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Dispatching Demand Response Transit Service: Maximizing Productivity and Service Quality Guidebook

Final Report

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16. Abstract

The ability of transit agencies to staff dispatch effectively and use technology to its full advantage is critical in responding proactively as service changes occur and in making sound routing decisions. Sound routing decisions result in improved productivity and cost-effective service delivery. A modest 3% improvement in service productivity would save the average rural demand response transit agency approximately $65,000 annually. This project focused on improving productivity while maintaining service quality. Researchers collected data from 42 demand response rural and small urban transit agencies regarding operations and use of technology. A database of results identified five transit providers that represented a cross-section of agencies and could be used for case studies of dispatch operation. Case studies focused on: 1) dispatcher goals and objectives, 2) dispatch-driver policies and procedures, 3) team responsibilities and expectations, and 4) reports and material collection. This resulting draft guidebook describes the impact of maximizing productivity, development of policies and procedures that affect productivity, service delivery strategies that impact productivity, dispatch performance measurement, an assessment tool for productivity elements of dispatch, and steps to implement a productive dispatch operation. The final guidebook, when available, will be placed on the Texas Transportation Institute (TTI) web site. Staff will request approval to post it on the Texas Department of Transportation's Regional Service Planning web site as well. Notification of the report will be made through e-mail to the U.S. Department of Transportation public transportation coordinators.

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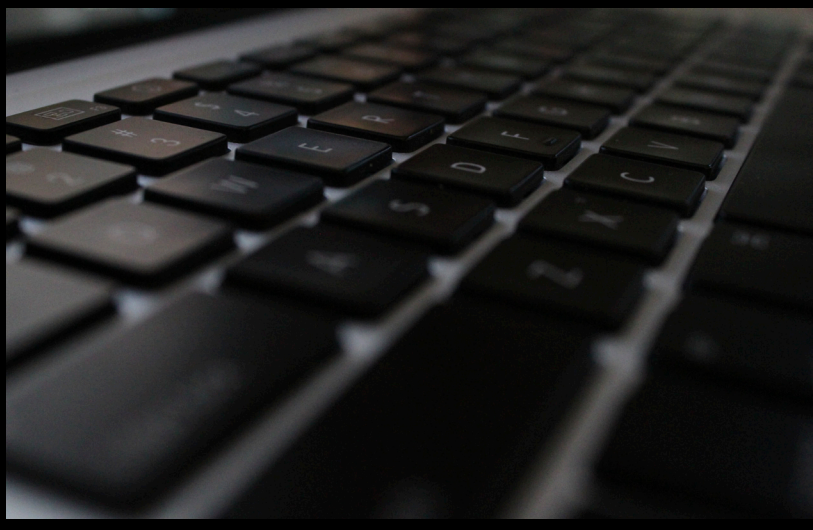

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Executive Summary

Problem and Objectives

With increasing demand for service, higher fuel and insurance costs, and tighter overall budgets, many transit agencies must find ways to control demand response service costs and focus on productivity. Transit agencies have historically invested in advanced scheduling systems and have put less emphasis on the dispatch function that controls actual service delivery. The ability of transit agencies to dispatch effectively is critical in responding effectively to service calls. Service changes affect sound routing decisions. Sound routing decisions result in improved productivity and cost-effective service delivery. The benefits of increased productivity are two-fold. Increased productivity can:

- decrease the resources needed to provide service, and
- provide additional capacity to service additional patrons.

At the same time, the goal of maximizing productivity must be balanced with attaining service quality standards.

The objective of this guidebook is to provide a resource for implementing an effective dispatch operation. The guidebook discusses processes to establish dispatch goals and objectives (Chapter 3), develop dispatch policies and procedures affecting productivity (Chapter 4), identify service delivery strategies affecting productivity (Chapter 5), implement performance measurement tracking and monitoring (Chapter 6), and provide a method to assess the transit agency's current system (Chapter 7).

Research Findings

Researchers surveyed forty-two rural and/or small urban Texas transit agencies, visited eight dispatch operations, and analyzed case studies of five transit agencies (included in the site visits). Researchers found issues that challenge dispatchers in providing effective and efficient demand response transit service. Issues included:

- operating multiple transit programs with differing service requirements (i.e. Medical Transportation Program, Headstart programs, Area Agency on Aging, general public service, etc.);
- operating without adequate policies and procedures that affect both dispatch productivity and service productivity (e.g., no-show, late cancellation, send backs, dwell time, advanced scheduling, subscription, dispatch backup, etc.);
- training staff to schedule/dispatch focusing on productivity;
- training (or retraining) staff to use existing technology fully (e.g., scheduling software, automated vehicle location systems, mapping tools);
- utilizing scheduling/dispatching software in large rural, multi-county service areas with varying population densities when that software appears geared toward providing paratransit service in urban, condensed-area settings; and
- collecting consistently high-quality dispatch/scheduling data and reporting that data in a way useful to making effective and efficient decisions.

To address these issues and challenges, researchers conducted a literature review and have included in this final guidebook information provided in the Transit Cooperative Research Program (TCRP) Report 124 and TCRP Synthesis 60; University of Wisconsin, Center for Transportation Education and Development dispatch training and technical briefs; and other literature or presentation information as cited. The guidebook also incorporates operational strategies to improve dispatch productivity acquired from the transit agencies visited.

Resulting Guidebook

This guidebook has seven chapters. Chapter 1 describes the research objectives and methodology of the research conducted in the project, including the case study selection process. Chapter 2 provides a framework for the guidebook, describing the economic and service impacts of maximizing demand response dispatch productivity and factors influencing dispatch productivity.

Chapters 3 through 6 provide the resources necessary to dispatch demand response transportation productively while balancing service quality. Chapter 3 describes ways to establish goals and objectives for dispatch based on improved productivity while reflecting the transit agency's overall goals and objectives. Chapter 4 includes policies and procedures that directly impact dispatch productivity providing definitions, examples, and suggestions. Chapter 5 presents service delivery strategies impacting productivity including staffing strategies, monitoring and proactive adjustment of schedules, matching supply (service and vehicles) to demand, using technology aids, educating team members, and coordinating service. Chapter 6 describes elements of monitoring and measuring dispatch performance to ensure productivity is maximized and service quality standards are met. Chapter 7 provides a dispatch self-assessment tool and outlines steps to implement a productive demand response dispatch system.

Conclusion

Focusing on demand response dispatch productivity while balancing service quality, will enable transit agencies to improve cost-effectiveness. Improving cost-effectiveness provides opportunities for expanding service or saving resources.

Assessing the demand response dispatch operation, establishing goals and objectives, tracking performance and implementing strategies is an ongoing process. Benchmarking performance before making changes in policy, procedures, or service strategy will provide a baseline and enable the transit agency to track progress toward meeting its goals.

This guidebook provides the resources needed to maximize demand response dispatch productivity and service quality.

Chapter 1. Guidebook Objective and Methodology

Public transit agencies that serve low-density service areas (typically rural agencies), people with disabilities, or specific clientele typically provide demand response transit service. These services are scheduled in advance using a reservation system. Demand response transit service costs on average five times as much per passenger trip than a fixed-route transit service.

Higher costs are a result of demand response operating characteristics such as longer trip lengths between passenger pick-ups, lower population densities, dwell times, and passenger loading times that limit the number of passengers carried per hour of service. With increasing service demand, higher fuel and insurance costs, and tighter overall budgets, many transit agencies must control service costs and improve productivity.

Transit agencies have historically invested in advanced scheduling systems and have put less emphasis on the dispatch function that controls service delivery. Researchers found that as much as 40% of scheduled service is changed on the day of service delivery due to cancellations, no-shows, and other service interruptions (breakdowns, illness, late trips, etc.). The ability of transit agencies to dispatch effectively is critical in responding proactively as service changes occur and in making sound routing decisions that will result in improved productivity and cost-effective service delivery.

Dispatching cost-effective demand response service in *rural* areas is of particular interest. Demographic forecasts indicate that Texas will see a growth in the percentage of retirees over the next 20 years and project that many will retire in rural areas.[1] With age, populations face increasing physical and cognitive challenges that may limit their abilities to drive. Retired populations typically have fixed incomes that may limit the ability to own and maintain an automobile. Public transportation provides transit options that prevent individuals from becoming isolated, help them stay involved in the community, and provide access to medical services, grocery stores, and entertainment. Demand response service also provides a safe means of travel for individuals with cognitive or physical challenges. Improving productivity and dispatch allows more persons to be served within existing budgets.

Objective

The objective of this guidebook is to provide a resource for establishing an effective dispatch operation to maximize productivity and optimize service quality. The guidebook seeks to provide transit agencies answers to questions such as:

- What are appropriate goals and objectives for a dispatch operation?
- What policies and procedures establish a basis for effective service?
- How should dispatch operations be staffed and what responsibilities of the dispatchers, drivers, and patrons affect productivity?
- How should dispatch performance be measured and tracked?
- How can a transit agency assess its dispatch operation and use the resources in this guidebook to maximize productivity?

Approach and Methodology

To meet the research objectives that formed the basis for this guidebook, researchers conducted a survey to collect data from 42 rural and/or small urban Texas transit agencies that operate predominately, if not exclusively, as a demand response transit service. A database of survey responses served as a reference for selecting five case studies. The

survey gathered information regarding the agency's operational data, service area descriptions, revenue fleet data, service types, technology types, organizational mission, goals, and objectives. Transit agencies were categorized into four levels based on use of technology in service delivery as follows:

High
- Use scheduling software to optimize schedules and/or use driver manifests
- Use computer-aided dispatch
- Use mobile data computers and/or terminals

Medium high
- Use scheduling software to optimize schedules and/or use driver manifests
- Use computer-aided dispatch
- *Do not* use mobile data computers and/or terminals

Medium low
- Use scheduling software as a database to hold trip information but *do not* use to optimize schedules
- *May or may* not use computer-aided dispatch
- *Do not* use mobile data computers and/or terminals

Low
- *Do not* use scheduling software
- *Do not* use computer-aided dispatch
- *Do not* use mobile data computers and/or terminals

Case study selection considered technology category, type of service provided (percentage of medical transportation service), fleet size, annual passenger trips, density of population, service productivity, and future agency goals. Selected cases represented a cross-section of these transit agency characteristics.

Researchers visited the five case study transit agencies selected and three additional dispatch operations for general observation, including one metropolitan transit authority paratransit operation. Researchers collected data and materials during each visit, including data on:

- dispatcher roles and objectives;
- dispatch-driver policies and procedures;
- roles and responsibilities of the drivers, dispatchers, and patrons;
- training policies and requirements; and
- work flow levels and overall dispatch design.

Researchers interviewed transit managers and dispatch supervisors of the selected agencies and observed dispatch operations. The following is a sample of observed issues and challenges to dispatch in providing effective and efficient transit service:

- operating multiple transit programs with differing service requirements (i.e. Medical Transportation Program, Headstart programs, Area Agency on Aging, Mental Health Mental Retardation, etc.);
- operating without adequate policies and procedures that affect both dispatch productivity and service productivity (no-show, late cancellation, send backs, dwell time, advanced scheduling, subscription, dispatch backup, etc.);
- training staff to schedule/dispatch focusing on productivity;
- training (or retraining) staff to use existing technology fully (i.e. scheduling software, automated vehicle location systems, mapping tools);
- utilizing scheduling/dispatching software in large rural, multi-county service areas with varying population densities when that software appears geared toward

providing paratransit service under the Americans with Disabilities Act in urban, condensed-area settings; and
- collecting consistent high-quality dispatch/scheduling data and reporting that data in a way useful to making effective and efficient decisions.

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The results of the research efforts are documented in this guidebook.

Chapter 2. Productivity and Its Impact

With rising costs, limited state and local revenues, and growing service demand, many transit agencies are looking for ways to reduce costs and generate revenue. Transit agencies are increasing fares, cutting service, dipping into contingency funds, making administrative staff cuts, and deferring capital replacements.[2] Ensuring that the transit agencies are operating at optimum productivity levels may produce cost savings without having to make these tougher economic decisions.

What is demand response transportation?
Demand response transportation is a service of a transit agency that operates using a reservation system. Demand response service can apply to the general public or may be limited to specific eligible clients. Passengers call in advance to transit operators and request pick-up and drop-off at passenger-specified origins and destinations. The transit operators dispatch vehicles to pick up the passengers and transport them to their destinations. Dispatch is the control center of demand response transportation. In this guidebook, the term "dispatch" is used as a noun to refer to the dispatch control center, dispatch operation or dispatch office; and as a verb to refer to the act of dispatching vehicles.

Demand Response Dispatch Control Center

What is meant by the term productivity?
When referring to transit agencies, productivity is a measure of service effectiveness. Typically productivity is defined as the number of passenger trips per hour or mile that revenue vehicles handle ("revenue vehicle hour" or "revenue vehicle mile"). Passenger trips per revenue vehicle hour are often considered to be the most important measure of demand response transit productivity. "Productivity captures the ability of demand response transit systems to schedule and serve passenger trips with similar origins, destinations, and time parameters, using the least number of in-service vehicles and revenue hours."[3]

How can dispatch affect productivity?
A demand response dispatch center that is staffed effectively and uses technology to its full advantage is critical in responding proactively as service changes occur and in making sound routing decisions. Sound routing decisions result in improved productivity and cost-effective service delivery. A modest improvement in service productivity can have a strong impact on cost-effectiveness of the demand response transit service.

Increased productivity impacts resources and service in one of two ways:

- Decrease resources needed to provide service – Increasing the number of passengers carried per service hour means fewer service hours are needed to generate the same revenue, and thus fewer vehicle and driver resources are used.
- Increase the level of service using the same resources – Efficient use of resources can free up capacity for additional patrons to be scheduled into existing service hours, thus generating increased revenue without the need for additional resources.

Table 1 provides an example of a typical rural Texas transit agency that provides 125,000 passenger trips per year with 62,500 revenue hours at a cost of $2,250,000 annually. If this rural transit agency increases productivity by a modest 3% – for example, from 2.00 to 2.06 passengers per revenue hour – the impact would give the transit agency the following options:

- Save money: An increase in productivity from 2.00 to 2.06 passengers per revenue hour would allow the agency to achieve the same level of passenger trips (125,000) in 1,820 fewer service hours, saving $65,534 in operating costs (see Table 1, Scenario A). The operating cost per passenger trip would be reduced from $18.00 to $17.48.
- Serve more passengers: An increase in productivity from 2.00 to 2.06 passengers per revenue hour would allow the agency to increase annual passenger trips by 3,750 within the existing service hours of 62,500 and operating costs of $2,250,000 (see Table 1, Scenario B). The operating cost per passenger trip would be reduced from $18.00 to $17.48.

