

On-Board and Intercept Transit Survey Techniques

DETAILS

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TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP SYNTHESIS 63

**On-Board and Intercept
Transit Survey Techniques**

A Synthesis of Transit Practice

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SUBJECT AREAS
Public Transit

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the Transit Development Corporation

TRANSPORTATION RESEARCH BOARD

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The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

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FOREWORD

*By Staff
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Transit administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the transit industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire transit community, the Transit Cooperative Research Program Oversight and Project Selection (TOPS) Committee authorized the Transportation Research Board to undertake a continuing study. This study, TCRP Project J-7, "Synthesis of Information Related to Transit Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute a TCRP report series, *Synthesis of Transit Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

This synthesis documents and summarizes transit agencies' experiences with planning and implementing on-board and intercept surveys. On-board/intercept surveys used throughout the report refer to self-administered surveys distributed on board buses and railcars, and in stations, as well as interviews conducted in these environments. The report provides an overview of industry practices and covers a broad range of issues addressed in planning a given survey. This topic is of interest to transit agency staff responsible for market research in their agency. They can use this report to learn from and compare their experiences with the experiences of other agencies.

The findings in this report are based on a literature review, a survey of transit agencies from across the United States, analysis of documentation submitted by transit agencies, and interviews with transit agency staff and other professionals involved in on-board and intercept transit surveys. Fifty-two transit agencies from throughout the United States provided information for this report.

Bruce Schaller, Schaller Consulting, collected and synthesized the information and wrote the report, under guidance of a panel of experts in the subject area. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

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ON-BOARD AND INTERCEPT TRANSIT SURVEY TECHNIQUES

SUMMARY On-board and intercept surveys are highly valuable to transit agencies as a means of obtaining vital information and opinions from a cross section of their customers. Transit agencies use on-board and intercept surveys to collect data on customer trip characteristics, travel behavior, demographic characteristics, and customer attitudes about service. Survey results are used for travel modeling, long-range and areawide planning, route planning and scheduling, service design, marketing, and customer communications. Agencies view the results as being highly useful, accurate, and timely.

As used in this report, “on-board and intercept surveys” refer to self-administered surveys distributed on board buses and trains and in stations, as well as interviews conducted in these environments. Such surveys are distinct from telephone interviews, mail surveys, and on-line surveys, none of which involve in person interaction between surveyors and transit riders.

A survey of 52 transit agencies found that 96% conducted on-board surveys between 2002 and 2004, with most of this group also having conducted intercept surveys. Large agencies typically conduct five or more on-board/intercept surveys annually, primarily focused on specific routes or geographic areas. Small agencies typically conduct surveys every 1 to 3 years, often involving the entire transit system.

On-board and intercept survey methodologies may be the only cost-effective way to gather information from riders where the incidence of transit users in the general population is low. In major cities with a high incidence of transit users, on-board and intercept methodologies are highly useful for surveys on specific routes or among specific customer segments. On-board and intercept surveys often provide higher response rates than alternative methodologies such as telephone, mail, and on-line surveys, and at lower cost. On the other hand, telephone or other methodologies are necessary for surveys of non-users and when the survey questionnaire is extensive or complex.

In carrying out on-board and intercept surveys, transit agencies most often use self-administered surveys that are distributed and collected on board buses and/or trains. In particular situations, however, personal interviews and in-station surveys are also undertaken.

Larger survey projects in which 5,000 to 10,000 or more completed surveys are obtained are typically carried out by consultants, whereas smaller-scale surveys are generally conducted by in-house transit personnel. For in-house surveys, temporary workers and/or office staff temporarily assigned for the purpose are used in the field work.

On-board and intercept surveys generally address two to four of the following research topics:

- Where and when do customers use transit?
- Who uses transit?
- How satisfied are customers?
- Why do customers use transit?

- How could the agency attract increased ridership?
- How effective are agency communications and information?

Survey questions for some of these topics, such as those about ridership frequency and demographics, are widely standardized across agencies. Survey questions on other topics, such as customer satisfaction and why customers use transit, frequently differ between surveys and between agencies.

Response rates reported by transit agencies varied widely, from 13% to 90% of riders who were asked to participate in a given survey. Within this very broad range, response rates for the majority of on-board and intercept surveys ranged from 33% to 67%, with one-half of the agencies reporting response rates in this range. Factors affecting response rates include the enthusiasm and diligence of survey workers who distribute questionnaires or conduct interviews, level of rider interest, whether self-administered surveys or personal interviews are used, length and complexity of the questionnaire, use of incentives, and frequency of surveys being conducted. Other factors, less subject to transit agency influence, are rider income, education and other demographic characteristics, language diversity, and rider literacy levels.

As with response rates, costs also vary widely. Overall costs for surveys reported by transit agencies ranged as high as \$350,000, although approximately one-fifth of surveys with cost data reported by transit agencies cost less than \$10,000. Even surveys employing similar methodologies show widely different costs. Factors affecting costs include the number of completed surveys to be obtained, whether personal interviews or self-administered questionnaires are used, whether survey staff dedicated to the task or bus operators are used to distribute surveys, the density of riders at survey locations, survey length and complexity, response rates, and labor costs.

This report documents and summarizes transit agencies' experience with planning and implementing on-board and intercept surveys. This information can help transit staff responsible for market research in their agency.

INTRODUCTION

BACKGROUND

Virtually all transit agencies conduct surveys on board buses and trains and often in transit stations as well. Agencies survey their customers on a wide range of topics, from the purpose, origin, and destination of their current trip to their satisfaction with the service and service improvements that would prompt them to ride more often. On-board and intercept surveys are highly valuable to transit agencies as a means of obtaining vital information and opinions from a cross section of their customers.

As a description of survey methodologies, the terms on-board and intercept are both distinct and overlapping. “On-board” means surveys conducted on buses, subway cars, light rail cars, commuter trains, and sometimes para-transit vehicles. On-board surveys can be self-administered surveys that are distributed to customers after they board the bus or rail car. Riders are typically encouraged to complete the survey immediately, but may also be offered the option of returning the completed questionnaire by mail. On-board surveys can also be conducted as personal interviews, in which case a survey worker asks riders a short series of questions and records the answers.

On-board personal interviews are generally speaking intercept surveys; however, the term “intercept” can also be reserved for surveys in subway and rail stations, at transfer stations or terminals, and at bus stops. Surveys at these locations can be conducted as self-administered surveys or personal interviews.

The term “on-board/intercept surveys” used throughout this report refers to self-administered surveys distributed on board buses and rail cars and in stations, as well as interviews conducted in these environments. They are distinct from telephone interviews, mail surveys, and on-line surveys, none of which involve in-person interaction between surveyors and transit riders.

Transit agency staff that are responsible for on-board and intercept surveys encounter a number of important issues in planning and conducting these surveys. These issues include:

- What is the most effective way of obtaining a representative sample of the target rider group or groups?
- What is the clearest way to word questions and elicit accurate responses?

- What are effective ways of eliciting meaningful responses on service quality issues?
- What response rates have been achieved?
- What techniques have transit agencies used to increase response rates?
- How long can surveys be without discouraging participation?
- How often are survey results updated?

These questions involve a broad range of methodological issues that must be addressed in planning a given survey. Should the survey be administered on board or in a station environment? Should self-administered questionnaires or personal interviews be used? For on-board surveys, how should a sample of routes be selected for surveying? How large a sample size is needed to ensure a satisfactory level of accuracy? Should respondents be provided with incentives to complete a survey? What question wording is most effective for a given survey purpose? How should surveys be introduced and how should the questionnaire be formatted? In what order should questions be asked?

Implementation of on-board and intercept surveys also raises a number of important questions. For on-board bus surveys, should self-administered surveys be distributed by bus operators or by dedicated survey staff? How should survey staff be recruited? What training, supervision, and monitoring is needed to ensure successful completion of the data collection? What factors affect response rates and how can response rates be maximized?

Finally, what is the likely cost of an on-board/intercept survey and what factors affect the overall cost?

This report documents and summarizes transit agency experiences with on-board and intercept surveys. Transit agency staff responsible for on-board and intercept surveys can use this report to learn from and compare their experiences with the experiences of other agencies.

METHODOLOGY

Findings in this report are based on a literature review, a survey of transit agencies, analysis of documentation submitted by transit agencies, and interviews with transit agency staff and other professionals involved in on-board and intercept transit surveys.

Information for this report was provided by 52 transit agencies from across the United States. Transit agency staff from these agencies completed a written questionnaire on on-board and intercept surveys (see Appendix A). In the questionnaire, agency staff reported on their overall experiences with on-board and intercept surveys. They also reported in detail on one or more on-board/intercept surveys conducted by their agency; information covering 58 surveys was obtained from this section of the questionnaire.

Other information provided by transit agencies included

- On-board and intercept questionnaires,
- Methodology for surveys, and
- Survey results.

Participating agencies represent a cross section of the transit industry in terms of agency size, location, and mode. Table 1 profiles key characteristics of participating agencies.

ORGANIZATION OF REPORT

This report is organized topically, synthesizing information from a literature review, the survey, interviews, and documents provided by transit agencies. Chapter two provides an overview of the use of on-board and intercept surveys in the transit agency environment, including frequency of use of on-board and intercept and other survey methodologies and reasons to use on-board and intercept surveys instead of a different survey method(s). Chapter three delves into decisions and choices that must be made in planning on-board and intercept surveys, ranging from choosing between on-board and transit locales to minimizing sampling error. Chapter four focuses on the process of developing questionnaires, including

TABLE 1
CHARACTERISTICS OF TRANSIT AGENCIES RESPONDING TO SURVEY

	No. of Agencies	Percentage
Agency Size		
Very large	9	17
Large	12	23
Medium	16	31
Small	15	29
Total	52	100
Mode		
Bus	49	94
Light rail	12	23
Heavy rail	9	17
Commuter rail	6	12

Notes:

Agency size definitions:

Very large—more than 100 million annual unlinked trips. Largest and smallest in this group: MTA New York City Transit and TriMet (Portland, Oregon).

Large—between 50 and 99 million annual unlinked trips. Largest and smallest in this group: Bay Area Rapid Transit District (Oakland) and Regional Transportation Commission of Southern Nevada.

Medium—between 10 and 49 million annual unlinked trips. Largest and smallest in this group: Metro (St. Louis) and Pinellas Suncoast Transit Authority.

Small—fewer than 10 million annual unlinked trips. Largest and smallest in this group: Lane Transit District (Eugene, Oregon) and The Bus (South Bend, Indiana).

question wording, question order, and layout. Chapter five addresses survey implementation and data processing, including staff recruitment, training, and supervision. Chapter six reviews the important issue of response rates and assesses factors that affect the response rates for different types of on-board and intercept surveys. Chapter seven summarizes survey costs, and chapter eight presents conclusions reached and suggested research needs.

CHAPTER TWO

TRANSIT AGENCY USE OF ON-BOARD AND INTERCEPT METHODOLOGIES

Transit agencies use on-board and intercept surveys to collect a wide variety of information. On-board and intercept survey topics include customer travel patterns, travel behavior, demographic characteristics, customer satisfaction and other attitudes, reasons for using transit, ways to attract increased ridership, and the effectiveness and usage of agency communications.

This chapter reports on how frequently on-board and intercept surveys are used at transit agencies and considerations in choosing between on-board and intercept surveys and other methodologies such as telephone, web, and mail surveys.

FREQUENCY OF USE OF ON-BOARD/INTERCEPT AND OTHER SURVEY METHODOLOGIES

On-board and intercept surveys are a mainstay of transit agency market research programs. In the survey of transit agencies conducted for this study, 96% reported having conducted an on-board survey(s) between 2002 and 2004. This figure includes 60% of the agencies that conducted both on-board and intercept surveys in the past 3 years (Table 2).

Although on-board and intercept surveys are a mainstay of transit agency market research programs, they are by no means the sole survey methodology used. Of agencies surveyed, 71% have conducted telephone surveys, 44% web-based surveys, and 38% mail surveys between 2002 and 2004 (Table 2).

Transit agencies are particularly reliant on on-board and intercept surveys to collect detailed trip origin and destination (O&D) data. In the agency survey, 73% reported using on-board surveys for O&D purposes. Intercept, telephone, web-based, and mail surveys were used far less frequently (Table 2).

The frequency of conducting on-board and intercept surveys varies widely across different transit agencies. All large agencies surveyed conduct on-board and intercept surveys at least once each year and a majority conduct at least five on-board and intercept surveys annually. These surveys are often relatively small line-specific surveys fielded by in-house staff; results are used for planning and related studies.

Two-thirds of the medium-size agencies conduct on-board and intercept surveys at least once a year, as do approximately one-third of smaller agencies. Medium and smaller agencies that conduct on-board and intercept surveys less than once a year typically conduct surveys every 2 to 4 years (see Table 3).

O&D surveys are critical for areawide and route planning and thus are often conducted on a regular basis. Forty-three percent of responding agencies conducted an O&D survey (including all methods) in just the previous 2 years; 73% had conducted an O&D survey in the past 7 years. Among those agencies reporting dates for the two previous O&D surveys, most conducted such surveys at 1- to 5-year intervals.

TABLE 2
SURVEY METHODOLOGIES USED BY TRANSIT AGENCIES

Methodology	Percentage of Agencies Using Survey Method in Past 3 Years*	Percentage Using Survey Method for Customer Satisfaction Surveys in Past 3 Years*	Percentage Using Survey Method for Origin and Destination Surveys at Any Time
On-board surveys	96	88	73
Intercept surveys	60	44	21
Telephone surveys	71	56	13
Web-based surveys	44	25	6
Mail surveys	38	17	8
Other	12	8	6
No. responding	52	52	52

*Between 2002 and 2004.

TABLE 3
FREQUENCY OF CONDUCTING ON-BOARD AND INTERCEPT SURVEYS

Time Period	Size of Transit Agency*				
	All (51)	Very Large (8)	Large (12)	Medium (16)	Small (15)
Several times a year	37%	88%	33%	44%	7%
About once a year	22%	13%	33%	13%	27%
About once every 2 years	4%	0%	0%	0%	13%
About once every 3 years	20%	0%	17%	31%	20%
About once every 4 years	4%	0%	8%	0%	7%
In excess of every 4 years	14%	0%	8%	13%	27%
Total	100%	100%	100%	100%	100%

*See Table 1 for agency size definitions.

USING ON-BOARD/INTERCEPT INSTEAD OF A DIFFERENT SURVEY METHOD

In choosing whether to use on-board/intercept or a different methodology, primary factors include the ability of the methodology to reach the targeted population, quality of responses to questions, response rates, schedule, costs, and length and complexity of the survey.

The central characteristic of on-board and intercept surveys is the direct access they provide to bus, subway, light rail, and commuter rail riders. On-board and intercept surveys can be conducted cost-effectively, because survey workers can readily reach a large number of bus and rail riders. By contrast, random digit dial telephone surveys are a costly way to reach transit users when the incidence of transit users among the general population is low.

Direct access to customers also means that on-board and intercept surveys can achieve excellent coverage of the targeted population. Surveys can be conducted of thin slices of the universe of users, such as riders on particular lines or those using transit in particular locations or specific times of the day. Thus, King County Metro (Seattle, Washington) surveyed only those riders in the downtown Ride Free Area. The Chicago Transit Authority (CTA) conducted one survey of riders on all bus and rail routes on the West Side and another survey of riders on the Douglas Line segment of the Blue Line.

Conversely, on-board and intercept surveys can achieve excellent coverage and a representative cross section of all transit users served by an agency. This flexibility is another prime advantage of on-board/intercept methods. Transit agencies as large as the Los Angeles County Metropolitan Transportation Authority (Metro) and as small as city of Lodi (California) have conducted systemwide on-board surveys.

Whether systemwide, areawide, or route-specific, well-designed on-board and intercept surveys can generate a rep-

resentative sample of the desired population (see chapter three for a discussion of sampling frames). All transit users can be found within the system, and on-board and intercept surveys can achieve good participation levels from prospective respondents (see chapter five).

Not surprisingly, the ability to reach and isolate the desired population, and the ability to obtain a representative sample of that population, are two primary reasons that transit agencies undertake on-board and intercept surveys instead of using telephone, web-based, mail, or other methodologies. Three-quarters of responding transit agencies indicated that “ability to target specific routes, customer segments, etc.” and “ability to obtain a representative sample” are among their primary reasons for using on-board and intercept survey methods (Table 4).

TABLE 4
REASONS TO USE AN ON-BOARD OR INTERCEPT METHODOLOGY INSTEAD OF A DIFFERENT SURVEY METHODOLOGY (check top 1 to 5 reasons)

Reason	Percentage
Ability to target specific routes, customer segments, etc.	77
Ability to obtain a representative sample of the desired population	73
Better information (accuracy, reliability, detail) from respondents	63
Ability to survey during the immediate experience of the service	60
Higher response rate	52
Lower cost	46
Faster turnaround	44
Availability of staff	10
Availability of consultant	8
Other	2
Do not conduct on-board/intercept surveys	2

Total number responding, 52.

Two other advantages of on-board and intercept surveys, cited by more than 60% of the transit agencies surveyed, are “ability to survey during the immediate experience of the service” and “better information (accuracy, reliability, detail) from respondents” (Table 4). Both of these advantages are because on-board and intercept surveys are conducted as customers use the bus and rail services, lending immediacy to the information or opinions being provided. This immediacy facilitates accurate responses so that respondents need not rely on recall of past experiences or feelings, as when surveyed later by phone, mail, or other methods.

Immediacy is also important when surveying a particular line or area. Respondents can readily focus on West Side service, or service on a particular route, because they are currently traveling in this area or on this route.

The aspect of immediacy can also be put to innovative uses. For example, MTA New York City Transit conducted a survey on selected bus routes to gauge reaction to a new bus lighting system then under consideration. Several buses on the selected routes were outfitted with the new lighting system. Respondents experienced actual lighting conditions as they completed the on-board questionnaire. Furthermore, by conducting the survey on both test buses and buses with regular lighting systems, the results provided a direct comparison of customer ratings for lighting attributes (brightness, glare, ability to see street signs, etc.) for new and regular lighting systems. By conducting the survey on the same routes and at the same time of day, the survey methodology controlled for exterior lighting conditions and trip and rider characteristics.

Three other frequent advantages to on-board and intercept surveys, cited by approximately one-half of transit agencies, are higher response rates, faster turnaround time, and lower costs.

Response rates for on-board and intercept surveys, although varying dramatically, generally range from 33% to 67% (see chapter five). By contrast, response rates are typically below 20% for mail surveys and below 40% for telephone surveys, based on interviews with transit agency staff. (Note that the relevant comparison for telephone surveys is interviews divided by residential households called, including calls resulting in no answer, a busy signal, answering machine, etc., and not simply the refusal rate once a potential respondent is on the phone.)

Faster turnaround time reflects agencies’ ability to quickly draft and field on-board and intercept surveys, particularly route-specific and area-specific surveys conducted for service planning purposes.

As with response rates, costs vary widely. On-board and intercept surveys offer cost savings where a low incidence of

transit users would drive up the cost of telephone or mail surveys. It should be noted that on-board and intercept surveys can also be costly, particularly when surveying on low-rider-ship routes or stations, or when the response rate is low.

Just as on-board and intercept surveys offer many advantages, they also have distinct limitations that make them inappropriate in some situations. A primary reason to use telephone surveys is to reach non-users, those who cannot be reached on board or at transit stations or centers. Of transit agencies surveyed, 63% cited this as a reason for using other methodologies (Table 5). Transit agencies in Ann Arbor (Michigan), Seattle, Orlando (Florida), Dallas (Texas), Charlotte (North Carolina), Cleveland (Ohio), Fort Worth (Texas), suburban Chicago, and Broward County (Florida), use telephone surveys to reach non-users and on-board and intercept surveys to reach users.

Surveys that are too lengthy and/or complex owing to skips, branching, or other complexities to be completed on board or in an intercept environment, also call for a different methodology. Approximately 4 in 10 agencies cited this as a major reason for using telephone, mail, or other survey methods.

It should be noted that on-board and intercept methodologies are often used in conjunction with other survey methods. Intercept interviews, for example, are often used to gather names and telephone numbers for telephone interviewing to be conducted later. Pierce Transit’s (Lakewood, Washington) 2004 Fixed-Route Customer Satisfaction Survey adopted this approach. The combination of intercepts and telephone interviews is very suitable where the incidence of transit riders is too low to make

TABLE 5
REASONS TO USE A DIFFERENT SURVEY METHODOLOGY
RATHER THAN AN ON-BOARD OR INTERCEPT SURVEY
(check top 1 to 5 reasons)

Reason	Percentage
Need to include non-users in study	63
Ability to obtain a representative sample of the desired population	54
Length and/or complexity of survey	42
Ability to target specific routes, customer segments, etc.	25
Lower cost	23
Faster turnaround	21
Availability of consultant	19
Better information (accuracy, reliability, detail) from respondents	15
Higher response rate	8
Availability of staff	4
Other	2
Do not conduct other types of surveys	13

Total number responding, 52.

random digit dial telephone interviewing cost-effective, but the survey is too long or complex for on-board or intercept interviews to be practical. The combination is particularly cost-effective for commuter railroads, where a large percentage of riders pass through a downtown terminal during their trip.

TIME REQUIREMENTS

The overall amount of time for on-board survey projects, from start to finish, ranged from several weeks to 29 months. Systemwide O&D surveys tend to populate the longest-

duration surveys and took a median of 10 months to complete. Non-O&D surveys involving 1,000 or more completed surveys took between 2 and 12 months to complete, with a median duration of 6 months. Smaller surveys took from 1 to 4 months, with a median duration of 3 months.

As reported by transit agencies, survey planning and design, data collection, data cleaning and processing, and analysis and report writing each generally take about the same amount of time, although there is considerable variation among projects.

PLANNING ON-BOARD AND INTERCEPT SURVEYS

On-board and intercept survey projects typically begin with an expressed need. Transit agency senior management asks the basic question, “How are we doing?” A survey is then commissioned to measure customer satisfaction. The marketing department wants to measure customer awareness of a recent advertising campaign or determine how often riders are visiting the agency website. The service planning department needs O&D data to develop a computer model of ridership patterns for use in route planning or wants to know how customers feel about a recent routing change. The bus department would like to know how customers reacted to recently introduced low-floor buses or wants to test a new bus lighting system under consideration.

Planning an on-board/intercept survey requires defining project goals, choosing where and how to conduct the survey, identifying the study population and sampling frame, and deciding what degree of precision is needed in the results. This chapter addresses these issues.

PROJECT GOALS

Planning an on-board/intercept survey involves first and foremost consideration of the survey goals. What information does the survey need to collect?

Overall, the goals or purposes of on-board and intercept surveys provided by transit agencies address five major areas:

- Travel modeling,
- Long-range and areawide planning,
- Route planning and scheduling,
- Marketing, and
- Customer communications.

Surveys typically ask questions in several rather than just one of these areas, although rarely in all five. O&D surveys are generally used in route planning, long-range planning and, to a lesser extent, scheduling and modeling (Table 6). Surveys covering customer attitudes and demographics address areas of areawide and route planning, marketing, and customer communications.

Project purposes can be specifically targeted to upcoming decisions or integrated into a planning process. In these

cases, survey methodology and selection and wording of questions can be developed in a strict decision framework. What methodology is best suited to this particular purpose? What questions will be used in the decision or planning process? Why is the information generated by each question useful? By asking these questions, unnecessary or extraneous questions can be dropped and the survey instrument can be streamlined.

Examples of targeted project purposes provided by transit agencies responding to the survey conducted for this report are:

- Track system transfer rate and distribution of fares [TriMet (Portland, Oregon) Annual Fare Survey].
- Measure the implementation of a new mode of transportation in service area (Massachusetts Bay Transportation Authority Silver Line Project).
- Determine customer perceptions of route changes and their travel patterns (Metropolitan Transportation Authority New York City Transit B15/Q3 Study).
- Evaluate summer loop service that uses trolley replica vehicles (Milwaukee County Transit System Trolley Evaluation).
- Measure ride free area ridership (to use in conjunction with automatic passenger counter data) (King County Transit Ride Free Area Survey).
- Analyze travel habits of bus customers traveling on the West Side of Chicago and in the near west suburbs (CTA West Side Customer Travel Survey).
- Determine if a proposed route change would result in more or fewer transfers [Greater Portland (ME) Transit District Route 1 O&D Study].

Surveys may also have the more generalized purpose of profiling the agency’s riders and their experience of transit service. Agencies reported that the information is useful in describing who benefits from transit service; comparing with the overall population and with peer markets and showing historical trends. Examples of relatively generalized survey purposes are:

- To determine overall customer evaluation of Dallas Area Rapid Transit (DART) service quality, marketing, and scheduling (DART Customer Satisfaction Survey).

TABLE 6
ANALYTIC USES FOR ORIGIN
AND DESTINATION DATA

Use	Percentage
Route planning	86
Long-range planning	76
Schedule planning	43
Modeling	38
Other	24

Total number responding, 21.

- To assess ridership behaviors, attitudes, and usage [Suburban Mobility Authority for Regional Transportation (SMART) Transit User Survey].

Finally, it is not unusual for surveys to have both specific and relatively general purposes. Examples are:

- To collect O&D information, including travel purpose information for the regional travel-demand model; to obtain a rider demographic profile; and to learn more about our ridership needs and travel habits and patterns to better serve those needs through transit planning [Citizens Area Transit (Las Vegas, Nevada) Origin and Destination Survey].
- To assess who our customers are and to generate input for the passenger estimation model [Metropolitan Atlantic Rapid Transit Authority (MARTA) Systemwide Survey].

WHERE AND HOW TO CONDUCT SURVEYS

Central decisions in survey planning involve whether to have riders complete the surveys themselves or to conduct personal interviews, where to conduct the survey (on board or in stations), how to distribute and collect questionnaires in the case of self-administered surveys, and whether to offer any type of incentives. Each of these issues is discussed in this section.

Self-Administered or Personal Interviews?

Transit agencies use self-administered surveys more often than personal interviews. More than two-thirds of the surveys reported by transit agencies for this study were entirely or primarily self-administered, whereas only 20% were entirely conducted through personal interviews. (The remaining 11% were partially self-administered and partially conducted as personal interviews.)

By definition, self-administered surveys involve respondents completing survey forms themselves and then returning the forms to the agency. For most of the surveys reported by transit agencies, questionnaires were distributed by survey workers dedicated to the task. Other options are to use other employees, such as bus operators, or to make questionnaires available in a convenient location, such as on board the bus, for riders to pick up.

Table 7 summarizes the advantages and disadvantages of self-administered surveys and personal interviews, and the types of situations in which transit agencies tend to use one or the other method.

A primary strength of self-administered surveys is that a number of respondents can complete the survey simultaneously. Survey workers' time can be used efficiently because survey staff can distribute questionnaires to a number of riders as the riders board the bus. Therefore, fewer surveyors are needed to obtain a given number of surveys than with personal interviews. Furthermore, a questionnaire can be offered to every rider, avoiding the need to sample those boarding a bus or train or passing through a station. Coverage is therefore maximized and sampling error is minimized.

Self-administered surveys must be carefully designed so that respondents can easily understand the questions, follow the flow of the questionnaire, and respond accurately. Without a trained interviewer to guide respondents through the survey the importance of good questionnaire design is paramount. (Chapter five discusses design issues.)

Self-administered surveys also need to avoid or minimize complexities such as skips between questions. Interviewer-administered surveys can more readily skip selected questions based on answers provided to previous questions. Self-administered surveys are thus most appropriate when the research need is to ask all respondents a uniform set of questions. Good examples are simple O&D questions, customer satisfaction, and customer opinion surveys.

