However some systems use available vehicles simply to run administrative errands. Vehicles also generate mileage being driven for gas and repairs. If your vehicles are being put to such uses in any appreciable amount it would be useful to also establish a Dead-Mile category.

If you do not have a Dead-Mile category, measures of Dead-Head Miles are simply the reverse of the Occupied Vehicle Mile figures discussed

Table 6
Common Productivity Measures

Resource Utilization	
Occupied Vehicle Miles per:	Total Vehicle Miles
	Vehicle Trip
Dead-head Vehicle Miles per:	Total Vehicle Hours
	Total Vehicle Miles
	Occupied Vehicle Miles
	Vehicle Trip
	Vehicle Hour
Occupied Vehicle Hours per:	Total Vehicle Service Hours
	Occupied Vehicle Mile
	Vehicle Trip
Dead-head Vehicle Hours per:	Total Vehicle Hours
	Occupied Vehicle Hours
Dead Vehicle Hours per:	Total Vehicle Hours
	Occupied Vehicle Hours
Service Utilization	
One-way Passenger Trips per:	Total Vehicle Miles
	Occupied Vehicle Miles
	Total Vehicle Hours
	Occupied Vehicle Hours
	Vehicle Trips
	Seat Miles

above. However, it is often useful to compute Dead-Heading Measures because they are a symbol of unused or underutilized capacity. The most common are:

- Dead-Head Vehicle Miles per Total Vehicle Miles
- Dead-Head Vehicle Miles per Occupied Vehicle Miles
- Dead-Head Miles per Vehicle Trips
- Dead-Head Miles per Vehicle Hour

As suggested above, an efficient way to lower the percentage of "unused" vehicle miles is to increase the group of clients by either time or location. You can establish flexible routing for example, and ask clients to try to fit their demands into such routes. Many rural providers are forced to adopt such measures. If you ask clients to schedule their trips close together by time or location you can often cut dead-heading significantly.

If you do have a Dead-Mile category, it is important to separate them from Dead-Heading miles. Dead-Miles are usually a sign of poor management.

If you have any appreciable percent of Dead-Miles you should reconsider your gasoline and repair locations; are they saving your agency more than they are generating in increased vehicle miles? It is also not a good idea to encourage the use of vehicles when not otherwise demanded. Vans and small buses do not get good gas mileage and their use increases the likelihood of the need for maintenance.

Vehicle-Mile figures are only one aspect of productivity. They generally should be used in conjunction with measures that relate resource utilization to time. It is possible to have a very high percentage of Occupied Vehicles Miles but still not use your vehicles very often during the service day.

Measures Using Occupied Vehicle Hour Data

You would like to have people using your system all during the service day. Common measures of the use over time of your vehicles are:

- Occupied Vehicle Hours per Total Vehicle or Service Hours
- Occupied Vehicle Hours per Occupied Vehicle Miles

•Occupied Vehicle Hours per Vehicle Trips

Ideally you would like the ratio of Occupied Vehicle Hours to Total Vehicle Hours to be very high; that would indicate that your vehicles were in use much of the day. You would also like your ratio of Occupied Vehicle Hours to both total Vehicle Miles and to Vehicle Trips to be high.

These three figures may or may not tell you something different about your system. Some systems operate in ways that create different ratios between Vehicle Hours and Vehicle Miles on onehand, and Occupied Vehicle Hours and Vehicle Hours on the other. Note that the actual numbers will always be different because there are only 24 hours in a day but wide variations in the mileage per trip. However these ratios themselves may or may not move in the same direction with the same consistency.

Measures Using Dead-Head Vehicle Hour Data

Dead Head Vehicle Hours tell the reverse side of the story; they tell how often your vehicles are not used. These measures are not direct reciprocals of Occupied Vehicle Hours because you may also have Dead-Hours. The most common Dead-Head Hour productivity measures are:

•Dead-Head Vehicle Hours per Total Vehicle Hours

•Dead-Head Vehicle Hours per Occupied Vehicle Hours

You would like these measures to be low; you would not like to show any appreciable number of Dead-Head Vehicle Hours if it were possible. However this measure tends to move in the same direction as Dead-Head Vehicle Miles. If you have many individual (not shared) trips with long average trip lengths in low density areas it is difficult not to incur significant Dead-Heading hours.