Table 1. Increased Productivity Scenarios

Scenario		Annual Revenue Hours	Annual Passenger Trips	Passengers per Revenue Hour	Operating Cost for Revenue Hours	Operating Cost per Passenger Trip
Existing Service and Productivity		62,500	125,000	2.00	$ 2,250,000	$ 18.00
A	Save Money	60,680	125,000	2.06	$ 2,184,466	$ 17.48
		(1,820)	-	0.06	$ (65,534)	$ (0.52)
B	Serve More Passengers	62,500	128,750	2.06	$ 2,250,000	$ 17.48
		-	3,750	0.06	-	$ (0.52)

Balancing Productivity with Service Quality

Increasing the number of persons scheduled per hour must be balanced with reasonable patron travel times and reasonable schedules that the drivers can achieve safely. A goal of maximizing productivity must be set at reasonable levels that consider the limits on passengers per hour caused by outside circumstances such as traffic, patrons not meeting the vehicle on time, boarding and wheelchair tie-down time, and drivers arriving at incorrect pick-up locations. Conversely, a goal of meeting tight on-time performance requirements – for example drivers required to arrive within five minutes of the scheduled pick-up - may reduce dispatching flexibility and hinder the ability of dispatchers to add trips effectively. Goals, objectives, policies/procedures, and service delivery strategies must be designed to provide a system that balances productivity with service quality.

Factors Influencing Transit Productivity

Transit Cooperative Research Program (TCRP) Report 124 discusses factors affecting demand response transit overall *performance* that are controllable or uncontrollable.[4] This guidebook focuses on the factors that specifically influence *productivity.* Transit agencies may or may not have control over these factors. Productivity is influenced by:

- environmental factors,
- service design factors,
- policies/procedures, and
- service delivery strategies.

Transit agencies have *minimal* control over **environmental factors** such as size and geography of the service area, population size and demographics, population density, roadway and sidewalk networks, major generators of service demand (e.g. proximal cities, hospitals, educational institutions), and the economy.[5]

Environmental factors are particularly challenging to most rural transit agencies in providing productive service. In Texas, the service area coverage of rural transit agencies averages 6,600 square miles, with one transit agency having a 44,000 square mile service area. Agencies that travel long distances to reach destinations or have low-density service areas and indirect routes must be creative to ensure productivity levels are reasonable and service demands can be met with available resources.

Transit agencies have *some* control over **service design factors** that influence productivity and can usually control what types of services to implement. Deciding to provide advanced response, same-day response, subscription service, feeder services, commuter service, or specific clientele services will impact productivity. Evaluating how particular types of demand response service will impact productivity and operational costs is important. For example, Medicare transportation service constraints may have a negative influence on productivity but a positive influence on revenues. Same-day response transit may have a negative influence on productivity due to the inability to group trips but may be viewed positively by the community.

Transit agencies have the *most* control over **policies and procedures**, and **service delivery strategies**. Choices in these areas have significant impact on a transit system's productivity.

Transit agencies can implement employee, passenger and agency related policies including:

- staffing,
- attendance,
- late cancellation and no-show,
- send back,
- dwell time/wait time and pick-up window,
- unscheduled change,
- refusal-to-transport,
- door-through-door, door-to-door or curb-to-curb service,
- advanced scheduling,
- will-call trips,
- wheelchair and mobility device standards,
- patron ride time,
- on-hold time and telephone queue,
- subscription, and
- communication/radio use.

Transit agencies can develop procedures to include:

- dispatcher backup and driver extra-board,
- reduction of no-shows and late cancellations,
- communications, and
- complaints,
- vehicle breakdown and accident.

Transit agencies can manage the delivery of service by defining:

- responsibilities and skills of the dispatcher/scheduler,
- setup of the dispatch office,
- staffing according to service needs (dispatch call volume, service demand),
- assignment of drivers to manifests and vehicles,
- vehicle schedules for backup and preventive maintenance,
- technology needs,
- responsibilities of patrons, and
- coordination of service.

Transit agencies can monitor the delivery of service by reviewing:

- passengers per hour by time of day, daily, monthly, and annually;
- average, minimum, and maximum wait time, dwell time, and ride time;
- number of cancellations and no-shows;
- individual driver productivity;
- dispatch decisions;
- late and missed trips;
- lost drivers;
- opportunities for grouped trips;
- amount of “slack” in the schedule;
- number of dispatch calls processed by time of day, average call time and average hold times; and
- fleet requirements and reliability.

Chapter 3. Establishing Dispatch Goals and Objectives

Understanding what factors are within the transit agency's control is important in establishing realistic goals and objectives. The goals of a demand response transit operation are often a balance of providing efficient and effective transit service while meeting acceptable safety and quality of service standards. A transit agency should establish goals and objectives that reflect the agency's priorities between these competing factors.

What are goals and objectives? Goals are broad statements that describe the desired results of actions. Goals should be based on research, reasonableness, and values of the community the agency serves. Objectives describe specific actions necessary to achieve goals. Objectives should be measurable so that the progress made toward achieving goals can be determined.

The transit agency as a whole will typically adopt broad organizational goals for reliable, effective, efficient, safe/secure, comfortable/clean, understandable, affordable transit service. The goals and objectives of the dispatch operation should reflect the agency's goals and objectives. Some aspects of high-productivity objectives for dispatch operation can negatively affect passenger ride times, on-time performance, operator assistance, and rider satisfaction, so balance among competing goals and objectives should be sought. Examples of dispatch operation goals and objectives are given below.

Dispatch Goals and Objectives Example

Goal #1 Effectiveness: Maximize service productivity through scheduling and dispatching strategies

Objectives:

- Achieve a productivity level of 2.0 passengers per revenue hour

Strategies:

- Identify slack in service by evaluating schedules
- Conduct dispatch staff training to fully utilize the scheduling system, and tests to determine knowledge retention of each system feature

Goal #2 Efficiency: Minimize driving time and miles to provide cost effective service

Objectives:

- Achieve cost per revenue mile of $2.40

Strategies:

- Monitor driver locations throughout the day to update schedules in real-time
- Sample pre-service and post-service manifests to identify opportunities for grouped/shared trips
- Monitor and review trip lengths and speeds, ensuring drivers are taking the most direct routes at reasonable speeds

Goal #3 Reliability: Passengers are picked up as close as possible to the scheduled pick-up time

Objectives:

- Achieve an on-time performance rate of 85%
- Dispatch hold times of less than 1.5 minutes

Strategies:

- Track drivers on-time performance and retrain drivers with late/lost patterns
- Assign staff to monitor hold times throughout the day

Goal #4 Quality: Passenger in-vehicle travel times are reasonable

Objectives:

- Achieve less than 0.5% of all trips with excessive travel times

Strategies:

- Track late trips and trips with excessive passenger travel times, documenting patterns and causes
- Categorize patron complaints to identify excessive wait and travel times

Goal #5 Safety and Courtesy: Service is provided in a safe and courteous manner

Objectives:

- Achieve no more than 0.5 accidents per 100,000 miles
- Achieve no more than 100 complaints per 100,000 passenger trips

Strategies:

- Send out daily safety messages to drivers encouraging drivers to focus on safety first
- Monitor complaints for each driver and retrain drivers with patterns of complaints

Summary

Establishing goals and objectives for dispatch that are based on improved productivity while reflecting the transit agency's overall goals and objectives is the first step to providing effective service. Goals and objectives will help the dispatch operation focus and will provide a vision for the service. Objectives should be measured and tracked by establishing performance measures and means of monitoring service. Performance measures and monitoring will be discussed in Chapter 6.

Chapter 4. Policies and Procedures Impacting Productivity

The ability to meet dispatch productivity goals and objectives is influenced by established transit agency policies, procedures, and service delivery strategies.

How is a policy different from a procedure?
A policy is a "statement that defines how an agency will respond to a given situation" and is a consistent guide for decision-making.[6] A policy should be consistent with the agency goals and objectives. A policy is effective if it provides for flexibility as well as consistency.

A procedure is a clearly defined set of steps implementing a policy. To be effective, a policy should be accompanied by a set of procedures. "Combined policies and procedures make clear who is responsible, what action should be taken and how to follow through."[7]

Education and consistent enforcement of policies and procedures are needed to ensure their positive impact on productivity. Policies should be written, communicated to the people affected by them, enforced, and reviewed regularly. Establishing written policies that are communicated to dispatchers, drivers, and patrons can help eliminate difficult situations and improve productivity.

Policies and procedures that affect transit productivity are included in this chapter. Other transit agency policies and procedures that do not directly impact productivity are not included.

Attendance Policies

An effective operation cannot be successful without the dispatch and driving staff being available for work at the specified time. Staff must be at work on-time when scheduled. Attendance policies include:

- tardiness,
- absences – excused and unexcused,
- vacations and holidays, and
- lunch and other breaks.

Dispatcher scheduling and attendance affect productivity. When dispatchers are not available, telephone queues rise, patrons may not be able to check on their trips or make cancellations, and drivers will not be able to inform dispatchers of service changes. When drivers are late for the first trip of the day, it will most likely have a ripple effect throughout the rest of the day's service. Dispatchers and drivers should be expected to return from scheduled breaks on time. A tardiness policy, which can also be extended to breaks and lunch breaks, should be established to hold staff accountable. Dispatchers should not be allowed to take simultaneous breaks that leave the dispatch office unattended.

Work-rule policies that impact productivity include:

- making and receiving personal phone calls,
- eating at the work station, and
- using cell phones.

Absenteeism Procedures - Dispatch Backup and Driver Extra-Board

Many transit agencies have backup staff that may be available on-call or as an "extra-board" during times that dispatchers and drivers have unscheduled absences. Backup staff is especially important during vehicle pull-out and peak service times. This backup staff helps ensure that trips remain on time when unscheduled absenteeism occurs. A backup system may utilize:

- cross-trained staff to transfer to the dispatch or driver position when absences occur,
- staff who are on-call at their homes and expected to report to duty to cover service when called, or
- extra staff scheduled to be on hand at the facility during morning vehicle pull-out to ensure on-time operation.

All of these options are likely to incur additional expense. The last option could involve significant additional cost for staffing. It is important to identify the optimal number of cross-trained, on-call, or backup staff needed. Unscheduled absenteeism rates should be documented throughout the year, and the average rate may be used to determine the number of backup staff needed on a daily basis. Some transit agencies guarantee extra-boards (backup drivers) at least two hours of pay to be at the bus garage during vehicle pull-out.

Late Cancellation and No-Show Policies

When a patron does not show up for a scheduled trip or cancels after it is too late to schedule another patron into the vacant time slot, the transit agency has essentially wasted the trip and resources. The no-show event may have a negative impact on on-time performance as the dispatcher spends time trying to find the patron, causing the driver to wait. Return trip no-shows pose an additional negative impact on productivity as the dispatcher may be forced to send a second vehicle to the location to pick up the rider later. These no-shows and late cancellations have a negative impact on productivity, are expensive, and should be minimized.

There are a variety of policies that discourage no-shows and late cancellations. All policies should define no-shows and late cancellations, determine what is considered an excessive number of events, and establish penalties for patrons who have excessive patterns of no-shows and late cancellations. A late cancellation may be defined by specifying a number of hours before pick-up time in which the patron must call to cancel. A threshold may be set for the number of allowable no-shows and late cancellations before that patron is suspended or terminated from service. One method that has proven successful is to call no-show or late patrons before infractions reach the penalty threshold to remind patrons of the policy and penalties. Letting patrons know that the transit agency is tracking their actions discourages abusive behavior. Many agencies have a progressive discipline policy for repeat-offender patrons; for example, they may begin with a verbal warning, advance to a written warning, then enforce a three-day or seven-day suspension, and finally move on to termination of service for that patron.

Outside of suspension and termination, other penalties can discourage habitual no-shows and late cancellations and incentives can encourage on-time behavior. Some penalties, incentives, or methods that increase on-time behavior include:

- fining or charging for no-shows or late cancellations,
- rewarding patrons without no-shows or late cancellations over a defined period of time with a free trip or other reward,
- requiring that patrons with a problem history confirm their trips with dispatch at a specified period of time (e.g., half hour) before the scheduled trip or the trip is canceled,
- contacting patrons with a problem history each night to confirm the next-day trip.[8]

Some circumstances that cause no-shows or late cancellations are beyond the control of the patron. These types of circumstances include:

- patron was ill or experienced a sudden emergency,
- patron had a mobility aid failure,
- patron could not get through on telephone lines,
- patron's transportation connection was late (intercity bus, airline),
- dispatcher did not record the cancellation,
- dispatcher recorded an incorrect pick-up location,
- dispatcher transmitted the wrong information regarding the cancellation, or
- driver canceled the wrong trip.

Because of such circumstances, many no-show and late cancellation policies and procedures include both a method for tracking the reason for the no-show and late cancellation along with a process for patron appeal.

TCRP Synthesis 60 conducted a survey of transit agencies with written no-show and late cancellation policies. For excessive no-shows, 90.2% of survey respondents stated their policies included suspensions, 20.3% reported their policies includes fines, and 7.3% reported that their policy did not include fines or suspensions for excessive no-shows (respondents could check more than one answer). For excessive late cancellations, 56.2% of the respondents said they include suspensions, 13.2% included fines, and 40.5% did not impose fines or suspensions for excessive late cancellations.[9]

The TCRP Synthesis 60 report indicates that of the 134 completed surveys in 36 states and the District of Columbia representing small, medium, and large transit agencies, the average passenger no-show rate reported is 2.9% of total passenger trips.[10]

TCRP Report 124 indicates that agencies that implemented and enforced no-show and late cancellation written policies decreased those rates (as a percentage of total trips) between 1% and 10% annually.[11] A reduction in no-shows and late cancellations can significantly improve productivity and service quality.

How does dispatch handle a patron's remaining trips after a patron is a no-show? What policies are in place? TCRP Synthesis 60 survey respondents indicated that after a no-show, 29.7% would leave the remaining trips on the schedule unless the patron called to cancel. Another 22.7% reported that the remaining trips would automatically be canceled. Almost 20% of the respondents made an attempt to contact the patron and would leave the trip on

the schedule if staff could not make contact, but 17.2% would attempt to contact the patron and would cancel trips if staff could not contact the patron. Transit agencies may monitor and determine which of these policies is most effective in their situations. Whichever policy an agency implements, it is important to be consistent so that all patrons are treated fairly.