The use of self-administered methods can exact a price in data quality. Respondents may misunderstand questions, leading to measurement error. Respondents may also complete only a portion of the questionnaire. Survey workers have very limited ability to ensure that respondents complete the questionnaire. Unless asked a question, survey workers cannot usually ensure the accuracy of responses or check the logic or consistency of answers.

Personal interviews reduce or eliminate problems with respondent understanding of questions and with item non-response. Interviewers can also skip questions based on previous responses, particularly when using handheld computers or similar devices.

Personal interviews can generate a very high response rate. Response rates, computed as interviews completed as a percentage of persons approached, exceeded 80% for surveys conducted by MARTA, King County Metro, and Gulf Regional Planning Commission (GRPC, Gulfport, Mississippi).

Because they are more time-intensive than self-administered surveys, personal interviews tend to be used

TABLE 7
CHARACTERISTICS OF SELF-ADMINISTERED SURVEYS AND PERSONAL INTERVIEWS

	Self-Administered	Personal Interview
Strengths	<ul style="list-style-type: none"> • Need fewer surveyors to obtain a given number of completed surveys because multiple respondents can complete the survey simultaneously • Can potentially survey all riders boarding a bus or train; no need to select a sample from among those boarding 	<ul style="list-style-type: none"> • Higher level of respondent understanding of questions • Ensures that all questions are answered • Obtains responses from persons with limited literacy skills
Weaknesses	<ul style="list-style-type: none"> • Respondents may misinterpret questions (measurement error) • Respondents may not complete the entire questionnaire (item nonresponse) • May result in lower response rate than personal interviews • Depends on ability of respondent to read questionnaire • Difficult to use branching and skip patterns 	<ul style="list-style-type: none"> • Can be time-intensive for surveyors; may need larger number of surveyors • Possible bias from nonrandom selection of riders interviewed • Cost
Situations likely to be used	<ul style="list-style-type: none"> • Projects needing large number of respondents • Same questions asked of all respondents • Relatively long questionnaires 	<ul style="list-style-type: none"> • Short questionnaires • Need relatively smaller number of completed surveys • Respondents unable to complete survey due to language, literacy, and/or disability • Use as adjunct to self-administration at choice of respondent
Implications for survey planning	<ul style="list-style-type: none"> • Survey instrument must be well designed, with clearly worded questions and clear navigation 	<ul style="list-style-type: none"> • Length of survey may need to be minimized • Need to interview riders where they will take the time needed to complete the interview

when the questionnaire is short and when a relatively small sample size is needed. The King County Transit Ride Free Area survey consisted of a few basic questions about transfers, fare payment, and boarding and alighting. The Port Authority Trans Hudson (PATH) (Jersey City, New Jersey) O&D survey was seven questions regarding O&D, access mode, transfers, trip purpose, and trip frequency.

Personal interviewing is important when some respondents do not have the literacy or English language skills necessary to complete a written questionnaire. GRPC offered riders a choice of being interviewed or completing the survey; most chose to be interviewed, in part owing to language skill considerations. The Charlotte Area Transit System (CATS) also offered the option of either self-administered or interviews; approximately 15% of riders completing the survey asked to be interviewed, primarily persons with disabilities that made self-completion difficult. A Fort Worth Transportation Authority survey was primarily self-administered; however, a bilingual surveyor, assigned to bus

routes with significant Hispanic ridership, conducted some interviews in Spanish.

PATH interviewers used handheld personal digital assistants to record respondents' gender and their answers to the seven survey questions. The survey was programmed into the handheld devices for this purpose.

This was the only survey among those reported by transit agencies that used electronic devices for recording respondents' answers. The use of electronic devices appears not to be widespread for two main reasons. First, they are not feasible for most self-administered surveys. Second, trials of electronic devices for on-board interviews found that interviewers had difficulty entering information on a moving bus. However, according to one company that specializes in this area, palm devices have been used successfully for intercept interviews at special events and of recreational visitors. Thus, as the PATH experience illustrates, they may be practical and useful for in-station environments.

On-Board or In-Station Surveying?

Closely related to the choice between self-administered surveys and personal interviews is the choice between administering the survey on board or in a stationary environment (e.g., a rail station or transit center).

Seven in 10 on-board/intercept transit surveys are conducted on board buses or trains, whereas 20% are conducted in stations and the remainder used both venues. Transit agencies choose the on-board approach for a variety of reasons.

- A steady flow of riders pass survey workers. On buses in particular and trains to some degree all riders pass through a single point to pay their fare or show a pass. This situation provides a good opportunity for survey workers to offer a questionnaire to each and every person boarding the bus or train.
- There is adequate time for respondents to complete the survey. The “cost” of completing the survey tends to be relatively low, because respondents are spending time on the bus or train anyway.
- Questionnaires can be returned on the spot. Most respondents can complete the questionnaire before leaving the bus or train and return it in person. Surveys completed and returned in this manner will not be misplaced or forgotten, as may happen with surveys taken off the vehicle to be completed later.
- It is a relatively safe environment for surveyors. The presence of bus operators and train crews provides a measure of safety for survey workers, whereas subway stations or bus stops in untrafficked areas may raise issues of personal safety for survey workers.
- It facilitates obtaining a representative sample of transit riders. The advantage of a moving bus or train is that it picks up passengers along an entire route. Therefore, a survey may be more likely to obtain a representative sample of riders by surveying on board rather than at bus stops or in subway, light rail, or commuter rail stations. This is an important consideration for any O&D study and for any study in which rider characteristics vary significantly between neighborhoods.

The choice of conducting surveys in stations or transit centers tends to be driven by circumstances that are particular to the survey or transit property. When nearly all riders pass through a downtown transit center or a few transfer points, it may be most time-efficient for survey staff to work at these central hubs rather than be spread out across a substantial number of buses.

Some surveys are conducted in rail stations. TriMet conducted its Ticket Vending Machine (TVM) Fascia Redesign survey immediately after respondents had used the TVM. Furthermore, TriMet chose the airport station to interview riders who were not experienced TVM users.

Station interviewing may also be attractive when the number of stations is relatively small, as with the PATH O&D survey. Notably, these surveys were conducted as personal interviews and were relatively short, so as to minimize the length of the interruption in respondents’ trips.

Distribution and Collection of Self-Administered Surveys

Self-administered surveys tend to be distributed and collected by survey staff assigned for this purpose. One or two survey workers are typically assigned to each bus or train car; rail surveys are more likely than are bus surveys to use two surveyors per car. Surveyors offer a questionnaire and pen or pencil to passengers as they board. Passengers return questionnaires to survey workers or place completed questionnaires in envelopes provided at the front and rear doors.

Questionnaires often provide the option of return by mail. The mail-back option is particularly important if respondents do not have sufficient time to complete the survey on board, if they may need help from a family member or friend, or if there is some extenuating circumstance such as they simply need their glasses to be able to complete the survey. Mail-back questionnaires include a postage-paid mailing address on one panel; riders can fold and staple or tape the questionnaire and drop it in the mail. Use of the mail option varies. For some surveys, the Washington Metropolitan Area Transit Agency (WMATA) and CTTransit (Hartford, Connecticut) reported receiving more than 30% of returned surveys by mail, whereas fewer than 10% of total surveys were returned by mail in two CTA surveys and in a TriMet survey.

Some surveys are distributed by bus operators or are left on seats or in timetable holders. One-quarter of the on-board surveys reported by transit agencies involved bus operators distributing the questionnaires (including surveys distributed by a combination of bus operators and survey workers). Agencies that use bus operators exclusively to distribute surveys tend to be smaller properties such as Pace Suburban Bus, SMART, Central Florida Regional Transportation Authority (known as LYNX), city of Lodi (California), and the Capital District Transportation Authority. Apparently, use of bus operators has been more successful at these smaller agencies; two larger agencies commented that bus operators have been too busy to distribute questionnaires to all riders. There may also be union issues of operators working “out of title” if asked to distribute surveys.

Prior Notice to Riders

For 46% of the surveys, the agencies notified passengers about the survey in advance through media, on-board

announcements, or other means. The most frequent means were on-board announcements, “take-one” brochures, car cards, and signs. Other means included press releases, print and electronic media, newsletters, and the Internet. Several agencies commented that the advance notice helped boost response rates.

Incentives

Incentives are often offered to riders to encourage participation in the survey and at times to encourage full and accurate completion of key survey questions. One-quarter of the transit agency surveys used some type of incentive, ranging from a free pass to a free pen to being entered in a lottery or drawing. Transit agency staff interviewed believes that incentives do increase response rates and that incentives provided to all respondents at the time of the survey are more effective than lotteries or drawings. However, there is little systematic evidence to document this belief or quantify the magnitude of the effect for transit surveys.

Extensive research on the use of incentives in mail surveys provides useful experience in a similar realm. Dillman (2000) reported that including \$1 or \$2 with mail surveys has been shown to increase response rates by 12 to 31 percentage points.

In mail surveys, incentives are more effective when sent with questionnaires rather than as a later reward; “token financial incentives of a few dollars” sent with mail questionnaires “have been shown to be significantly more effective than larger payments sent to respondents who have returned the questionnaires” (Dillman 2000). Incentives provided with the questionnaire constitute a “goodwill gesture that puts the sponsor and questionnaire in a positive light and sets the stage for the respondent to reciprocate with an appropriate gesture of completing the questionnaire.” By contrast, prizes have “relatively small, if any, effect on response” (Dillman 2000).

IDENTIFYING STUDY POPULATION AND DRAWING THE SAMPLE

Survey methodologists distinguish between the theoretical population, study population, sampling frame, and sample (Trochim 2004). These are important distinctions and, although not complicated for most on-board and intercept surveys, need to be carefully considered.

Theoretical Population

The population that the researchers wish to generalize to is the theoretical population. In a survey of voter preference, for example, the theoretical population would be persons who will vote in the next election. The theoretical population in

on-board and intercept transit surveys is typically composed of bus, rail, and other transit users. The theoretical population may be all riders or a subset such as riders on a particular route or traveling in a particular area or at a particular time of day.

Study Population

The population that the researcher can gain access to is the study population. In a survey of voter preference, the study population might be voters with telephones. In that case, the study population differs somewhat from the theoretical population because not all voters have telephones. The study population in on-board and intercept transit surveys is often congruent with the theoretical population, because all riders can, at least in theory, be reached on board transit vehicles or at transit stops or stations. This is one of the major advantages of on-board and intercept surveys—the survey can reach all riders whether or not they live in the service area, or have telephones, or are literate.

Three-quarters of the surveys reported by transit agencies defined the study population as “all riders” in some fashion: all bus riders, all rail riders, all fixed-route riders, or all transit riders. The remaining surveys defined the study population in a variety of ways based on geography or time period; for example:

- Riders within a geographic study area,
- Riders on one route or a group of routes,
- Riders traveling within a time period (most often weekdays), or
- Riders traveling through a selected station.

In addition to these distinctions, on-board and intercept surveys often qualify respondents by age so that children and sometimes young adults are not included in the study population.

A fundamental research question is whether the study population is defined as riders (people) or trips. Although at first glance the differences may seem trivial, they do have significant implications for how the survey is conducted and interpreted.

Focusing on riders is most appropriate for customer satisfaction, attitudinal, and demographic questions where the objective is to obtain information on a cross section of customers. The objective of the survey is to collect information from individuals who use transit. In the survey process, customers who are encountered by surveyors more than once are surveyed only the first time.

Focusing on trips is most appropriate when the information will be used to profile characteristics of trips such as O&D patterns and trip purposes. The objective is to obtain a

completed survey for each customer trip in the sample frame. Thus, a rider who is encountered by survey workers twice is asked to complete two surveys.

A further distinction is between trips and trip segments. Following the standard practice in O&D surveys, a “customer trip” for this discussion is defined as a journey between two activities; for example, home to shopping, whether one or more than one bus or train is used for the journey. A “trip segment” is each time the traveler boards a bus or passes through a turnstile. The distinction is important because a person making a transfer has twice the chance of being surveyed than one who does not. The transferring rider can easily be overrepresented in a sample if the intent is to measure customer trips. With an appropriate weighting of transferring riders, this issue can be corrected.

In theory, then, customer satisfaction and attitudinal surveys would appropriately define the study population as “riders.” O&D surveys would define the study population as customer trips or trip segments. Many surveys, however, have both O&D and attitudinal sections. In this case, the decision would be based on the importance of the O&D data and the ability to avoid double counting riders in the attitudinal section.

One option is to ask riders to complete the O&D section for each trip or trip segment, but to complete the attitudinal section only once. This is a workable approach provided the study population can understand this instruction.

As a practical matter, transit agencies have experienced difficulty in enlisting riders to complete more than one survey. Completing multiple surveys may seem redundant to customers and overly burdensome. Therefore, although O&D surveys may request that customers complete multiple surveys, many do not actually do so. This may not be a substantial problem in a large agency where customers are unlikely to be encountered by survey workers more than once. However, it can be a substantial problem with large survey efforts in mid-size or smaller agencies. In either case, the issue of riders not wanting to complete more than one survey is one reason that agencies emphasize weighting of O&D surveys by route, direction, and/or time of day, as shall be discussed later, to attempt to offset the possible biasing effects of self-selection in the survey process.

A final comment on this issue concerns the importance of being clear in the presentation of survey results. Although it may be tempting to speak generally about the survey showing how riders feel or how they travel, care should be taken to identify the study population. A survey in which the study population is riders, for example, can refer to riders who used transit on the specified survey dates. A survey that uses trips as the study population can be clear that results are specific to trips, with some riders represented multiple times.

Sample Frame

The sample frame is the listing of the study population from which the sample will be drawn. In a telephone survey of voter behavior, the sampling frame might be all residential phone numbers. On-board and intercept transit surveys can define the sampling frame in a number of ways. For on-board surveys, the sampling frame is typically based on bus or train routes or vehicle trips (defined as service from one end of the route to the other). The sample frame is therefore customers on these listed routes or vehicle trips. On-board bus and rail surveys reported by transit agencies generally adopted this approach.

One variation to this approach is to survey only high-ridership routes. Broward County Transit’s 2003 on-board bus survey was conducted on the 10 routes with the most ridership. This approach focuses survey resources on routes that are likely to generate the largest number of completed surveys. At the same time, there is the possibility that lower-ridership routes not surveyed would produce different responses. The results should thus be viewed as representative only of riders on the most used routes.

Surveys conducted at bus stops or rail stations typically define the sampling frame as stops or stations. For the light rail portion of the Denver-area Regional Transportation District (RTD) Customer Satisfaction Survey, the sampling frame was station platforms. Likewise, PATH’s O&D survey defined the sampling frame as all PATH stations.

Another approach is to survey at centralized nodes, such as transit centers or transfer facilities. The advantage of this method is that riders from a cross section of routes can be surveyed without having to disperse surveyors over every route. GRPC conducted interviews at a transit center and four transfer facilities for this reason. From a data accuracy standpoint, this approach is most appropriate if the large majority of customers pass through one of these central nodes.

The sampling frame may be further defined by time of day, choice of weekday or weekend, and direction of travel. These further refinements are designed to ensure that a representative sample is drawn for each segment; for example, each line, direction, or time-of-day combination. The use of this sampling frame in a stratified sample is discussed later in this chapter.

Sample

The sample is the group of people selected to be surveyed. As Trochim (2004) points out, the sample is not the group of people that actually complete the survey. Rather, the sample is the group of people that the researcher attempts to contact or recruit.

The sample may consist of the entire sample frame. For example, Pace Suburban Bus distributed its Customer Satisfaction Index/User Survey on all Pace buses over a 3-day period. More often, however, a subset of the sample frame is selected, typically through simple random sample procedures. For example, Los Angeles County Metropolitan Transportation Authority (Metro) created a digital file of all bus trips and used computer software to randomly select bus trips to assign to survey workers for an on-board customer satisfaction survey. Similarly, for a systemwide survey, MARTA randomly selects 1,000 bus and rail trips to be surveyed each year.

Simple random samples, as in these examples, are methodologically attractive because they maintain the basic principal of probability sampling: that each unit has an equal chance of being selected. Simple random samples can be difficult to field, however. Random selection of routes (or bus stops or stations) can result in survey workers spending an inordinate amount of time moving between assignments.

MARTA circumvents this problem by filling in surveyor time with other assignments through the course of the year. Another approach is to group bus trips, for example, to form coherent itineraries for survey workers. Each “package” of bus trips is then run through the random selection procedure. Santa Clara Valley Transportation Authority (VTA) used this approach for its 2000 On-Board Survey.

Although the sampling frame may consist of bus trips, subway stations, or light rail platforms, the sample itself inevitably consists of riders. The transition from vehicle trips or stations to riders is generally straightforward. In self-administered surveys, the sample typically consists of all persons riding the buses or trains that are in the sampling frame. However surveys are distributed, the transit agency attempts to enlist participation from every rider.

At times, however, it is necessary to select from within the group of people boarding the bus or otherwise falling into the sample frame. If survey workers are conducting personal interviews, for example, it is probably not possible for them to interview every person who boards the bus or passes through a station. Without a carefully implemented method of selecting which persons are approached, there is an acute chance that surveyors will gravitate toward persons who appear friendly and/or are similar to the surveyor. Transit agencies typically attempt to maintain the randomness of the sampling procedure by selecting every n th person. Thus, the King County Metro Ride Free Area survey selected for interviewing every third rider that boarded during non-peak times and every fifth rider that boarded during peak times. MARTA surveyors interviewed every fifth person to board the bus or train for a 5-min interview on travel patterns.

Not all agencies adopt a strict sampling procedure. Some agencies reported encouraging bus operators who

are charged with distributing surveys to attempt to distribute the surveys to a cross section of riders. The integrity of the sample can be affected by this approach, although clearly there may be logistical and budgetary reasons necessitating it.

Stratified Sampling

Although most on-board and intercept surveys reported by transit agencies used a simple probability sample, approximately one-quarter of these agencies reported using a stratified sample. The objective of stratification is to ensure that key subgroups of the population are represented in the overall population. Among on-board and intercept surveys, stratification is most often applied to time of day and route. The objective is to ensure that peak and non-peak hours, or each route, are represented in the sample and to control for variations in response rate within strata.

In a stratified sample, the sample frame is divided into mutually exclusive and exhaustive subsets. A simple random sample of elements is then chosen independently from each group or subset. A San Diego Association of Governments (SANDAG) On-Board Transit Passenger Survey, which covered 164 bus and rail routes in a large geographic area, was stratified based on route, direction, and time of day. Surveyors were assigned trips within each of four time periods for each route and direction combination.

In deciding how to stratify, a main goal is to divide the sample frame into relatively homogeneous groups. In the case of bus routes, agencies believe or assume that bus riders on a given route and rail riders at a given station and time period are relatively similar.

Some agencies stratify at a more generalized level. For example, the Regional Transportation Commission of Southern Nevada stratified based on quadrants of the agency’s service area. The Ann Arbor Transportation Authority (AATA) stratified for five groupings of bus routes.

The same sampling fraction can be used within each strata; for example, sampling one in every 10 bus trips for each route, time of day, and direction combination. Almost universally, transit agencies reported using the same sampling fraction for each strata, which is called a proportionate stratified random sample.

An alternative is to use different fractions to produce a disproportionate random sample. This approach provides statistically significant results for relatively small subgroups; for example, people using transit during late night hours. A proportionate stratified sample would likely produce too few surveys from this group to be statistically meaningful. TriMet oversampled light rail riders to obtain a meaningful number of responses from light rail riders.

Whether using proportionate or disproportionate sampling, weights are developed for each group (strata) in the sample once the surveying is completed. Weights are most often based on ridership. The weight for each stratum is calculated based on the ratio of total ridership for the strata and the number of surveys collected from that group. Total ridership may be for a given route, route and time-of-day combination, or station. As an example in a rail survey, WMATA weighted surveys to daily ridership by mezzanine.

For weighting by boardings, transit agencies measure total boardings in a variety of ways. SANDAG, for example, used automatic passenger counters to determine the number of passengers boarding for each route and time-of-day combination. Ridership can also be based on entries as recorded by bus fare boxes or turnstiles. Another method is for survey workers to count the total number of passengers entering, whether or not they accepted a survey form. (See chapter five for further discussion of the fieldwork protocols for these counts.)

Although most responding transit agencies weighted surveys by ridership, more complex methods are sometimes used, particularly for O&D surveys. A good example is PATH, which used an advanced statistical technique called iterative biproportional fitting to weight response by station entry and exit and time of day.

MINIMIZING SAMPLING AND NONRESPONSE ERROR IN SURVEY

The precision of a survey is determined by the amount of error created in the process of taking a sample and conducting data collection. Sampling error, which arises from surveying a sample of the study population rather than the entire population, is often the focus of discussion of survey error issues. There are other sources of error, however, including nonresponse error, coverage error (discussed earlier), and measurement error (discussed in chapter four).

Sampling Error

Virtually all on-board and intercept transit surveys involve taking a sample of the study population and are thus subject to sampling error. Because surveys rely on a sample of the population, survey results are likely to be somewhat different than if the entire population was interviewed.

The sampling error is an expression of the difference between the true (but unknown) value and observed values if, hypothetically, the survey were repeated numerous times. To use an example, suppose that an on-board bus survey found that 20% of riders transferred to another bus on the trip. The sampling error might be stated as plus or minus 3 percentage points with a 95% confidence level. The confidence interval (plus or minus 3 percentage points) is the

degree of precision and reflects the spread of observed values that would be seen if the survey were repeated numerous times. The confidence level (95%) is how often the observed transfer rate would be within 3 percentage points of the true transfer rate if the survey were repeated numerous times.

The sample size that is needed for a given survey depends on the population size and level of precision desired. If the researcher wants to be within 3 percentage points, for example, a sample size of 1,066 is required for a large population, but approximately one-half that number for a population of about 1,000. Table 8 provides sample sizes needed for three levels of precision (10%, 5%, and 3%) at a 95% confidence level for various population sizes.

In transit surveys, it is often desired to achieve a given level of precision for each of a number of major routes or for each of several time periods. In this situation, the sample size needs to be computed for each subgroup; for example, each route or day part. A Transit Authority of River City (TARC) survey, for example, developed the sample plan based on achieving a sampling error of 8 percentage points for routes with 1,000 or more average weekday boardings and 12 percentage points for routes with fewer weekday boardings. In addition, the bottom 10 routes in terms of ridership were sampled as one unit with a sampling error of 5 percentage points.

For surveys with stratified sampling, as in the TARC survey, calculating the sampling error for the entire survey must take account of the stratified sample design. One cannot simply use the overall number of responses to calculate the sampling error. Stratification may change the efficiency of the sample—in some cases improving efficiency (as when the strata are relatively homogeneous) or reducing efficiency (when the variance of each strata are about the same). The specific situation will affect the sampling error of the total sample.

Nonresponse Error

Another major source of error is nonresponse error, which results from failure to obtain completed surveys from some

TABLE 8
SAMPLE SIZES NEEDED FOR VARIOUS POPULATION SIZES
AT VARIOUS LEVELS OF PRECISION

Population	Sampling Error for 95% Confidence Level		
	±10%	±5%	±3%
200	65	132	169
400	78	196	291
1,000	88	278	517
6,000	95	361	906
20,000	96	377	1,013
1,000,000	96	384	1,066

Note: Sample size needed for each sampling error; responses with frequency of 50%.

portion of the population selected in the sample. It is inevitable that some riders refuse to take a survey, never return a survey that they took, or refuse to be interviewed. These respondents might have responded in the same way as respondents who did complete the survey, or they might not have. In contrast to sampling error that can be computed, there is no standardized way to compute the error that arises from nonresponse.

However, one can attempt to evaluate and possibly compensate for nonresponse. The likely impact from nonresponse can be evaluated by comparing characteristics of respondents with those of the entire population or those within the sampling frame. The comparison is sometimes made for rider characteristics such as gender, race, and place of residence, or for trip characteristics such as on and off locations.

DEVELOPING QUESTIONNAIRES

Questionnaires are at the heart of the survey effort, with survey questions the means by which the desired information is obtained from respondents. However, perhaps less obviously, questionnaires also convey the purpose of the survey, its importance, and the attitude of the sponsor toward respondents.

In developing on-board and intercept surveys, transit agency staff must choose the questions to be asked that will cover the topics identified in the survey planning and accordingly design the questionnaire. Staff must write the questions and answer choices and the text that introduces the survey to riders.

The wording of introductions, questions, and answer choices and the formatting of the questionnaire affect the quality of data collected. A well-written introduction and well-designed layout encourages transit users to participate in the survey, thus minimizing nonresponse error. Well-written questions, appropriate answer choices, and an easy-to-follow questionnaire design help respondents to understand the questions, provide accurate responses (thus minimizing measurement error), and answer all questions (minimizing item nonresponse).

Transit agency practices and relevant findings in the literature are discussed for each aspect of questionnaire drafting and design.

QUESTIONNAIRE INTRODUCTIONS

On-board and intercept transit surveys generally include a short introduction that explains the purpose and use of the survey and requests the recipient to complete the questionnaire. Introductory scripts used in personal interviews are similar to written introductions in self-administered questionnaires.

Introductions typically request cooperation, convey that the survey will help to improve transit service, and provide instructions on where to return the questionnaire. Stating the purpose of the survey and how the survey supports “group values” (e.g., improving bus and rail service) serves to motivate participation (Dillman 2000). By content and tone, introductions also convey a respectful attitude toward respondents, requesting their cooperation and assuring them that their answers will be taken seriously.

Examples of introductions are:

- “The Big Blue Bus [Santa Monica, California] needs your help to provide improved bus service. Please complete this survey and return it to the surveyor.”
- “The Santa Clara Valley Transportation Authority (VTA) wants YOUR help to improve transit services by completing this questionnaire and placing it in the return box at the rear exit before leaving the vehicle.”
- “Dear Customer: Please take a few minutes to complete this survey. Your answers will be used in evaluating [Greater Cleveland] RTA services. When you leave the vehicle, return the survey to the person collecting them or drop it in any mailbox. No stamp is needed. Thank you for taking time to complete this survey, and enjoy your ride.”
- “Dear Bus Rider: The Citizens Area Transit (CAT) is conducting a survey to improve bus services in Las Vegas. Please complete this form and drop it in the envelope by the bus door. Thank you for your cooperation.”
- “CTA would like to know more about your travel needs, in order to serve you better. Please fill out this brief survey, and return it to the person who gave it to you.”
- “Dear Bi-State Rider: Thank you for using Bi-State Transit [St. Louis] services. In order to improve our services, we are conducting a short survey of Metrolink and bus riders. Please take the time to complete this questionnaire, and when you are done, simply follow the folding instructions and place it in the mail. We will pay for postage. Your input will help us to serve you better. Thank you for your help. Tom Irwin, Executive Director.”

In sum, introductions are short and focused on motivating response. Information relating to specific questions is placed with the question to which it applies rather than in the introduction.

TOPICS AND QUESTION WORDING

On-board and intercept transit surveys are conducted for a range of purposes and the results are used in a wide variety of ways within transit agencies. Questions on the survey and response choices naturally need to serve the goals and objectives of the survey project. Therefore, it is useful to begin by

considering how survey objectives translate into specific survey questions.

Figure 1 schematically diagrams the relationships between agency needs, research questions, and survey questions. Agency needs relate to the goals and objectives discussed earlier. Each agency need results in one or more research questions. For example, agency marketing efforts can generate a variety of research questions ranging from who uses transit to how ridership can be increased.

In some cases, translating research questions into survey questions is straightforward. Transit users can be profiled in

terms of gender, age, income, etc., common topics for survey questions. In other cases, considerable thought needs to be given to how to translate research questions into survey questions. An example is the question of how ridership can be increased. As discussed here, in practice a variety of survey questions are used to address this issue.