If however your Dead-Heading hours seem to move somewhat differently than Dead-Heading miles, you should investigate why. Again the numbers involved will, of course, be different because hours and miles are not comparable. But if the percentage of Dead-Head Hours is much higher or lower than Dead-Head Miles you should look for the reasons why.

As with Dead-Head Miles you should look for acceptable ways to change your service to lower the amount of time you are travelling to and from a pick-up or drop-off without any passengers aboard. Perhaps you should limit your service area or ask riders living in the same areas of town to schedule trips to similar destinations at the same time. These measures would significantly decrease Dead-Heading Hours.

Measures Using Dead Vehicle Hour Data

The two most common measures of this factor are:

- Dead Hours per Total Vehicle Hours
- Dead Hours per Occupied Vehicle Hours

Dead Hours are a sign of underutilization of your resources, generally regardless of your service area or trip characteristics. While Dead-Heading Miles and Hours may be unavoidably give certain community or client characteristics, Dead-Hours are a sure sign that you are not working hard enough to ensure full utilization of your vehicles.

Remember that administrative errands and miscellaneous use of Dead vehicles are not satisfactory answers. These uses generate more Dead Miles without decreasing Dead Hours.

If you show large or even appreciable percentages of Dead Hours per the two common indices, you should immediately investigate coordination and contracting alternatives in your community. Perhaps you can sell the Dead Hours to other social service agencies to transport their clients.

Dead-Hours are often incurred because clients have a very specific time in which they need to travel; congregate meal trips, and trips to Sheltered and other workshops are common examples. The vehicles are busy during the middle of the day for congregate meal services; they are busy during the morning and evening peaks for the work-trip type Workshop needs.

These examples suggest some ways to jointly utilize vehicles and resources to reduce Dead-Hours and increase other indices of productivity. An agency serving the elderly for congregate meals should investigate selling transportation services to agencies needing

morning and evening peak trips. The reverse is also true. Refs. 5, 10, 12 discuss these possibilities at length.

Another problem which may cause an increase in the percentage of Dead-Hours is that an agency may already be at capacity for the times clients need to travel. For example, if more trips in the middle of the day are needed for congregate meals, Dead-Hours will significantly increase if a vehicle is bought and a driver hired for just those trips. Agencies at capacity should think about purchasing services from other transportation providers to cover any overload during capacity periods, if they cannot shift the demand to uncongested times.

Some changes in other productivity measures might increase Dead Hours. If an agency groups trips more efficiently to lower Dead-Heading time, but they do not increase total ridership, they will initially create Dead Hours (although not Dead Miles). Dead Hours are marginally cheaper than Dead-Heading Miles because gas and maintenance costs are not incurred.

Agencies should act to reduce Dead-Heading Miles even if this initially increases Dead-Hours. However those agencies should then act to reduce the Dead Hours by using vehicles and other resources in a productive fashion. The "extra" or excess capacity should be used to provide more trips for additional agency clients or sold to other community providers.

Note that many agencies "hide" their Dead Hours and Miles in Dead-Heading figures. While it is not always possible to decide exactly what is a Dead-Mile and what is a Dead-Hour, as the sample Driver/Scheduler log in this Chapter shows, Dead Hours are an extremely important productivity measure. You should calculate and use this figure to examine how well you are using the resources available to you.

You should also be wary of using other systems' Dead-Heading data if you can't be sure that their figures don't contain Dead Miles or Hours. Their data is meaningless if you don't know this fact; it is almost as meaningless if their Dead-Heading data do contain Dead Hours/ Miles figures.

What These Figures and Measures Don't Tell You

These productivity measures are important ones. They give you indications of how well you are actually utilizing your vehicle and staff resources. However they are incomplete because they can't tell you anything about how your clients are using their resources.

It is possible to have fairly high ratings on the types of measures discussed in this section simply by having only one rider aboard the vehicle most of the service day. It is possible to increase these measures by taking people miles out of their way on each trip!

Moreover you could be using your resources all day for one passenger at a time and carry less people than a system carrying many people at one time for a few hours, even if that system were incurring significant Dead Hours or even Miles.

In short what you would really like of your system is that your resources be in use as much of the service day as possible, that people be be aboard the vehicles as much of the time as possible, and, that as many people be aboard at one time as possible.