Reservations and Cancellation Recording Procedures

Late cancellations and no-shows are not always the fault of the patron. Dispatchers and reservationists do make errors. To minimize these errors, procedures and forms for accurately and consistently recording reservations, cancellations, and no-shows should be developed. Staff should be trained and monitored in using them.

Reservations may be taken manually or through an automated scheduling system. If the transit agency records trips manually, a detailed trip reservation form should be used that includes all trip information needed. To insure proper recording of information, dispatchers/reservationists should record the information while the patron is on the phone and repeat the information back to the patron to confirm.

Changes and cancellations for same-day trips must be made immediately. For future trips (if the transit agency takes reservations in advance), changes or cancellations may be made at the time of the call or at a time convenient to the transit operation. An automated scheduling system will typically allow for more immediate changes to be made while the patron is on the phone.

For agencies that experience a large number of trip changes, instead of taking time to make the change to the schedule while the patron is on the phone, a trip change form may be used to record changes. These change requests may then be passed to a designated dispatcher responsible for making the changes and cancellations.

Changes to subscription/standing order trips may be documented on a designated form that allows a record of requested changes to subscription/standing order trips. This form not only serves to record the schedule change but also may be entered in the patron file to indicate the change was requested.

In transit agencies that require drivers to record information on paper manifests, a proper form to record trip changes or added trip information is needed. The driver should be instructed to record all information in full on the form. The dispatcher should give out the trip information in a standard sequence so that the driver is prepared to receive and record the information.

No-Show Procedures

In TCRP Synthesis 60, 91.1% of survey respondents indicated that in case of a no-show, "drivers are directed to contact dispatch, either for instructions or to confirm the passenger no-show, before they proceed."[12] Most are instructed to wait five minutes before contacting dispatch for assistance. Of those that require a dispatch confirmation, 15.3% instruct the driver to leave the vehicle to look for passengers while 4% indicated they leave a door hanger or card (see Figure 1). Of those survey respondents answering what procedure is taken for handling no-shows, 53.4% indicated dispatch would attempt to contact the patron before instructing the driver to declare the passenger a no-show.[13]

Staff responsible for monitoring and identifying no-shows may have related duties such as determining whether a no-show patron was at fault, investigating a location that is causing no-shows (difficult addresses or unclear entrances), mailing postcards or letters to patrons advising them of the apparent no-show, or attempting to contact patrons to verify a return trip for that day.[14] The key is to have a clear and effective procedure that is followed.

A procedure to call patrons who no-show on their first trip of the day may be implemented. The call would help to find out if there is a situation that may prevent the patron from traveling for a period of time. If the dispatcher cannot contact the patron, a decision may be made to cancel return trips for the day. The patron will eventually call if the return trip was needed, which gives the dispatcher the opportunity to remind the patron of the policy to cancel trips to prevent a no-show.

No-show procedures include steps to determine that a patron is a now-show, followed by steps to handle the no-show. Suggested procedures include:

Determining a no-show:

- Driver reports no-show to dispatcher and verifies the actual pick-up time and address to ensure correct information. Common address errors include recording incorrect endings such as “street,” “road,” “lane.”
- Dispatcher attempts to contact the patron via phone.
- Dispatcher verifies that the driver made an unsuccessful attempt to physically locate the patron.
- Driver waits five minutes after the scheduled pick-up time before the passenger is considered a no-show.

Handling a no-show:

- Dispatcher documents circumstances of the no-show event, recording arrival time, attempts to contact patron, and time the driver left.
- Driver leaves a “no-show door hanger” on the patron’s door.
- Dispatcher cancels patron’s remaining trips for that day.

Dwell Time/Wait Time and Pick-up Window Policies

Patrons who are not ready when the vehicle arrives impact the productivity of the system. Driver wait time or dwell time may be minimized by requiring patrons to be ready within a specified window of time such as 15 minutes in advance of a scheduled pick-up time. “The pick-up window is the time before and after a trip is scheduled that a passenger is expected to be ready to travel. Most agencies use some type of pick-up window to give schedulers and drivers some flexibility in the actual pick-up time and still be considered on time.”[15] The pick-up window allows flexibility in the schedule and helps ensure the patron is ready at the scheduled time. The most prevalent pick-up window is 15 minutes before to 15 minutes after the scheduled pick-up time. The most common required wait time reported is five minutes (75.8% of survey respondents).[16]

Patrons Awaiting Demand Response Vehicle

Patron education is the key to ensuring dwell times are minimized. Methods for patron education will be discussed further in Chapter 5.

Send Back Policies

A transit agency may consider implementing a policy concerning sending back vehicles for patrons who missed their trip connections. Sending back a vehicle will impact the productivity of the system, and some agencies have implemented policies that state that a driver will be sent back for a patron only if there is time available in the schedule. Other agencies have a policy of no send backs.

Unscheduled Change Policies

A written policy requiring dispatcher authorization to make a change in the drivers' schedules can prevent drivers from taking unscheduled patrons, changing the scheduled drop-off location, or leaving the most direct route without permission. Such an unscheduled change policy will help maintain productivity and may also assist drivers when dealing with patrons who are demanding schedule changes that impact other scheduled trips.

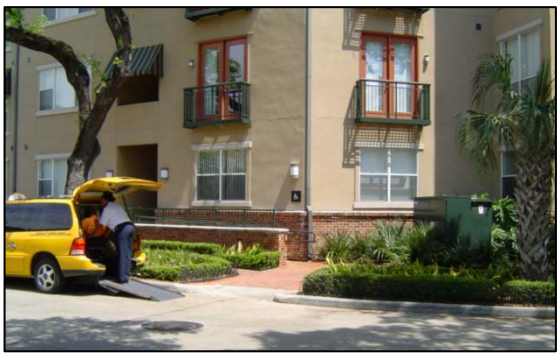
Refusal-to-Transport Policies

Refusing service may be necessary when safety is a concern. A patron refusal policy may provide a basis for action if a patron is disruptive or abusive or if the patron needs more assistance than the agency is authorized to give. Both situations impact the transit agency's productivity, as the driver must take extra time to deal with the situation when it occurs. Once a policy is in place, procedure guidelines should define inappropriate rider behaviors or circumstances, specify appropriate driver responses, and assign authority for refusal-to-transport decisions to individuals (driver, dispatcher, supervisor, etc.) or to a specified combination of personnel. These guidelines should contain flexibility that allows the authorized personnel to make appropriate applicable decisions in real-time.

Door-through-Door / Door-to-Door / Curb-to-Curb Service Policies

Agency policy must define levels of driver assistance and which assistance services the agency offers.

In door-through-door service, driver's can assist patrons through the doors of both locations. However, agency personnel typically are not permitted to enter a patron's home. In instances where there is a foyer or two sets of entrance/exit doors separated by a short hallway, the driver is usually allowed to assist the patron through both doors but is required to maintain visual contact with the vehicle at all times.



Curb-to-Curb Service – Patron Meets Vehicle at the Curb

Door-to-door service provides patrons with driver assistance from the exit door of origin to the vehicle. It also provides patrons with assistance from the vehicle to the entrance door of the destination.

Curb-to-curb service requires patrons to meet the vehicle at the curb. The driver will typically be required to provide assistance into and out of the vehicle.

TCRP Synthesis 60 reports that of the 120 respondents, 63% indicated that service is provided curb-to-curb, 51% indicated that service is provided door-to-door, and 7% indicated that service was provided door-through-door (or on a "common sense" basis).[17]

For transit agencies that also provide fixed route service, the Americans with Disabilities Act of 1990 (ADA) requires complementary paratransit service that is comparable to the fixed route. Since fixed route bus operators do not help riders into their homes or go into a residence to find a rider, any service provided by a paratransit operator beyond that of fixed route service is not mandatory.

The effect on productivity in providing door-through-door, door-to-door, or curb-to-curb service is not apparent. Comparing scheduling parameters between agencies, there is only a negligible difference between transit agencies providing door-through-door versus curb-to-curb service. Other policies could affect productivity such as dwell time, no-show, trip change and slack time policies. Research found that many transit agencies that stated they provide "curb-to-curb" service also indicated that they provide additional assistance to the door on a "common sense" basis. This finding may explain why productivity differences are negligible between those transit agencies providing curb-to-curb versus door-to-door service.

While research does not produce a clear measure of the productivity impacts of the three types of service, it is clear that ongoing education of patrons can have a positive impact on overall agency productivity. Agencies can improve patron response by educating and reminding riders:

- to be ready at the *start* of the scheduled pick-up window,
- to cancel trips in advance,
- to understand the no-show policy and consequences, and
- to understand fare payment policies.

Advanced Reservation Policies

Of 130 responses to the TCRP Synthesis 60 nation-wide survey[18], 12% accept reservations more than 14 days in advance, 43% accept reservations up to 14 days in advance, 25% accept reservations up to 7 days in advance, 9% up to 3 to 5 days in advance and 5% one day in advance.

By shortening the advanced reservation window – for example from 8 days in advance to 1 day in advance, agencies might see a reduced number of reservations for trips that are not definite. Shortening the advanced reservation window could also decrease no-shows because patrons would be less likely to forget their trips.

A trip that is canceled before the final reservation is printed into the driver manifest is referred to as an early cancellation. Studies show that reducing the advanced reservations window from a 7 day window to a 3 day window can reduce early cancellations between 1% and 4%. As a result, the number of calls relating to cancellations decreases.

How would shortening the advanced reservation window to 1 day in advance impact reservations and dispatch? A 1 day advance reservation window would:

- decrease the number of cancellation calls – patrons would not schedule many indefinite trips;
- increase the number of reservation calls – patrons could no longer make multiple day reservations; and
- decrease talk time for a reservation – patrons are making one day reservations only.

A comparison of the average call length and number of calls for a transit agency that takes 1 day advance reservations to an agency taking 8 day advance reservations indicates that moving to a 1 day advance scheduling system would decrease the talk time per call by 50% (1.68 minutes per call versus 3.14 minutes per call) but increase the number of reservation calls by 50%.[19] These findings imply that the real impact on dispatch and reservations moving to a 1 day advance reservation window would be in the decreased number of cancellation calls.

Will-Call Trip Policies

Will-call trips are trip reservations that are made the same day of service. Providing same-day service may be a means of improving productivity if dispatch has the ability to respond to requests. Mobile data terminals (MDTs) and automatic vehicle location (AVL) technology enable quick response to same-day trip needs (see Chapter 5 for further discussion of MDTs and AVLs). The inability to respond to same-day requests, quickly locate available vehicles, and have current information available regarding driver schedules can have a negative impact on productivity.

Some transit agencies have policies that patrons schedule only their first trip in advance, and the return trip is left as an open return for the same day of service. In those agencies, the patron calls when ready for the return trip, and the transit agency picks up the patron within a specified time from the call (e.g. one hour from the return request). In order to do this, the dispatchers must find an open return trip in the existing service scheduled or create an overtime run. Dispatch must be staffed appropriately to respond to open returns.

Open return policies may negatively impact productivity if dispatchers cannot respond quickly, as often dispatchers are given limited time to find a vehicle within the area and may miss the opportunity to group trips. Alternately, open returns may benefit a system, as often patrons do not know when they will actually be ready to return (from doctor's appointments for example) and an open return policy will prevent unanticipated changes to the schedule.

Wheelchair and Mobility Device Policies

Agencies should create policies concerning transporting non-common wheelchairs, scooters, wheelchairs without operable breaks, and other non-standard mobility devices. In addition, policies regarding maneuvering wheelchairs up or down steps as well as allowable weight when pushing or maneuvering wheelchairs should be considered. Service interruptions occur, affecting productivity, when a driver cannot transport a patron due to safety issues concerning the patron's mobility device.

Patron Ride Time Policies

Demand response public transportation is a shared ride service. Reasonable maximum patron ride times should be established based on trip lengths. Dispatchers and schedulers should have the ability to group trips while maintaining reasonable ride times. If the transit

agency promises unreasonably short patron ride times, this will result in essentially providing direct service, is not a wise use of the public vehicle, and will greatly reduce productivity. Table 2 provides an example of ride times based on trip lengths.

If a transit agency provides fixed-route service, ADA requires complementary demand response paratransit service to be provided. In this case, ride times must be comparable to travel time on the local fixed-route service. If a fixed-route trip takes 1 hour from pick-up to drop-off, then the complementary demand response service should take 1 hour or less.

Table 2. Ride Times by Trip Length Example

Trip Length (miles)	Maximum Ride Time (minutes)
0 to 1	35
1 to 2	37
2 to 3	41
3 to 4	53
4 to 5	55
5 to 6	62
6 to 7	65
7 to 8	67
8 to 9	69
9 to 10	71
10 to 11	73
11 to 12	76
12 to 13	78
13 to 14	80
14 to 15	82
15 to 16	84
16 to 17	86
17 to 18	88
18 to 19	89
19 to 20	90
20 to 21	92
21 to 22	94
22 to 23	97
23 to 24	101
24 to 25	105
25 to 26	109
26 to 27	113
27 to 28	116
28 to 29	120
29 to 30	126
30 to 50	130

Telephone Queue Time Policies

Answering patron calls in a timely fashion can impact productivity of the transit agency. Patrons calling to find out “where’s my ride” prompt the dispatcher to locate the driver and respond to late trip issues. Patrons may be calling to cancel trips or to let dispatch know they are ready to be picked up. Dispatchers can route drivers productively by responding to these calls immediately. Scheduling dispatch lunch breaks and dispatch shift changes to keep a sufficient level of dispatchers to answer calls will minimize the impact on patron queue times. Cross-training staff to cover for dispatch absenteeism is another method for staffing at adequate levels.

Transit agencies that provide ADA complementary paratransit demand response service are required to have queue times that do not limit the availability of service. Common standards for telephone measures include:[20]

- Abandoned Calls: 5% of total calls
- Average Queue (Hold) Times: 2 minutes

As transit systems grow, telephone capacity should be monitored. Enhanced use of the agency's staff to handle any period of extraordinary peaks or use of interactive voice response (IVR) systems are two options to consider in a growing transit system (IVR systems are discussed further in Chapter 5).