This section is organized around the six research questions:

1. Where and when do customers use transit?
2. Who uses transit?
3. How satisfied are the customers?

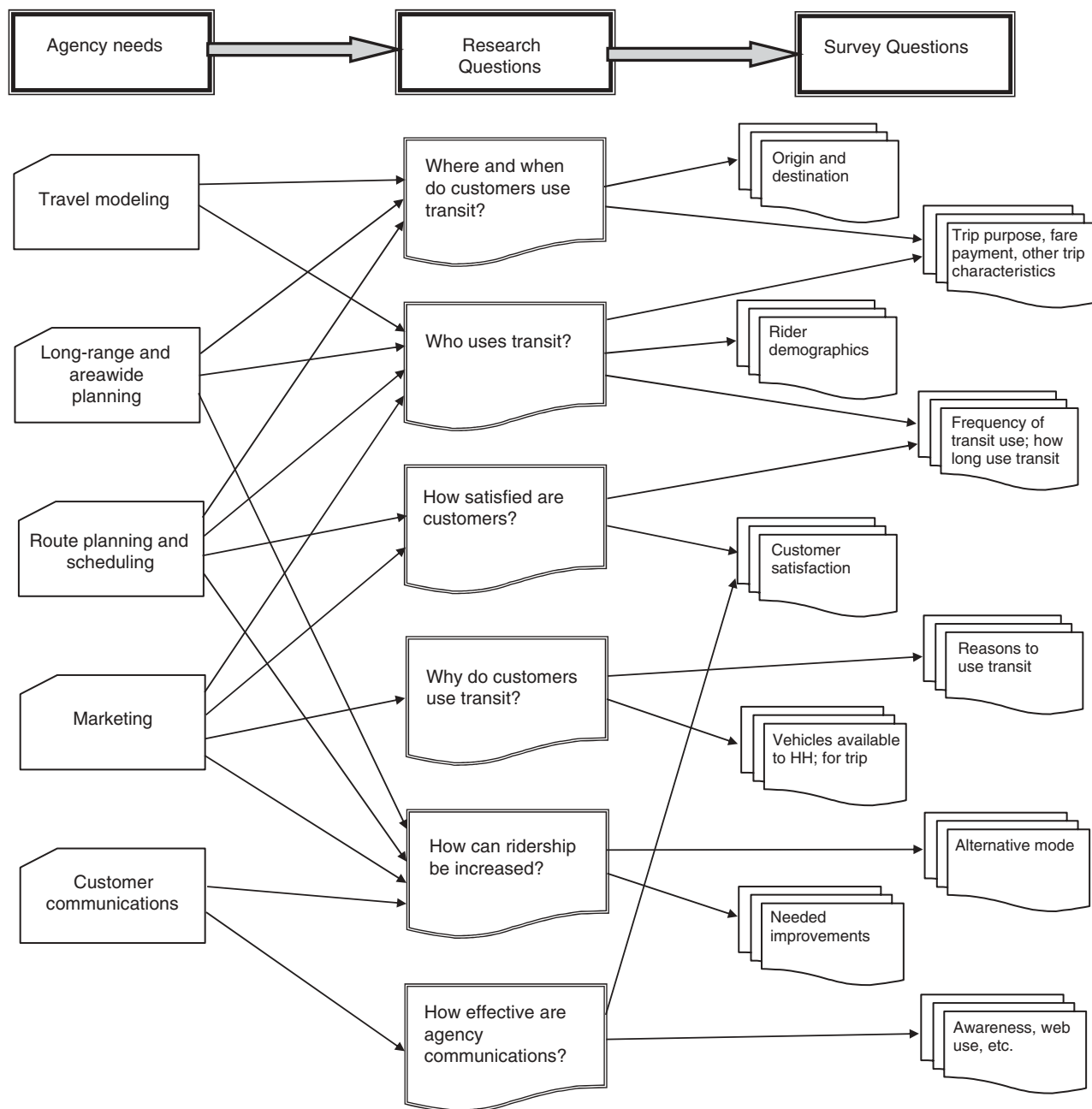


FIGURE 1 Translating agency needs into research questions and survey questions.

4. Why do customers use transit?
5. How can the agency attract increased ridership?
6. How effective are agency communications?

Question wording for each topic is discussed in the following sections.

Where and When Do Customers Use Transit

Many on-board and intercept transit surveys are primarily designed to obtain detailed information about each respondent's current trip. Survey results form a profile of where and when customers use transit services. The substantial body of O&D surveys reported by transit agencies reflects the usefulness of on-board and intercept surveys to capturing travel behavior information. On-board and intercept surveys are well suited to this purpose. Because the surveys are conducted during customers' actual trips, on-board and intercept surveys are able to cover the entire universe of riders. By inquiring about the current trip, surveys are able to minimize errors that arise from recalling past trips (as can occur in telephone, Internet, or mail surveys).

The most common travel behavior questions in questionnaires provided by transit agencies for this study concern specific aspects of "this trip."

- Origin,
- Destination,
- Purpose (work, shopping, return home, etc.),
- Access mode (e.g., walk, auto, bus, train),
- Egress mode (e.g., walk, auto, bus, train),
- Duration of access/egress trips,
- Waiting time for bus or train on this trip,
- Other routes used on this trip today, and
- Method of fare payment.

Trip Purpose and Access and Egress Modes

The wording of trip purpose, access, and egress questions was standardized through the Transit Performance Monitoring System (TPMS). TPMS was designed to collect data on transit customers through the use of on-board surveys using standardized questions. The program was funded through a cooperative agreement between FTA and APTA. From 1996 to 2003, the program collected survey results from approximately three dozen transit agencies (McCollom Management Consulting 2002, 2004).

Table 9 shows TPMS questions and response categories for trip purpose, access, and egress. Trip purposes were asked in terms of O&D activities. Trips from home to work, for example, were classified as work trips, as are trips from work to home.

TABLE 9
ACTIVITY-BASED ORIGIN AND DESTINATION SURVEY
QUESTIONS FROM TRANSIT PERFORMANCE MONITORING
SYSTEM

Activity at origin	1) Where did you come from before you got on this bus/train? <input type="checkbox"/> Work/work-related <input type="checkbox"/> Home <input type="checkbox"/> College/other school <input type="checkbox"/> Shopping <input type="checkbox"/> Medical services <input type="checkbox"/> Social, religious worship, personal business <input type="checkbox"/> Other _____
Access mode	2) How did you get to this bus/train? <input type="checkbox"/> Walked <input type="checkbox"/> Drove my car <input type="checkbox"/> Dropped off by someone <input type="checkbox"/> Rode my bicycle <input type="checkbox"/> Rode a bus/train <input type="checkbox"/> Rode with someone who parked
Activity at destination	3) Where are you going now? <input type="checkbox"/> Work/work-related <input type="checkbox"/> Home <input type="checkbox"/> College/other school <input type="checkbox"/> Shopping <input type="checkbox"/> Medical services <input type="checkbox"/> Social, religious worship, personal business <input type="checkbox"/> Other _____
Egress mode	4) When you get off this vehicle, how will you get to your final destination? <input type="checkbox"/> Walk <input type="checkbox"/> Drive my car <input type="checkbox"/> Get picked up by someone <input type="checkbox"/> Ride a bus/train <input type="checkbox"/> Ride my bicycle <input type="checkbox"/> Ride with someone who parked

Source: McCollom Management Consulting 2004.

O&D Questions

The most comprehensive O&D surveys obtain four locations for each trip: origin, boarding, alighting, and destination (OBAD). Each location is geocoded for further analysis and modeling. For riders who transfer between routes or modes, the surveys usually ask place of boarding the first bus or train and where the rider will alight from the final bus or train, as well as the route numbers for each segment of the trip. Although some O&D surveys use the full set of OBAD locations, others use boarding and alighting locations only.

O&D questions are a challenging type of question to formulate and present on the questionnaire owing to the detailed nature of the information and the nonintuitive character of the concepts employed in the questions; in particular, the concept of a one-way trip.

For modeling purposes, transit planners precisely define what they mean by a trip and each segment of the trip, starting from when travelers leave one activity site to when they arrive at the next activity site. Transit users are generally not familiar with this concept and may not think in these terms.

Thus, respondents may not understand the distinctions between origin and boarding, or between alighting and destination. For some trips, of course, the origin and boarding locations are the same and it may seem redundant to the respondent to be asked about both locations. In other cases, respondents view the trip to begin at the boarding location; so again, the origin appears to be redundant even though, by the intended definition, it is not.

Customers also may not understand how to report trips involving a transfer or stops along the way (linked trips, in the planner’s parlance). Sacramento Regional Transit District reports that customers transferring from light rail frequently report the transfer point as the end of the trip.

Respondents may not even correctly identify the start and end of the trip; some respondents provide round-trip information—what appears to be a home-to-home trip, for example—rather than a one-way home-to-shopping trip.

Another difficulty is that respondents simply may not know the address or intersection information. Transit staff report that riders who do not drive, in particular, may not know the street names at intersections, and therefore cannot report the intersection where they boarded the bus. Even when they know the exact address, riders may be reluctant to report the specific address, particularly for their place of residence.

Even when precisely reported, location information can pose data processing challenges, as when street names repeat in multiple cities within an agency’s service area (i.e., two or more “Main Streets”).

These problems are reported uniformly across O&D surveys. Although survey design, instructions, use of examples, and other measures may reduce the incidence of problems with the data, no agency reported having completely surmounted these challenges.

Transit agencies seek to overcome these problems by asking riders to narrate their trip, usually from beginning to end. This approach takes advantage of the linear nature of transit trips.

A typical sequence of OBAD questions is shown in Appendix C from a survey conducted for TARC. (Note that the survey was printed on 17 in. by 11 in. paper so that the two pages appear opposite each other in the version used in fieldwork.) The question sequence is:

1. “Where were you before riding this bus (beginning location)?” Answer choices are “My home,” “My work,” “Visiting friend or relative,” etc.
2. “What is the name of this place/building where you began this trip?” Boxes are provided to fill in the name of a place; an example of a bank is provided.

3. “What are the nearest cross streets or intersection of that place?” Boxes are provided for two street names.
4. “What is the exact street address of that place?” Boxes are provided for street number, street name, city, and zip code.
5. “Where did you board this bus?” Boxes are provided for cross streets and city.
6. “What time did you board this bus?”
7. “How did you get from the beginning location to the bus stop where you boarded this bus?” Response categories are provided for “Walk,” “Shuttle/vanpool,” “Rode with someone who parked,” etc.

Comparable information is asked for alighting location, destination location, and activity. Surveys for TriMet, CTA, and the Southern California Regional Rail Authority (known as Metrolink) follow similar question sequences (see Appendix C).

The concept behind this sequence of questions is that riders will most readily be able to report their trip by starting with their last activity and continuing sequentially. The survey communicates the idea of the start of the trip by asking, simply, “Where were you before riding this bus?” The survey communicates the definition of a one-way trip without using the word “trip” and without needing to explain what is meant by a one-way trip.

Most O&D questionnaires provide several ways to report each location: as a landmark, cross streets, or address (with city and zip requested to avoid problems with duplicate street names). In the experience of transit agency staff, providing all three ways to present location information produces more usable locations than providing only one or two ways.

The formatting of answer spaces for this information varies. Some surveys provide separate spaces for landmark, intersection, and address, as shown in the TARC survey in Figure 2. In practice, respondents typically complete only portions of the landmark/intersection/address section—hopefully reporting enough information for geocoding purposes.

Other surveys consolidate spaces for all three types of location information. For example, a TriMet survey provided blanks for the street name, nearest cross street, city, and zip code. (The full survey is in Appendix C.) TriMet staff believes that a simpler format is less intimidating to riders than the more extensive formats they used in earlier O&D surveys.

Even more simply, a SMART survey asked for the corner of two streets; instructions were under the lines specifying, “Address, street name, or landmark” and “Street name,” respectively (Figure 2).

Some agencies have experienced difficulty with the “street 1” and “street 2” terminology. CTA reports that these

What is the **NAME** of this place/building where you began this trip?
 ¿Cuál es el **NOMBRE** de ese lugar/edificio en dónde usted empezó este viaje?

Example / Ejemplo:
 R E P U B L I C B A N K

What are the **NEAREST CROSS STREETS** or **INTERSECTION** of that place? / ¿Cuál es la **INTERSECCIÓN DE CALLES MÁS CERCANA** a ese lugar?

Street 1 / Calle 1:

&

Street 2 / Calle 2:

Example / Ejemplo:
 W M A R K E T S T
 S I X T H S T

What is the **EXACT STREET ADDRESS** of that place? / ¿Cuál es la **DIRECCION EXACTA** de ese lugar?

Example / Ejemplo:
 6 0 1 W M A R K E T S T

Street # / # de la calle:

Street name / Nombre de la calle:

City / Ciudad:

Zip / CP:

3. At which stop did you get on this bus? Please give the address, an intersection, or a landmark:
 Corner of _____ and _____
 (Address, street name, or landmark) (Street name)

FIGURE 2 TARC (top) and SMART origin questions.

words elicited O&D streets from some respondents in its West Side survey (see Appendix D). The CTA Douglas Line survey asked for intersection, address, and landmark in one space, as shown in Appendix C. CTA staff believes that this approach is easier on field staff (because the questionnaire is simpler for respondents), although more labor intensive for coding staff. In the view of CTA staff, a more complex questionnaire would need more highly trained field workers.

Regardless of these wording and formatting choices, transit agencies uniformly report at least some difficulties with obtaining accurate and logical descriptions of riders' trips. Some agencies have experimented with reordering the questions. The CTA West Side Customer Travel Survey begins by asking, "What bus route are you riding now?" That question is followed by questions on alighting location, transfers, and origin activity (home, work, school, etc.) and origin location. The concept is to begin with a very well-defined question (current bus route) and work backwards to boarding and origin locations. CTA staff believes that there is merit to this approach, although respondents continue to have difficulty with the "Where are you coming from?" language.

Metrolink also asked for the boarding station as the first question for a survey of commuter rail riders, but found little difference in data quality from sequences that started with the "where came from" question.

Overall, it appears that avoiding the use of trip and one-way trip terminology is more effective than attempting to define or explain the meaning of these words.

Multisegment trips involving transfers also create confusion for respondents. Agencies marked by high transfer rates have used various approaches to improve the transfer information provided to them. For example, a Lane Transit District survey first asked whether the rider was using one bus or more than one bus on this trip, and if the latter, to specify the route number(s) (see Appendix C). Lane Transit District staff believes that overall this approach worked well, although there was some confusion about multisegment trips.

Surveys sometimes include examples of answers. The experience appears to be that providing example answers (as in the TARC survey) is effective, whereas examples of the meaning of instructions can be counterproductive. The CTA West Side survey that illustrated the meaning of one-way trips with a home to work example was taken to mean by some respondents that only home to work trips should be reported (see Appendix D).

Fare Payment

An important aspect of each trip is how the fare is paid. Agencies typically list fare payment options and ask respondents to check the one that applies to this trip. The list of

payment options can be quite extensive for agencies that have various passes and different rates for seniors, persons with disabilities, and students. One approach is to present the options in a matrix format, as illustrated on the TriMet questionnaire in Appendix C. Although there is reason to avoid matrix formats (as will be discussed later), the format appears to be workable for fare payment.

Who Uses Transit?

On-board and intercept transit surveys are widely used to profile characteristics of transit users. Transit agencies reported that information on customer characteristics is highly valuable for planning and marketing purposes and of keen interest to upper management. Rider profiles help provide a picture of who is using bus and rail services, without which it is difficult to think concretely about how to provide or market the services.

Profile information can be categorized as travel behavior (going beyond describing the current trip) and demographic information.

General Travel Questions

General travel questions used on questionnaires provided by transit agencies include:

- Frequency of using transit,
- How long the respondent has been using transit,
- Vehicles available to the household, and
- Alternative modes.

Frequency of transit use shows the degree to which riders are regular versus occasional users. Particularly when analyzed by trip purpose and time of day of travel, the frequency question can show what portion of riders' overall travel is served by transit, and suggest areas for potentially attracting current riders to use transit more often.

Duration of transit use is valuable information to show the turnover rate among riders. Some agencies find relatively high turnover among riders. TPMS found that nearly one-half of riders in small and large systems have been using transit for less than one year. However, the results are not uniform: a survey in Denver found that only 14% of RTD bus riders were new riders (less than one year). It would be important to investigate the factors causing rapid turnover, where present, which could well lead to prescriptions to retaining riders and thus growing overall ridership.

Wording of the frequency and turnover questions varies, as shown in Table 10. Frequency of transit use can be asked on a days per week (or month) basis, or trips within a defined time period (usually a week or month). The latter approach has the advantage of reflecting differences in the number of

trips per day and not simply the number of days transit is used. Capturing trips per day is most relevant for transit systems that are often used for more than one round trip per day. However, some surveys have found that an inordinate number of riders report using transit for five trips per week. Many of those responding in this way are presumably meaning 5 round-trips per week, or 10 one-way trips. The days per week wording sidesteps the problem of respondents not understanding the concept of trips.

For questions about the duration of transit ridership, question wording may or may not specify a threshold frequency of use. Thus, Pace Suburban Bus asks simply, "When did you begin riding Pace?" TPMS wording specifies "How long have you been a regular transit rider" and defines regular as at least once each week. CTTransit (Hartford, Connecticut) defines regular as at least once each month. Defining frequency works to ensure a uniform interpretation of the question.

The number of vehicles available to a household shows whether the rider may have an automobile available for the current trip. Table 10 shows wording used by several transit agencies and in the 2001 National Household Travel Survey and 2000 U.S. Census Bureau long-form questionnaire. Transit surveys often use trip-specific questions in addition to, or instead of, the household vehicle question, as discussed later in this chapter.

A standardized TPMS question, widely adopted, concerns the alternative mode for the current trip. If transit service were not available, would the respondent make the trip by car, walking, riding with a friend, taxi, bicycle, or not make the trip at all? The number that would not make the trip shows the degree to which transit provides basic mobility for riders. The number that would use an automobile documents transit's role in reducing traffic congestion, although the "ride with a friend" response does not indicate whether the friend is already making the trip.

Demographic Questions

Demographic questions can provide insight into travel behavior and customer attitudes. Demographic data can also be useful in assessing which markets transit is tapping and possible untapped or underdeveloped markets.

Demographic questions used on questionnaires provided by transit agencies cover the following topics:

- Gender,
- Age,
- Race and ethnicity,
- Have driver's license,
- Household income,
- Household size,
- Employment status,

TABLE 10
SURVEY QUESTIONS RELATED TO WHO USES TRANSIT

Frequency of transit use	TPMS How often do you use transit?	National Household Travel Survey (NHTS) In the past two months, about how often have you used public transportation such as buses, subways, streetcars, or commuter trains?	Pace (suburban Chicago) How many days per week do you ride Pace?	LYNX (Orlando) How often do you ride the bus?
	<input type="checkbox"/> 7 days a week <input type="checkbox"/> 6 days a week <input type="checkbox"/> 5 days a week <input type="checkbox"/> 4 days a week <input type="checkbox"/> 3 days a week <input type="checkbox"/> 2 days a week <input type="checkbox"/> 1 day a week <input type="checkbox"/> Twice a month <input type="checkbox"/> Once a month <input type="checkbox"/> First time riding	<input type="checkbox"/> Two or more days a week [11+ times] <input type="checkbox"/> About once a week [5–10 times] <input type="checkbox"/> Once or twice a month [2–4 times] <input type="checkbox"/> Less than once a month [one time] <input type="checkbox"/> Never	<input type="checkbox"/> Less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days <input type="checkbox"/> 6–7 days	<input type="checkbox"/> 5–7 days a week <input type="checkbox"/> 2–4 days a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once or twice a month <input type="checkbox"/> Less than once a month
	TriMet (Portland, OR) How many trips have you taken on a TriMet bus/MAX/streetcar in the last month? (Count each direction as one trip.) <input type="checkbox"/> 0 or 1 <input type="checkbox"/> 2 to 6 <input type="checkbox"/> 7 to 12 <input type="checkbox"/> 13 to 29 <input type="checkbox"/> 30 or more	RTD (Denver) How many one-way trips did you take on any RTD bus last week? (A round trip counts as two trips.) Please do not include trips you may have taken on the 16th Street Mall Shuttle or to events like the Rockies games. (Put “0” if none.) One-way bus trips last week _____		
How long a transit user	TPMS How long have you been a regular transit rider—at least once a week?	Pace (suburban Chicago) When did you begin riding Pace?	CTTransit (Hartford, CT) How long have you regularly—at least once a month—been riding transit?	
	<input type="checkbox"/> Less than a month <input type="checkbox"/> 1–6 months <input type="checkbox"/> 7–12 months <input type="checkbox"/> 1–2 years <input type="checkbox"/> 3–4 years <input type="checkbox"/> More than 4 years	<input type="checkbox"/> Less than 1 year ago <input type="checkbox"/> 1 to 2 years ago <input type="checkbox"/> 2 to 3 years ago <input type="checkbox"/> 3 to 4 years ago <input type="checkbox"/> 4 to 5 years ago <input type="checkbox"/> 5 to 7 years ago <input type="checkbox"/> 7 to 10 years ago <input type="checkbox"/> More than 10 years ago	<input type="checkbox"/> Less than a month <input type="checkbox"/> 1–6 months <input type="checkbox"/> 7–12 months <input type="checkbox"/> 1–2 years <input type="checkbox"/> 2–4 years <input type="checkbox"/> More than 4 years	

TABLE 10 (Continued)

Vehicles available to household	NHTS How many vehicles are owned, leased, or available for regular use by the people who currently live in your household? Please be sure to include motorcycles, mopeds, and RVs. —	2000 Census How many automobiles, vans, and trucks of one-ton capacity or less are kept at home for use by members of your household? —	TARC (Louisville) How many vehicles are in running condition and available for use by your household? <input type="checkbox"/> None <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4+	Sun Tran (Tucson) How many working vehicles (autos, trucks, motorcycles) are available in the household where you live or where you stay in the Tucson area? <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 or more	LYNX (Orlando) How many cars or trucks are in your household? —
Choice of mode were current mode not available	TPMS If transit service were not available how would you make this kind of trip? <input type="checkbox"/> Use a car <input type="checkbox"/> Walk <input type="checkbox"/> Ride with a friend <input type="checkbox"/> Use a taxi <input type="checkbox"/> Bicycle <input type="checkbox"/> I would not make this trip	TARC (Louisville) If bus service was not available, how would you make this trip? <input type="checkbox"/> Drive <input type="checkbox"/> Ride with someone <input type="checkbox"/> Taxi <input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Would not make this trip			

- Home ZIP code, and
- Internet access.

Question wording is relatively straightforward for these questions, and often standardized. Table 11 shows TPMS wording for demographic questions included in the TPMS project, and wording used by agencies for selected questions.

How Satisfied Are Customers?

Customer satisfaction and attitudinal sections of on-board and intercept surveys address the basic question, “How are we doing?” These questions reveal riders’ level of satisfaction and experience with bus and rail services. However, the questions do not necessarily show why riders use transit or where agencies should focus their resources.

Questionnaires provided by transit agencies typically ask for a rating of overall service and ratings for various attributes. The surveys use a variety of scales for these ratings. An alternative approach is to query riders’ direct experience with transit rather than rating service attributes.

Attribute Ratings

The most common approach to measuring customer satisfaction is to ask respondents to rate overall service and rate a series of attributes. The overall rating may be obtained as one item on the list of attribute ratings or as a separate question.

The number of service attributes presented—and the level of detail—varies widely. In questionnaires provided by transit agencies, the number of attributes ranged from 5 (Sun Tran, Tucson, Arizona) to 24 (CATS). Studies of customer satisfaction in transit have included as many as 48 attributes (Morpace International 1999).

Extensive attribute lists can include very specific aspects of service, such as posted signs on bus stops (CATS) and cleanliness of train interior (Metrolink) (Table 12). These attributes are of direct relevance and interest to operational divisions of the respective agencies and thus provide specific and timely feedback to operating personnel.

Lengthy attribute lists increase the length of the survey. Whether the amount of information collected is greater than for a shorter list is open to question, given that ratings for attributes touching on similar aspects of service are often highly correlated. The high level of correlation could reflect a similar level of performance across different attributes—for example, agencies that keep the trash emptied may keep stations and railcars clean as well. On the other hand, strong correlations between attributes may reflect a limit on how many different aspects of the transit user experience riders perceive. In a subway station environment, for example, users may perceive the station to be “clean and well lit”

without making distinctions between litter on the floor, overflow of trash cans, or brightness of the lighting.

It is possible to develop a concise attribute list that captures the different aspects of the user experience and thus reduces survey length. Studies that use qualitative methodologies such as focus groups or advanced statistical methodologies such as factor analysis and structural equations have found that the user experience can be distilled into 7 to 10 service attributes (Strategic Marketing & Research 1997; Stuart I. Brown Associates 1997; Stuart et al. 2000; Weinstein 2000; Miller et al. 2002; Zhou et al. 2004) Although the wording of the attributes varies between transit systems, they generally cover the following areas:

- Timely service (frequency of service, predictability of bus or train arrivals),
- Speed of service,
- Cleanliness (on board and in station),
- Safety/police presence,
- Comfort,
- Driver courtesy and friendliness,
- Crowding,
- Cost/value, and
- Information availability and ease of use.

Interestingly, the studies identified crowding as an issue among larger agencies but not smaller agencies, whereas driver courtesy and friendliness was highlighted only by the smaller agencies.

LYNX and TriMet surveys illustrate attribute lists that reflect these basic aspects of service (Table 12).

Ratings Scales

Ratings of attributes may employ either a verbal or numeric scale. Commonly used verbal scales include 5-point scales ranging from “Very satisfied” to “Very dissatisfied” or from “Strongly agree” to “Strongly disagree.” These scales have the advantage that each point on the scale is clearly positive or negative, with a neutral point in the middle.

Another common verbal scale uses the short, easily understood words, “Excellent,” “Good,” “Fair,” and “Poor”; however, whether “Fair” is a positive or negative rating can be open to interpretation.

Numeric scales are also commonly used. Such scales typically range from 1 to 5, 1 to 7, or 1 to 10. Numeric scales are easily fit on the page. Scores can be averaged and the average can be easily tracked over time. On the other hand, scores can be difficult to interpret; is a “5” a satisfactory score?