The measures discussed in this section deal only with the first two of the three productivity objectives you might have for your system or service. The next section of this Chapter discusses measures of the people-carrying utilization of your system. These two types of measures should be used together to accurately gauge the productivity of transportation services.

DEVELOPING AND USING SERVICE UTILIZATION PRODUCTIVITY MEASURES

Most service measures relate the actual number of one-way passenger trips to several indices of the available service or resources. The most useful and common service measures relate one-way passenger trips to vehicle miles, vehicle hours, vehicle trips and seat miles.

Passenger Trips Per Total Vehicle Miles and Per Total Vehicle Hours

You would like to have a very high ratio of one-way passenger trips to both the total Vehicle Miles and Vehicle Hours of service. This

would indicate that you were serving a lot of people. However it would not necessarily mean that you were serving those people all through the service day.

These figures reflect averages. You could have a respectable ratio on both these measures by serving large groups for just a few hours per day. While this would still be nice you would need to combine this measure with the resource utilization measures discussed above to gauge the overall productivity of your system.

Passenger Trips Per Occupied Vehicle Miles and Occupied Vehicle Hours

These measures are a variant of the one discussed above. Comparing one-way passenger trips to only Total Vehicle Miles or Vehicle Hours ignores the impact that dead-heading has on your ability to provide service. Since dead-heading may be unavoidable, you would also like a measure of the number of passengers who you served in the "active" part of your service.

One-way Passenger Trips per Occupied Vehicle Hour and per Occupied Vehicle Mile are very good measures of the average number of people whom you carry in an hour and over a mile. Ideally you would like these figures to be very high; obviously they are much higher than total figures.

These Passenger per Occupied Vehicles figures are two of the most important of the basic productivity measures. If you carry group trips these measures should be very high; if you serve many demand-responsive trips they will not be as high. If you serve many people in wheelchairs these figures may not be very high.

The discussion above conveys an important message. While you would like these two ratios to be as high as possible, they are limited by the type of clients whom you serve and their needs.

Congregate meal providers should expect much higher measures of One-Way Passenger Trips to Occupied Vehicle Miles and Hours than systems serving sheltered workshops for the handicapped in wheelchairs. However both of these providers should expect fairly high ratios on these measures because they are serving group trips, which tend to increase

one-way passenger trips per hour and mile of service. Systems providing demand-responsive service to the handicapped should expect much lower measures.

Again you must use these figures along with the resource utilization productivity measures to get an accurate picture of your system. If you are serving ambulatory people for congregate meals you may show much higher One-way Passenger Trips per Occupied Mile or Occupied Hour of service than a neighboring system serving the handicapped. You may however show a much lower rate of Occupied Vehicle Miles or Hours to Total Miles or Hours. This would indicate that you were not using your resources very efficiently for the remainder of the day.

Again note that you cannot compare your system to nearby systems unless you both are serving exactly the same kind of trips, in the same areas, using the same kind of vehicles. You can have higher productivity measures in several areas and actually be less efficient than other systems. Your clients, and the services which you deliver to them help determine these measures.

Passenger Trips per Vehicle Trip

This measure is a variant of some of the resource utilization measures discussed above. It suggests how well you may be utilizing your vehicles in serving passengers. As previously mentioned, the concept of a vehicle trip is an important one for some systems and not for others.

If you are serving a low density area or a rural community where vehicles are stationed at different locations, you might want to monitor this index. It may give you an idea of how well you are routing and scheduling your passengers' trips. Ideally you would like this measure to be high indicating that you are not sending vehicles out to pick-up just one person. However the actual measure is in part determined by the temporal and geographic grouping of your clients and the kinds of trips which you serve.

You might use this measure as well as measures of One-Way Passenger Trips per Total Vehicle Miles and Hours. If they seem to move differently you should investigate why this is so.

Passenger Trips per Seat Miles

Seat Miles are an important index of the total capacity of your vehicles to carry passengers. A vehicle may be able to carry 4 people or 27. If One-Way Passenger Trips per Occupied Vehicle Mile were 3.0 you would be fairly efficient if you owned vehicles with a capacity of four people and very inefficient if your vehicle capacity was 27.