Subscription Policies

All demand response agencies provide some level of subscription service. Subscription service is prebooked service of recurring trips that does not require a reservation and is a type of advanced scheduling. Typically subscription service is provided for trips to work, work training, education, specialized medical care, or other regular travel needs. The amount of subscription service impacts the ability for the general public to utilize the transit system and impacts the workload of the dispatch and scheduling staff.

Subscription service improves productivity where large groups of patrons are traveling from the same origins or destinations (workshops for example) and where demand for trips is once or twice a day (not all day long). Subscription trips can be an effective backbone for the demand response service and provide the opportunity for grouping trips within the same geographical area to improve productivity.

Communication Policies

Communication policies ensure that communication can be established readily and effectively from the dispatcher to the driver. Not being able to communicate effectively prevents trips from being dispatched readily, affecting the overall productivity of the system.

Radio policies may include:

- Radios are to be turned on at all times during service hours.
- Drivers should not interrupt a conversation in progress unless an emergency (if the radio system allows all conversations to be heard).
- Passengers are not allowed to use the communication system.
- Profanity or unprofessional language is never to be used.
- Drivers must notify the dispatcher upon arrival and departure.
- Drivers must notify the dispatcher of delay of any type.

Each transit agency must set radio/communication system policies according to what is suitable for the operation.

Communication Procedures

Dispatch communication by the majority of transit agencies is accomplished via two-way radios and/or cellular phones. Some transit agencies may communicate through mobile data terminals (discussed further in Chapter 5). It is important that radio transmissions are kept as brief and professional as possible.

Professionalism should be maintained at all times. The dispatcher should communicate using the following conditions:

- Tone of voice – Keep an even tone of voice, avoiding sarcasm and impatient manner.
- Sensitive choice of words – Do not use words that are offensive. For example, do not use the words "old" and "crippled." Rather, use "passengers who are elderly" and "passengers who use cane/walker/wheelchair." Dispatchers and drivers should be trained in sensitivity. Use "persons who are" rather than using labels identifying the person first.
- Enunciation and pronunciation – Speak clearly and directly into the radio mike. Clearly enunciate numbers. 50 may sound like 15, 5 may sound like 9, and 7 may sound like 11. Be careful that dispatched addresses are correctly communicated.
- Do not rush – Rushing words does not save time, as it typically results in repeated communications. Speak slowly and steadily.
- Use proper terms – Be professional at all times. Use as few words as possible, avoiding slang or phrases such as "that's a big 10-4 buddy." Be courteous, using please and thank you.[21]

Codes

Communication codes are meant to streamline communication and prevent misunderstanding. Every transit operation should use at least the nine common radio codes shown in the following list, although there are over 100 code possibilities.

10-1	Driver will be out of vehicle temporarily
10-4	Message received, acknowledged, OK
10-5	Vehicle empty – ready for next passenger
10-6	Passenger loaded into vehicle
10-7	Driver out of service. Can be used by driver to request a few minutes for personal needs or by dispatcher/scheduler to have driver stand by if there is nothing to do for a short period
10-9	Repeat transmission again, not understood
10-10	Return to base or office
10-20	Location
ETA	Estimated time of arrival

Drivers should be assigned identification codes and identify themselves by their codes to save time in communication and ensure that the dispatcher is directing information to the correct driver.

Order of Dispatched Trip Information

When trip information is dispatched in the same order consistently, drivers will be prepared to listen for the trip information and for the order in which it is being dispatched. The order of trip information may include:

- driver identification code,
- time,
- address, and
- additional information (disability information, attendant).[22]

Vehicle Breakdown and Accident Policies

A vehicle that is out of service due to a breakdown or accident can be disruptive to service and affect productivity. A vehicle that is not able to transport patrons affects the productivity of the entire system and on-time performance, as trips must be shifted to other vehicles that may be at capacity. Policies and procedures must be established to minimize service interruptions.

A spare or backup vehicle should be available if at all possible to be dispatched in case of a vehicle breakdown or accident. If a transit agency does not have its own backup vehicle, an agency may consider establishing an arrangement with other agencies to backup service vehicles as needed.

To ensure that vehicle breakdowns and accidents are handled as quickly and efficiently as possible, procedures should be outlined and staff responsibilities should be defined. A vehicle breakdown and accident form should be available to ensure all information is recorded accurately and consistently. A vehicle breakdown policy and procedure should include:

- Information required to be recorded by the dispatcher:
  - Date and time
  - Location of the vehicle
  - Vehicle problem
  - Passengers on the vehicle
- Identities and responsibilities of decision makers and responding personnel:
  - Manager/coordinator
  - Dispatcher
  - Maintenance personnel
  - Driver
- Procedure for transporting passengers on board the vehicle:
  - Sending a backup vehicle
  - Calling passenger destinations to inform them of the delay
  - Identifying location where passengers will wait for replacement vehicle if needed[23]

Both vehicle breakdown and accident policies are important not only to minimize service interruptions but to ensure safety of the persons involved. Vehicle breakdown and accident policies should include:

- Vehicle procedures:
  - Decision whether the vehicle can be driven
  - If the vehicle can be driven, return the vehicle to the garage
  - If the vehicle must be towed, where and who tows
- Passenger procedures:
  - Offer to take passenger to hospital or doctor
  - Offer to take passenger home
  - Decision to take passenger to destination
- Injury procedures:
  - Call ambulance
  - Transport to hospital
  - Call family or destination to inform[24]

Accident policies should be carefully reviewed by legal staff to ensure legality.

Complaint Procedures

Complaint procedures should be put in place to ensure that the dispatch staff is not handling patron complaints while dispatching service. Patron complaints and commendations are an important tool in providing feedback regarding the quality of service and effectiveness of operations. Monitoring, tracking, and investigating complaints can provide valuable

information to manage the agency. Managers can resolve dispatch, driver, and patron issues quickly, provide retraining if needed, and/or implement disciplinary action.

In order to resolve complaints and capture both complaints and commendations, a procedure should be established for staff to follow. Some of the following suggestions to include in a complaint procedure are:

- Set up a separate telephone number that is staffed with a person trained in taking public comments. This will provide the patron with a sense of comfort that there will not be retaliation for the complaint and that he or she will not be shuttled from office to office.
- Publicize the number, address, and/or web site for passenger feedback.
- Develop a form to record complaints and commendations. The form should include space for both the patron's comments and the staff member's comments. The form should also include a space for the supervisor to record how the complaint was resolved.
- If a complaint is serious in nature, a supervisor should be designated to handle the complaint.
- The complaint procedure should establish a timeline for resolution of the complaint. A response should be provided to the patron within 3 to 5 working days.[25]

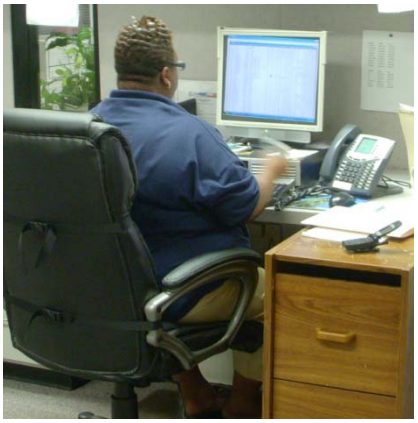
Not having a complaint procedure can impact dispatch productivity because patrons will often call the dispatch number to voice a complaint. Dispatchers should be focused on the delivery of the service, and a separate number for patrons to call will help ensure dispatchers are not removed from dispatch tasks.

Chapter 5. Service Delivery Strategies Impacting Productivity

Carrying out the delivery of demand response transportation is a team effort. Each team member must understand his or her responsibilities. The dispatcher, scheduler, reservationist, driver, and patron all must understand what is acceptable and expected. Communicating expectations and delineating responsibilities can be accomplished through well-written job descriptions and a rider's guide. Staff assigned to dispatch have the most impact on the transit agency productivity and should be focused on the responsibilities of the dispatch office.

Responsibilities and Skills of the Dispatcher/Scheduler

The dispatcher position is responsible for on-time delivery of service. The dispatchers handle patron and driver inquiries, cover for service interruptions, and reschedule patron trips due to lateness, ready early, or other schedule change requests. The dispatcher is responsible for all communications responding to passenger and driver requests, balancing vehicle and driver resources, and maintaining on-time performance while maximizing productivity. In order to maximize productivity while maintaining quality of service standards, the dispatcher/scheduler must be well organized. The dispatch office must have necessary information readily available, electronically or through posted information or a combination of both.



Dispatcher at Work

Depending on the size of the transit agency, dispatch/scheduler responsibilities may include:

- coordinating the transportation needs of passengers with the vehicles in service,
- dispatching trip requests to drivers so that drivers can arrive at the passenger pick-up address on time,
- acting as troubleshooter for driver problems,
- monitoring and updating driver and/or vehicle locations,
- monitoring late trips and proactively reassigning trips to maintain on-time performance,
- assisting passengers with trip changes or trip requests,
- checking on status of drivers,
- handling emergency situations,
- scheduling driver's work hours and lunch breaks, and
- summarizing statistical data including number of rides provided to wheelchair users, trip refusals, cancellations, and no-shows.[26]

To accomplish these duties, the dispatcher should have the following knowledge and skills:

- good knowledge of the service area,
- ability to handle large amounts of data,
- ability to remain calm and collected during an emergency,
- good organizational skills,

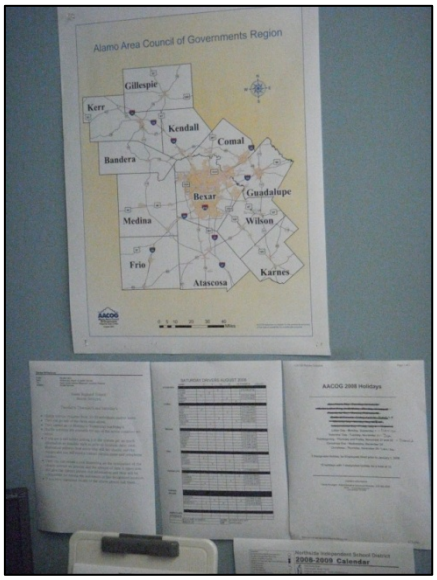
- good listening skills,
- empathetic attitude, and
- pleasant and articulate voice.[27]

Because the dispatcher is expected to juggle large amounts of information, constantly monitoring the system for issues, updating status of drivers and position of vehicles, and matching resources to passenger trip demands, the dispatcher must have an environment to maintain total concentration. Because dispatchers are expected to act as liaisons between passengers and the drivers, dispatcher responsibilities should be separate from driver supervision and patron complaint responsibilities.

Dispatch/Scheduling Office Setup

The dispatch office should be well organized and free from distractions. The following items are necessary for the dispatch operation to be successful:

- pens, pencils, pads of paper;
- wall clock and calendars;
- road maps;
- books delineating locations of major streets, buildings, and generators of service;
- map of the service area;
- fare payment structure;
- headset; and
- reliable communication system.[28]



Information

Dispatch Staffing by Call Volume

Staffing in dispatch can affect the productivity of the overall system. If patrons cannot get through to dispatch to cancel a trip, check on a driver, or let the dispatcher know the driver is late, the entire schedule for the day can be negatively affected. When drivers cannot get through to dispatch to help find a patron, authorize a no-show, help with directions, or call in a detour, the schedules are affected and dispatch cannot aid in finding resources to keep schedules on time and productive. Determining a staffing level that is cost-effective and provides quality of service can result in a highly productive transit system.

There are many ways to determine the optimal staffing levels of a dispatch area. The primary task of dispatchers is communicating with patrons and drivers. Dispatch communication may occur by radio, telephone, cell phone, or mobile data terminals/computers. Whatever the communication means, it is important to know how many calls are coming into and out of the dispatch area by time of day and the time needed to process each call. Call volumes and processing times are a fundamental information resource to use in determining dispatch staffing requirements.

Some transit agencies have phone systems that provide call statistical reports that may be printed on demand or at the end of a time period (day, week, and month). Other transit agencies have local phone companies that provide statistical reports on a periodic basis.

Still other transit agencies periodically manually record phone call information to provide statistics.

What call information is needed to determine staffing levels?
Staffing levels in dispatch should be determined to ensure calls are answered within reasonable queue times. Transit agencies will determine the appropriate queue times and may incorporate the queue time goal as part of the annual goals and objectives. Many phone systems will provide call information in a variety of formats. To determine staffing levels with reasonable queue times, at a minimum the number of calls answered and the average talk time per call is needed. Ideally the following information is needed in half-hour increments throughout the day:

- number of calls answered,
- average delay time before call is answered (queue times),
- number of abandoned calls (drops before dispatch answers),
- average hold time during call (dispatcher puts call on hold), and
- average talk time.

Dispatch, reservation, and patron service call statistics should be separated if possible. The separation of call statistics by call center helps to better understand the workloads by task type, find opportunities for cross utilization of staff, and determine quality of service goals.

Because many rural and small urban dispatchers are also reservationists, this section will discuss both reservation call volumes and dispatch call volumes in relation to determining staffing levels.

Table 3 illustrates a call report by time of day for the reservations call center. The Reservations Call Report illustrated in Table 3 includes calls taken from the time reservations open at 8:00 a.m. to the time reservations close at 3:00 p.m. Queue times and the number of abandoned calls at 8:00 a.m. are high, as many patrons are calling to make a reservation at the time the Call Center opens. From 8:00 to 8:30 a.m., 100 calls are answered with an average talk time per call of 1.26 minutes and an average hold time during call of 0.11 minutes. The hold time during the call is used by the reservationist to enter information into the scheduling system or research information. As discussed in Chapter 4, common queue time standards are 2 minutes and common abandoned call standards are 5% of all calls.

Table 3. Example of Reservations Call Report by Time of Day

Time of Day	Total Calls	Average Queue Time per Call (Min.)*	Number of Abandoned Calls	Average Hold Time during Call (Min.)	Average Talk Time per Call (Min.)
8:00	100	8.97	5	0.11	1.26
8:30	90	2.90	2	0.20	1.38
9:00	78	2.84	2	0.25	1.33
9:30	72	2.61	1	0.28	1.43
10:00	75	2.53	3	0.34	1.37
10:30	70	1.95	0	0.28	1.33
11:00	65	1.59	0	0.33	1.37
11:30	60	2.68	1	0.37	1.36
12:00	61	2.76	2	0.25	1.32
12:30	59	3.58	4	0.18	1.37
13:00	68	3.69	5	0.29	1.43
13:30	70	3.62	4	0.29	1.51
14:00	80	4.73	5	0.32	1.55
14:30	91	5.41	7	0.26	1.61
Total	**1,039**	**3.15**	**42**	**0.27**	**1.40**

*Avg. Queue Time Goal less than 2 minutes
Avg. does not include first half hour

How can this information be used to determine staffing levels?
Staffing levels may be determined by first calculating the amount of total time needed to process calls. In Table 4, the amount of time it takes to process an average call is a sum of the average talk time per call and the hold time during the call for the total shown in the column entitled Average Call Processing Time. The *total* time needed to process calls can be determined by multiplying average processing time per call by the total calls. In Table 4, the column entitled Total Call Processing Time shows the results of this calculation. For example, to calculate the total call processing time from 8:00 to 8:30 a.m., the total of calls answered (100) is multiplied by the average call processing time (1.37) for a total call processing time of 137 minutes.