Agencies sometimes combine numeric and verbal scales. For example, questionnaires may use a 1 to 5 scale but

TABLE 11
DEMOGRAPHIC SURVEY QUESTIONS

Gender	TPMS I am... <input type="checkbox"/> Male <input type="checkbox"/> Female			
Age	TPMS My age is: <input type="checkbox"/> Under 15 <input type="checkbox"/> 15 to 18 <input type="checkbox"/> 19 to 24 <input type="checkbox"/> 25 to 34 <input type="checkbox"/> 35 to 49 <input type="checkbox"/> 50 to 64 <input type="checkbox"/> 65 or more			
Income	TPMS What is your total household income? <input type="checkbox"/> Under \$20,000 <input type="checkbox"/> \$20,000–\$29,999 <input type="checkbox"/> \$30,000–\$39,999 <input type="checkbox"/> \$40,000–\$49,999 <input type="checkbox"/> \$50,000–\$59,999 <input type="checkbox"/> \$60,000–\$79,999 <input type="checkbox"/> \$80,000 or greater	RTD (Denver) Which one of the following categories best describes the total annual income, before taxes, for all persons in your household? <input type="checkbox"/> Under \$15,000 <input type="checkbox"/> \$15,000–\$24,999 <input type="checkbox"/> \$25,000–\$34,999 <input type="checkbox"/> \$35,000–\$49,999 <input type="checkbox"/> \$50,000–\$74,999 <input type="checkbox"/> \$75,000–\$99,999 <input type="checkbox"/> \$100,000 or more	Sun Tran (Tucson) What do you estimate was the combined total annual income (before taxes) in 2003 for everyone who lives in that household? <input type="checkbox"/> Below \$5,000 <input type="checkbox"/> \$5,000–\$9,999 <input type="checkbox"/> \$10,000–\$19,999 <input type="checkbox"/> \$20,000–\$29,999 <input type="checkbox"/> \$30,000–\$39,999 <input type="checkbox"/> \$40,000–\$49,999 <input type="checkbox"/> \$50,000–\$59,999 <input type="checkbox"/> \$60,000–\$74,999 <input type="checkbox"/> \$75,000 or more	TARC (Louisville) What was your estimated total household income (in 2003) before taxes? <input type="checkbox"/> <\$20,000 <input type="checkbox"/> \$20,000–\$39,999 <input type="checkbox"/> \$40,000–\$59,999 <input type="checkbox"/> \$60,000–\$79,999 <input type="checkbox"/> \$80,000–\$99,999 <input type="checkbox"/> \$100,000+
Household size	TPMS Including yourself, how many people live in your household? _____	NHTS Including yourself, how many people live in your household? Please do not include anyone who usually lives somewhere else or is just visiting, such as a college student away at school. <input type="checkbox"/> ____	Sun Tran (Tucson) Including yourself, how many people live in the household where you live or where you stay in the Tucson area? <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 or more	
Internet access	NHTS During the last 6 months, did you have access to the Internet or world-wide web? <input type="checkbox"/> Yes <input type="checkbox"/> No	CTTransit (Hartford, CT) Do you have Internet access? <input type="checkbox"/> Yes <input type="checkbox"/> No	TARC (Louisville) Do you have access to the Internet at any of the following locations? (Mark all that apply.) <input type="checkbox"/> At home <input type="checkbox"/> At work <input type="checkbox"/> At school <input type="checkbox"/> At the local library <input type="checkbox"/> I don't have access to the Internet <input type="checkbox"/> Other places (specify)	Pace (suburban Chicago) Do you have access to the Internet at home? at work? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No

TABLE 12
SURVEY QUESTIONS RELATED TO CUSTOMER SATISFACTION

TriMet (Portland, OR)

Please read the following statements and answer using the 5-point rating scale.

- Cleanliness inside bus
- Safety while on-board
- Reliability of service
- Frequency of service
- Overcrowding
- Overall service

Scale: 1 (poor) to 5 (excellent)

LYNX (Orlando)

Evaluate LYNX services:

- Routing
- On time
- Safety
- Cleanliness
- Operator courtesy
- Fare
- Frequency
- Hours of operation
- Overall service

Scale: Excellent, Good, Fair, Poor, Very poor, Don't know

Sun Tran (Tucson)

Do you agree or disagree with the following statements?

- Transit services operate on time.
- I feel safe when riding the bus.
- Drivers are helpful and friendly.
- Route/schedule information is easy to use.
- Buses are clean and well-maintained.

Scale: Strongly agree, Agree, No opinion, Disagree, Strongly disagree

Pace (suburban Chicago)

Please indicate your level of satisfaction with Pace service on a scale from 1 to 5, where 5 is Very Satisfied and 1 is Very Dissatisfied.

- Overall satisfaction with Pace
- How driver obeys and enforces rules
- Accuracy of route information
- Availability of route information
- Driver courtesy
- Posted signs at bus stop
- Personal safety on bus
- Ease of fare payment
- Cleanliness inside buses
- Total travel time
- Service connections
- Personal safety at bus stops
- Responses of telephone representatives
- Service when and where desired
- Reliability of equipment
- Buses running on time
- Drivers safe driving
- Value of service for fare paid
- Availability of bus shelters
- Notification of service changes

Scale: 1 (very satisfied) to 5 (very dissatisfied)

Metrolink (Los Angeles area)

Please rate each feature associated with traveling on Metrolink trains.

- Travel time on Metrolink vs. car
- On-time arrivals
- Connecting transit buses at station
- Availability of free unreserved parking at station
- Availability of paid and reserved parking at station
- Availability of seating on the train
- Cleanliness of train interior
- Safe operation of trains
- Personal security on the train
- Personal security at the station
- Trains free of defects (heat, doors, etc.)
- Ease of purchasing tickets
- Courtesy of Metrolink conductors
- Cost of a Metrolink ride

CATS (Charlotte, NC)

Rate how well CATS performs in each area.

- Buses are on time
- Bus passes are sold at convenient locations
- Travel time on the bus is reasonable
- Buses are clean inside
- The Transit Center is clean and well maintained
- It's easy to get bus information on the phone
- The transit system serves all parts of the city
- Buses begin running early enough in the morning
- Buses continue to run late enough at night
- There is frequent bus service on weekdays
- There is frequent bus service on Saturdays
- There is frequent bus service on Sundays
- Bus fares are reasonable
- You feel safe from crime at the Charlotte Transit Center
- You feel safe from crime on the bus

TABLE 12 (Continued)

<input type="checkbox"/> Communication of schedule changes	<input type="checkbox"/> Taking the bus is relaxing
<input type="checkbox"/> Communication of delays	<input type="checkbox"/> The bus ride is comfortable
<input type="checkbox"/> Schedule convenience	<input type="checkbox"/> Bus drivers are courteous
<input type="checkbox"/> Ease of getting information at 800-371-LINK	<input type="checkbox"/> Bus drivers are knowledgeable
Scale: 1 (dissatisfied) to 5 (satisfied). Also asked for importance on 1 to 5 scale	<input type="checkbox"/> Bus drivers are safe drivers
	<input type="checkbox"/> Bus drivers are sensitive to the needs of passengers
	<input type="checkbox"/> Bus drivers greet you
	<input type="checkbox"/> Complaints/suggestions get a quick response
	<input type="checkbox"/> The system provides a valuable service to the community
	Scale: 1 (very poor) to 5 (excellent). Also asked for importance on 1 to 5 scale

anchor the “1” and “5” as “Very satisfied” and “Very dissatisfied,” respectively.

Simple “Yes” and “No” scales may be also be used where appropriate, as when asking whether the respondent would recommend transit to others.

See Appendixes C and D for examples of ratings scales in sample questionnaires.

Direct Experience with Transit

Another approach to relating the customer experience to agency performance is to ask riders specific questions about their user experiences, either for the current trip or overall experience. A good example is presented in a CTTTransit on-board survey. The survey asked respondents whether buses arrive within 5 min of the scheduled time “Always,” “Sometimes,” “Most times,” or “Not very often.” Similar questions pertained to the courteousness of bus operators, bus cleanliness, availability of timetables and notices, and helpfulness of telephone center representatives. (See Appendix D for the full questionnaire.)

Similarly, a GCRTA survey asked riders to “grade RTA’s services for this trip.” Attributes included GCRTA arriving at the stop as scheduled, GCRTA driver being courteous, GCRTA seating comfort, and if the GCRTA shelter is clean.

Why Do Customers Use Transit?

A key objective of many on-board and intercept surveys is to understand why riders use transit. What are the key drivers that prompt members of the traveling public to choose the bus, subway, light rail, or commuter rail over alternatives that range from automobiles to walking?

Questionnaires provided by transit agencies show a wide variety of approaches to surveying on this topic. One approach is to focus primarily on the availability of an automobile as the primary alternative mode, with some surveys simply asking whether the respondent had an automobile available for this trip. People who have a car available for the

trip are viewed as “choice” riders, who are using transit because of the quality of service or other factors. Individuals who do not own a car or do not have a car available for this trip are classified as “transit dependent” or “captive.” They are assumed to use transit for lack of an alternative.

Whether riders that do not have an automobile available are truly captive is open to question. National surveys show that people living in zero-vehicle households still make far more trips by private automobile (34%) than by transit (19%) (Pucher and Renne 2003). Survey results from 18 transit agencies, reported through the TPMS program, show that one-quarter of riders surveyed would “ride with someone else” if transit were not available for the trip, whereas 20% would walk or bike and 11% would take a cab (McCullom Management Consulting 2004). Thus, even riders who, based on lack of automobile ownership appear to be captive appear to have several means of transportation available to them.

Some surveys take a more nuanced approach to the automobile availability question. TriMet, for example, has four categories (results from 2000 survey are in parentheses):

- I do have a car but prefer to use TriMet (43%).
- I don’t have a car because I prefer to use TriMet (14%).
- I don’t have a car available for me to use (28%).
- I don’t drive or don’t know how to drive (15%).

These categories acknowledge that the availability and quality of transit service may encourage some riders to forego buying a car (or a second car) even though they could afford to do so. In a sense, they choose to be captive riders.

Other on-board and intercept transit surveys look not only at automobile availability but also to other factors that affect mode choice. Table 13 shows examples from several surveys that ask why respondents are using transit for this trip, or why they use transit generally. Variation in the wording of answer choices reflects different local conditions, but answer choices can be summarized as:

- Do not drive,
- No car available (or allows someone else to use the car),

TABLE 13
SURVEY QUESTIONS RELATED TO WHY CUSTOMERS USE TRANSIT

Reasons for using transit	<p>VTA (San Jose, CA)</p> <p>What is your main reason for using transit in Santa Clara County?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Have no other way <input type="checkbox"/> Better use of time <input type="checkbox"/> Costs less <input type="checkbox"/> Faster than driving <input type="checkbox"/> Allows someone else to use the car <input type="checkbox"/> Fewer problems than using car <input type="checkbox"/> Car in shop <input type="checkbox"/> Good for the environment <input type="checkbox"/> Other (specify) 	<p>Pace (Chicago area)</p> <p>Why did you use Pace today instead of another way of traveling?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Don't drive <input type="checkbox"/> No car available <input type="checkbox"/> Reduces pollution <input type="checkbox"/> Prefer transit <input type="checkbox"/> Can read or relax <input type="checkbox"/> Unavailable parking <input type="checkbox"/> No license <input type="checkbox"/> Cheaper than driving <input type="checkbox"/> Expensive parking <input type="checkbox"/> Other 	<p>Bi-State Development Agency (St. Louis)</p> <p>What is the main reason you use Bi-State transit services?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cheaper than driving <input type="checkbox"/> Faster than driving <input type="checkbox"/> I don't drive <input type="checkbox"/> No car available <input type="checkbox"/> Traffic is too bad <input type="checkbox"/> Parking is too expensive <input type="checkbox"/> More relaxing than a car <input type="checkbox"/> Friends use transit <input type="checkbox"/> Employer helps pay fare <input type="checkbox"/> Better for the environment <input type="checkbox"/> Other (specify) 	
	<p>TriMet (Portland, OR)</p> <p>What is the major reason you are using the bus for this one-way trip? (Check one best answer.)</p> <ul style="list-style-type: none"> <input type="checkbox"/> I do have a car but prefer to use TriMet. <input type="checkbox"/> I don't have a car because I prefer to use TriMet. <input type="checkbox"/> I don't have a car available for me to use. <input type="checkbox"/> I don't drive or don't know how to drive. 		<p>Big Blue Bus (Santa Monica, CA)</p> <p>What are the most important reasons you are riding the bus today?</p> <ul style="list-style-type: none"> <input type="checkbox"/> I do not own a car <input type="checkbox"/> Someone else has the car <input type="checkbox"/> The bus is faster than walking <input type="checkbox"/> Parking is expensive <input type="checkbox"/> I do not like to drive in traffic <input type="checkbox"/> The bus is faster than driving <input type="checkbox"/> To help the environment <input type="checkbox"/> I do not have a driver's license <input type="checkbox"/> My employer pays for bus fare 	
	<p>MetroLink (Los Angeles)</p> <p>Please think about when you first started riding MetroLink. What was the single most important reason that made you take MetroLink? (Choose one.)</p> <ul style="list-style-type: none"> <input type="checkbox"/> I had moved to a new residence and needed a new way to commute <input type="checkbox"/> I got a new job or job location and needed a new way to commute <input type="checkbox"/> My employer gave me a free MetroLink ticket <input type="checkbox"/> My employer paid for part of my MetroLink pass <input type="checkbox"/> A family member, friend, or co-worker told me about MetroLink <input type="checkbox"/> I have seen advertising for MetroLink and was curious <input type="checkbox"/> The MTA strike forced me to find alternate transportation <input type="checkbox"/> I took the train to a special event <input type="checkbox"/> I was traveling in a group <input type="checkbox"/> My car was being repaired <input type="checkbox"/> My car was being used by another family member <input type="checkbox"/> I could not drive my car for medical reasons <input type="checkbox"/> The high cost of gas <input type="checkbox"/> I served on jury duty and received a free MetroLink ticket <input type="checkbox"/> I received an offer in the mail <input type="checkbox"/> Other (please specify) 			
Availability of auto for this trip	<p>TPMS</p> <p>Do you have a car or other personal vehicle that you could have used to make this trip?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No 	<p>SANDAG</p> <p>Did you have a car that you could have used today instead of the bus?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No 	<p>DART</p> <p>Do you have a car available to you to make this trip?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No 	<p>VTA (San Jose, CA)</p> <p>Was an auto available to you for this trip?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> Yes, but with inconvenience to others <input type="checkbox"/> No

- Faster than driving,
- Avoid driving in traffic,
- Better use of time (e.g., read and relax),
- Cost of driving and/or parking, and
- Environmental considerations (reduces pollution).

This list is consistent with transit research findings that mode choice is largely driven by the cost and availability of parking, travel times (especially out of vehicle time), price, comfort and convenience (Charles River Associates 1997; Dueker et al. 1998; Schaller 1999; Miller et al. 2002).

How Can an Agency Attract Increased Ridership?

Closely allied to the issue of why people use transit is the question of how to attract additional ridership. Although related, the two issues are quite distinct. Some riders use tran-

sit for most work trips; for example, to avoid parking costs or avoid the stress of traffic, but take the automobile on days when they will come home later in the evening. In this example, the reasons for using transit (parking and traffic) are different from actions that would attract increased usage, which might be more frequent evening service. As another example, some riders use transit for work but not shopping trips, owing to buses not conveniently serving trips to the mall.

Transit questionnaires tend to take a straightforward approach to assessing ways to increase ridership. Questionnaires provided by transit agencies ask what the agency “could do to improve bus service” (Broward County Transit), what “would motivate you the most to continue riding or ride more often?” (Pace Suburban Bus), or use similar wording. The surveys then provided a list of possible service improvements. Respondents are instructed to check the one to three most important service improvements (Table 14).

TABLE 14
SURVEY QUESTIONS RELATED TO IMPROVING TRANSIT AND ATTRACTING INCREASED RIDERSHIP

Needed improvements	Broward County (FL) Transit Please tell us three things that we could do to improve bus service. Please check only up to three:	RTD (Denver) What is the single most important area, if any, in which RTD should make improvements to its’ bus service?
	<input type="checkbox"/> More bus routes <input type="checkbox"/> Fewer transfers <input type="checkbox"/> Park & ride lots <input type="checkbox"/> More information <input type="checkbox"/> More frequent bus service <input type="checkbox"/> Express buses <input type="checkbox"/> More evening and weekend service <input type="checkbox"/> More comfortable buses <input type="checkbox"/> Better on-time performance <input type="checkbox"/> Bus stop shelters/benches <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Cost <input type="checkbox"/> Comfort <input type="checkbox"/> Convenience <input type="checkbox"/> Customer information <input type="checkbox"/> Travel time <input type="checkbox"/> Park-n-ride <input type="checkbox"/> Bus driver performance <input type="checkbox"/> Telephone information center (TIC) <input type="checkbox"/> Security/safety <input type="checkbox"/> None
	Pace (suburban Chicago) What is the ONE item listed below that would motivate you the MOST to continue riding or to ride more often? <input type="checkbox"/> Reduce fares <input type="checkbox"/> Provide stops closer to my home <input type="checkbox"/> Run buses more often <input type="checkbox"/> Change the schedule <input type="checkbox"/> Reduce travel time <input type="checkbox"/> Run express service more often <input type="checkbox"/> Serve more destinations <input type="checkbox"/> Improve on-time performance <input type="checkbox"/> Improve safety while driving <input type="checkbox"/> Improve safety while waiting <input type="checkbox"/> Make transit information more accessible <input type="checkbox"/> Provide a more convenient connection to final destination <input type="checkbox"/> Run service from free parking lots to busy Metra stations <input type="checkbox"/> Other (please specify) <input type="checkbox"/> Nothing—will not consider riding or riding more often <input type="checkbox"/> Does not apply—I ride as often as I can	LYNX (Orlando) What bus service improvements are most needed? (Check top three.) <input type="checkbox"/> Frequency <input type="checkbox"/> New routes <input type="checkbox"/> Night and weekend service <input type="checkbox"/> Shelters <input type="checkbox"/> Pre-paid fare cards <input type="checkbox"/> Free transfers <input type="checkbox"/> Additional transfer locations <input type="checkbox"/> Other _____

Responses to these questions can be enlightening. Among the 11 choices provided by Broward County Transit, responses clustered around three improvements related to more service (more frequent bus service, more bus routes, and more evening and weekend service), and two other improvements (better on-time performance and bus stop shelters and benches). Agency staff felt that the results demonstrated opportunities to increase ridership among current riders. The results thus provided clear direction toward providing additional service for existing customers rather than adding routes in lower density areas, which had been done previously.

Similarly, a LYNX survey found that night and weekend service, and more frequent service, to be the service improvements that riders felt were most needed.

Lists of service attributes may pose a substantial respondent burden because respondents must compare each answer choice with the others and then make a selection (Dillman 2000). The respondent burden can be reduced in two ways. First, it is important that response choices be as concrete as possible and mutually exclusive. Second, respondents can be asked to choose the most important (or three most important) items rather than be asked to rank the items. Ranking is a more difficult task. The Broward County Transit and LYNX surveys illustrate questions that follow these guidelines.

Choosing from lists of service attributes requires that respondents be thoughtful and reflective about the reasons that they use transit and other modes. Responses are subject to rationalizations and a desire by some respondents to answer in a socially acceptable manner.

An alternative approach, illustrated by questions developed from focus group research in New York and Chicago, is to ask respondents to simply report their experience of using transit. Focus groups in these cities found that riders choose the mode that presents the fewest or least severe problems in terms of travel time, on-time reliability, safety, cost, comfort, etc. The focus groups also found that different types of trips (e.g., work and non-work, peak, and non-peak) encounter different types of problems (Schaller 1999).

Survey questions were designed to measure the incidence of problems with transit service. In a CTA on-board survey, riders were asked to indicate how often problems occurred for “the type of trip you are making today, considering the reason for the trip and your destination.” Survey results identified strengths and weaknesses of CTA service for work and non-work trips for different geographic areas. From this information, the agency was able to assess alternative strategies to capture a greater share of total travel (Miller et al. 2002).

How Effective Are Agency Communications?

Finally, on-board and intercept surveys on occasion measure awareness of advertising or agency websites, providing feedback to the agency marketing and public information departments. As illustrated in Table 15, questions in this topic area may include recall of agency advertising and media used, channels used to obtain service information, and visitation to the agency’s website.

QUESTIONNAIRE DESIGN AND LAYOUT

Questionnaire design is a critical element of survey development. Although Dillman (2000) reports that mail survey clients often overlook the importance of design, surveys provided by transit agencies display considerable care in question ordering, lay out, font selection, and other design aspects.

Transit staff surveyed cited the use of short questionnaires and simple, carefully worded questions as keys to successful on-board and intercept surveys. Surveys provided by transit agencies are often one to two pages long. They typically employ a simple, consistent, linear flow of questions that clearly defines the desired navigation path through the questionnaire. Questions on the same topic are grouped together. Questions are usually numbered sequentially, with few if any skips. Instructions are kept to a minimum and placed within the question to which they apply. Notably, Dillman (2000) advises following these same design principles in mail surveys.

Question Ordering

Question ordering is a key aspect of questionnaire design. Dillman (2000) recommends that the first question be easy to answer, apply to all respondents, be interesting, and be clearly connected to the purposes and topic of the survey.

Nearly all transit O&D surveys begin with questions about the current trip, usually with a question about where the trip began. Transit staff starts with O&D questions primarily to be sure to obtain the trip information, even if respondents do not complete the rest of the survey. This approach appears to be consistent with Dillman’s advice to start with questions that apply to all and are clearly connected with the survey topic and purposes.

On the other hand, trip questions may be of relatively less interest to riders and are not necessarily easy to answer. Dillman suggests starting with attitudinal questions, which are likely to have high salience with respondents, rather than factual questions of less interest. However, it has not been tested whether starting transit surveys with attitudinal questions would increase response rates.

TABLE 15
SURVEY QUESTIONS RELATED TO AGENCY COMMUNICATIONS AND INFORMATION

Communications	<p>Pace (suburban Chicago)</p> <p>Do you recall any advertisements about Pace service during the past 2 months?</p> <p><input type="checkbox"/> Yes—go to 26A.</p> <p><input type="checkbox"/> No—skip to 29.</p> <p><input type="checkbox"/> Not sure—skip to 29.</p> <p>Where did you see, hear, or read them? (Mark all that apply.)</p> <p><input type="checkbox"/> TV (specify)</p> <p><input type="checkbox"/> Radio (specify)</p> <p><input type="checkbox"/> Newspaper (specify)</p> <p><input type="checkbox"/> Other (specify)</p>	<p>CTTransit (Hartford, CT)</p> <p>Where do you receive bus information?</p> <p><input type="checkbox"/> On bus</p> <p><input type="checkbox"/> Telephone</p> <p><input type="checkbox"/> Sales outlet</p> <p><input type="checkbox"/> Work</p> <p><input type="checkbox"/> Online</p> <p><input type="checkbox"/> At bus stop (Guide-a-ride)</p>	<p>LYNX (Orlando)</p> <p>How do you get information about LYNX?</p> <p><input type="checkbox"/> On the bus</p> <p><input type="checkbox"/> Mail</p> <p><input type="checkbox"/> Work</p> <p><input type="checkbox"/> Phone</p> <p><input type="checkbox"/> Internet</p> <p><input type="checkbox"/> Word of mouth</p> <p><input type="checkbox"/> Newspaper/magazine</p> <p><input type="checkbox"/> Shopping center/convenience store</p> <p><input type="checkbox"/> Other _____</p>	<p>VTA (San Jose, CA)</p> <p>What are the best ways for VTA to get information to you? (Check up to three.)</p> <p><input type="checkbox"/> VTA Take One</p> <p><input type="checkbox"/> VTA website/e-mail</p> <p><input type="checkbox"/> Inside bus advertising</p> <p><input type="checkbox"/> VTA telephone customer service</p> <p><input type="checkbox"/> Downtown customer service center</p> <p><input type="checkbox"/> Mail</p> <p><input type="checkbox"/> Information at stops/stations</p> <p><input type="checkbox"/> Radio (which station?)</p> <p><input type="checkbox"/> Newspaper (which newspaper?)</p> <p><input type="checkbox"/> Other (specify)</p>
Website visitation	<p>CTTransit (Hartford, CT)</p> <p>Have you visited the CTTRANSIT website at www.cttransit.com?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>RTD (Denver)</p> <p>Have you ever used RTD's website to obtain bus trip information?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>		

Non-O&D transit questionnaires typically begin with factual questions about ridership frequency, trip purposes, or customer attitudes about service.

The ordering of attitudinal questions should take into account biases that may be introduced by the order in which questions are asked. One source of bias is from the tendency of respondents to make their answers to each question consistent with answers to previous questions. In an example from the literature, a study of happiness found that for married persons, a question on general happiness received more positive responses when asked after a question about marital happiness than did the general happiness question by itself. This result suggested that “asking the marital question first tended to increase positive responses to the general question by causing it to be defined in terms of marital happiness” (Schuman and Presser 1996). In survey research parlance, this is known as a part–whole question combination in that one question is more general and in some sense contains part of the more specific question.

Analogous transit survey questions pertain to satisfaction with service overall and with specific aspects of service. To avoid biases, it is advisable to obtain a rating for overall service before ratings questions for reliability, speed of service, routing, etc.

Another consistency effect can occur when respondents answer questions in light of an earlier answer on a different but related topic. An example in the literature showed slight changes to respondents’ self-classification of their subjective social class (upper class, middle class, working class, or lower class) depending on placement of a question on their education and occupation (Shuman and Presser 1996). It is possible that respondents answered the social class question to conform to their educational and occupation levels when the education and occupation questions were asked before social class. This possible effect can be avoided if the “objective” questions are asked after other questions or, at minimum, if the questions are separated on the survey by other topics. An application to transit surveys would suggest putting automobile ownership and availability questions after questions about alternative modes for this trip.

Navigation Guides

Questionnaire layout and formatting provide visual clues to guide respondents in navigating from one question to the next and properly marking answers to each question.

Most on-board and intercept surveys provided by transit agencies use simple, clean-looking layouts. The questionnaires typically use black type on white or other light-colored paper, and there is minimal use of shading in most question-

naires. Agencies rely on several simple formatting devices to aid navigation:

- Questions begin in the upper left corner;
- Vertical one or two-column formats;
- Sequential questionnaire numbering from beginning to end;
- Bold questions and light answer choices to clearly distinguish questions from answer;
- Check-off boxes used to indicate answer choices; and
- Minimal use of lines between columns or sections of the questionnaire, thus avoiding visual clutter.

These practices are consistent with Jenkins and Dillman (1993) and Dillman’s recommendations for mail surveys (2000).

Transit agencies sometimes use shading to highlight answer spaces. A Sun Tran O&D survey used dark shading for questions, light shading for the background to answers, and white boxes for answer choices (see Figure 3 for a portion of the Sun Tran questionnaire). However, write-in answer spaces for addresses and open-ended questions were shaded. The practice of other carefully developed questionnaires, such as the 2000 U.S. Census, is to use shading for questions and white space for all answer areas including any fill-in answers (U.S. Census Bureau 2000).

Two areas that show a range of different transit practices involve the layout of answer choices and use of matrixes.

Answer Choices: One, Two, or Three Columns?

As Dillman (2000) notes in the context of mail surveys, designers of transit surveys sometimes decide to save space by listing answer choices in two or three columns, particularly when a large number of choices are involved. Surveys provided by transit agencies frequently adopt multi-column formats or list choices horizontally on the same line. Questions 13 to 15 in Figure 4 (taken from a GCRTA survey) provide examples of both horizontal and multi-column answer formats.

Although multi-column or horizontal formats save space, they also interrupt the vertical flow of the questionnaire. These practices tend to increase the burden of the respondent, which tends to increase item nonresponse. In addition, respondents may overlook answer choices in the second or third column. The order of choices may therefore influence the results of the survey. The degree to which results are affected by format in transit surveys has apparently not been tested; however, the possibility of an effect certainly exists.