Seat Miles are a way to reflect your actual capacity when developing measures of productivity. Seat Miles are simply the number of seats per vehicle multiplied by the total number of Vehicle Miles. You could also calculate Seat Hours but this is not a common figure.

It is not always easy to figure out the capacity of lift-equipped vehicles that are used to serve both ambulatory and non-ambulatory passengers. Many lift-equipped vehicles have far less room for the ambulatory when passengers in chairs are aboard. In these cases you could use the average seating capacity of the vehicle to determine Seat Miles.

If you rarely serve the wheelchair bound you should use the regular seating capacity figure. If you almost always serve those in wheelchairs you should use that capacity figure.

One-Way Passenger Trips per Seat Mile are extremely important measure of how well you are using your resources to serve your clients. This figure will be always much lower than Trips per Occupied Miles. However it is a more realistic appraisal of how effectively you are providing service and the extent of your underutilized capacity.

If either One-Way Passenger Trips Per Occupied or per Seat Mile are low you should investigate ways to increase the number of clients carried. Before you buy any more equipment you should see if there are more productive ways of serving your clients. A common example is buying services from the local taxi operator or from a community coordinated system.

One way to increase the number of Passenger Trips per Seat Mile is to enter into ride-sharing arrangements with other providers or with other local agencies. Previously we suggested that you could increase

productive use of your resources if you had a lot of Dead Time by time-sharing your vehicles. That is you could sell your Dead Time to other systems or local agencies to carry their clients.

Here we suggest that you could make arrangements to carry other agencies' clients along with your clients when your service productivity is low. Ride-sharing is more organizationally complicated and billing arrangements can be a little more complex. But if your service productivity is low, you should investigate this option. Many of the expressed difficulties can be addressed by adequate bookkeeping and dispatching systems.

Rural providers may find this is a very valuable way to increase productivity especially on long trips or inter-city trips. An example is trips from a rural area into the nearby City for medical service.

HOW TO USE PRODUCTIVITY MEASURES

You should use the two types of productivity measures described above in the same way that you used performance measures. You should develop objectives, turn those objectives into measures and standards and develop adequate record-keeping and monitoring systems. You should then monitor your operations and see how well your actual productivity meets your expectations.

DIVIDING PRODUCTIVITY DATA BY TYPES OF SERVICE

If you provide very different types of service it is very important to develop productivity measures for each type of service. The Manual has already suggested that systems which provide very different types of services should not be compared to one another. If one agency provides very different services the productivity of each service should be examined separately.

Often agencies provide group trips for congregate meals, subscription services for work or kidney dialysis etc., and individual demand responsive trips for all sorts of eligible trips. The average productivity figures of such systems would be almost meaningless in trying to improve

service. Measures could be quite high but the system could be operating some one component very inefficiently.

To the extent possible you should develop separate productivity figures for the different services which you provide, as well as overall system averages. There is nothing wrong with developing average system figures if you also examine separate services separately. It is possible that you are willing to allow your demand-responsive service to have low productivity because other services offset it with their higher productivity. However you cannot make this policy decision without knowing how productive each type of service is.

You really cannot improve service without examining the individual service components. If your average system productivity were to drop, you would want to pinpoint which service was pulling down the average and why. Your group or subscription services may be very efficient but your demand-responsive service may not be. Of course, simply having a lower productivity doesn't mean that the demand responsive service is automatically inefficient. However, you won't know unless you examine that service's productivity initially and over time.

The record-keeping procedures suggested earlier in the Manual easily facilitate this kind of examination. If each trip is coded as it is scheduled, the kinds of trips can be counted and collated each day.

DIVIDING PRODUCTIVITY DATA BY TYPE OF CLIENT OR VEHICLE

Many systems serve both the ambulatory and those in wheelchairs. Ideally you would like to separate productivity data by client type. Ambulatory passengers are easier to serve; they consume less time and less space. You would expect lower productivity in serving the handicapped than the ambulatory. Often however this kind of client-specific data is not easy to collect.

A good surrogate or proxy for passenger-type data is often data separated by vehicle type. Many systems have some vehicles with lifts and some without. Although most systems do not totally segregate the ambulatory from the handicapped, lift-equipped vehicles in general would

would be expected to have a lower productivity than non-lift vehicles if the former actually carried those in wheelchairs. (That is you may have a lift-equipped vehicle and no clients who require a lift).