The staffing level can be determined by dividing the Total Call Processing Time by the 30 minutes one person can work. For example, from 8:00 to 8:30 a.m. the total call processing time of 137 minutes is divided by 30 minutes for a staffing level of 5. In other words, it takes 5 staff members to answer the 100 incoming calls. Quality of service columns in Table 4 include Average Queue Time per Call and Number of Abandoned Calls.

If the queue time goal throughout the day is 2 minutes, the agency illustrated in Table 4 would have not met this goal for the majority of the day. The goal of 2 minutes is met only from 10:30 to 11:30. In addition, patrons are giving up on getting through the lines when queue times are high, as seen in the Number of Abandoned Calls. For a transit agency reservations manager, this may mean that more staff (and possibly more telephone lines) are needed to process calls to meet the quality of service queue time goals.

Table 4. Reservations Staffing Level Example

Time of Day	Total Calls	Average Queue Time per Call (Min.)*	Number of Abandoned Calls	Average Hold Time during Call (Min.)	Average Talk Time per Call (Min.)	Average Call Processing Time (Min.)	Total Call Processing Time (Min.)	Staffing Level based on Processing Time
8:00	100	8.97	5	0.11	1.26	1.37	137.08	4.57
8:30	90	2.90	2	0.20	1.38	1.58	142.00	4.73
9:00	78	2.84	2	0.25	1.33	1.57	122.63	4.09
9:30	72	2.61	1	0.28	1.43	1.71	122.80	4.09
10:00	75	2.53	3	0.34	1.37	1.71	128.44	4.28
10:30	70	1.95	0	0.28	1.33	1.61	112.88	3.76
11:00	65	1.59	0	0.33	1.37	1.70	110.77	3.69
11:30	60	2.68	1	0.37	1.36	1.73	103.67	3.46
12:00	61	2.76	2	0.25	1.32	1.56	95.23	3.17
12:30	59	3.58	4	0.18	1.37	1.54	90.96	3.03
13:00	68	3.69	5	0.29	1.43	1.71	116.45	3.88
13:30	70	3.62	4	0.29	1.51	1.79	125.61	4.19
14:00	80	4.73	5	0.32	1.55	1.86	149.11	4.97
14:30	91	5.41	7	0.26	1.61	1.87	169.74	5.66
Total	**1,039**	**3.15**	**42**	**0.27**	**1.40**	**1.67**	**1,727.37**	

*Avg. Queue Time Goal less than 2 minutes
Avg. does not include first half hour

Most agencies will expect a high queue average at the beginning of the day when reservations open. If the transit agency is at capacity, where demand for trips is equal to or greater than the supply of service, the number of reservation calls at the beginning of the day may be high and higher staffing levels may be needed at the beginning of the day to minimize queue times and abandoned calls. There may also be a rush at the end of the day when patrons are making last-minute reservations. Many agencies will cross-utilize staff or staff with part-time reservationists during peak call times.

Staffing levels for the dispatch function may also be determined in the same manner. For dispatch, the calls may be a combination of patron “where’s my ride” calls, driver telephone calls, driver radio calls, and driver mobile data computer calls. Table 5 illustrates how these types of calls can be combined.

Table 5. Dispatch Staffing Level Example

	Where's My Ride" Patron Cal			Driver Calls			Dispatch Summary			
Time of Day	Calls	Avg. Talk Time	Total Talk Time (min) Calls * Talk Time	Radio/ Phone Calls	Avg. Talk Time*	Total Talk Time (min) Calls * Talk Time	Total Calls	Avg. Talk Time	Total Talk Time (min.)	Staffing Level
6:00	24	1.02	24	38	1.25	164	62	3.03	188	6
6:30	27	1.08	29	38	1.25	164	65	2.97	193	6
7:00	36	1.26	45	52	1.25	223	88	3.05	268	9
7:30	37	1.40	52	52	1.25	223	89	3.09	275	9
8:00	43	1.44	62	59	1.25	253	102	3.08	314	10
8:30	45	1.56	70	59	1.25	253	104	3.10	323	11
9:00	45	1.64	74	61	1.25	264	106	3.18	337	11
9:30	43	1.71	74	61	1.25	264	104	3.24	337	11
10:00	43	1.51	65	60	1.25	259	103	3.15	324	11
10:30	39	1.63	63	60	1.25	259	99	3.26	323	11
11:00	39	1.55	61	60	1.25	260	99	3.24	321	11
11:30	39	1.54	60	60	1.25	260	99	3.24	320	11
12:00	42	1.47	62	57	1.25	247	99	3.12	309	10

This staffing level analysis may be used to:

- determine if existing staffing levels are too high or too low,
- determine if quality of service levels change by time of day – during shift changes or during service peaks, and
- justify annual budgets.

Other Dispatch Staffing Considerations

Outside of calls from the patrons and drivers, dispatchers may perform other important tasks that require additional staff hours. Proactively monitoring for trips that are running late and monitoring available time in driver manifests can increase productivity.

Monitoring and Adjusting for Late Trips

Some agencies dedicate a dispatcher to monitor late trips and reroute to other vehicles to maintain productivity and on-time performance. Proactive problem solving enables transit agencies to increase productivity. Patron wait times are decreased because dispatchers proactively check for trouble and reroute if needed. Troubleshooting also decreases “where’s my ride” calls into the dispatch office, releasing that time for other dispatch tasks.

Monitoring and Using Slack Time

Transit system “slack time” is a term commonly used by the demand response industry to identify gaps in a driver manifest or schedule. Usable slack may be a specified time period such as 20 minutes of consecutive time in a driver’s schedule that could be used for an additional trip. Transit agencies sometimes sample average weekdays to determine the amount of usable slack. Table 6 illustrates an example of the average amount of usable slack by hour in a weekday schedule. In this example, there is enough slack in the system, time periods of over 20 minutes in consecutive time, to accommodate 42 trips.

Table 6. Usable Slack

Time Range	Usable Slack (over 20 min.)	Possible Trips to Schedule into Slack
06:00-07:00	16	1
07:00-08:00	36	2
08:00-09:00	73	3
09:00-10:00	37	2
10:00-11:00	48	2
11:00-12:00	85	4
12:00-13:00	101	5
13:00-14:00	22	1
14:00-15:00	61	3
15:00-16:00	62	3
16:00-17:00	67	3
17:00-18:00	76	4
18:00-19:00	61	3
19:00-20:00	24	1
20:00-21:00	61	3
21:00-22:00	10	1
22:00-23:00	31	1
Total		**42**

Transit agencies must staff dispatch centers adequately to take advantage of slack caused by cancellations and other changes in driver schedules. Staff can monitor extra capacity in the system in real-time to utilize the slack time in the schedule – for example, for a cancellation and non-traveled leg of a no-show. The ability to accommodate 20 to 40 additional trips within the existing service can significantly impact productivity. To monitor slack and make use of time slots, a dispatcher may be assigned to this specifically as part of his/her job tasks.

TCRP Synthesis 60 survey indicates that of those agencies that actively pursue the use of slack time, dispatch uses the slack time as follows:

- reassigning trips or allowing drivers to catch up (55%),
- using time for will-calls, same-day service, wait list trips, or unscheduled trips (29%),
- taking breaks, reassigning patrons from taxi service, assisting other services in system (11%), or
- using late cancellation time (but not no-show time) to reassign trips (5%).[29]

The TCRP Synthesis 60 report indicates that one agency performs a second batch of routing at 11 a.m. every day after the majority of no-shows and cancellations occur to capture slack in the system.

As dispatch is the most influential area in controlling the productivity of the entire service (and therefore in controlling costs), management oversight focused on dispatch results during the day of service delivery, rather than on the prior day's scheduling, is advised. Dispatch supervision will allow better real-time decisions to control productivity on existing demand response service.

Driver and Vehicle Scheduling

In small agencies, the dispatch and/or scheduling staff may be responsible for creating driver schedules, assigning drivers to manifests and vehicles, and determining vehicle fleet needs. Determining the number of drivers and vehicles needed to cover service adequately by time of day is needed to provide for a cost-effective and productive system.

Driver Scheduling Based on Service Demand

Most agencies have peak times of service. Unless service demands do not fluctuate throughout the day, a combination of full-time and part-time drivers is most cost-effective. Driver schedules should be based on the service demand throughout the day. If service demand is low during certain times of day, staffing with part-time drivers during these times may be more productive than other arrangements. Transit agencies may monitor the productivity or number of passengers carried per hour of service for each driver manifest to determine if each manifest is at its peak productivity level.

Table 7 illustrates the average number of passengers carried daily for a small transit agency with 10 vehicles in service at the peak demand period. In the first hour of service there are four vehicles in service that carry three passengers, for a productivity of 0.8 passengers per hour average for all four vehicles. Vehicle 1 carried 59 passengers during the entire day for a productivity average of 3.1 passengers per hour. Table 7 may be helpful in determining if the number of vehicles might be reduced during a particular time of day or if all vehicles are maximized. Table 7 does not tell us the origins and destinations of the vehicles. Although a vehicle may appear to be unproductive, it may be reasonable if the vehicle is traveling long distances or in a different geographic area than other vehicles. This table is a tool that may be used in combination with the knowledge of transit agency staff to help maximize productivity.

Table 7. Passengers per Vehicle by Time of Day

	Vehicle Number										Total	Avg. Productivity
Time of Day	1	2	3	4	5	6	7	8	9	10	Passgrs.	per Manifest
5:00 to 5:59	1	1	0	1							3	0.8
6:00 to 6:59	1	1	1	1	1	1	1	1	1		9	1.0
7:00 to 7:59	2	1	0	1	2	2	1	0	1		10	1.1
8:00 to 8:59	3	3	1	0	1	3	3	1	0	1	16	1.6
9:00 to 9:59	6	4	3	5	3	6	4	3	5	3	42	4.2
10:00 to 10:59	5	3	4	5	3	5	3	4	5	3	40	4.0
11:00 to 11:59	4	5	2	4	4	4	5	2	4	4	38	3.8
12:00 to 12:59	3	2	3	3	3	3	2	3	3	3	28	2.8
13:00 to 13:59	4	2	4	2	2	2	4	2	2		24	2.7
14:00 to 14:59	3	2	4	2	1	3	2	4	2	1	24	2.4
15:00 to 15:59	4	5	2	1	2	4	5	2	1	2	28	2.8
16:00 to 16:59	4	5	1	2	3	4	5	1	2	3	30	3.0
17:00 to 17:59	3	4	1	2	2	3	4	1	2	2	24	2.4
18:00 to 18:59	6	8	4	5	4	6	8	4	5		50	5.6
19:00 to 19:59	4	3	3								10	3.3
20:00 to 20:59	2	1	1								4	1.3
21:00 to 21:59	1	1	1								3	1.0
22:00 to 22:59	1	0	1								2	0.7
23:00 to 23:59	2	1									3	1.5
Total Passengers	**59**	**52**	**36**	**34**	**31**	**46**	**47**	**28**	**33**	**22**	**388**	**3.9**
Productivity per Manifest	**3**	**3**	**2**	**2**	**2**	**4**	**4**	**2**	**3**	**2**		

As a less time-consuming tool, the calculation of the overall system productivity (passenger per revenue hour) rather than by time of day by vehicle is useful in monitoring trends and understanding patterns that can help fine tune service.

Understanding expected demand based on trip demand and then scheduling the appropriate amount of service is essential in managing service productivity. Service can be adjusted by day of the week, time of year, holiday, or weather conditions. If same-day cancellations are greater on a particular day of the week, for example, the number of drivers might be adjusted or the length of the manifests might be changed. Productivity can be managed at its fullest by monitoring trends and patterns.