The issue is whether these costs in respondent burden and impact on results are worth the gain in reducing questionnaire

12) How many days a week do you **usually** ride RTA? (Check **one** answer)
 First Time Ever Less than once a week 1 2 3 4 5 6 7

13) How long ago did you start using RTA? (Check **one** answer)
 Up to one year ago One year ago or up to two years ago Two years ago or up to three years ago
 Three years ago or up to five years ago Five years ago or more

14) Thinking about how often you ride RTA **buses** now as compared with a year ago, would you say you now ride?
 (Check **one** answer) Much more often
 Somewhat more often About the same
 Somewhat less often Much less often

15) Thinking about how often you ride RTA **rapid transit trains** now as compared with a year ago, would you say you now ride?
 (Check **one** answer) Much more often
 Somewhat more often About the same
 Somewhat less often Much less often

16) If you answered "...less often" for either bus, train, or both, please tell us why you changed your riding pattern; otherwise, go to question 17

(TURN PAGE)

16. How did you travel to that METROLINK station ?
 (Choose one for longest part of trip)

1 Drove alone in a car
 2 Drove alone in a company car
 3 Was dropped off at station
 4 Carpooled
 5 Rode a bike

6 Rode MTA-Metro ▶ **Which line (s):**

1 Gold line 4 Red line
 2 Green line
 3 Bus #: _____

7 Rode the DASH bus # _____

8 Rode a different bus ▶ **Bus company:** _____
Bus #: _____

9 Rode an employee van/shuttle
 10 Walked _____ minutes
 11 Other (please specify) _____

FIGURE 4 Excerpts from GCRTA (top) and Metrolink surveys with skip questions. GCRTA survey also illustrates multi-column and horizontal answer layouts.

Matrix Formats

The primary exception to linear question sequences in surveys provided by transit agencies is an occasional use of matrix formats. Rather than having a question and list of answer choices, the questions and choices are arranged in some type of grid.

Transit agencies most often use matrix-type formats for O&D questions. An example is shown in Figure 5.

There appears to be a natural logic to using a matrix for O&D questions because each question used for the origin is repeated for the destination. Questionnaires in a matrix-type design can align the comparable O&D questions. A matrix format might also convey the meaning of a one-way trip.

Transit agencies reported mixed success with matrix formats, however. Although more logical to some respondents, the matrix formats produce a large block of type at the top of the survey. Intended navigation is also less clear, because respondents are expected to jump from the bottom of the left part of the matrix to the top of the right part, then down and to the left to continue with the survey.

The experience of the U.S. Census Bureau is relevant to this issue. Before 2000, the Census Bureau used a matrix format for long-form questions about each household member. Based on testing, it replaced the matrix format for the 2000 Census. In 2000, the agency asked all the questions about one person in the household in a linear format before moving on to the next person. The new approach lengthened the questionnaire from 20 to 28 pages but, in testing, improved the response rate by 3 to 4 percentage points (Dillman 2000).

COMING FROM	GOING TO								
<p>1a. Where did you come from on this one-way trip? (check one best answer)</p> <p><input type="checkbox"/>₀₁ Home <input type="checkbox"/>₀₅ Personal business <input type="checkbox"/>₀₈ Visiting friends/relatives <input type="checkbox"/>₀₂ Work <input type="checkbox"/>₀₆ Shopping <input type="checkbox"/>₀₉ Medical appointment <input type="checkbox"/>₀₃ School <input type="checkbox"/>₀₇ Other: _____ <input type="checkbox"/>₀₄ Recreation: _____</p> <p>1b. Where was that located? Fill in:</p> <ul style="list-style-type: none"> • a street address and the city OR • a street with the nearest cross street and the city OR • a landmark → with specific location details, for example, <i>John's Grocery on Hawthorne.</i> <p style="text-align: center;">(circle one) NE SE NW SW</p> <p>Street: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>N</td><td>S</td><td>E</td><td>W</td></tr></table> _____</p> <p>Nearest Cross Street: _____</p> <p>City: _____ Zip Code: _____</p> <p>2. How did you get to the stop/station for this bus/MAX? (check one)</p> <p><input type="checkbox"/>₀₁ Walked _____ # blocks <input type="checkbox"/>₀₄ Transferred from MAX <input type="checkbox"/>₀₂ Drove and parked <input type="checkbox"/>₀₅ Dropped off by someone <input type="checkbox"/>₀₃ Transferred from bus #: _____ <input type="checkbox"/>₀₆ Other: _____</p>	N	S	E	W	<p>3a. Where are you going on this one-way trip? (check one best answer)</p> <p><input type="checkbox"/>₀₁ Home <input type="checkbox"/>₀₅ Personal business <input type="checkbox"/>₀₈ Visiting friends/relatives <input type="checkbox"/>₀₂ Work <input type="checkbox"/>₀₆ Shopping <input type="checkbox"/>₀₉ Medical appointment <input type="checkbox"/>₀₃ School <input type="checkbox"/>₀₇ Other: _____ <input type="checkbox"/>₀₄ Recreation: _____</p> <p>3b. Where is that located? Fill in:</p> <ul style="list-style-type: none"> • a street address and the city OR • a street with the nearest cross street and the city OR • a landmark → with specific location details, for example, <i>John's Grocery on Hawthorne.</i> <p style="text-align: center;">(circle one) NE SE NW SW</p> <p>Street: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>N</td><td>S</td><td>E</td><td>W</td></tr></table> _____</p> <p>Nearest Cross Street: _____</p> <p>City: _____ Zip Code: _____</p> <p>4. How will you get to that location from this bus/MAX? (check one)</p> <p><input type="checkbox"/>₀₁ Walk _____ # blocks <input type="checkbox"/>₀₄ Transfer to MAX <input type="checkbox"/>₀₂ Drive <input type="checkbox"/>₀₅ Be picked up by someone <input type="checkbox"/>₀₃ Transfer to bus #: _____ <input type="checkbox"/>₀₆ Other: _____</p>	N	S	E	W
N	S	E	W						
N	S	E	W						

FIGURE 5 TriMet 2000 O&D survey using matrix formatting.

TriMet moved from a matrix format for O&D questions in its 2003 and earlier Ridership Surveys to a vertical format in the 2004 survey (see Appendix C). In pretests, TriMet found that the vertical format produced a better response rate.

On the other hand, Metrolink has been satisfied with a similar format for its O&D section. It is possible that the favorable conditions of a commuter rail line (long trips, good lighting, an upscale demographic) contribute to this positive experience.

Aside from O&D questions, transit agencies have used matrix formats successfully for attitude and fare payment questions. Customer attitude questions are often formatted in matrixes with service attributes down the left column and the ratings scale repeated horizontally (see the LYNX Question 16 in Appendix D). This format saves space and has proven easy to complete. Dillman (2000) noted that the format encourages respondents to place each item in a comparative framework. Respondents think about their rating for on-time arrivals, for example, relative to their rating for cleanliness. Often, this is exactly the intention of survey designers. If not intended, questions should be asked separately.

The increasing complexity of many transit agencies' fare structures has led some to use matrices for fare payment questions, largely to save space. TriMet reports that customers have become accustomed to this format in the agency's annual survey. Ease of responding is probably helped because respondents are being asked to check only one box and by showing the price of each fare option next to each box.

Branching and Skips

Although transit surveys tend to ask respondents to answer every question, occasionally the need arises to ask a follow-up question to a subset of riders, based on their answer to a previous question. This need introduces the challenge of asking respondents to follow instructions for skipping certain questions.

For example, Metrolink asked customers who accessed a Metrolink station by bus to report bus company and bus line information. GCRTA asked an open-ended question of respondents who currently use transit less often than they did a year ago (see Figure 4).

The difficulty with skips is that respondents may not read the instructions or follow the arrows. Therefore, respondents who rode the same amount or more often than they did a year earlier answered the GCRTA skip question, as well as those who ride less often. In the analysis, GCRTA filtered out the first two groups and focused on open-ended answers from only the "ride less" group. In this way the agency was able to achieve its research objective.

Use of Other Languages

Transit agencies often serve a multi-ethnic population that has varying proficiency in the English language. A number of agencies take for granted that customer communications should offer customers a choice of English and other languages, primarily Spanish. In the survey of transit agencies, 43% reported using both English and Spanish in the survey

TABLE 16
RESPONDENT USAGE OF FOREIGN LANGUAGE OPTION

Agency	Survey Project	Completed Surveys	Completed in Spanish	Percentage Completed in Spanish	Completed in Other Languages (no. and percentage)
Metro (Los Angeles)	2004 On-Board Customer Satisfaction Survey	14,265	5,125	35.9	
Santa Monica (CA) Big Blue Bus	Line-by-Line Analysis	4,709	895	19.0	
CTA (Chicago)	Douglas Branch Blue Line Passenger Survey	1,756	319	18.2	
VTA (San Jose)	2000 On-Board Survey	18,351	2,953	16.1	Vietnamese 40 (0.2%)
CTA (Chicago)	West Side Customer Travel Survey	5,200	398	7.7	Polish 6 (0.1%)
CTTransit (Connecticut)	Bi-annual passenger survey	4,500	300	6.7	
TriMet (Portland, OR)	Origin Destination Survey—Systemwide 2000	81,100	4,000	4.9	
TriMet (Portland, OR)	Annual Fare Survey	15,179	594	3.9	
LTD (Eugene, OR)	2004 Origin/Destination Study	5,528	185	3.3	
RTD (Denver)	Customer Satisfaction Survey	3,654	120	3.3	
Metrolink (L.A. area)	2004 Onboard Survey	13,470	323	2.4	
Pace Suburban Bus (Chicago area)	CSI/User Study	7,937	160	2.0	
TARC (Louisville)	Project Gobility	4,211	85	2.0	

questionnaire. Included in this figure is 5% of agencies that used English, Spanish, and a third language, either Vietnamese (in Orange County and Santa Clara County, California) or Polish (in Chicago). The remaining 57% of the questionnaires used English only.

For the most part, a large majority of riders complete surveys in English. For surveys in which transit agencies reported the breakdown of returned surveys by language, one-half reported that fewer than 5% of respondents chose the Spanish option. The use of Spanish questionnaires can be quite high in certain cities, however: Los Angeles (36%), Santa Monica (19%), Chicago (8% in one survey, 17% in another survey), and San Jose (16%) (Table 16). Use of the Vietnamese and Polish languages options was 0.2% or less.

The layout of multilanguage questionnaires takes essentially two approaches. One approach is to reproduce the same questionnaire in both (or all three) languages. The alternatives may be presented side-by-side on one page, on the front and back of the same sheet of paper, or by using separate sheets of paper. The specific choice depends largely on the length of the questionnaire.

The advantage to this approach is a cleaner visual appearance for each language. The disadvantage is that respondents may overlook the version of the survey in their preferred language in the case of front-and-back printing. Some agencies have observed that some passengers, if they look at the “wrong” side of the questionnaire first, simply set it aside rather than flipping it over. In situations where separate sheets of paper are used for different languages, survey workers need to determine which version to give riders. This need can introduce awkwardness or, at minimum, creates an additional step in the distribution of questionnaires.

The alternative approach is to include Spanish text immediately after the English text. The O&D TARC questionnaire in Appendix C illustrates this approach, which avoids the problems mentioned above and may reduce space requirements. However, it also appears more cluttered, which could possibly affect response rates, item nonresponse, and/or accuracy of answers.

Surveying Respondents Who Cannot Read

Although some respondents can complete a questionnaire in Spanish (or another language) but not English, another problem that arises involves riders who are not able to read in any language. AATA (Ann Arbor, Michigan) reported that some of its riders cannot read. Although survey workers assist these riders, AATA staff believes that this portion of AATA’s customer base is underrepresented in the survey.

Another issue that arises concerns persons with visual impairments. TriMet provides Braille cards that ask the person to call a phone number and be interviewed on the phone. TriMet also provides large-font surveys and, time permitting, surveyors administer surveys verbally on-board.

PRETESTING QUESTIONNAIRE

Pretesting is a standardized step in questionnaire development. The objective is to determine how well the questionnaire is working before commencing the fieldwork and to make any needed changes for clarity of questions, navigation, etc.

Surveys can be pretested in the field using actual survey procedures. Surveys can also be pretested using a convenience sample such as nearby office workers who use transit, but are not familiar with the purposes and details of the survey. In either case, respondents are asked to complete the survey as they would in the fieldwork phase. If possible, it is useful to ask for verbal feedback from respondents on any questions that are unclear. Finished questionnaires can be checked for completeness, consistency, and any apparent accuracy problems.

Pretesting is critical for new surveys and complex questions or question sequences. Pretesting may not be necessary if essentially the same questionnaire is used from a previous survey. For surveys reported by transit agencies, pretesting was conducted in 45% of the cases.

SURVEY FIELDWORK AND DATA PROCESSING

Data collection is one of the most important phases of on-board and intercept surveys—and also one of the most challenging. Fieldwork is challenging because the locus and scope of the project expands. Although survey planning involves a relatively small number of people in centralized offices, fieldwork involves a relatively large number of survey workers, supervisors, and respondents, usually spread over a geographically disparate area. Project staff generally has less direct control and oversight of this phase of the overall survey project than any other project phase.

Planning for data collection takes into account four primary considerations: costs, data quality, duration, and manageability. Each of these considerations is affected by the method of data collection. Who will be used as survey workers? How will they be recruited, trained, and supervised? How will workers be deployed in the field? How will their safety be ensured? How will the quality of their work be monitored?

To some extent choices may necessitate tradeoffs. Deploying survey workers in pairs may increase response rates, data quality, and safety but also increase costs. Obtaining survey workers from a temporary employment agency may reduce staff time for fieldwork but increase the amount of training and supervision needed. On the other hand, some choices may be beneficial across the board. For example, using a pool of experienced part-time survey workers may reduce costs for training and supervision while also improving data quality.

Planning for survey data collection can leverage the core strength of on-board and intercept surveys; namely, the direct contact between survey workers and transit riders. Friendly, courteous, and engaging survey workers can achieve response rates equal to or greater than response rates for other types of surveys. Survey workers can answer questions and assist respondents as necessary. Survey workers can also disburse small-value incentives, such as free ride coupons, directly to respondents. The survey team can accurately track the total number of surveys completed as they are received. Tracking is particularly useful in surveys with route, location, and/or time-of-day quotas, because survey workers can be kept in the field until the target number of surveys is obtained for each stratum. Data processing can begin as completed surveys start to arrive, thus speeding the pace of the project.

Data collection planning must also address the sometimes-daunting challenges that are inherent to fieldwork. Survey staff must be recruited and trained. Supervision and monitoring must be arranged for geographically dispersed survey workers. Unpredictable events ranging from adverse weather to accidents or other disruptions in transit service must be dealt with, often with little or no warning. While adhering to the sampling plan, survey workers need to be deployed with an eye toward cost-efficiency.

Key steps in data collection are:

- Identification and recruitment of survey staff,
- Survey staff training,
- Supervision, and
- Safety.

IDENTIFICATION AND RECRUITMENT OF SURVEY STAFF

Data collection can be carried out by in-house transit agency staff, consultants, or academic institutions. Most transit agencies surveyed have used both consultants and in-house staff for on-board and intercept fieldwork in the previous 3 years. Approximately 7 in 10 agencies reported using transit agency staff, and about the same proportion have used consultants for one or more surveys in the past 3 years. By contrast, only 8% used academic institutions for any fieldwork during this period.

Looking specifically at the 58 on-board and intercept surveys that transit agencies reported on in detail, fieldwork was conducted as follows:

- By consultants (50%), primarily using a combination of permanent staff (e.g., supervisors) and temporary workers hired for the purpose.
- By transit agency staff (34%), primarily by permanent staff or, in a few cases, by part-time workers hired directly by the agency. A few agencies use a combination of permanent and temporary staff.
- By a combination of transit agency and consultant staff (12%).
- By academic institutions (3%).

Transit agencies are inclined to use in-house staff for relatively small surveys involving samples of 2,000 or fewer

riders. Agency staff can be diverted from staff functions for a period of a few days at most to carry out the survey. When used, temporary staff hired directly by transit agencies often work part-time for extended periods on one or more surveys.

Some agencies reported innovative approaches to obtaining survey staff at minimal cost. CTA recruits survey workers through postings on college campuses. These “volunteers” are compensated with free fare media and work no more than a few days a month. The episodic nature of the work matches both the students’ availability and CTA’s needs. One volunteer has worked for several years and become quite skilled at obtaining a high response rate.

The quality of available temporary workers can affect the duration of data collection. For example, the Greater Portland (Maine) Council of Governments chose to use a smaller number of reliable staff over a 3-week period rather than have a large concentration of temporary staff finish the survey in 1 week. Conversely, the Oshkosh Transit System found that a condensed 2-day time frame to collect data using temporary in-house staff worked extremely well.

Larger surveys tend to exceed the in-house resources of transit agencies. Therefore, consultants are typically used for surveys requiring samples of 5,000 or 10,000 or more riders. Consultants usually bring in temporary workers obtained from temporary agencies or the consultant’s own recruitment efforts.

Here too, duration of surveying can affect costs and data quality. It is likely to be less expensive for a consultant to field a survey on a continuous basis than to conduct the survey in a “blitz” implementation. Continuous surveys need fewer survey workers at any one time and will, by their nature, use more experienced survey workers. Costs for training and supervision will also be lower. MARTA’s Systemwide Survey is a good example of the benefits of continuous surveying.

SURVEY STAFF TRAINING

Although data collection tasks such as distributing and collecting surveys may seem to require minimal skills, the experience of transit agencies is that some potential survey workers are much more effective than others. The aptitudes required are actually quite varied. Survey workers must be punctual and able to identify and reach the correct survey location. They must give attention to detail in tracking surveys, yet also be reasonably outgoing in greeting passengers. Survey workers must be able to greet passengers with a friendly countenance and a direct gaze. They must possess the stamina to work on a moving bus or train for hours at a time. They must also have the fortitude and good judgment to mollify the occasional disgruntled rider or bus operator.

Given the breadth of aptitudes required, proper training of survey staff is essential. Training is designed to ensure that

survey procedures are carried out properly and to maximize response rates. Training may cover a range of topics:

- Survey purposes,
- Deployment and scheduling,
- How to approach passengers,
- How to aid passengers who request assistance in completing the survey,
- Tracking refusals,
- Safety,
- Dress,
- Behavior and courtesy, and
- Record keeping.

Survey workers are often provided with detailed written instructions. The instructions list tasks to be completed at the start of the shift, during survey administration, and at the end of the shift.

Training typically takes between 30 min and 4 h, although a large survey for Pinellas Suncoast Transit Authority involving on-board interviewing required a full day of training. The length of training depends primarily on the experience level of the survey workers. New temporary workers are often given 4 h of training, whereas experienced survey staff may only need 30 to 60 min to become familiar with the current operation.

For new survey workers in particular, training is likely to include role playing of the interaction with customers. Role playing helps survey workers learn how to approach riders in a friendly, courteous manner to maximize participation in the survey. Role playing may also cover action regarding refusals and problem situations.

Effective training is critical to the overall success of on-board and intercept surveys. Transit agency staff surveyed for this report cited friendly and experienced survey staff, outgoing personalities, and proper appearance as key factors affecting data quality and response rates.

SUPERVISION

In addition to recruiting and training survey workers, effective supervision and monitoring is critical to the success of the data collection effort. Proper supervision is crucial to ensuring that survey staff is at their assigned locations and carrying out survey procedures. Transit agencies reported experiences in which surveyors went absent without notice and in which they falsified data.

Supervisors generally issue work assignments to survey staff at the beginning of each shift. For assignments that begin in the early morning, assignments are usually made on the previous day. In either case, survey workers turn in surveys collected from the previous shift and are given their next assignment. Supervisors can check the surveys at this time for quality and completeness.

The work of survey staff is often reviewed during the fieldwork as well as at the end of the shift. Supervisors may randomly observe and monitor surveyors on board buses and trains or at transit centers. Some agencies also use “mystery shoppers” (anonymous observers) to monitor surveyors. One agency asks drivers to report any problems with survey administration.

Transit agencies (and their consultants) employ a variety of approaches to dispatching survey workers to their starting locations. The approach depends on the configuration of the transit service, time of day, and other factors. In large bus surveys using temporary workers, for example, survey workers are often required to provide their own transportation to the starting location. Staff may be boarding the first bus run of the morning at bus garages in relatively remote parts of town and public transportation may not be available.

In other situations, most or all bus routes serve a central terminal such as a downtown transfer center. Dispatching survey workers from a terminal facilitates close supervision from a central location.

An important consideration for on-board bus surveys involves bus operators. Transit agencies noted that bus operators must be aware that a survey will be conducted and must feel comfortable with having survey workers on the bus. The workers must not interfere with passenger boarding. Los Angeles County Metropolitan Transportation Authority (Metro) has surveyors board buses at the terminal rather than on the street. This ensures that the surveyor boards the correct bus and that the bus operator trusts the surveyor. The surveyor rides out to the bus in a support vehicle with the operator if it is a second or third shift.

SAFETY

One-third of transit agencies surveyed reported taking steps to protect survey workers’ physical safety, whether from crime or accidents. Agencies issue high-visibility or fluorescent safety vests to protect against accidents, and also to convey to the public that these workers are part of the transit system. During training, survey workers may be instructed on when to stand on buses or trains and when to be seated to avoid injury. Surveyors working on trains are sometimes given rail safety instruction.

To address concerns about crime, transit agencies have surveyors work in teams of two, particularly at night. Agencies sometimes limit the hours the survey is conducted (to the 8 a.m. to 5 p.m. period, in one case) and avoid assigning female surveyors to night shifts. Agencies also issued workers identification badges, alerted police officials to survey schedule dates, and notified bus operators that survey workers would be on their buses.

DATA CLEANING AND DATA PROCESSING

Once surveys have been returned from the field, the task of checking, cleaning, and tabulating the data can be substantial. This is especially the case for large O&D surveys where addresses, intersections, and landmarks must be geocoded.

Particularly in the case of O&D surveys, transit staff emphasizes the importance of beginning data editing and coding as soon as surveys are completed. That way, corrective action can be taken to mitigate aspects of the fieldwork that may be affecting data quality. In addition, the overall workflow goes more smoothly if data collection commences during the fieldwork.

Transit agencies report various requirements and procedures for completeness, data editing, and cleaning. Agencies also use a variety of software for data processing and analysis.

Completeness

More than one-half of agencies surveyed required that either a certain percentage of questions be answered or that certain key questions be answered for the survey to be considered complete and usable. The percentages used ranged from 25% to 90%; most agencies that used this approach cited a percentage of more than 50%.

Agencies that required certain key questions to be answered tended to focus on questions related to O&D, trip purpose, and fare type. Greater Portland (Maine) Transit District required that the O&D questions be completed. WMATA required that O&D and jurisdiction of residence be completed. TriMet’s Annual Fare Survey required that fare and transfer questions be answered. Sun Tran required that O&D and other trip-specific questions be answered, but not satisfaction and demographic questions.

Four in 10 agencies surveyed required that all questions on the survey be answered for the survey to be considered complete and usable. Many of these were short surveys or surveys conducted by means of personal interviews. However, self-administered surveys for the Lane Transit District, Fort Worth Transportation Authority, Milwaukee County Transit System, Metra (Chicago area), Southwest Ohio Regional Transit Authority, Potomac & Rappahannock Transportation Commission, Transit Authority of Northern Kentucky, Tompkins Consolidated Area Transit, Southeastern Pennsylvania Transportation Authority (SEPTA), Sacramento Regional Transit District, and Merrimack Valley Regional Transit Authority required that all questions be answered.

Six in 10 O&D surveys reported by transit agencies required that all O&D survey questions be answered for the survey to be considered complete and usable. Agencies not requiring that all O&D information be complete generally

required that at least one part of the start of the trip (origin or boarding) and one part of the end of the trip (alighting or destination) be complete.

Data Editing and Cleaning

Two in three transit agencies surveyed implemented editing procedures or other steps in data cleaning and data processing to ensure the accuracy of the data. Most commonly, agencies checked for logic and consistency in the answers—e.g., whether transfers made sense based on the routes involved and eliminating self-reported “home to home” trips. Other procedures were to eliminate outliers in the data based on the number of standard deviations from the mean and proofing the accuracy of data input.

For O&D surveys many agencies conducted extensive address editing procedures to geocode as many locations as possible. Data processing procedures included checking the consistency of trip direction, distance, and speed with O&D locations and transit routing information; verifying addresses against geographic information system databases, and using landmark look-up tables. See Table 17 for survey results on data processing for address information.

TABLE 17
STEPS TAKEN IN VALIDATING ADDRESS DATA

Action taken	Percentage
O&D direction logical with bus/train direction	62
Looked at route/line used for trip	62
Used logic or consistency checks	57
Verified addresses/intersections using GIS software	48
Used landmark listing	43
Speed of trip logical for O&D distance and time of trip provided by respondent	10
Speed and distance reasonable for origin–boarding and alighting–destination pairs based on mode of access/egress (e.g., don’t walk 20 miles or at 60 mph)	5
Other	38

Total number of respondents, 21.
O&D = origin and destination; GIS = geographic information system.

Consultants (or academic institutions) were responsible for data cleaning and data processing for 64% of the surveys reported by transit agencies. The transit agency was responsible for these tasks in 23% of the surveys. The consultant and agency shared data cleaning and data processing duties in the remaining 13% of surveys.

Tabulating

Several database software packages are used for tabulating survey results. Surveys reported by transit agencies used both traditional database software such as SPSS, Microsoft Access, and SAS, and spreadsheet software such as Microsoft Excel (Table 18).

Some agencies have had positive experiences with using scanners to input data. Scanning reduces data entry needs and can produce data quickly. Other agencies however have found that the intelligence applied during data entry (especially O&D data) is essential to the process and cannot be replicated using scanners. Some agencies have also found that scanners introduce errors during the data capture process and as a result, take more time than manual data entry.

TABLE 18
SOFTWARE USED IN TABULATING RESPONSES

Software	Percentage
SPSS	50
Microsoft Excel	50
Microsoft Access	12
SAS	9
Wincross	3
Other software, primarily GIS software	14

Total number of respondents, 19.
GIS = geographic information system.

RESPONSE RATES

Response rates are critical to both survey quality and survey costs. High response rates minimize nonresponse error and thus reduce the impact of nonrespondents being different from those responding to the survey. High response rates also reduce the costs of carrying out the survey by reducing the number of survey worker hours needed to obtain the targeted number of completed surveys and, in the case of self-administered surveys, by reducing the number of questionnaires that need to be printed.

MEASURING RESPONSE RATES

Careful thought needs to be given to calculating response rates and comparing response rates between surveys. Ideally, response rates are computed as the number of surveys returned and usable (the numerator) as a percentage of the number of riders asked to participate in the survey (the denominator, or base). For example, if 1,000 riders are offered questionnaires as they board a sample of buses and 400 accept and return their questionnaires, the response rate is 40%. Similarly, if 1,000 riders are approached in a transit center for an interview and 600 agree to be interviewed and complete the interview, the response rate is 60%.

In practice, agencies reported response rates using a variety of different numerators and denominators, as summarized in Table 19. Depending on which counting method is used, and whether the study population is people or trips, response rates can be difficult to compare on an apples-to-apples basis.

One “base” (denominator) often used is the number of customers asked to participate in the survey. This base is appropriate when the study population is trips (rather than people) and customers are asked to complete a second or third survey if they are encountered by a survey worker a second or third time. In practice, this base is most workable in large systems because customers are rarely encountered more than once by a survey worker. Thus, the problem of riders being disinclined to complete a survey more than once does not arise. An example of this situation is the SANDAG O&D survey in San Diego.

Another often-used base is the number of surveys distributed. This number is almost always less than the number of customers asked to participate in the survey, and therefore overstates the response rate.

Some agencies use an estimate of the number of unique riders as the base figure. This is appropriate in customer satisfaction surveys that do not expect riders to complete multiple surveys. Thus, LYNX and Pace Suburban Bus used an estimate of unique riders based on boardings, transfer rates, and trips per day per customer. Both were one-day surveys that attempted to include all riders using the bus on the survey day(s).

The calculated response rate is also affected by the choice of numerator. Agencies generally reported the number of surveys “completed and returned.” As discussed here, some agencies require that every question be answered for a survey to be considered complete, whereas others set a lesser standard; a choice that affects the measured response rate.