The message of both this section and the preceeding one is that where different service features generate very different productivity measures, you should try to obtain the actual productivity for those different services or clients. You cannot improve or even evaluate your service if you do not understand the service components which go to make up your average productivity figures.

These two sections also point out how useless are other system's average productivity data. Unless you knew the composition of their average figures, they are meaningless to you.

On the other hand, separating out your productivity data by type of service and type of client (or vehicle type) can actually allow you to use other system data for general comparisons. If you are given average figures or ranges of productivity measures, as Ref. 3 does for example, you will know which parts of your service to compare, with caution, to the data given.

Many systems willingly "cross-subsidize" low-productivity services, like individual demand responsive social trips, with much higher productivity congregate meal or group trips. That is, they allow these two productivity figures to work against one another in developing a system average.

You might want to set a system average productivity objective. The Manual does not argue that you should not. But you should also set objectives for the individual components of service as well.

There is no reason to allow low productivity services to be less productive than they can be even if you are willing to allow them to be lower than system averages. Your willingness is a perfectly acceptable policy decision. The decision should not obscure the fact that you can work to keep productivity up to some level for even those services. Moreover such policy decision should be made knowingly, with full system facts to guide you.

You can use the ranges given in Table seven to set some basic productivity standards for your system. These numbers are actual figures reported on in the literature. Unfortunately there are no reliable data on the many other important productivity measures described and discussed in this Chapter.

Even the figures presented here must be used with caution, as expressed throughout the entire Manual. You must set your own standards for your own system and monitor those measures over time. You should only use the data given in Table seven for general guidance.

For the other productivity measures for which we can give no data, you might ask other systems in your area how they are doing, or you might ask your local transit system or State Transportation Department for guidance.

Remember that the important point is to set standards which seem sensible and then adjust those standards as you operate and monitor your system. If you do not have enough guidance to set numerical standards for key productivity measures, then don't set standards initially. But do measure and monitor your performance and watch your patterns over time. Once you know how your own system operates you may be able to set standards for all important areas.

Sample Worksheet One shows how you can set standards within the ten-step evaluation process explained in the Manual.

WORKSHEET ONE
CONTINUED

Agency Goal or Objective	Transportation Service Expectations or Objectives	Specific Priorities	Specific Measures or Standards	Desired Standard	Evaluation Schedule	Sources of Evaluation Data
Serve as many trips as possible Use resources effectively	PRODUCTIVITY Resource Utilization • High ratio of occupied vehicle miles to total vehicle miles • High ratio of occupied vehicle hours to total vehicle hours	Miles before hours Take long group trips before short demand responsive trips even if blocks of time remain open	Oc. Vh to Total VH Oc. VM to Total VM Oc. VH to Seat Miles Dead Hours to Total VH	50% or better 50% or better .25 Less than 10%	Monthly	Info from Driver/Dispatcher log.
	Service Utilization • High average 1-way passenger trip to VH + VM	Take group trips before others Try to obtain subscription service even if it means some demand-responsive trips are refused	1 way passenger trip -per Seat mile -per VM -per Oc VM -per VH -per Oc VH	.3 .24 .46 .23 .46	Monthly	Info from Driver/ Dispatcher log

Table Seven

General Guidelines for Setting Productivity Standards

COMMON PRODUCTIVITY MEASURES	GENERAL SERVICE							
	Lift-Equipped or Non-Ambulatory Passengers only		Ambulatory Passengers only		System Averages		Rural System Averages	
	High	Low	High	Low	High	Low	High	Low
Number of passenger trips per vehicle hour	4.4	1.4	13.6	5.0	8.5	2.7	5.2	1.7
Number of passenger trips per vehicle mile	.34	.09	1.28	.17	.52	.11	.37	.14
Vehicle trips per vehicle mile	-		-		.31	.11	-	
Vehicle trips per vehicle hour	-		-		7.23	2.44	-	
Vehicle miles per vehicle (month)	-		-		7,000 - 2,000		-	

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AVAILABILITY

Documents with an NTIS number are available to the public from the National Technical Information Service, 5825 Port Royal Road, Springfield, Virginia 22161. Those without numbers can be obtained it you will write to NTIS and be sure to include the full title and the author(s) name(s). Generally, both paper and microfiche copies are available; costs vary with the length of the document.

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