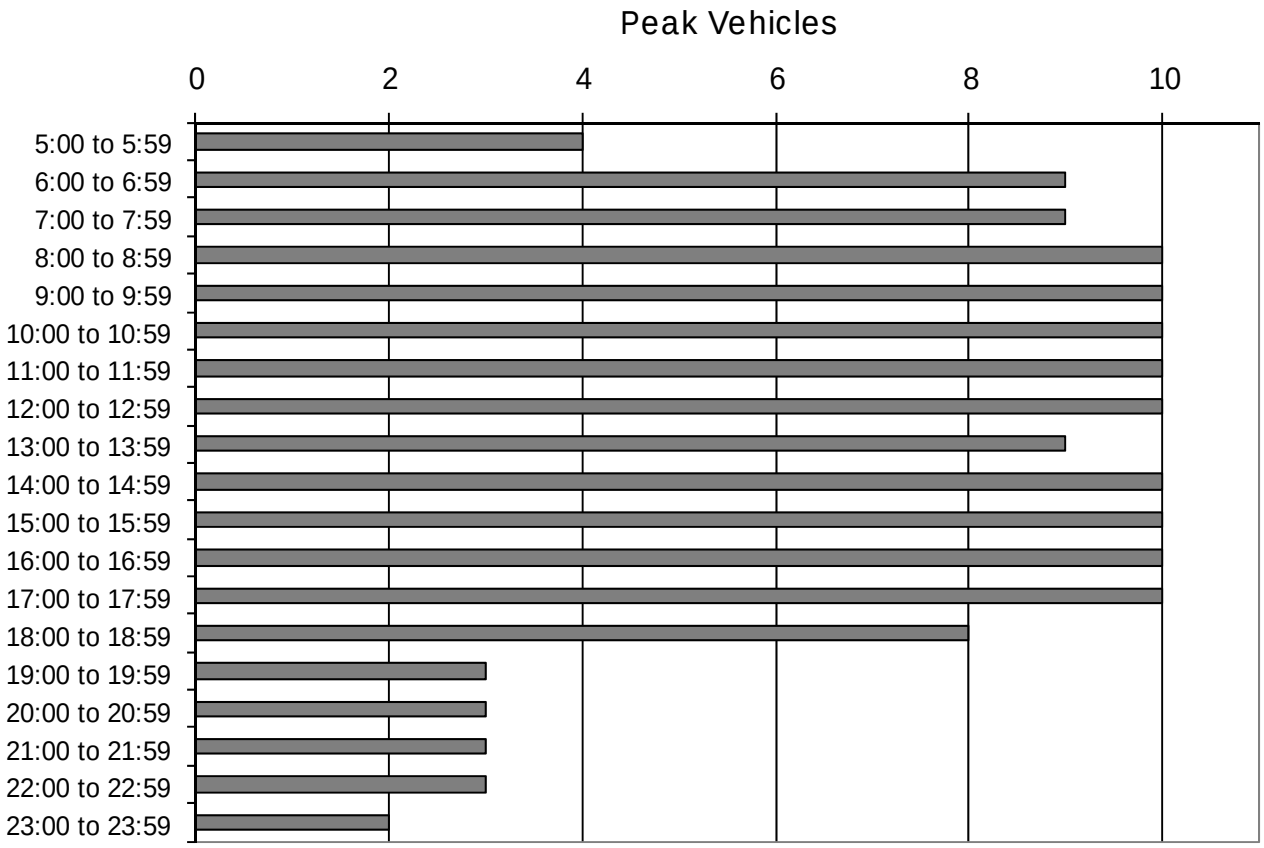
Assigning Drivers to Daily Manifests and Vehicles
Dispatchers in smaller agencies may be responsible for assigning drivers to manifests and vehicles. If possible, assigning the same driver to the same manifest daily is preferable, as drivers become familiar with both routing and patrons. Familiarity with routes and patron needs can lead to increased productivity. Drivers know the most direct and quickest route to take. Drivers will be familiar with the assistance needs of individuals. If possible, assigning the same drivers to the same vehicle is preferable, as drivers become familiar with vehicle maintenance issues. Where there is a variety of vehicle types, drivers become familiar with differing lift and wheelchair tie-down equipment. Drivers who are familiar with their vehicles may catch maintenance issues before service interruptions occur.

Scheduling Vehicles for Adequate Maintenance and Backup
When scheduling vehicles, time needed for scheduled preventive maintenance should be considered. Ideally the transit agency would have a number of spare vehicles, vehicles not assigned to service, that can be used for backup when regularly scheduled vehicles need repair.

Spare vehicles are determined based on a percentage of peak vehicles in use during the day. For example, Figure 1 illustrates a transit agency that has a peak vehicle count of 10. The maximum number of vehicles in service at any given time during the day is 10 vehicles. A spare ratio of 10% is calculated by multiplying 10 times 1.10 for a total of 11 vehicles needed to deliver service – 10 in service at the peak with 1 spare vehicle. An 18% spare ratio is typical of large agencies but may not be applicable to small transit agencies. Small transit agencies may determine the number of spare vehicles needed by estimating the number of vehicles scheduled for preventive maintenance inspections and the number of vehicle breakdowns.

Demand Response Vehicle

Figure 1. Peak Vehicles by Time of Day



Technology

There are a variety of technologies used to enhance demand response service and increase productivity. Table 8 lists the major technology tools used in demand response service and the functions they serve.

Table 8. Major Demand Response Transit Service Technologies

Technology Tool	Function
Automated Scheduling and Routing Software	Automatically routes and schedules transit services. For a demand response system, expedites call taking; automatically schedules trips and routes vehicles; collects and maintains client, service, and vehicle data; generates driver manifests; and generates standard and customized reports. This information can be used to improve overall system efficiency and productivity to manage and operate transit services.
Automated Vehicle Location System (AVL)	Measures real-time position of transit vehicles using onboard computers and positioning systems such as a global positioning system (GPS) or signposts. Relays information to a central location such as a dispatch center. This information can be used to track vehicle location and can improve scheduling and dispatching to increase productivity.

Technology Tool	Function
Communications equipment	Provides voice and/or digital communication among vehicles and between vehicles and the base station or central dispatch center. Communication may be by radio, cell phone, or mobile data terminal.
Computer-Assisted Scheduling and Dispatch (CASD) for Demand Response Transit	For a demand response agency, expedites call taking; collects and maintains client, service, and vehicle data; generates driver manifests; and generates standard and customized reports. Requires manual scheduling of trips and assignment of vehicles. This information can be used to improve efficiency and productivity in patron service, scheduling, and administration.
Electronic Payment System	Enables passengers to pay for transportation services with electronic fare media. This includes automated fare payment systems such as bar codes, magnetic stripe cards, and Smart Cards. Electronic payment systems may improve patron service and convenience and assist transit managers in reporting and collecting fare revenues efficiently.
Geographic Information System (GIS)	Computerized data management system in which databases are related to one another using a common set of location coordinates. GIS is used by dispatchers to display fleet and route data on a display map on a computer screen.
Interactive Voice Response (IVR)	Automates interaction with telephone callers. Historically, IVR solutions have used prerecorded voice prompts and menus to present information and options to callers, and touch-tone telephone keypad entry to gather responses. IVR solutions enable transit users to retrieve information about routes, schedules, and more from any telephone. Additionally, IVR solutions are increasingly used for demand response transit to place outbound calls such as reminders of a scheduled trip.
Internet Web Site	Allows personal computer users to request service and display transit service information such as trip requests, route schedules, maps and policies.
Vehicle Management Information System (VMIS)	Electronically processes, stores, and reports detailed vehicle maintenance and repair data, including parts and supplies inventories, and may also track fuel. Generates standard and customized reports. This information can be used to monitor vehicle preventive maintenance accountability.
Mobile Data Terminal (MDT) or Mobile Data Computer (MDC)	Serves as the information link between the control or dispatch center and driver to relay relevant information such as driver, route, trip information, and rider information. Electronically stores and updates vehicle schedules (driver manifests). This can be mounted in a vehicle or can be a hand-held personal electronic device. The terms for MDT and MDC are often used interchangeably; however, an MDT may be used to refer to a terminal where data can be received and acknowledged only. An MDC typically refers to a device where important information can be sent as well as received.

The most commonly used demand response technology applications are computer-assisted scheduling and dispatching (CASD) (79.2%), automatic vehicle locators (AVL) (28.0%) and mobile data terminals/computers (MDTs/MDCs) (27.2%).[30]

Computer-Assisted Scheduling and Dispatching

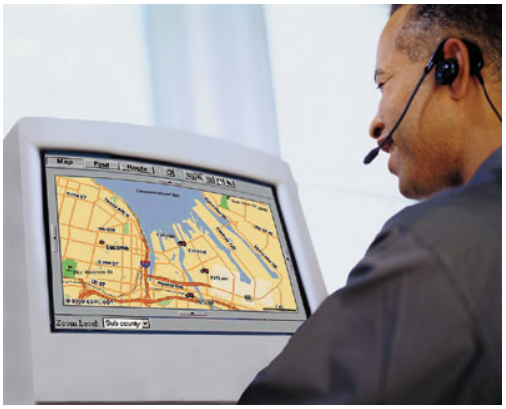
TCRP Report 124 researched 35 small urban, large urban, and largest urban demand response transit agencies around the country. Rural agencies were excluded from the research. Most agencies studied in the research had used computer-assisted scheduling and dispatching (CASD) technology for a period of time, with a few recently implementing the technology. The following improvements were cited in implementing CASD:

- More realistic and accurate scheduling – Knowing what is already scheduled; staff can immediately see what is reserved and determine if a new trip request can be scheduled.
- Improved accuracy of driver manifests – Trips are entered into the computer, aided by drop-down menus and trip history files for routine and repeat trips. Staff are less likely to schedule the wrong address because common destinations are in the agency's database.
- Improved on-time performance – More accurate and realistic driver manifests result in more trips being completed on time.
- Impact on productivity – Tighter scheduling on driver manifests increases service productivity. [31]

Demand response agencies do not always utilize the CASD technology to its fullest potential. Research for this guidebook found that many transit agencies have had staff turnover and have lost staff experienced and trained on CASD. Other transit agencies report that there was not proper follow through with training sessions after the CASD system was purchased, staff need refresher training, or staff did not fully understand initial training and do not use all of the system features.

Automatic Vehicle Locators (AVL)

AVL systems are valuable for finding the closest vehicle to a waiting patron so that a trip can be assigned efficiently. AVLs are also valuable in providing accurate information to dispatch in locating drivers and giving feedback to waiting patrons. One agency indicated that before they installed the AVL system, drivers would typically respond that they were "five minutes away." Productivity was increased by tracking a driver's actual location. Capturing the locations of drivers is helpful in determining whether the driver is in the right place when calling in a no-show request.



Dispatcher Viewing Automatic Vehicle Locator
Source: www.vehiclelocationagencies.com

Mobile Data Terminals/Computers (MDT/MDC)

With the implementation of MDTs, MDCs and AVLs, there may be an opportunity to free some of the dispatch time spent on "where's my ride" calls and to spend more time on same-day routing functions. MDTs allow trips to be transmitted to drivers electronically without the use of paper manifests. This enables dispatchers to make changes throughout the day and utilize excess capacity (slack) with more flexibility.

TCRP Report 124 cited the following improvements in implementing AVL and MDT/MDC technology:


Driver Viewing Mobile Data Computer

- Increased on-time performance – Dispatchers can respond to timeliness issues, making adjustments to the schedule to better manage on-time performance.
- Real-time trip management – Dispatchers can effectively insert new trips into a driver's manifest, move trips from one manifest to another, and make other real-time revisions to driver manifests.
- Accurate response to "where's my ride" calls – Dispatch staff can determine where a particular vehicle is and when it should arrive at the scheduled location.
- Dispersed duties – Other staff (reservationists) can take "where's my ride" calls rather than dispatchers, allowing dispatchers to focus on higher-level responsibilities.
- Decreased no-show complaints – The AVL system can store data that can be used to determine if a vehicle was at a particular location at the scheduled time.
- Improved monitoring of drivers – Operators that may be off-route, pass up a trip, or make unscheduled stops can be monitored and held accountable.
- Improved productivity – all of the above improvements increase transit service productivity.[32]

Other Mapping Solutions

Several of the transit agencies studied in this research utilize simple map overlays of the service area map and fixed-route system. This allows the agency to enter and locate a patron address, to identify what vehicles are closest, and/or if the patron may be able to utilize the fixed-route system.

In-vehicle mapping technology provides directions to addresses and may also provide traffic condition information to aid in routing to patron locations.

On-line free mapping resources are utilized by many small transit agencies to aid dispatchers and drivers in finding addresses and providing directions.

Interactive Voice Response

Decreasing dispatch time in handling patron calls allows dispatchers to shift their time to monitoring schedules for problem trips to maintain productive schedules and good on-time performance. IVR technology allows patrons to use the keypad of a touch-tone telephone to communicate with the computer's database for activities such as scheduling or canceling a trip and checking scheduled pick-up times.[33] Users of IVR report reductions in telephone hold times into dispatch. Transit agencies must offer an equivalent opportunity to perform the same functions for persons who cannot use the IVR technology (e.g., persons who are deaf).

Patron Responsibilities

Education of patrons on an ongoing basis is important in providing effective transit service. Well-educated and knowledgeable patrons can contribute significantly to a properly functioning system, easing the job of driver and dispatch and reducing patron complaints.[34]

Patron education programs may be implemented using a variety of means including rider guides, letters, flyers, brochures, and telephone queue recordings. Information may include:

- methods for paying the fare,
- ways to cancel rides in advance,
- definition of the pick-up window
- need for being ready at the start of the pick-up window, and
- instructions for shared-ride service.

In educating patrons, emphasize to patrons that a productive transit system requires the cooperation of dispatchers, drivers and patrons working as a team.

Coordination of Service

Demand-response transit agencies can coordinate with other transit or community-based agencies to utilize vehicle resources during times of day or areas where service demand is low. Rural transit agencies often travel long distances to locations, so grouping trips is difficult. Creating partnerships with other agencies can increase vehicle productivity and may have the additional benefit of providing new or additional resources to remote or underserved service areas. Dispatchers can work with other agencies to utilize the driver and vehicle slack time.

Chapter 6. Dispatch Performance Measurement

How can a transit agency monitor dispatch performance to ensure productivity is maximized and service quality standards are met? The first step in determining performance is to understand what data to collect and how to measure and track it. Once a system is in place to routinely collect data and measure performance, resulting information can be a powerful tool in evaluating service levels and identifying issues.

Most data needed to calculate performance is readily available and can be collected from the driver manifest or the automated scheduling system after service is performed. The following data are recommended for collection:

- passenger trips (boardings),
- revenue hours,
- revenue miles,
- on-time performance,
- missed trips,
- late trips,
- excessive ride times,
- no shows/late cancellations,
- denied reservations,
- accidents,
- roadcalls /service interruptions,
- patron complaints,
- calls into each call center (dispatch, reservations, patron service), and
- operating expenditures.

Data collection does not require a computer system, although spreadsheet software is helpful. A standard form that incorporates these data elements may be developed by the transit agency and utilized to record data on a monthly basis. Requiring vehicle operators to turn in manifest information *daily* is highly recommended. In this way, information may be checked for accuracy while it is still fresh in the memories of the operators and dispatchers as questions arise.

Productivity Measures

Productivity is calculated as passenger trips per revenue hour or revenue mile. For demand response service, passenger trips per revenue hour serves as an effective productivity measure. Productivity may be calculated using functional blocks such as by month, by driver, by service type, by day of week, by season, or by holiday. The dispatch operation can analyze performance of drivers and service and the productivity of the dispatcher/scheduler. The following sections provide examples of productivity calculations by various blocks.

Productivity by Driver

Table 9. Productivity by Driver Example

Driver	Revenue Hours	Passenger Trips	Productivity
Driver A	19.0	59	3.1
Driver B	18.0	30	1.7
Driver C	13.0	31	2.4
Driver D	13.0	47	3.6

In this table, productivity results from the number of passenger trips divided by the number of revenue hours. Productivity for Driver B appears to be by comparison very low and may need further investigation to determine the cause(s). Driver B may have been scheduled to pick up patrons in distant locations lowering productivity. Productivity will vary from day to day and is affected by a variety of factors both within and outside the control of the driver including:

- vehicle breakdowns,
- ill patrons,
- no-shows,
- dispatcher decisions,
- driver route decisions,
- lost drivers,
- drivers not remaining in communication with dispatch (disappearing),
- roadway conditions, and
- long distances between trips.