RESPONSE RATES REPORTED BY TRANSIT AGENCIES

Response rates reported by transit agencies vary widely, from a low of 13%, for a survey distributed on-board buses by bus operators in Lodi to 90%, for an on-board bus survey distributed by university students in Ann Arbor. Within this very broad range, response rates for the majority of on-board and intercept surveys ranged from 33% to 67%, with one-half of agencies reporting response rates in this range.

Response rates vary not only between agencies and surveys, but also between routes and modes for a given transit agency survey. For example, a TARC survey experienced response rates ranging from 23% to 53% among lines with at least 400 surveys distributed.

The following detailed profiles and Table 20, a summary of response rates, provide overall response rates and key features of 29 surveys for which transit agencies reported sufficient information to compute a response rate. Surveys are presented in two groups based on the completeness of the count of riders being asked to participate in the survey. The first group is comprised of agencies that reported the total number of riders who were offered a questionnaire or were asked to be interviewed. The response rates in these cases therefore reflect both refusals and unreturned surveys. (In a few cases, the number of people offered surveys is calculated

TABLE 19
BASES AND NUMERATORS USED IN RESPONSE RATE CALCULATION

	Measure	Comments
Base Riders ^a	<ul style="list-style-type: none"> Fares paid or boardings, excluding transfers and adjusted for number of riders making multiple trips 	<ul style="list-style-type: none"> If data are collected for period other than survey days, this may differ from number of riders on survey days Requires calculation of transfers (when boarding data are used) and number of riders making multiple trips per day
Trips ^b	<ul style="list-style-type: none"> Passenger boardings, measured through farebox or automatic passenger counters, adjusted for transfers 	<ul style="list-style-type: none"> Need to weight surveys to account for transfers
Asked to participate	<ul style="list-style-type: none"> Number of customers approached for interview or offered questionnaire 	<ul style="list-style-type: none"> Must track people refusing
Surveys distributed	<ul style="list-style-type: none"> Number of questionnaires distributed to customers 	<ul style="list-style-type: none"> Must track number actually taken by customers; this can be difficult to discern if surveys are left in envelopes or seats for customers to pick up
Respondents		
Surveys returned	<ul style="list-style-type: none"> Count of returned surveys that are not blank 	<ul style="list-style-type: none"> May include unusable surveys with few answers marked
Complete surveys	<ul style="list-style-type: none"> Count of returned surveys that are fully or partially completed 	<ul style="list-style-type: none"> Strictness of rule for counting as “complete” will affect response rate and data quality

^aNumber of people using transit—each rider asked to complete the survey once.

^bPassengers asked to complete a survey for each trip.

as total daily ridership, because an attempt was made to offer a survey to every rider.)

Surveys for which transit agencies did not track the number of refusals are grouped separately. The true response rate for these surveys is somewhat lower (probably by 5 to 15 percentage points) as a result of not counting riders who refused to take a survey.

Surveys in which refusals are included in calculating response rates

AATA (Ann Arbor, MI)

Rider survey

Self-administered survey on board buses. Survey staff distributed surveys to passengers as they boarded. Surveys were returned to surveyors.

Incentives: Pens with agency name, website, and phone number.

2,700 riders were offered surveys. 2,433 surveys were completed and returned.

90% response rate. Refusals included in base number.

High response rate attributed to using University of Michigan students as surveyors; students are personable and enthusiastic survey workers; incentive; conducting the survey regularly (every 2 years); and the university setting.

King County Metro Transit Division (Seattle, WA)

Ride Free Area (RFA) Survey

Short interviews conducted on board buses in downtown Ride Free Zone. Survey workers selected every 3rd or 5th person boarding for very short interview.

Incentives: None.

1,899 riders were approached for interviews. 1,663 surveys were completed.

88% response rate. Refusals included in base number.

High response rate attributed to short, personal interviews and general willingness of riders to participate in surveys.

TABLE 20
SUMMARY OF SURVEY RESPONSE RATES

Agency	Project	Base	Percentage completed and returned	Modes				Method.		Survey distributed by		Incentives
				Bus	Light rail	Subway	Commuter rail	Self-administered	Interview	Survey staff	Bus operators	
<i>Refusals included in calculating response rate</i>												
AATA	Rider survey	2,700 offered	90	✓				✓		✓		Pens
King Co. Metro (Seattle)	Ride Free Area (RFA) Survey	1,899 approached	88	✓					✓	✓		None
SEPTA (Philadelphia)	R-7 Origin, Destination and Trip Purpose Study	535 offered	86				✓	✓		✓		None
MARTA (Atlanta)	Systemwide Survey	5,000 approached	80	✓		✓			✓	✓		None
Gulf Regional Planning Commission	Customer Appreciation Day Survey	110 approached	73	✓				✓	✓	✓		Food
CTA	Douglas Branch Blue Line Passenger Survey	2,478 distributed + est. refusals	71			✓		✓		✓		None
Intercity Transit (Olympia, WS)	Customer Satisfaction	2,672 offered	70	✓				✓		✓		None
Lane Transit District (Eugene, OR)	2004 Origin/Destination Study	8,338 offered	63	✓				✓		✓		None
SANDAG (San Diego)	Onboard Transit Passenger Survey	79,220 offered	54	✓	✓		✓	✓		✓		None
Metra (Chicago area)	On-Board Survey	50,000 offered	50				✓	✓		✓		None
LYNX (Orlando)	2001 LYNX Market Research Study	33,470 est. daily ridership	45	✓				✓			✓	None
Santa Clara VTA	2000 On-Board Survey	44,633 offered	41	✓	✓			✓		✓		None

TABLE 20 (Continued)

Agency	Project	Base	Percentage completed and returned	Modes				Method.		Survey distributed by		Incentives
				Bus	Light rail	Subway	Commuter rail	Self-administered	Interview	Survey staff	Bus operators	
Metrolink (L.A. area)	2004 Onboard Survey	32,960 boardings	41				✓	✓		✓		Drawing
TriMet (Portland, OR)	TriMet O&D Systemwide Survey 2000	205,000 offered	40	✓	✓			✓		✓		None
Santa Monica Big Blue Bus	Line-by-Line Analysis	13,000 offered	36	✓				✓		✓		None
TARC (Louisville, KY)	Project Gobility	12,906 offered	33	✓				✓		✓		Free ride(s)
Pace Suburban Bus (Chicago area)	CSI/User Study	58,000 est. daily ridership	14	✓				✓		✓		Drawing
<i>Refusals not included in calculating response rate</i>												
Fort Worth Transportation Authority	Customer Satisfaction Survey	500 distributed	80	✓			✓	✓		✓		None
Potomac & Rappahannock Transportation Commission (Woodbridge, VA)	Full on-board surveys of local and commuter bus riders	3,647 distributed	70					✓		✓		None
CTA	West Side Customer Travel Survey	8,230 distributed	67	✓				✓		✓		None
Metro (Los Angeles)	Spring 2004 On-Board Customer Satisfaction Survey	27,280 distributed	52	✓	✓	✓		✓		✓		Drawing
RTD (Denver)	Customer Satisfaction Survey	9,000 distributed	41	✓	✓			✓		✓	✓	Free ride(s)
Orange County (CA) Transportation Authority	2001 On-Board Survey	25,000 distributed	38	✓				✓		✓		Free ride(s)
Metro (St. Louis)	Metro On-Board Survey	10,000 distributed	35	✓	✓			✓		✓		Drawing

TABLE 20 (Continued)

Agency	Project	Base	Percentage completed and returned	Modes				Method.		Survey distributed by		Incentives
				Bus	Light rail	Subway	Commuter rail	Self-administered	Interview	Survey staff	Bus operators	
WMATA (Washington, DC)	Metrorail Passenger Survey	207,788 distributed	28			✓		✓		✓		None
GCRTA (Cleveland)	Annual Onboard Survey	4,000 distributed	23	✓	✓			✓		✓		None
CTTransit (Hartford, CT)	Bi-annual passenger survey	22,000 distributed	20	✓				✓		✓	✓	None
DART (Dallas)	Customer Satisfaction Survey	40,000 distributed	14	✓	✓		✓	✓		✓		Drawing
City of Lodi	Customer Service	400 distributed	13	✓				✓			✓	None

Notes: Offered = number of passengers offered a questionnaire. Includes refusals. Approached = number of passengers approached for personal interview. Includes refusals. Distributed = number of surveys distributed. Does not include refusals unless otherwise noted. Boardings = number of riders boarding bus/train. Includes customers who had completed survey previously. Estimated daily ridership = Number of unique customers. Persons transferring and persons taking 2+ trips per day are counted once. See chapter six for detailed information.

SEPTA (Philadelphia, PA)**R-7 Origin, Destination, and Trip Purpose Study**

Self-administered survey on board commuter rail trains. Survey workers distributed short one-page surveys to passengers as they boarded. Surveys were returned to surveyors.

Incentives: None.

535 riders were offered surveys. 460 surveys were completed and returned.

86% response rate. Refusals included in base number.

MARTA (Atlanta, GA)**Systemwide Survey**

Survey workers interviewed passengers on board buses and subway cars. Every fifth rider selected for a short interview.

Incentives: None.

5,000 riders were approached for interviews. 4,000 surveys were completed.

80% response rate. Refusals included in base number.

High response rate the result of short, personal interviews.

Gulf Regional Planning Commission (Gulfport, MS)**Customer Appreciation Day Survey**

Survey workers approached riders as they alighted buses at transfer station and train, beach, and mall hubs. Surveyors offered riders the option of being asked questions or self-administering the survey; most riders chose to be interviewed. Self-administered surveys were returned to survey workers.

Incentives: Soft drinks and cookies offered.

110 riders were approached for interviews. 80 surveys were completed.

73% response rate. Refusals included in base number.

Interviewing increased response rates, particularly given low literacy rate and demographic groups involved.

CTA (Chicago, IL)**Douglas Branch Blue Line Passenger Survey**

Self-administered survey on board elevated train. Survey workers distributed two-page (front and back) surveys to passengers as they boarded. Surveys were returned to surveyors.

Incentives: None.

2,230 surveys distributed. About 90% of riders entering the train accepted a survey. 1,756 surveys were completed and returned.

71% response rate, based on refusal rate of 10%.

Very skillful and experienced survey worker generates high response rates. Focused nature of survey area (branch of the Blue Line) may also have encouraged participation.

Intercity Transit (Olympia, WA)**Customer Satisfaction Survey**

Self-administered survey on board buses. Survey workers distributed two-page (front and back) surveys to passengers as they boarded. Surveys were returned to surveyors and bus operators.

Incentives: None.

2,672 riders were offered surveys. 1,885 surveys were completed and returned.

70% response rate. Refusals included in base number (18% of riders boarding refused to take a survey).

Suburban/rural area, many riders users for many years; riders appreciated being asked their opinion.

Lane Transit District (Eugene, OR)**2004 Origin/Destination Study**

Self-administered survey on-board buses. Survey workers distributed two-page (front and back) surveys to passengers as they boarded. Surveys were returned to surveyors or bus drivers.

Incentives: None.

8,338 riders were offered surveys. 5,528 surveys completed and returned.

63% response rate. Refusals included in base number (10% refused). (Note that 73% of passengers returned survey; response rate is reduced by 10% as a result of some riders filling out multiple surveys; these were set aside.)

High response rate attributed to ridership being skewed to younger riders, many of whom are university students and are likely to complete the survey.

SANDAG (San Diego, CA)**Onboard Transit Passenger Survey**

Self-administered survey on board buses, light rail, and commuter rail. Survey workers distributed one-page surveys to passengers as they boarded. Surveys were returned to surveyors.

Incentives: None.

79,220 riders offered surveys. 42,740 surveys were completed and returned.

54% response rate. Refusals included in base number. (Note that 65% of passengers returned survey; response rate is reduced by 11% from setting aside incomplete surveys.)

High response rate attributed to use of short, simple questionnaire and effective survey staff.

Metra (Chicago, IL)**On-Board Survey**

Self-administered survey on board commuter rail trains. Survey workers distributed five-page survey to passengers after they were seated. Large majority of surveys

were returned to survey workers or deposited in boxes at downtown terminals; surveys also returned by mail.

Incentives: None.

50,000 riders were offered surveys. 25,000 surveys were completed and returned.

50% response rate. Refusals included in base number.

Good response rate attributed to length of most commuter rail trips and by convincing passengers that results would be used to improve service.

LYNX (Orlando, FL)

2001 LYNX Market Research Study

Self-administered survey on board buses. One-page surveys placed in boxes on board buses. Signs and bus operators encouraged riders to complete a survey.

Incentives: None.

33,470 estimated number of daily riders, all of whom were at least theoretically offered a survey. 15,000 surveys were completed and returned.

45% response rate. Total ridership included in base number.

Bus operators were happy with their contract at that time and many actively encouraged riders to complete the survey. Note that some riders may have completed multiple surveys, in which case true response rate would be lower.

Santa Clara VTA (San Jose, CA)

2000 On-Board Survey

Self-administered survey on board buses and light rail. Survey workers distributed two-page (front and back) surveys to passengers as they boarded. Surveys were returned to surveyors or return box at rear exit.

Incentives: None.

44,633 passengers who had not previously been asked to complete a questionnaire on the line being surveyed were offered surveys. 18,351 surveys were completed and returned.

41% response rate. Refusals included in base number.

Metrolink (Los Angeles, CA)

2004 Onboard Survey

Self-administered survey on board commuter rail. Survey workers distributed four-page surveys to passengers as they boarded. Surveys were returned to surveyors or by business reply mail.

Incentives: Drawing for free monthly passes.

32,960 passengers boarded during the surveying, including many who had previously completed the survey; 14,834 surveys were actually distributed, with 13,470 completed and returned.

41% response rate based on total passengers, including those who refused the survey because they had completed a survey earlier. Response rate for surveys distributed was 91%.

TriMet (Portland, OR)

TriMet Origin Destination Survey—Systemwide 2000

Self-administered survey on board buses and light rail. Survey workers distributed one-page surveys to passengers as they boarded buses. On light rail, two survey workers approached riders after they boarded. Surveys returned to envelopes posted by each exit and by mail.

Incentives: None.

205,000 riders were offered surveys. 81,100 surveys were completed and returned.

40% response rate. Refusals included in base number.

Santa Monica Big Blue Bus (Santa Monica, CA)

Line-by-Line Analysis

Self-administered survey on board buses. Survey workers distributed one-page surveys to passengers as they boarded. Surveys were returned to surveyors or bus drivers.

Incentives: None.

13,000 riders were offered surveys. 4,709 surveys were completed and returned.

36% response rate. Refusals included in base number.

TARC (Louisville, KY)

Project Gobility

Self-administered survey on board buses. Survey workers distributed two-page surveys to passengers as they boarded. Surveys were returned to surveyors and by mail.

Incentives: Free ride ticket with the completion of the survey.

12,906 riders were offered surveys. 4,211 surveys were completed and returned.

33% response rate. Refusals included in base number.

Pace Suburban Bus (Arlington Heights, IL)

CSI/User Study

Self-administered survey on board buses. Bus operators distributed surveys or made surveys available on bus dashboard. Bus operators chose method to distribute that they were most comfortable with. Bus operators were also asked to make announcements and car cards were posted in each bus to announce the survey. Surveys returned to on-board folder and by mail.

Incentives: Raffle of three 1st prizes—\$500 U.S. Savings Bonds and five 2nd prizes—\$100 U.S. Savings Bonds.

58,000 estimated number of daily riders, all of whom were at least theoretically offered a survey. 7,937 surveys were completed and returned.

14% response rate. Total ridership included in base number.

Surveys were distributed to bus operators through dispatchers. Not known how many surveys were actually distributed to passengers.

Surveys in which refusals are *not* included in calculating response rate

Fort Worth Transportation Authority (Fort Worth, TX)

Customer Satisfaction Survey

Self-administered survey at bus terminal and four transfer facilities. Survey workers intercepted riders and asked them to complete survey. Surveys returned to survey workers or by mail. Also distributed some surveys on board; bilingual survey worker conducted some interviews in Spanish.

Incentives: None.

500 surveys distributed. 403 surveys were completed and returned.

80% response rate. Refusals not included in base number.

High response rate for riders who agreed to participate, but difficult to obtain participation in this setting owing to lack of time.

Potomac & Rappahannock Transportation Commission (Woodbridge, VA)

Full on-board surveys of local and commuter bus riders

Self-administered survey on board buses. Survey workers distributed one or two-page surveys to passengers as they boarded. (Survey length varied by type of service.) Surveys were returned to surveyors.

Incentives: None.

3,647 surveys distributed. 2,544 surveys were completed and returned.

70% response rate.

CTA (Chicago, IL)

West Side Customer Travel Survey

Self-administered survey on board buses. Survey workers distributed one-page surveys to passengers as they boarded. Surveys were returned to surveyors or by mail.

Incentives: None.

8,230 surveys distributed. Does not include riders refusing to take a survey. 5,200 surveys completed and returned.

67% response rate. Refusals not included in base number.

Metro (Los Angeles, CA)

Spring 2004 On-Board Customer Satisfaction Survey

Self-administered survey on board buses, subway, and light rail. Survey workers distributed surveys to passengers. Surveys were returned to surveyors.

Incentives: Drawing for 10 free monthly passes.

27,280 surveys distributed. 14,265 surveys were completed and returned.

52% response rate. Refusals not included in base number.

RTD, Denver (Denver, CO)

Customer Satisfaction Survey

Self-administered survey on board buses and light rail. On buses, bus operators distributed seven-page surveys (in envelopes with pencils and incentives) to randomly chosen passengers. Surveys were returned by mail (primarily) and to bus operators. On light rail, survey workers distributed 11-page survey to passengers on platforms. Surveys were returned by mail.

Incentives: Two free ride coupons included in each survey packet; drawing for grocery gift certificates.

9,000 surveys distributed. 3,654 surveys were completed and returned.

41% response rate. Refusals not included in base number. Anecdotally, however, only a small number of passengers refused to take a survey.

Good response rate attributed to strong incentives, survey being conducted periodically, and passengers wanting to provide feedback to the agency.

Orange County Transportation Authority (Orange, CA)

2001 On-Board Survey

Self-administered survey on board buses and at transit centers. Survey workers distributed surveys to passengers. Surveys were returned to surveyors and by mail.

Incentives: Free ride coupon on survey return.

25,000 surveys distributed. 9,500 surveys were completed and returned.

38% response rate. Refusals not included in base number. (Note that 56% of passengers returned survey; response rate is reduced by 18% from setting aside of incomplete surveys.)

Metro—St. Louis (St. Louis, MO)

Metro On-Board Survey

Self-administered survey on board buses and at light rail stations. Survey workers distributed two-page (front and back) surveys to passengers as they boarded buses and at light rail stations. Surveys were returned to surveyors and by mail.

Incentives: Respondents eligible for contest drawing.

10,000 surveys distributed. 3,500 surveys were completed and returned.

35% response rate. Refusals not included in base number.

WMATA (Washington, DC)

Metrorail Passenger Survey

Self-administered survey in subway stations. Survey workers distributed surveys on platforms. Surveys were returned to surveyors and by mail.

Incentives: None.

207,788 surveys distributed. 57,700 surveys were completed and returned.

28% response rate. Refusals not included in base number.

GCRTA (Cleveland, OH)**Annual Onboard Survey**

Self-administered survey on board bus and light rail. Survey workers distributed four-page surveys to passengers as they boarded. Surveys returned to survey workers and by mail.

Incentives: None.

4,000 surveys distributed. 935 surveys were completed and returned.

23% response rate. Refusals not included in base number; number refusing tends to be small.

Experience of agency staff is that response rate with City Year survey workers used in this project (as well as other temporary workers) tends to be about one-half the response rate when using agency employees.

CTTransit (Hartford, CT)**Bi-annual passenger survey**

Self-administered survey on board buses and at transit centers. Surveys were distributed on board buses from envelopes; bus operators encouraged riders to take and complete a survey. Agency staff distributed surveys to riders at bus stops and transportation centers. Survey returned on board and by mail. One-day blitz in each division of CTTransit.

Incentives: None.

22,000 surveys distributed. 4,500 surveys completed and returned.

20% response rate. Refusals not included in base number.

DART (Dallas, TX)**Customer Satisfaction Survey**

Survey workers distributed surveys to passengers at transit centers. Also used seat drops on buses and rail at start of trips, and stocked timetable holders on board buses and light rail. Surveys returned by mail and to operators. Majority of surveys were returned by mail; some also returned to bus operators.

Incentives: Drawing for a monthly pass.

40,000 surveys distributed. 5,950 surveys completed and returned.

14% response rate. Refusals not included in base number.

Response rate affected by mail return.

City of Lodi (Lodi, CA)**Customer Service Survey**

Self-administered survey on board buses. Distributed by drivers on fixed-route buses and returned by mail. Distributed by drivers and by mail to dial-a-ride service riders and returned by mail.

Incentives: None.

400 surveys distributed. 50 surveys completed and returned.

13% response rate. Refusals not included in base number.

Relatively low response rate attributed to use of mail for return of survey and the survey format, which may have appeared similar to comment card. Agency expects higher response rate with on-board return of surveys and revised formatting. Distribution by drivers is an asset; passengers know drivers by name.

FACTORS AFFECTING RESPONSE RATES

Many factors affect the response rate achieved for on-board and intercept surveys. Primary factors based on a comparison of response rates across different surveys and interviews with transit agency personnel can be divided between people factors and methodological factors. "People factors" include the enthusiasm and diligence of survey workers, rider interest in responding to transit surveys, and rider demographics. Methodological factors include whether surveys are self-administered or conducted as personal interviews, the venue (on-board or in-station), length and complexity of the questionnaire, use of incentives, and the regularity with which surveys are conducted.

Enthusiasm and Diligence of Survey Workers

The importance of the survey staff and diligence with which they go about their jobs cannot be understated. Agency staff repeatedly cited survey staff as a primary factor in explaining both unusually high and unusually low survey response rates.

It is more difficult than one might expect to generalize about who makes for effective survey staff aside from proper training and supervision. The experiences with student workers, for example, is quite varied. AATA found that University of Michigan students were personable, enthusiastic, and effective as survey workers. AATA's bus survey achieved a response rate of 90%, owing in part to the effectiveness of the students as well as a small incentive (pens) and riders' willingness to participate. CTA has also had good experience with recruiting students and other part-time workers to distribute and collect surveys. Conversely, Metrolink moved away from using student survey workers owing to accuracy and reliability problems.

Response rates are sometimes relatively low when bus operators distribute the questionnaires. Bus operators are primarily focused on their regular duties and may give less attention to encouraging riders to complete a survey and may be less able to provide assistance to riders in completing the survey. CTTransit, Pace Suburban Bus, and the city of Lodi experienced response rates of 13% to 20% using bus operators to distribute on-board surveys.

However, RTD and LYNX achieved response rates of 41% to 45% using bus operators to distribute surveys—comparable to many on-board surveys distributed by dedicated survey

workers. RTD's response rate is particularly remarkable given the length (seven pages) of the survey. RTD attributes the high response rate to strong incentives that included two free ride coupons in each survey packet and passengers' desire to provide feedback to the agency. In addition, RTD conducts on-board surveys on a periodic basis, conditioning riders to the survey process. LYNX attributes its high response rate to bus operators actively encouraging riders to take and complete a survey.

Whether students, part-time or full-time survey workers, or bus operators handle the task, it appears that having an individual actively distributing and collecting questionnaires is important. A DART survey was distributed, in part, by leaving questionnaires on seats and in timetable holders (as well as some distribution by survey workers). The DART survey response rate was 14%.

Rider Interest in Responding to Transit Surveys

As mentioned for AATA and RTD, rider interest can be just as important as survey worker enthusiasm. To some extent, rider interest is a function of their view of the agency and service and perhaps demographic characteristics. However, there are steps that agencies can take to increase interest, including advance notification of the survey and an explanation of how the survey will benefit them through improved service. Publicizing survey results may also spur interest; AATA reports that its customers like to complete the survey and see the results.

Rider Demographic Characteristics

Certain groups tend to be consistently more likely to respond to surveys. Response rates tend to be higher among express bus, light rail, and commuter rail riders than bus riders. For example, response rates were in the 40% to 50% range on local bus routes in Denver and Dallas, but more than 60% for express and regional bus routes in Denver and on light rail lines in Dallas. Mode and express versus local service reflect respondent income and length of the ride, both of which are positively correlated to response rates.

Some agencies report that frequent riders, long-time riders, students, and tourists are inclined to have relatively high response rates. In Ann Arbor and Eugene, Oregon, large student populations contributed to relatively high survey response rates.

Short routes, which do not allow time for riders to complete a survey, are more likely to experience lower response rates. Riders who lack English proficiency also tend to be less likely to complete surveys. Some agencies substituted personal interviewing for self-administered surveys to address low response rates among these groups.

Self-Administered or Personal Interviews

Not surprisingly, personal interviewing tends to generate better response rates than self-administered surveys. Interviewing provides more individual attention to respondents, less respondent burden to complete the questionnaire, and assistance with understanding questions. Interviews also are more likely to involve shorter questionnaires than self-administered surveys, which can also influence the response rate. Short, personal interviews conducted by King County Metro, MARTA, and Gulf Regional Planning Commission achieved response rates of 80% or higher.

Interviewing is particularly effective when riders lack English proficiency. In the Gulf Regional Planning Commission survey, surveyors offered respondents the option of being interviewed or completing the questionnaire themselves. Most riders opted for the interview. Agency staff reported that offering the interviewing option was particularly important for riders with low literacy skills.

Venue (On-Board or In-Station)

The importance of venue is not that on-board or in-station venues tend to produce higher response rates. Rather, venue affects the ease of approaching riders and the amount of time that riders have to complete the survey. In many cases, the on-board environment offers the better venue for these very reasons; riders can be easily approached as they board the bus or railcar. They usually have sufficient time during the trip to complete a questionnaire.

The on-board environment can pose problems, however. The primary problem is trip length—riders taking short trips may not have time to complete a questionnaire. On train cars with multiple doors, survey workers may be challenged to keep track of which riders have entered at each station, for purposes of offering a survey.

In-station locales can offer distinct advantages. For example, in the Gulf Regional Planning Commission survey agency staff offered food to respondents who completed an interview or survey. Offering food is more practical in a station than on board a bus.

Length and Complexity of the Questionnaire

In mail surveys, length tends to be inversely related to response rates (Dillman 2000). One would expect the same to be true for on-board and intercept transit surveys. Indeed, SANDAG and SEPTA survey response rates were high in part from the use of a short questionnaire (see Appendix C). At the other end of the response rate spectrum, GCRTA attributed a 23% response rate to the need for mail-back return of a four-page questionnaire.

Long questionnaires, however, do not necessarily result in low response rates. Excellent examples are the four- to

seven-page surveys for RTD, Metrolink, and Metra. This shows that response rates are a function of a combination of factors and not simply survey length.

The threshold for considering a survey complete and usable also affects response rates. Some agencies considered a survey complete if three or more questions were answered, whereas other agencies used only surveys with complete O&D data. The criteria for “complete and usable” depend on survey purposes. For surveys that include O&D questions, the definition of complete frequently depends on whether the O&D information is the central survey purpose or one of several purposes, in which case surveys with incomplete or unusable O&D data still have value for the analysis.

Differences in the definition of complete can significantly affect the reported response rate. A VTA O&D survey used only those surveys in which all questions were answered; the response rate was 41%. LYNX reported a slightly higher response rate of 45%. However, if the LYNX survey had counted only those surveys with complete O&D information, the response rate would have been just under 30%. Similarly, the CTA West Side survey response rate would be 48% instead of 67% if only surveys with complete O&D information were counted.

Incentives

In several cases, incentives appear to have had a significant impact on obtaining good response rates. Transit staff in Ann Arbor and Denver reported that the distribution of pens and free rides, respectively, stimulated response rates. On the other hand, TARC and Orange County Transportation Authority surveys in which free rides were offered do not show higher response rates than similar surveys in which no incentives were offered.

Regularity with Which Surveys Are Conducted

Several agencies reported that conducting surveys on a regular basis generally improves response rates. Riders learn to expect a survey every year or two. Riders also become educated about the purpose of the survey. If riders see improvements to service that may be attributed to feedback through surveys as well as other means, they are likely to feel empowered and thus more likely to respond.

On the other hand, agencies mentioned that surveying riders too often induced respondent fatigue, with a negative impact on response rates.

COSTS

On-board and intercept surveys involve a number of steps: planning, questionnaire design, fieldwork, data collection, data cleaning, analysis, and report writing. Given the dimensions of the effort involved, survey costs can be quite substantial. Overall costs for surveys reported by transit agencies ranged as high as \$350,000. Survey costs can also be quite modest, particularly for smaller, targeted surveys. Approximately one-fifth of the surveys with cost data reported by transit agencies cost less than \$10,000.

Table 21 summarizes survey costs for 37 surveys for which transit agencies reported what appears to be usable cost information. Costs included were consultant costs for projects using consultants and the value of in-house staff time for projects conducted using in-house agency staff. (A few agencies reported the value of in-house staff time; in other cases, the value was estimated using approximated wage rates for professional, clerical, and field staff.) Some agencies reported consultant costs but not staff costs or time spent; these surveys are included because the consultant cost is likely to greatly exceed the value of staff time, but the omission should be borne in mind in analyzing the data.

A useful way to assess survey costs is to calculate the total cost per completed survey, thus viewing costs relative to the number of surveys that were completed and usable.

A large number of factors affect survey costs. As Table 21 shows, even when controlling for basic factors such as whether the survey was conducted by means of personal interviews or was self-administered, the cost per survey varies widely. Figure 6 summarizes key factors affecting data quality and survey cost.

The widest range is seen for self-administered surveys distributed by survey workers, which show a range from

\$3 to \$56 per completed interview. Costs for self-administered surveys distributed by bus operators ranged from \$13 to \$22 per completed interview. For surveys conducted using personal interviews, cost per survey ranged from \$13 to \$40, even after excluding several outlying values.

Although it is difficult to fully explain these wide variations, several observations can be made. In the largest group of surveys—self-administered surveys distributed by survey workers—the lower-cost surveys tended to be larger, suggesting that economies of scale reduce the cost per survey. Lower-cost surveys also were generally from transit agencies with relatively high numbers of riders per vehicle hour. Presumably, fewer survey worker hours are needed to contact a given number of riders with a positive impact on costs.

The higher-cost, self-administered on-board surveys were likely to be O&D surveys, which require substantially more effort to code and analyze, but have small to moderate sample sizes. In some cases, the response rate is relatively low, further increasing the time needed to obtain a given number of surveys.

Similar patterns are seen in surveys conducted by personal interviews. Surveys with a lower cost per interview are often in high-density cities and have higher response rates.

Survey costs are also affected by the overall scope of consultant contracts. Depending on the nature of the project objectives, there may be additional analytic or outreach tasks included in costs for some surveys that are not included for other surveys.

TABLE 21
SURVEY COSTS

Agency	Project Name	Consultant Cost	Est. In-House Staff Costs*	Est. Total Costs	Completed Surveys	Cost per Survey Completed	Response Rate	If O&D Survey	Systemwide Unlinked Trips per Vehicle Hour
<i>Self-Administered Surveys Distributed by Survey Staff</i>									
GCRTA (Cleveland)	Annual Onboard Survey	\$650	\$2,800	\$3,450	935	\$3.69	23%		32
TriMet (Portland, OR)	TriMet Origin Destination Survey—Systemwide 2000	\$270,000	\$44,500	\$314,500	81,100	\$3.88	40%	Yes	48
Metro (Los Angeles)	Spring 2004 On-Board Customer Satisfaction Survey	\$60,000	\$3,500	\$63,500	14,265	\$4.45	52%		60
Santa Monica (CA) Big Blue Bus	Line-by-Line Analysis	\$15,586	\$6,000	\$21,586	4,709	\$4.58	36%	Yes	51
TriMet (Portland, OR)	Annual Fare Survey	\$65,000	\$16,750	\$81,750	15,179	\$5.39	62%		48
Metra (Chicago area)	On-Board	\$150,000		\$150,000	25,000	\$6.00	50%		333
WMATA (Washington DC)	Metrorail Passenger Survey	\$350,000		\$350,000	57,700	\$6.07	28%	Yes	**
Metro (St. Louis)	Metro On-Board Survey Results Final Report June 2003	\$20,000	\$1,750	\$21,750	3,500	\$6.21	35%		39
Fort Worth Transportation Authority	Customer Satisfaction Survey	\$1,000	\$1,600	\$2,600	403	\$6.45	80%		**
CTA (Chicago)	Douglas Branch Blue Line Passenger Survey	\$800	\$10,550	\$11,350	1,756	\$6.46	80%	Yes	**
Milwaukee County Transit System	Trolley Evaluation	\$500	\$800	\$1,300	195	\$6.67	N/A		**
SANDAG (San Diego)	Onboard Transit Passenger Survey	\$250,000	\$50,000	\$300,000	42,740	\$7.02	54%	Yes	49
Delaware Transit	Onboard survey	\$0	\$7,000	\$7,000	960	\$7.29	30%	Yes	20

TABLE 21 (Continued)

Agency	Project Name	Consultant Cost	Est. In-House Staff Costs*	Est. Total Costs	Completed Surveys	Cost per Survey Completed	Response Rate	If O&D Survey	Systemwide Unlinked Trips per Vehicle Hour
Greater Portland (ME) COG	Passenger Survey	\$15,000		\$15,000	2,038	\$7.36	N/A		19
(SEPTA (Philadelphia)	R-7 Origin, Destination, and Trip Purpose Study	\$0	\$3,440	\$3,440	460	\$7.48	86%	Yes	**
DART (Dallas)	Multimodal Travel Pattern Analysis	\$150,000		\$150,000	17,590	\$8.53	42%	Yes	37
LTD (Eugene, OR)	2004 Origin/Destination Study	\$42,000	\$6,800	\$48,800	5,528	\$8.83	63%	Yes	33
VTA (San Jose)	2000 On-Board Survey	\$200,000		\$200,000	18,351	\$10.90	41%	Yes	33
Broward County (FL) Transit	Public Involvement Component of the 2005 Transit Development Plan	\$23,600	\$320	\$23,920	1,400	\$17.09	N/A		30
Potomac & Rappahannock Transportation Commission (Woodbridge, VA)	Full on-board surveys of local and commuter bus riders	\$56,500		\$56,500	2,544	\$22.21	70%		13
Intercity Transit (Olympia, WA)	Customer Satisfaction	\$43,000	\$ 2,045	\$45,045	1,885	\$23.90	70%	Yes	21
Orange County (CA) Transportation Authority	2001 On-Board Survey	\$250,000		\$250,000	9,500	\$26.32	38%	Yes	38
Transit Authority of Northern Kentucky (Ft. Wright, KY)	Market Research	\$20,000	\$ 3,000	\$23,000	600	\$38.33	60%		19
Sun Tran (Tucson, AZ)	Tucson Transit Study	\$150,000		\$150,000	3,300	\$45.45	11%	Yes	30
TARC (Louisville)	Project Gobility	\$235,000		\$235,000	4,211	\$55.81	33%	Yes	25

TABLE 21 (Continued)

Agency	Project Name	Consultant Cost	Est. In-House Staff Costs*	Est. Total Costs	Completed Surveys	Cost per Survey Completed	Response Rate	If O&D Survey	Systemwide Unlinked Trips per Vehicle Hour
<i>Personal Interviews</i>									
Metro (Portland, ME)	Route 1 O&D Study	\$5,000		\$5,000	995	\$5.03	N/A	Yes	**
CTA (Chicago)	Customer Response to Routing Change #95E	\$0	\$3,100	\$3,100	401	\$7.73	N/A	Yes	**
PATH (Jersey City, NJ)	PATH Origin and Destination Travel Survey	\$210,000		\$210,000	15,850	\$13.25	N/A	Yes	**
King Co. Metro (Seattle)	Ride Free Area (RFA) Survey	\$22,000	\$4,000	\$26,000	1,663	\$15.63	88%		**
MARTA (Atlanta)	Systemwide Survey	\$0	\$63,000	\$63,000	4,000	\$15.75	80%		67
NYC Transit (Brooklyn)	B15/Q3x	\$15,000		\$15,000	400	\$37.50	N/A		**
RTC (Las Vegas)	Citizens Area Transit O&D Survey (2002)	\$149,000	\$4,000	\$153,000	4,077	\$37.53	N/A	Yes	43
Pinellas Suncoast Transit (Clearwater, FL)	Market Research	\$80,675		\$80,675	2,040	\$39.55	41%		20
TriMet (Portland, OR)	Ticket Vending Machine (TVM) Fascia Redesign	\$3,000	\$2,000	\$5,000	107	\$46.73	N/A		**
<i>Self-Administered Surveys Distributed by Bus Operators</i>									
Pace Suburban Bus (Chicago area)	CSI/User Study	\$63,000	\$39,500	\$102,500	7,937	\$12.91	14%	Yes	23
LYNX (Orlando)	2001 LYNX Market Research Study	\$200,000	\$40,000	\$240,000	15,000	\$16.00	45%	Yes	23
RTD (Denver)	Customer Satisfaction Survey	\$54,000	\$26,000	\$80,000	3,654	\$21.89	41%		30

Notes: N/A = not available.

*Blanks indicate that no information was provided.

**Systemwide unlinked trips per vehicle hour are shown as a measure of density of passengers on board buses and trains. Shown only for surveys conducted on board throughout the transit system.

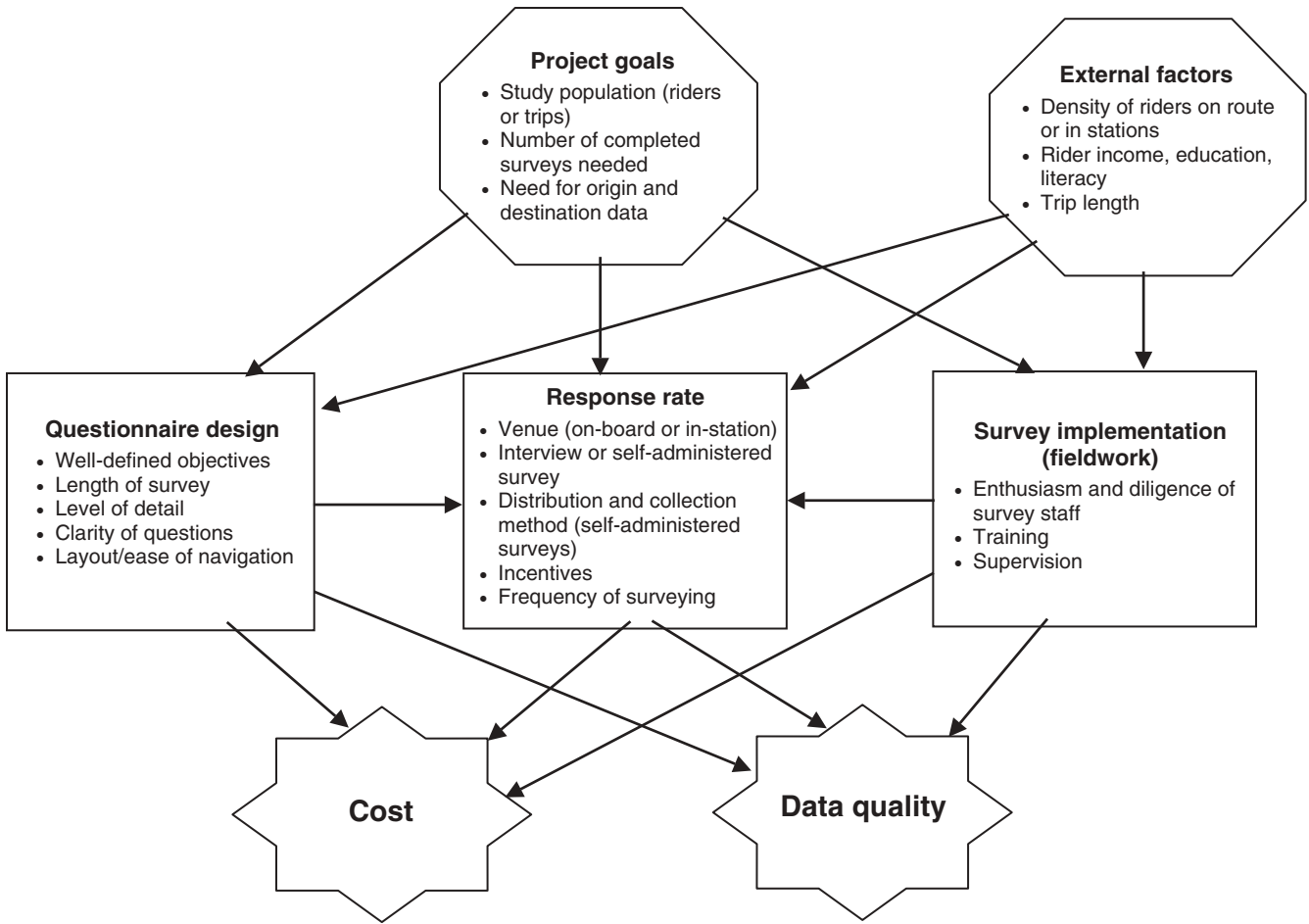


FIGURE 6 Summary of factors affecting data quality and cost.

CONCLUSIONS AND FURTHER RESEARCH

On-board and intercept surveys are used by virtually all transit agencies to collect data on customer trip characteristics, customer ridership and demographic characteristics, and customer attitudes about service. Survey results are used for a wide variety of purposes including travel modeling, areawide and route planning, scheduling, marketing, and customer communications. Transit agencies reported that survey results can be highly useful, accurate, and timely.

On-board and intercept survey methodologies are essential to transit agencies in a variety of situations. These methodologies may be the only cost-effective way to gather information from riders where the incidence of transit users in the general population is low. In major cities with a high incidence of transit users among the citizenry, on-board and intercept methodologies are highly useful for surveys on specific routes or among specific customer segments.

Other major strengths of on-board and intercept surveys include the ability to obtain a representative sample of the targeted population; the wherewithal to obtain accurate, reliable, and detailed information from riders; and the means to survey during the immediate experience of the service. On-board and intercept surveys often provide higher response rates than alternative methodologies such as telephone, mail, and on-line surveys, and at lower cost.

Although offering many advantages, on-board and intercept surveys are not the optimal methodology in a variety of situations. Telephone or other methodologies are necessary when the objective is to survey non-users. On-board and intercept surveys also cannot be used when the survey questionnaire is extensive or complex.

Surveys are typically returned to survey workers, but may also be deposited in envelopes or boxes on board or through the mail.

Self-administered surveys are sometimes distributed at transit centers and transfer points instead of on board. This approach is particularly suitable when most or all of the study population passes through the survey locations.

On occasion agencies use personal interviews instead of self-administered surveys. Personal interviews can be conducted either on-board or in rail stations, transit centers, or at transfer points. The interviews are generally relatively brief.

Personal interviewing tends to achieve a higher response rate, fewer item nonresponses, and possibly better understanding of questions than self-administered surveys.

On-board and intercept surveys are highly flexible and adaptable to the project purposes and characteristics of the agency's service configuration and of the study population. Given the need to tailor survey methodology to the particularities of the situation, there is no uniform way to carry out on-board and intercept surveys. In designing a survey to fulfill project objectives, maximize data quality, and control costs, a number of factors need to be considered. Important considerations relating to project purposes include:

- What is the study population?—Whether the study population is all riders, riders on a particular route, or those using a particular station will affect the choice of on-board versus in-station locales.
- What amount and level of detail of information is needed?—Longer surveys need to be conducted in situations where respondents have sufficient time to complete the survey for immediate return or are likely to complete the survey at a later time for return through the mail. The ability of respondents to provide accurate detailed information and the level of accuracy needed will affect the choice of personal interviews or self-completed surveys.
- What aspects of the customer experience does the survey ask about?—For example, surveys may need to take place proximate to customers' experience of a ticket vending machine.

Considerations affecting data quality are:

- Response rates—Response rates affect the amount of nonresponse error, which arises from the possibility that those not completing a survey would have answered differently than those who did complete a survey. Response rates are affected by a broad range of factors including the enthusiasm and diligence of survey workers who distribute questionnaires or conduct interviews, the level of rider interest, whether self-administered surveys or personal interviews are used, length and complexity of the questionnaire, use of incentives, and the frequency of surveys being conducted. Other factors, less subject to transit agency influence, are rider income, education level, and other demographic characteristics and rider literacy levels.

- Clarity and organization of the questionnaire—Wording of questions, question ordering, and layout can affect the ease of completing the questionnaire and the accuracy and completeness of responses.
- How and where the survey is conducted—Data quality is affected by whether self-completed questionnaires or personal interviews are used, where the surveying is carried out, and the means of returning self-administered surveys.

Costs for on-board and intercept surveys vary widely, even for surveys conducted using nearly identical methodologies. Factors that affect costs are:

- Whether the survey is conducted by personal interview or uses self-administered questionnaires.
- Length and complexity of the survey.
- Whether the survey collects detailed origin and destination surveys, which tend to incur higher costs for geocoding and data processing.
- Total number of completed surveys (larger surveys may benefit from economies of scale).
- Density of riders (e.g., number of riders per hour on surveyed bus or train routes or in stations).
- Response rates.
- Whether self-administered questionnaires are distributed by dedicated survey staff or bus operators.

Planning and implementing surveys also involves decisions about identifying the study population and selecting the

sample; determining the sample size needed for the desired level of precision in the results; and stratification and weighting of subgroups being surveyed based on route, time of day, direction, and other factors. Additional important tasks are recruitment, training, and supervision of survey workers; ensuring worker safety; and data cleaning, data processing, data tabulation, and analysis.

In on-board and intercept surveys, the devil is in the details. Although transit agencies have developed many effective practices through experience, there is insufficient methodologically sound research to guide decisions in two key areas: (1) impact of design and layout of questionnaires and (2) impact of the use of incentives. Additional research is needed to explore these two issues. The research should formulate and test different questionnaire designs and different incentive levels to measure the affects of these factors on response rates, item nonresponse, and, for origin and destination information, the quality of address and trip information. Alternative designs could also be tested to determine the impact of questionnaire length, use of matrixes, and use of horizontal versus vertical lists of answer choices.

Ideally, alternative questionnaire designs and incentive levels should be tested on routes (or stations) where characteristics of the sampled population are held constant, to derive reliable conclusions about the impacts, if any, of alternative layouts and incentive levels.

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GLOSSARY

On-board and intercept surveys—self-administered surveys distributed on board buses and rail cars and in stations, and personal interviews conducted in these environments.

Sample—group of people selected to be surveyed and that the researcher attempts to contact.

Sample frame—listing of the study population from which the sample will be drawn.

Sampling error—difference between the true (but unknown) value and observed values if, hypothetically, the survey were repeated numerous times.

Simple random samples—sample in which each person in the study population has an equal chance of being selected.

Stratified sample—sample divided into separate subsamples, each of which is then sampled as a simple random sample.

Study population—population to which the researcher can gain access.

Theoretical population—population to which researchers wish to generalize.

APPENDIX A

Survey Questionnaire

Transit Cooperative Research Program
Project J-7, Topic SH-05

On-Board/Intercept Passenger Survey Techniques

Study Questionnaire

This questionnaire should be completed by the transit system manager responsible for on-board and intercept surveys. Please forward this questionnaire to that person as necessary. If multiple departments or divisions conduct on-board or intercept surveys (e.g., a different department conducts origin and destination surveys than customer satisfaction surveys), please have the appropriate department complete pages 1–3 and both departments complete pages 3–10 for surveys for which they are responsible.

Note to individual filling out this questionnaire:

My sincere thanks for taking the time to fill out this questionnaire. The information that you and others from different transit systems provide will offer all of us valuable insights into on-board and intercept passenger survey techniques. This study is on a fast track to bring you results and we will be happy to notify you by e-mail when the study is printed.

Please complete this questionnaire as quickly and completely as you can. If you don't have all the information available, please send what you do have now and forward any additional information when it becomes available. Thanks again for your time and effort.

This questionnaire can be completed on-line and I encourage you to do so. Go to www.schallerconsult.com/onboard and click the link on that page to access the on-line version of this survey.

Return by December 15, 2004, to:

Bruce Schaller	Voice: (718) 768-3487
Schaller Consulting	Fax: (718) 768-5985
94 Windsor Place	schaller@schallerconsult.com
Brooklyn, NY 11215	

Your Name: _____

Title: _____

Department: _____

Transit Agency: _____

Street Address: _____

City, State, ZIP: _____

Phone: _____ E-mail: _____

Part I. Survey Practices

1. What survey methodologies has your agency used in the past 3 years? (Check all that apply.)
 - Telephone surveys
 - On-board surveys (conducted on buses, rail cars, etc.)
 - Intercept surveys (conducted at bus stops, in subway stations, etc.)
 - Mail surveys
 - Web-based surveys
 - Other: _____

2. For **customer satisfaction** and **customer opinion** studies, what survey methodologies has your agency used in the past 3 years? (Check all that apply.)
 - Telephone surveys
 - On-board surveys (conducted on buses, rail cars, etc.)
 - Intercept surveys (conducted at bus stops, in subway stations, etc.)
 - Mail surveys
 - Web-based surveys
 - Other: _____

3. For **origin and destination** studies:
 - a) What year was an origin and destination (O&D) study last conducted?
 _____ (year) Check if have not conducted O&D study
 - b) What year was the previous origin and destination study conducted?
 _____ (year) Check if have not conducted O&D study
 - c) What survey methodology(ies) were used? (Check all that apply.)
 - Telephone surveys
 - On-board surveys (conducted on buses, rail cars, etc.)
 - Intercept surveys (conducted at bus stops, in subway stations, etc.)
 - Mail surveys
 - Web-based surveys
 - Other: _____

4. How often does your agency conduct any type of **on-board or intercept survey**?
 - Several times a year: About how many per year? _____
 - About once a year
 - About once every 2 years
 - About once every 3 years
 - About once every 4 years
 - In excess of every 4 years

5. Who has conducted fieldwork (handing out and collecting surveys and interviewing) for on-board and intercept surveys in the past 3 years? (Check all that apply.)
 - Transit agency staff
 - Consultants
 - Academia

6. Who has conducted analytic tasks for on-board and intercept surveys in the past 3 years? (Check all that apply.)
 - Transit agency staff
 - Consultants
 - Academia

7. What are the top 1–5 reasons that you use an on-board or intercept methodology instead of a different survey methodology?
- Lower cost
 - Faster turnaround
 - Ability to obtain a representative sample of the desired population
 - Ability to target specific routes, customer segments, etc.
 - Higher response rate
 - Better information (accuracy, reliability, detail) from respondents
 - Ability to survey during the immediate experience of the service
 - Availability of staff
 - Availability of consultants
 - Other: _____
 - Do not conduct on-board/intercept surveys
8. When you use a different methodology, what are the top 1–5 reasons that you use *a different survey methodology* rather than an on-board or intercept survey?
- Lower cost
 - Faster turnaround
 - Length and/or complexity of survey
 - Ability to obtain a representative sample of the desired population
 - Ability to target specific routes, customer segments, etc.
 - Need to include non-users in study
 - Higher response rate
 - Better information (accuracy, reliability, detail) from respondents
 - Availability of staff
 - Availability of consultants
 - Other: _____
 - Do not conduct other types of surveys

NOTE: If you have not conducted any on-board or intercept surveys in the past 5 years, please check here and return pages 1–3 of the survey. _____

Otherwise, continue with Part II.

Part II. Experience with On-Board/Intercept Surveys

Complete this section for a specific on-board or intercept survey conducted by your agency. Please make photocopies of this section for up to two additional on-board and/or intercept surveys completed by your agency. (The on-line version also allows you to report on multiple surveys.)

For each survey, attach the survey questionnaire, instructions to survey staff and/or respondents, and explanations of the questionnaire design, sampling method, response rate and other aspects of methodology, fieldwork, data processing, and data analysis.

We are especially interested in origin and destination (O&D) surveys conducted by your agency. If a different person/department conducted O&D survey(s), please ask them to complete a copy of Part II of the questionnaire (paper or on-line).

1. Name of survey project: _____
2. What was the purpose of the study?

3. What method(s) were used to complete the survey? (Check as many as apply.)
 - Hand out questionnaire, self-administered and returned to survey staff
 - Hand out questionnaire, self-administered and mailed back

- Interviews conducted by survey staff
- Seat drops (surveys left on seats and mailed back or returned at designated location)
- Other: _____

4. What modes were surveyed? (Check all that apply.)

- Bus
- Subway
- Light rail
- Commuter rail
- Paratransit
- Other: _____

5. Who distributed the survey instrument?

- Survey staff assigned for this purpose
- Bus operators
- Other: _____

6. What was the timeline for the project?

Phase of Research	Month(s) and Year
Survey design	
Data collection	
Data cleaning/data processing	
Analysis/report writing	
Report completed	

7. Who carried out each of the following phases of the research process for this project?

Phase of research	In-House Staff	Consultant/ Contractor	Academic Institution
Survey design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data collection—permanent staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data collection—temporary workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data cleaning/data processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Analysis/report writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. What was the approximate cost of the survey, including analysis and report writing? (Please provide best estimate if exact costs or hours are not known.)

- Consultants/contractors \$ _____
- In-house professional staff \$ _____ or _____ hours
- In-house clerical staff \$ _____ or _____ hours
- In-house field staff \$ _____ or _____ hours

9. Were passengers notified in advance of the survey through the media, on-board posters, announcements, etc.?

- Yes: How? _____
- No

10. Describe length and nature of training of survey staff.

11. Were any steps taken to ensure the physical safety of the survey staff?

Yes: Describe: _____

No

12. What was the survey universe? (e.g., all bus riders, all commuter rail riders, riders on particular lines, weekend subway and bus riders, etc.)