Manifest productivity should be measured over a period of time to determine if the dispatcher can aid the driver in being more productive, if retraining is needed, or if the schedule can be revised to increase productivity.

Productivity by Day of Week

Table 10. Productivity by Day of Week Example

Driver D	13.00	47.00	3.6
	63.00	167.00	

Day of Week	Revenue Hours	Passenger Trips	Productivity
Monday	60.0	167	2.8
Tuesday	60.0	170	2.8
Wednesday	60.0	180	3.0
Thursday	60.0	165	2.8
Friday	60.0	150	2.5
Saturday	60.0	115	1.9
Sunday	60.0	120	2.0

Evaluating productivity is helpful by day of week to determine if demands for service fluctuate. Typically weekend service demand is lower than weekday service demand. Table 10 illustrates that transit revenue hours are the same for each day of the week but

demand is lower on the weekend. This is reflected in lower productivity on the weekend. In this case, adjusting service hours to demand would likely increase productivity.

Productivity by Month

Table 11. Productivity by Month Example

Month	Revenue Hours	Passenger Trips	Productivity
January	1860.0	4429	2.4
February	1680.0	3800	2.3
March	1860.0	4725	2.5
April	1800.0	4573	2.5
May	1860.0	4725	2.5
June	1800.0	3429	1.9
July	1860.0	3543	1.9
August	1860.0	3764	2.0
September	1800.0	4573	2.5
October	1860.0	4871	2.6
November	1800.0	3857	2.1
December	1860.0	3764	2.0

Productivity levels may fluctuate by month. Ridership typically drops in the summer months unless the agency services summer tourists. Table 11 shows an example of productivity calculations by month. Service hours should be adjusted to meet demand, increasing productivity and saving money.

Many agencies will decrease the amount of service the day before predicted inclement weather. These reductions can improve productivity and result in significant annual cost savings.

Productivity by Service Type

Table 12. Productivity by Service Type Example

Service	Revenue Hours	Passenger Trips	Productivity
General Public	1300.0	2635	2.0
Medicare	600.0	940	1.6
Worksource	40.0	95	2.4
JARC	40.0	95	2.4
Total	**1940.0**	**3670**	**1.9**

Analyzing productivity by service type is helpful in determining which service may be affecting productivity levels. This analysis may help the dispatch staff to modify unproductive services where possible to gain productivity. Table 12 demonstrates an analysis of typical service areas. In this case, Medicare service has a low productivity level by comparison; this transit service would need to further analyze if there are improvements in policies or procedures that could raise this number.

On-Time Performance

On-time performance definitions vary across transit agencies. The majority of transit agencies define on-time performance within the following three criteria shown as on-time performance industry standards[20]:

- 20 minute pick-up window may be defined as -10 to +10 minutes, -5 to +15 minutes, or 0 to +20 minutes;
- 30 minute pick-up window may be defined as -15 to+15 minutes or -10 to +20 minutes;
- 20 minute drop-off window may be defined as 0 to +20 minutes .

Dispatch flexibility is enhanced as the on-time performance window increases. Larger on-time performance allows dispatchers additional time to fit in un-routed trips and open returns to avoid costly overtime runs.

On-time performance can be calculated manually if drivers record actual pick-up times for each trip on the manifest. In computer-assisted scheduling and dispatching systems, the driver is responsible for providing accurate pick-up times to the dispatcher who updates the system. If the transit agency utilizes mobile data computers, then the pick-up time is recorded when the driver depresses the arrival button on the equipment.

Recording on-time performance in time brackets allows easy analysis, as illustrated in Table 13.

Table 13. On-Time Performance Calculation Example

Category	Trips	% of Trips
On-time	1200	81%
16 - 30 minutes late	225	15%
31 to 60 minutes late	45	3%
Over 60 minutes late	10	1%
Total	**1480**	**100%**

Further analyzing on-time performance by driver, by time of day, or by specified time period. Calculating on-time performance by time of day may aid dispatchers and schedulers in scheduling trips more effectively. Calculating on-time performance by driver may aid in determining routing issues for a particular manifest or driver retraining needs.

Service Interruptions

Service interruptions may cause trips to be reassigned to spare vehicles or other vehicles in service or they may cause patrons to miss appointments. Service interruptions occur for a variety of reasons both preventable and unpreventable. Tracking appropriate service interruption data can aid in identifying and correcting preventable service interruptions and minimizing the impact on service by unpreventable interruptions. Tracking service interruptions is a task that can be accomplished through the dispatch office notes.

Dispatch notes can be recorded manually or electronically. Categorizing service interruptions is helpful in identifying and addressing problem areas that affect productivity and service quality in a timely manner. Some agencies code service interruptions by category as shown in Table 14. Computer-assisted scheduling and dispatching systems often provide code and/or comment fields that can be used to record service interruption data.

Table 14. Service Interruption Categories

Service Interruption Reasons
Late Pullout - No Vehicle
Late Pullout - No Operator
Late Pullout - Misc.
Late (time)
Late (lost)
No Operator Available
Vehicle Breakdown
Accident
Overlooked/Passed Up
Picked Up Wrong Patron
Ill Patron
No Contact (no answer)
No-Show Not Reported
No Vehicle Available
Driver Refused Trip

No-Shows and Late Cancellations

As discussed in Chapter 4, no-shows and late cancellations can greatly affect productivity. No-shows and late cancellations should be recorded and monitored monthly to resolve problems before they become excessive. No-shows should be categorized to help determine if the no-show is the fault of the patron or the transit agency. The following categories are suggested for no-shows and late cancellations:

- passenger no-show and
  - driver is on-time
  - driver is late
- passenger cancellation *on driver arrival* due to
  - unpreventable cause (e.g. illness/emergency)
  - preventable cause (e.g. patron forgot to cancel)
  - undetermined cause (patron cannot give a reason)
- address error by
  - patron
  - reservationist
  - dispatcher
  - unknown

By tracking no-shows and late cancellations by category, the dispatch and driver staff can determine specific improvements in each category.

Recording cancellations by trip purpose or location is helpful in addressing chronic cancellations. For instance, workshops for persons with disabilities may be closed on certain holidays. Patrons who have subscription trips may forget to cancel trips. If the transit agency tracks the locations of workshops and works with the facility to provide holiday schedules, transit agencies can be proactive in contacting these patrons to cancel trips in advance.

Complaints

As discussed in Chapter 4, a complaint form and system for processing complaints should be developed. Complaints and commendations are an indicator of how well the dispatch office and transit service are performing. Complaints should be recorded in full and investigated. Categorizing complaints and commendations is important and should be tallied monthly to track patterns.

Call Center Statistics

Productivity can be affected when patrons and drivers are not able to get through to dispatch. Trip cancellations may be missed, lost drivers cannot get directions, and no-shows cannot be called in for authorization to move on.

Recording and tracking dispatch, reservation, and patron service call center data will help not only in staffing call centers appropriately as discussed in Chapter 5 but also will provide an indicator of service quality. Some transit agencies have telephone reporting capabilities built into telephone systems. Other agencies request phone studies to be completed on a sample of calls. Information collected that will aid in evaluating the quality of service and timeliness in responding to patron and driver calls includes:

- average daily calls into each call center,
- maximum call delay (queue time) in each day,
- average call delay, and
- average call processing time.

Other Performance Measures

The following additional performance measures are recommended to be tracked to better measure the productivity of operation:

- service efficiency measures
    - average passenger trip length
    - average travel time
    - missed trip rate (as a ratio of total trips)
    - operating cost per revenue hour and revenue mile
- cost effectiveness measures
    - staff absentee rate
    - operating cost per passenger trip
- fleet reliability measure
    - miles between road call or service interruption

Although these performance indicators are not directly related to dispatch influence on productivity, the measures are a good management tool in understanding and managing the overall transit operation.

Chapter 7. Dispatch Assessment and Implementation

The information provided in this guidebook gives transit managers the resources necessary to dispatch transportation productively. This guidebook is intended to provide a means to focus demand response service on productivity while balancing service quality. The steps in the following section are suggested in assessing an agency's productivity and implementing a productive demand response dispatch system.

Steps to Assessing and Implementing a Productive Demand Response Dispatch System

1) Perform an agency-assessment on the dispatch operation in regard to productivity
2) Benchmark performance measures to establish a performance baseline
3) Identify areas of strengths and of weaknesses
4) Identify possible solutions for improving weaknesses and enhancing strengths
5) Set dispatch goals and objectives
6) Identify solutions to meet objectives and determine strategies
7) Track performance over time (monthly)
8) Review goals, objectives and strategies (once a year)

The charts in this chapter expand these steps.

Step 1: Agency-Assessment

The first step in the agency assessment of the dispatch operation is to identify items that the agency currently provides that affect service productivity. This can be done by completing the Demand Response Dispatch Productivity Assessment Tool provided on the following pages.

Demand Response Dispatch Productivity Assessment Tool

Item	Yes	No	Strength	Weakness
Attendance Has the agency developed and implemented attendance policies? • Lateness • Excused and unexcused absences • Vacations • Holidays • Lunch and other breaks	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
Dispatch Backup and Driver Extra-Board Has the agency developed and implemented procedures to provide backup for unscheduled dispatch and driver absences? • Cross-trained staff • On-call staff • Extra staff (at vehicle pull-out or shift change)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐

Item	Yes	No	Strength	Weakness
Late Cancellations / No-Shows				
Has the agency developed and implemented policies and procedures for passenger cancellations and no-shows?				
• Policy defining "no-show"	☐	☐	☐	☐
• Policy defining "late cancellation"	☐	☐	☐	☐
• Procedure for tracking the reason for the no-show or late cancellation	☐	☐	☐	☐
• Policy defining patron penalties:				
o Verbal warning	☐	☐	☐	☐
o Written warning	☐	☐	☐	☐
o Require patron trip confirmation	☐	☐	☐	☐
o Dispatch calls patron to confirm next day trip Suspension	☐	☐	☐	☐
o Fines/charge	☐	☐	☐	☐
• Policy defining patron appeal process	☐	☐	☐	☐
• Policy is actively monitored and enforced	☐	☐	☐	☐
• Procedure for no-show authorization:				
o Verify the pickup time and address	☐	☐	☐	☐
o Dispatch attempt to contact patron	☐	☐	☐	☐
o 5 minute wait time after the scheduled pick-up time	☐	☐	☐	☐
o Driver attempt to locate the patron	☐	☐	☐	☐
o Leave a no-show hanger or card	☐	☐	☐	☐
o Cancel remaining trips for the patron	☐	☐	☐	☐
• Are no-shows investigated to determine if the patron is at fault and should be charged with a no-show?	☐	☐	☐	☐
• Are no-show locations tracked for patterns?	☐	☐	☐	☐

Item	Yes	No	Strength	Weakness
Recording Reservations and Cancellations Does the agency have procedures to record reservations and cancellations while the patron is on the phone? • Are reservationist and dispatchers instructed to repeat the trip information back to the patron to confirm? • Are same-day trip cancellations and changes made immediately? • Does the agency have procedures for making future trip cancellations and changes? • Is the driver instructed to record all information in full on a form as the trip is dispatched? • Does the dispatcher give out trip information in a defined sequence every time a trip is dispatched? • Does the agency have a subscription/standing order change form?	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐
Send Back Does the agency have a policy concerning sending back a vehicle for patrons who miss trips?	☐	☐	☐	☐
Pick-up Window Does the agency have a specified pick-up window in which a passenger is expected to be ready to travel (before and after the scheduled pick-up time)?	☐	☐	☐	☐
Unscheduled Change Does the agency have a policy requiring dispatch authorization for the driver to make a change in the schedule for: • Unscheduled riders? • Change in drop-off location? • Use of an indirect route?	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Refusal-to-Transport Does the agency have a policy to refuse service to patrons who are: • Abusive patrons? • Disruptive patrons? • Require assistance beyond what the agency is prepared to give?	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐

Item	Yes	No	Strength / Weakness S	W
Door-through-Door, Door-to-Door or Curb-to-Curb • Does the agency have a policy for providing door-through-door, door-to-door, or curb-to-curb service? • Does the agency proactively educate riders on the policy?	☐ ☐	☐ ☐	☐ ☐	☐ ☐
Advanced Scheduling • Does the agency have an advanced scheduling window for patrons to book trips? • Does the agency record the number of early cancels and late cancels?	☐ ☐	☐ ☐	☐ ☐	☐ ☐
Will-Call Trips • Does the agency schedule trips on the same day of service? • Are there policies for providing same day service? • Are same day service requests responded to quickly without a negative impact on productivity? • Does the agency allow open return trips? • Are there policies regarding open return trips?	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
Wheelchair and Mobility Aid Does the agency have policies regarding transporting mobility devices? • Uncommon wheelchairs • Maneuvering wheelchairs up or down steps • Transporting scooters • Wheelchairs with inoperable breaks • Weight limitations	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
Patron Ride Time Does the agency have maximum patron ride time policies?	☐	☐	☐	☐
Telephone Queue Time Does the agency: • Monitor queue times throughout the day? • Create queue time reports? • Review maximum and average queue times by time of day, day of the week and monthly?	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐

Item	Yes	No	Strength/ Weakness S	W
Subscription (Standing Order)Trips Does the agency provide subscription (standing order) trips:				
• Does the agency have policies regarding subscription trips?	☐	☐	☐	☐
• Require a minimum number of weekly travel days to obtain subscription	☐	☐	☐	☐
• Is service capacity constrained due to the number of subscription trips (non-subscription riders are regularly denied trips)	☐	☐	☐	☐
• Are the majority of subscription trips grouped trips?	☐	☐	☐	☐
Communication Does the agency have policies/procedures regarding use of communication equipments (radios, MDTs):				
• Drivers remain in communication with dispatch throughout the day	☐	☐	☐	☐
• Passengers not allowed to use communication equipment	☐	☐	☐	☐
• Drivers practice professional communication standards	☐	☐	☐	☐
• Driver notification requirements of trip arrival and departures	☐	☐	☐	☐
• Driver notification requirements of delays	☐	☐	☐	☐
• Use of communication codes	☐	☐	☐	☐
Complaints Does the agency have complaint policies/procedures:				
• Separate telephone number staffed outside of dispatch for complaints	☐	☐	☐	☐
• Phone number, address and/or web site publicized for patron complaints	☐	☐	☐	☐
• Complaint form in use that includes: o Categories of complaints/commendations	☐	☐	☐	☐
o Record of patron complaint, driver/staff member response to complaint and supervisor follow through	☐	☐	☐	☐
• Procedures for handling serious complaints	☐	☐	☐	☐
• Timeline for investigation and resolution of complaint	☐	☐	☐	☐

Item	Yes	No	Strength/ Weakness S	W
Vehicle Breakdown and Accident Does the agency have vehicle breakdown and accident policies/procedures:				
• Spare vehicle availability	☐	☐	☐	☐
• Vehicle breakdown form to record incidents	☐	☐	☐	☐
• Vehicle accident form to record incidents	☐	☐	☐	☐
• Defined responsibilities of the following personnel in response to accident or breakdown:				
o Manager	☐	☐	☐	☐
o Dispatcher	☐	☐	☐	☐
o Maintenance	☐	☐	☐	☐
o Driver	☐	☐	☐	☐
• Procedures for alternate transportation of passengers on board the disabled vehicle	☐	☐	☐	☐
• Procedures for handling injuries	☐	☐	☐	☐
Defined Dispatcher Responsibilities and Skills Does the transit agency outline the job responsibilities of a dispatcher in a job description including:				
• Dispatcher responsibilities separated from driver supervisor	☐	☐	☐	☐
• Dispatcher responsibilities separated from patron complaint responsibilities	☐	☐	☐	☐
• Dispatcher knowledge of service area	☐	☐	☐	☐
Does the agency require dispatchers to have skills in:				
• Handling large amounts of data	☐	☐	☐	☐
• Remaining calm and collected during emergencies	☐	☐	☐	☐
• File management and organization	☐	☐	☐	☐
• Listening	☐	☐	☐	☐
• Empathetic attitude	☐	☐	☐	☐
• Pleasant and articulate voice	☐	☐	☐	☐

Item	Yes	No	Strength / Weakness S	W
Dispatch Office Set Up Is the dispatch office free from distraction and well organized including:				
• Dispatch office separated from other offices	☐	☐	☐	☐
• Dispatch office quiet and free from distractions	☐	☐	☐	☐
• Service area maps readily available	☐	☐	☐	☐
• Key maps provided	☐	☐	☐	☐
• Location information available regarding major streets, buildings and major generators of service	☐	☐	☐	☐
• Fare payment structure posted	☐	☐	☐	☐
• Headsets required	☐	☐	☐	☐
• Communication system reliable	☐	☐	☐	☐
• Standard office supplies and required forms available	☐	☐	☐	☐
• Clock and calendar posted	☐	☐	☐	☐
Staffing by Call Volume				
• Does the agency staff by volume of calls?	☐	☐	☐	☐
• Does the agency have automated phone reports?	☐	☐	☐	☐
o If not, does the agency's local phone company provide phone statistic reports or has the agency conducted a manual recording of call volumes?	☐	☐	☐	☐
• Does the agency have goals/standards for average queue times?	☐	☐	☐	☐
Monitoring and Proactively Adjusting for Late Trips				
• Does the agency monitor and proactively adjust for late trips throughout the day?	☐	☐	☐	☐
• Does the agency have a designated dispatcher to monitor driver on-time performance and actively reroute trips?	☐	☐	☐	☐
Monitoring and Using Slack Does the agency monitor slack in the transit service and actively use the slack time including:				
• Policy defining "slack" time (e.g., 20 minutes)	☐	☐	☐	☐
• Dispatcher designated to monitor slack in the system and reroute trips.				
o Reassign trips to slack to allow late drivers to catch up	☐	☐	☐	☐
o Use slack for will-calls, same-day service	☐	☐	☐	☐
o Use slack for driver breaks	☐	☐	☐	☐

Item	Yes	No	Strength / Weakness S	W
Driver and Vehicle Scheduling				
• Does the system require dispatch to schedule drivers and vehicles?	☐	☐	☐	☐
• Are drivers scheduled based on demand for service, including:				
o Both full-time and part-time drivers scheduled based on service demand?	☐	☐	☐	☐
o Schedule adjustments according to changes in demand by:				
▪ Day of week	☐	☐	☐	☐
▪ Holidays	☐	☐	☐	☐
▪ Weather conditions	☐	☐	☐	☐
▪ Seasons	☐	☐	☐	☐
• When possible, are drivers assigned:				
o To the same manifest	☐	☐	☐	☐
o To the same vehicle	☐	☐	☐	☐
o Based on preventive maintenance requirements	☐	☐	☐	☐
• Are spare vehicles available?	☐	☐	☐	☐
o If yes, are the number of spare vehicles determined based on vehicle maintenance and breakdowns?	☐	☐	☐	☐

Item	Yes	No	Strength / Weakness S	W
Technology Does the agency use current technologies to dispatch service including:				
• Computer-assisted scheduling and dispatching (CASD)	☐	☐	☐	☐
• Automatic vehicle locators (AVL)	☐	☐	☐	☐
• Mobile data terminals/computers (MDT)	☐	☐	☐	☐
• Other mapping technologies (e.g., on-line mapping tools)	☐	☐	☐	☐
• Does the agency provide ongoing dispatch training in the use of technologies?	☐	☐	☐	☐
• Does the agency fully utilize the features of the technologies employed?	☐	☐	☐	☐
• CASD:				
o Does the agency re-optimize the CASD parameters to test productivity levels?	☐	☐	☐	☐
• AVL:				
o Does the agency use the AVL to find to:				
▪ Find the closest vehicle to a waiting patron?	☐	☐	☐	☐
▪ Provide vehicle updates to waiting patrons?	☐	☐	☐	☐
▪ Determine if the driver is in the right place when calling in a no-show?	☐	☐	☐	☐
▪ Calculate on-time performance?	☐	☐	☐	☐
• MDT:				
o Does the agency have policies/procedures to:				
▪ Log arrival and departure times of vehicles?	☐	☐	☐	☐
▪ Request and log permission for no-show events?	☐	☐	☐	☐
o Does the agency use MDT to:				
▪ Optimize staffing of drivers?	☐	☐	☐	☐
▪ Optimize vehicle routes?	☐	☐	☐	☐
▪ Monitor drivers that may be off route, pass up trips, or make unscheduled stops?	☐	☐	☐	☐

Item	Yes	No	Strength / Weakness S	W
Patron Responsibilities				
Does the agency educate patrons on the policies and procedures of the demand response transit system?	☐	☐	☐	☐
• Does the agency actively educate riders regarding:				
o Fare requirements?	☐	☐	☐	☐
o Canceling rides in advance?	☐	☐	☐	☐
o Being ready at the start of the pick-up window?	☐	☐	☐	☐
o Shared-ride service?	☐	☐	☐	☐
• Does the agency provide this information				
o Orally from drivers/dispatchers/telephone message system?	☐	☐	☐	☐
o In writing with a rider's guide/ educational booklet?	☐	☐	☐	☐
o Via a patron's page on the agency's web site?	☐	☐	☐	☐
Coordination of Service				
Does the agency coordinate with other agencies to utilize vehicle resources during times of day or in areas where service demand is low?	☐	☐	☐	☐
Data Collection				
Does the agency collect and analyze the following data elements to optimize agency performance?				
• Passenger trips (boardings)	☐	☐	☐	☐
• Revenue hours and revenue miles	☐	☐	☐	☐
• On-time performance	☐	☐	☐	☐
• Missed trips	☐	☐	☐	☐
• Late trips	☐	☐	☐	☐
• Excessive ride times	☐	☐	☐	☐
• No-shows and late cancellations	☐	☐	☐	☐
• Denied reservations	☐	☐	☐	☐
• Accidents	☐	☐	☐	☐
• Roadcalls/service interruptions	☐	☐	☐	☐
• Complaints	☐	☐	☐	☐
• Number of calls into each call center (dispatch, reservations, patron service)	☐	☐	☐	☐
• Operating expenditures	☐	☐	☐	☐

Item	Yes	No	Strength / Weakness S	W
Performance Measures Does the agency calculate and monitor the following performance measures?				
• Productivity by driver	☐	☐	☐	☐
• Productivity by day of week	☐	☐	☐	☐
• Productivity by month	☐	☐	☐	☐
• Productivity by service type	☐	☐	☐	☐
• Productivity by zone or specified portions of service area	☐	☐	☐	☐
• On-time performance	☐	☐	☐	☐
• Service interruptions by category:				
o Late pullout – no vehicle, no driver, misc.	☐	☐	☐	☐
o Late – time, lost driver	☐	☐	☐	☐
o No driver available	☐	☐	☐	☐
o Vehicle breakdown / accident	☐	☐	☐	☐
o Overlooked/passed up patron	☐	☐	☐	☐
o Picked up wrong patron	☐	☐	☐	☐
o Ill patron	☐	☐	☐	☐
o No contact with driver (no answer)	☐	☐	☐	☐
o No-show not reported	☐	☐	☐	☐
o No vehicle available	☐	☐	☐	☐
o Driver refused trip	☐	☐	☐	☐
• No-shows and late cancellations:				
o No-show by category	☐	☐	☐	☐
o No-show by location	☐	☐	☐	☐
• Complaints and commendations by categories	☐	☐	☐	☐
• Call center statistics:				
o Average daily calls into each call center	☐	☐	☐	☐
o Maximum call queue time per day	☐	☐	☐	☐
o Average call queue time	☐	☐	☐	☐
o Average call processing time	☐	☐	☐	☐
o Abandoned calls	☐	☐	☐	☐

Step 2: Calculate and Benchmark Performance Measures

At a minimum, calculate the following performance measures to determine the agency's current performance:

- productivity (passenger trips per revenue hour),
- on-time performance (percent of on-time trips),
- no shows and late cancellations (no-shows and late cancels per total scheduled passenger trips),
- complaints (complaints per passenger trips),
- call center queue times, and
- service interruptions (service interruptions per total passenger trips).

The performance measures may be used as a benchmark to measure future performance, determine agency strengths and weaknesses, and aid in establishing dispatch goals and objectives.

Step 3: Identify Strengths and Weaknesses

Identify which productivity items the agency considers strong (needing little or no improvement) and which items are weak (needing improvement). Using the Dispatch Productivity Assessment Tool, determine next to each item whether the item is an agency strength or weakness. To assess the item strength or weakness, review items identified in step 1 and the calculated performance measures in step 2. For example, in assessing whether Attendance is an agency strength or a weakness, review whether of the policies listed are lacking and the current rate of absenteeism. If the agency identified that it is lacking in Attendance policies regarding lateness and excused absences and has a high absenteeism rate, the agency may assess this Attendance item as a weakness. Assess policy and procedures both on whether they exist and on whether the policy and procedures are enforced or implemented. The agency may be strong in providing written policies and procedures overall but weak applying them or enforcing the use.

Step 4: Identify Possible Solutions for Improving Weaknesses and Enhancing Strengths

To identify possible solutions, refer to the table of contents (p. 3) which references each of the items listed in the Demand Response Dispatch Productivity Assessment Tool and create a list of solution possibilities. Not all solutions may be possible for every transit agency. For example, if technology is identified as a weakness, technology purchases may not be possible due to budget constraints. Determining the cost and benefit of implementing possible solutions must be considered. The agency may consider listing both short-term and long-term solutions.

Step 5: Set Dispatch Goals and Objectives

Set dispatch goals and objectives based on overall transit agency and community goals (refer to Chapter 3). Dispatch objectives should be based on benchmarked performance measures to determine what objectives are obtainable. For example, an objective to obtain a certain productivity level should be based on the current benchmarked performance measure. If the demand response system is achieving a productivity level of 2.00 passengers per revenue hour, a reasonable objective may be to obtain a level of 2.03 passengers per revenue hour by the end of the year. Balance productivity goals and objectives with service quality goals and objectives.

Step 6: Identify Solutions to Meet Objectives and Implement Strategies

Identify the best solution to meet goals and objectives established in step 5 and determine the strategy to accomplish the solution. Strategies are a means of obtaining the measurable objective. Review the list of possible solutions in step 4 and identify which of these solutions will help meet goals and objectives set in step 5. For example, if the goal is to maximize service productivity to achieve the objective of 2.03 passengers per revenue hour, a solution may be to better utilize the automated scheduling system. The strategy to accomplish this solution may be to conduct dispatch staff training to fully utilize the scheduling system.

Step 7: Track Performance over Time (monthly)

A means of recording and tracking performance consistently over time should be established. The agency may develop a spreadsheet that staff can use to enter key data elements on a monthly basis that will automatically generate performance statistics.

Dispatch supervisors and staff should monitor performance to proactively address performance issues. Dispatch supervisors should communicate performance patterns to staff to establish a unified focus on productivity and service quality.

Step 8: Review Goals, Objectives and Strategies (annually)
Lastly, at the end of the year, compare performance to the established objectives and to the benchmarked levels at the beginning of the year. Determine which performance measures improved and which performance measures declined. Determine if the strategies implemented for improving performance had a positive or negative effect, and why. A review of goals, objectives and strategies annually will enable the transit agency to communicate positive performance improvements and aid in determining changes needed where performance may have declined. Involve the entire dispatch team in reviewing performance and determining future goals, objectives and strategies.

Conclusion

Dispatch is the heart of a demand response transit system. Focusing on productivity while balancing service quality will enable the transit agency to improve cost-effectiveness of the demand response service. Improving cost-effectiveness provides opportunities for expanding service or saving resources without expanding the budget. Assessing the demand response dispatch operation, establishing and implementing goals and objectives, tracking performance and implementing strategies are an ongoing process.

The agency may conclude that it is not ready to make broad policy and procedure changes but would like to make service delivery changes. Benchmarking the performance now will provide a baseline and enable the agency to see the progress made with service delivery changes. Benchmarking will also give the agency a base for implementing future policy and procedural changes.

This guidebook gives agencies the resources needed to implement a productive dispatch demand response operation while balancing service quality. This guidebook assists transit agencies in focusing on productivity factors and making improvements that will lead to a more successful demand response dispatch operation. A successful demand response dispatch operation will not only benefit the transit agency but also will ultimately benefit the community.

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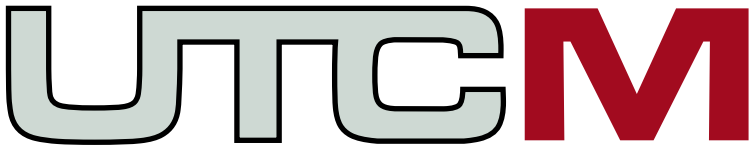

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