13. Was stratification (random selection within “strata” such as bus routes, time of day) used in the sample design?

Yes: Describe: _____

No

14. Were weights or expansion factors used (to improve representativeness of results)?

Yes: Describe: _____

No

15. What language(s) was the survey offered in?

English only

English and:

Spanish

Chinese

Other: _____

16. Did you offer incentives to induce higher response rates (e.g., free bus tokens)?

Yes: Describe: _____

No

17. Where was surveying conducted? (Check all that apply.)

Bus: On-board Bus stops Transit center(s)

Rail: On-board Stations Transit center(s)

Paratransit: On-board

Other: _____

18. During what time(s) of day was surveying conducted? (Check all that apply.)

All times that service operates (also check applicable time periods)

a.m. peak

Midday

p.m. peak

Evening

Late night

19. On what days was surveying conducted? (Check all that apply.)

Monday

Friday

Tuesday

Saturday

Wednesday

Sunday

Thursday

70

20. Describe how routes or stations were selected for sampling.

21. Did you pretest the survey questionnaire?

- Yes
- No

22. On how many days was the survey fielded? _____ (days)

23. How many surveys were

- a) Distributed: _____
- b) Returned: _____
- c) "Complete" using your definition: _____

24. How many were completed in each language?

- English _____
- Spanish _____
- Chinese _____
- Other: _____: _____ number completed

25. What was the overall response rate? _____ percent

26. How did you measure the base used to calculate the response rate?

- Passenger counts
- Number of surveys distributed
- Number of persons approached by interviewers
- Other: _____

27. Describe whether you found differences in response rate by route, station, language, time of day, day of week, etc.

28. Did you use any procedures to ensure that surveys were completed by respondents (not made up by survey staff)?

- Yes: Describe: _____
- No

29. Were characteristics of survey respondents compared with any of the following to evaluate the quality of the sample?

	Yes	No
a) Census data	<input type="checkbox"/>	<input type="checkbox"/>
b) On and off counts (stop/station level data)	<input type="checkbox"/>	<input type="checkbox"/>
c) Ridership (e.g., route level data)	<input type="checkbox"/>	<input type="checkbox"/>
d) Other: _____	<input type="checkbox"/>	<input type="checkbox"/>

e) If yes to any of the above, briefly describe data used:

If This Was **Not** an Origin and Destination (O&D) Study, Skip to Question 33

30. What steps did you take in processing the data to obtain valid/usable addresses?

- O&D direction logical with bus/train trip direction
- Speed of trip (mph) logical for O&D distance and time of trip provided by respondent
- Speed and distance reasonable for origin–boarding and alighting–destination pairs based on mode of access/egress (e.g., don't walk 20 miles or at 60 mph)
- Verified addresses/intersections using GIS software
- Looked at route/line used for trip
- Used landmark listing
- Used logic or consistency checks
- Other: _____
- Other: _____

31. What standard was used to consider O&D data complete?

- All origin/destination data complete and could be coded
- Percentage of origin/destination data complete and could be coded:
What percentage? _____
- Other: _____

32. How was origin/destination data used? (Check all that apply.)

- Route planning
- Schedule planning
- Long-range planning
- Modeling
- Other: _____

33. Did you implement any editing procedures or other steps in data cleaning/data processing to ensure accuracy?

- Yes: Describe: _____

- No

34. What standard did you use to consider the survey “complete” and usable in the results (in addition to O&D-specific considerations reported in Question 31)?

- All questions answered
- Percentage of questions answered: What percentage? _____
- Other: _____

35. What software did you use in data input, data processing, and data analysis? (Check all that apply.)

- SPSS
- SAS
- Microsoft Excel
- Microsoft Access
- Wincross
- Other: _____

36. Describe any innovative aspects to this project.

37. Overall, how would you assess the accuracy and usefulness of the survey results?

38. What affected the quality of the data collected in this survey (for better or worse)?
(In answering this question, you might think about design of the sample, questionnaire length, wording of questions, languages used in administering the survey, where/when survey was conducted, who distributed survey, method of collecting survey from respondents, staff used (in-house, contracted), incentives.)

39. Describe any “things to do again” that you learned or used in this survey.

40. Describe any “things *not* to do again” that you learned in this survey.

41. Provide name and contact information for any follow-up questions specific to this survey:

Same as person named on page 1.
 Other person:
Name: _____
Phone: _____
E-mail address: _____

Thank you for completing this section. Please include:

- Questionnaire for survey described above.
- Instructions to survey staff.
- Written explanations of the methodology, data collection, etc.

Please return this questionnaire (paper or on-line) and documentation (by mail or e-mail) by December 15, 2004 to:

Bruce Schaller
Schaller Consulting Voice: (718) 768-3487
94 Windsor Place Fax: (718) 768-5985
Brooklyn, NY 11215 schaller@schallerconsult.com

THANK YOU FOR YOUR COOPERATION!

APPENDIX B

Survey Respondents

State	City	Agency
AZ	Tucson	Sun Tran
CA	Lodi	City of Lodi
CA	Los Angeles	Los Angeles County Metropolitan Transportation Authority (Metro)
CA	Los Angeles	Southern California Regional Rail Authority (Metrolink)
CA	Orange	Orange County Transportation Authority (OCTA)
CA	Sacramento	Sacramento Regional Transit District
CA	San Diego	San Diego Association of Governments (SANDAG)
CA	San Francisco	San Francisco Municipal Transportation Agency
CA	San Jose	Santa Clara Valley Transportation Authority (VTA)
CA	Santa Monica	Santa Monica Big Blue Bus
CO	Denver	Regional Transportation District (RTD)
CT	Hartford	CTTransit
DC	Washington	Washington Metropolitan Area Transit Authority (WMATA)
DE	Wilmington	Delaware Transit Corporation
FL	Clearwater	Pinellas Suncoast Transit Authority
FL	Orlando	Central Florida Regional Transportation Authority (LYNX)
FL	Pompano Beach	Broward County Transit
GA	Atlanta	Metropolitan Atlanta Rapid Transit Authority (MARTA)
IL	Arlington Heights	Pace Suburban Bus
IL	Chicago	Chicago Transit Authority (CTA)
IL	Chicago	Metra
IN	South Bend	The Bus
KY	Ft. Wright	Transit Authority of Northern Kentucky (TANK)
KY	Louisville	Transit Authority of River City (TARC)
MA	Boston	Massachusetts Bay Transportation Authority (MBTA)
MA	Haverhill	Merrimack Valley Regional Transit Authority
ME	Portland	Greater Portland Transit District (Metro)
MI	Ann Arbor	Ann Arbor Transportation Authority
MI	Detroit	Suburban Mobility Authority for Regional Transportation (SMART)
MN	Minneapolis	Metro Transit
MO	St. Louis	Metro
MS	Gulfport	Gulf Regional Planning Commission (GRPC)
NC	Charlotte	Charlotte Area Transit System (CATS)
NH	Manchester	Manchester Transit Authority
NJ	Jersey City	Port Authority Trans Hudson (PATH)
NV	Las Vegas	Regional Transportation Commission of Southern Nevada
NY	Albany	Capital District Transportation Authority (CDTA)
NY	Brooklyn	Metropolitan Transportation Authority New York City Transit
NY	Ithaca	Tompkins Consolidated Area Transit
OH	Cincinnati	Southwest Ohio Regional Transit Authority (SORTA)
OH	Cleveland	Greater Cleveland Regional Transit Authority (GCRTA)

OH	Dayton	Greater Dayton Regional Transit Authority
OR	Eugene	Lane Transit District (LTD)
OR	Portland	Tri-County Metropolitan Transportation District of Oregon (TriMet)
PA	Philadelphia	Southeastern Pennsylvania Transportation Authority (SEPTA)
TX	Dallas	Dallas Area Rapid Transit (DART)
TX	Fort Worth	Fort Worth Transportation Authority
WA	Lakewood	Pierce Transit
WA	Olympia	Intercity Transit
WA	Seattle	King County Metro Transit Division
WI	Milwaukee	Milwaukee County Transit System
WI	Oshkosh	Oshkosh Transit System

APPENDIX C

Sample Origin and Destination Survey Questionnaires

- Transit Authority of Northern Kentucky (TARC) Project Gobility Passenger Survey
- Tri-County Metropolitan Transportation District of Oregon (TriMet) 2004 Ridership Survey
- Southern California Regional Rail Authority (Metrolink) 2004 Rider Survey
- Chicago Transit Authority (CTA) Blue Line (Douglas line) Customer Survey
- Lane Transit District (LTD) Survey
- San Diego Association of Governments (SANDAG) 2002 Onboard Transit Survey

5. How did you **PAY** for this bus trip? (mark only one) / ¿Cómo **PAGÓ** por este viaje en autobús? (seleccione solamente una)
- Cash / En efectivo → amount / cantidad: \$ Stop 'n go Transfer Ticket / Boleto de Transferencia Stop 'n go
 FareSaver Monthly Pass / Pase Mensual FareSaver FareSaver Special Ticket et / Boleto Especial FareSaver
 FareSaver Ticket / Boleto FareSaver
6. How many **DAYS A WEEK** do you ride TARC? / ¿Cuántos **DÍAS A LA SEMANA** usted transita en TARC?
- 7 days / 7 días 4 days / 4 días 1 day / 1 día
 6 days / 6 días 3 days / 3 días Don't ride every week / No transita cada semana
 5 days / 5 días 2 days / 2 días First time riding / Primer viaje
7. How many **PEOPLE** live in your home? (including yourself) / ¿Cuántas **PERSONAS** viven en su hogar? (incluyéndose Ud.) #
8. How many **VEHICLES** are in **RUNNING CONDITION AND AVAILABLE** for use by your household? / ¿Cuántos **VEHICULOS EN CONDICIONES DE USO Y DISPONIBLES** hay para el uso de su hogar?
- None / Ninguno 1 2 3 4+
9. If bus service was not available, how would you **MAKE THIS TRIP**? (mark only one) / Si este servicio de autobús no estuviera disponible, ¿cómo hubiera **HECHO ESTE VIAJE**? (seleccione solamente una)
- Drive / Manejando Ride with someone / Manejado con alguien Taxi
 Walk / Caminando Bicycle / En bicicleta Would not make this trip / No hubiera hecho este viaje
10. Do you live in a ... / ¿Usted vive en una/un ...
- House or mobile home / Casa o casa móvil
 Apartment, condominium, duplex or other multi-unit home / Apartamento, condominio, duplex u otra vivienda de varias unidades
11. Do you have access to the **INTERNET** at any of the following locations? (mark all that apply) / ¿Usted tiene acceso al **INTERNET** en cualquiera de los siguientes lugares? (marque todas las que correspondan)
- At home / En la casa At the local library / En la biblioteca local Other places (specify) / Otro lugares (especifique)
 At Work / En el trabajo I don't have access to the Internet /
 At school / En la escuela Yo no tengo acceso al Internet _____
12. What was your estimated total **HOUSEHOLD INCOME** (in 2003) before taxes? / ¿Cuál fue el estimado del **INGRESO TOTAL DE SU HOGAR** (en el 2003) antes de impuestos?
- <\$20,000 \$40,000 - \$59,999 \$80,000 - \$99,999
 \$20,000 - \$39,999 \$60,000 - \$79,999 \$100,000+
13. Are you ... ? / ¿Es usted ... ? Male / Hombre Female / Mujer
14. Are you ... ? / ¿Es usted ... ? Under 18 / Menor de 18 años 25 - 34 45 - 54 65 or older / 65 años o mayor
- 18 - 24 35 - 44 55 - 64
15. Are you ... ? (check the one that best describes you) / ¿Es usted ... ? (seleccione el que mejor le describa)
- Black/African American / Negro/Afro-Americano Native American / Americano Nativo
 Hispanic/Latino / Hispano/Latina Asian American / Asi-tico Americano
 White / Blanco Other / Otro

Do you have any **COMMENTS** on how TARC may be able to serve **YOU** better? / ¿Tiene algún **COMENTARIO** sobre cómo TARC pudiera servirle mejor a **USTED**?



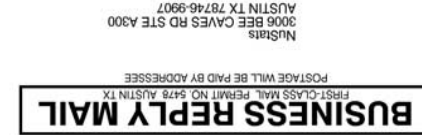
PASSENGER SURVEY ENCUESTA DE PASAJEROS

Please take a minute to help us plan for your transit needs by filling out this survey. Return the completed survey to the surveyor, OR place it in the special box located near the exit door of this vehicle OR drop it in any mailbox (no postage required).

Por favor tome un minuto y ayúdenos a planificar sus necesidades de tránsito completando esta encuesta. Regrese la encuesta completa al encuestador, colóquela en la caja especial cerca de la salida de este vehículo O póngala en cualquier buzón postal (franqueo prepagado).

Register to Win!	¡Regístrate para Ganar!
As a thank you for FULLY COMPLETING this survey and returning it to the surveyor while you are on this bus, you will receive a FREE ONE RIDE TICKET and be registered for a DRAWING TO WIN .	Como muestra de agradecimiento por COMPLETAR TODA esta encuesta y regresarla al encuestador mientras está en este autobús, usted va a recibir UN PASE GRATIS y entrará a participar en un SORTEO PARA GANAR :
GRAND PRIZE: One monthly pass each month for 6 months 1ST PRIZE: One monthly pass each month for 3 months 2ND PRIZE: One monthly pass awarded to 5 passengers	PREMIO MAYOR: Un pase mensual para cada mes por 6 meses 1^{ER} PREMIO: Un pase mensual para cada mes por 3 meses 2^{DO} PREMIO: Un pase mensual otorgado a 5 pasajeros

Name / Nombre: EXAMPLE / EJEMPLO: J O H N S M I T H <input type="text"/> Street number / Número de calle: <input type="text"/> City / Ciudad: <input type="text"/>	Telephone / Teléfono (<input type="text"/>) <input type="text"/> - <input type="text"/> Street name / Nombre de la calle: <input type="text"/> State / Estado: <input type="text"/> Zip / CP: <input type="text"/>
--	---



Postage paid by the sender. No postage necessary if mailed in the United States.

1111

Mark here if you completed a survey on another trip & continue. / Marque aquí si usted ya llenó un cuestionario en otro viaje y continúe.

Please print clearly as in the example:
Por favor escriba claramente como en el ejemplo:

A	B	C	1	2	3
---	---	---	---	---	---

 Fill bubble with:
Llene la burbuja con:

1. WHERE were you before riding this bus (**BEGINNING LOCATION**)?
¿En **DÓNDE** estaba usted antes de abordar este autobús (**LUGAR DE COMIENZO**)?

- | | | |
|--|--|--|
| <input type="radio"/> My home / Mi casa | <input type="radio"/> My work / Mi trabajo | <input type="radio"/> Worship / Religioso |
| <input type="radio"/> Visiting friend or relative's home /
Visitando la casa de amigos o familiares | <input type="radio"/> Recreation or entertainment /
Recreación o entretenimiento | <input type="radio"/> Personal business (bank, post office, etc.) /
Asunto personal (banco, oficina postal, etc.) |
| <input type="radio"/> School / Escuela | <input type="radio"/> Grocery or Department Store /
Supermercado o Tienda por Departamentos | <input type="radio"/> Medical services / Servicios médicos |
| <input type="radio"/> Restaurant / Restaurante | | |

What is the **NAME** of this place/building where you began this trip?
¿Cuál es el **NOMBRE** de ese lugar/edificio en dónde usted empezó este viaje?
Example / Ejemplo: REPUBLIC BANK

What are the **NEAREST CROSS STREETS** or **INTERSECTION** of that place? / ¿Cuál es la **INTERSECCIÓN DE CALLES MÁS CERCANA** a ese lugar?

Street 1 / Calle 1: & Street 2 / Calle 2:
Example / Ejemplo: W I M A R K E T S T S I
S I G H T S T

What is the **EXACT STREET ADDRESS** of that place? / ¿Cuál es la **DIRECCION EXACTA** de ese lugar?
Example / Ejemplo: 6 0 1 W I M A R K E T S T

Street # / # de la calle: Street name / Nombre de la calle:
City / Ciudad: Zip / CP:

2. Where did you BOARD THIS BUS? [Cross street(s) or intersection and city]
¿En dónde **ABORDO ESTE AUTOBUS?** (Intersección y ciudad)

Street 1 / Calle 1: & Street 2 / Calle 2:
City / Ciudad:
NEAREST CROSS STREETS OR INTERSECTION INTERSECCION DE CALLES MÁS CERCANA

What **TIME** did you **BOARD THIS BUS**? / ¿A qué **HORA** **ABORDÓ ESTE** autobús? : am pm

How did you **GET FROM** the beginning location to the bus stop where you boarded this bus?
¿Cómo **LLEGÓ DEL** lugar de comienzo a la parada de autobús en dónde usted se subió a este autobús?

- | | | |
|---|--|--|
| <input type="radio"/> Walked / Caminé | <input type="radio"/> Shuttle/vanpool | <input type="radio"/> Bicycle / En bicicleta |
| <input type="radio"/> Rode with someone who parked / Fui con alguien que estacionó | <input type="radio"/> Drove a car & parked / En mi carro y estacioné | <input type="radio"/> Taxi |
| <input type="radio"/> Transferred from another bus ↓ / Transferencia de otro autobús: ✓ | <input type="radio"/> Dropped off by someone / Alguien me trajo | |

Route# / Ruta#: → Route Name / Nombre de la Ruta:

How long did you wait for this bus? (# minutes) / ¿Cuánto tiempo usted esperó por este autobús (# minutos)? # minutes / # minutos:

HOW FAR, in minutes, is the place where you came from and the first bus stop you used when you began this trip?
¿**QUÉ TAN LEJOS**, en minutos, es el lugar de donde usted vino y la primera parada de autobús que usó cuando usted comenzó este viaje? # minutes / # minutos:

3. Where will you get off THIS BUS? [Nearest cross street(s) or intersection and city]
¿En dónde se **BAJARÁ DE ESTE AUTOBUS?** (Intersección más cercana y ciudad)

Street 1 / Calle 1:
Street 2 / Calle 2:
City / Ciudad:
NEAREST CROSS STREETS OR INTERSECTION INTERSECCION DE CALLES MÁS CERCANA

After you get off this bus, how will you **GET TO YOUR FINAL DESTINATION**? (mark only one)
¿Después de bajarse de este autobús, **COMO LLEGARA A SU DESTINO FINAL?** (seleccione solamente una)

- | | | |
|--|---|---------------------------------------|
| <input type="radio"/> Walk / Caminaré | <input type="radio"/> Bicycle / En bicicleta | <input type="radio"/> Taxi |
| <input type="radio"/> Ride with someone who parked / Iré con alguien que estacionó | <input type="radio"/> Drive my car / Manejaré mi carro | <input type="radio"/> Shuttle/vanpool |
| <input type="radio"/> Transfer to another bus / Transferencia a otro autobús: | <input type="radio"/> Picked up by someone / Alguien me irá recoger | |

Route# / Ruta#: Route Name / Nombre de Ruta:

4. Where are you GOING TO NOW?
¿Hacia dónde **SE DIRIGE** ahora?

- | | | |
|--|--|--|
| <input type="radio"/> My home / Mi casa | <input type="radio"/> My work / Mi trabajo | <input type="radio"/> Worship / Religioso |
| <input type="radio"/> Visiting friend or relative's home /
Visitando la casa de amigos o familiares | <input type="radio"/> Recreation or entertainment /
Recreación o entretenimiento | <input type="radio"/> Personal business (bank, post office, etc.) /
Asunto personal (banco, oficina postal, etc.) |
| <input type="radio"/> School / Escuela | <input type="radio"/> Grocery or Department Store /
Supermercado o Tienda por Departamentos | <input type="radio"/> Medical services / Servicios médicos |
| <input type="radio"/> Restaurant / Restaurante | | |

What is the **NAME** of this place/building?
¿Cuál es el **NOMBRE** de ese lugar/edificio?

What is the **NEAREST CROSS STREETS** or **INTERSECTION** of that place?
¿Cuál es la **INTERSECCION DE CALLES MÁS CERCANA** a ese lugar?

Street 1 / Calle 1: & Street 2 / Calle 2:
NEAREST CROSS STREETS OR INTERSECTION INTERSECCION DE CALLES MÁS CERCANA

What is the **EXACT STREET ADDRESS** of that place?
¿Cuál es la **DIRECCION EXACTA** de ese lugar?

Street # / # de la calle: Street name / Nombre de la calle:
City / Ciudad: Zip / CP:

HOW MANY MINUTES is your final destination from the last bus stop where you will get off on this trip?
¿**A CUÁNTOS MINUTOS** está su destino final de la última parada en donde usted se bajará en este viaje? # minutes / # minutos:

2222
Continue / Continué

TRIMET RIDERSHIP SURVEY

To help us plan better service, please tell us about your **ONE-WAY** trip. Fill out this form even if you have already received one before, or rarely use TriMet. When finished, place the form in the envelope near the door, or you may return it by postage-paid mail.

This One-Way Trip

- 1. Where did you come from on this trip?** (check one best answer)
- Home Personal business Visiting friends/relatives
 Work Shopping Medical appointment
 School Other: _____
 Recreation: _____

2. Where was that located? (see question 1)
(Complete address & city OR street/cross street & city OR landmark.)

(circle one)
NE SE NW SW

Street: N S E W _____

Nearest Cross Street: _____

City: _____ Zip Code: _____

- 3. How did you get to the stop where you got on this bus?** (check one best answer)
- Walk _____ # blocks Transferred from MAX
 Drove Dropped off by someone
 Transferred from bus#: _____ Other: _____

4. Where was that bus stop located?

(Street/cross street & city)

5. At what bus stop will you get off this bus?

(Street/cross street & city)

- 6. Where are you going on this trip?** (check one best answer)
- Home Personal business Visiting friends/relatives
 Work Shopping Medical appointment
 School Other: _____
 Recreation: _____

7. Where is that located? (see question 6)
(Complete address & city OR street/cross street & city OR landmark.)

(circle one)
NE SE NW SW

Street: N S E W _____

Nearest Cross Street: _____

City: _____ Zip Code: _____

- 8. How will you get to that location from this bus?** (check one best answer)
- Walk _____ # blocks Transfer to MAX
 Drive Be picked up by someone
 Transfer to bus#: _____ Other: _____

- 9. Did you have to transfer to or from a different bus/MAX to make this trip in one direction?**
- No Yes → If yes, how many times? _____

- 10. How did you pay for this trip?** (check one)
- | | | | | |
|------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| | CASH | TICKET
(BOOK OF 10) | MONTHLY
PASS | ANNUAL
PASS |
| Adult All-Zone..... | <input type="checkbox"/> \$ 1.60 | <input type="checkbox"/> \$15.50 | <input type="checkbox"/> \$58.00 | <input type="checkbox"/> \$638.00 |
| Adult 2-Zone..... | <input type="checkbox"/> \$ 1.30 | <input type="checkbox"/> \$12.50 | <input type="checkbox"/> \$47.00 | <input type="checkbox"/> \$517.00 |
| Adult 1-Zone..... | | <input type="checkbox"/> \$12.00 | | |
| Honored Citizen/STAR..... | <input type="checkbox"/> \$.60 | <input type="checkbox"/> \$ 5.00 | <input type="checkbox"/> \$16.00 | <input type="checkbox"/> \$175.00 |
| Youth..... | <input type="checkbox"/> \$ 1.00 | <input type="checkbox"/> \$ 9.50 | <input type="checkbox"/> \$34.00 | <input type="checkbox"/> \$355.00 |
| School Pass grades K-12..... | | <input type="checkbox"/> \$16.50 | | |
- OTHER**
- Employee ID with TriMet sticker
 College ID with TriMet sticker
 C-TRAN fare
 Fareless Square (free)
 Other: _____

- 11. Did your employer or school pay for any portion of your fare?**
- No Yes

- 12. What is the major reason you are using the bus for this one-way trip?** (check one best answer)
- I do have a car but prefer to use TriMet.
 I don't have a car because I prefer to use TriMet.
 I don't have a car available for me to use.
 I don't drive or don't know how to drive.

- 13. If transit service were not available, how would you make this kind of trip?** (check one best answer)
- Use a car Bicycle
 Walk I would not make this trip
 Ride with a friend Other: _____
 Use a taxi

About You

- 14. How many trips have you taken on a TriMet bus/MAX/streetcar in the last month?** (count each direction as one trip)
- 0 or 1 13 to 29
 2 to 6 30 or more
 7 to 12

- 15. What is your home zip code?** _____

- 16. What year were you born?** 19 _____

- 17. Are you:** (check one)
- Asian/Pacific Islander Hispanic/Latino
 African-American/Black Native American Indian
 Caucasian/White Other: _____

- 18. What was your total annual household income before taxes in 2003?** (check one)
- Under \$10,000 \$50,000 to \$59,999
 \$10,000 to \$19,999 \$60,000 to \$69,999
 \$20,000 to \$29,999 \$70,000 or more
 \$30,000 to \$39,999 Don't know
 \$40,000 to \$49,999

Your Opinion of This Trip

- 19. Please read the following statements and answer using the 5-point rating scale.** (Circle 1 answer for each statement.)
- | | | | | |
|--------------------------------|------|---|---|-----------|
| | Poor | | | Excellent |
| a) Cleanliness inside bus..... | 1 | 2 | 3 | 4 5 |
| b) Safety while on-board..... | 1 | 2 | 3 | 4 5 |
| c) Reliability of service..... | 1 | 2 | 3 | 4 5 |
| d) Frequency of service..... | 1 | 2 | 3 | 4 5 |
| e) Over-crowding..... | 1 | 2 | 3 | 4 5 |
| f) Overall service..... | 1 | 2 | 3 | 4 5 |



2004 RIDER SURVEY

Every other year Metrolink surveys our riders onboard the trains to improve our services. Even if you are not a regular Metrolink rider or if you are visiting Southern California, we would like to hear from you. Please fill out this survey and return to the attendant.

Please select your response for each question by placing an "X" in only one box , unless the instructions indicate otherwise . . .

1. How long have you been riding METROLINK regularly ?

- | | |
|--|--|
| <input type="checkbox"/> 1 This is my first time | <input type="checkbox"/> 5 Between 2 and 4 years |
| <input type="checkbox"/> 2 Less than 6 months | <input type="checkbox"/> 6 Between 4 and 6 years |
| <input type="checkbox"/> 3 Between 6 months and 1 year | <input type="checkbox"/> 7 More than 6 years |
| <input type="checkbox"/> 4 Between 1 and 2 years | |

2. Please fill in number of days you usually ride METROLINK.

- 1 I typically ride Metrolink _____ day (s) per week, OR
- 2 I typically ride Metrolink _____ day (s) per month, OR
- 3 I typically ride Metrolink _____ day (s) per year
- 4 I am not a regular rider. I last took Metrolink in _____ (month/year)
- 5 Don't know

3. On days when you don't take Metrolink, how do you make this trip? (choose one)

- | | |
|---|--|
| <input type="checkbox"/> 1 Don't make this trip | <input type="checkbox"/> 6 Take the MTA-Metro (Red, Blue, Green, or Gold Line) |
| <input type="checkbox"/> 2 Use AMTRAK | <input type="checkbox"/> 7 Other (please specify:) |
| <input type="checkbox"/> 3 Drive alone | |
| <input type="checkbox"/> 4 Drive with someone/vanpool | |
| <input type="checkbox"/> 5 Take a bus | |

4. What was the purpose of your very first trip on Metrolink? (choose one)

- | | |
|--|--|
| <input type="checkbox"/> 1 Commuting to or from work | <input type="checkbox"/> 4 Taking the train for just fun |
| <input type="checkbox"/> 2 Visiting friends or family | <input type="checkbox"/> 5 Other (please specify:) |
| <input type="checkbox"/> 3 Taking the train to a special event | |

These next questions ask about the current one-way Metrolink trip you are taking, including this train and all other Metrolink trains which are a part of this trip (for example: this may be your trip from home to work, or from work to home). . .

5. What type of ticket are you using today ?

- 1 Monthly pass
Since when have you been buying a monthly pass regularly?
Since: Month: _____ Year: _____
- 2 10-trip (average # of weeks until used up _____)
- 3 Four-trip ticket
- 4 Round trip ticket
- 5 One-way ticket
- 6 Amtrak ticket
- 7 Other (please specify:)

6. What was the price of your pass or ticket? _____

7. Does your employer pay part or all of your pass or ticket ?

- 1 No
- 2 Yes - My employer pays \$ _____ per month
- 3 Does not apply (I am not employed)

8. Is this trip part of a round-trip?

- 1 Yes, this is a round trip on Metrolink
- 2 Yes, this is a round trip using Metrolink in one direction and Amtrak in the opposite direction
- 3 No, I will use Metrolink in one direction only

9. Does this one-way trip include a transfer to or from another Metrolink or Amtrak train? (Choose one)

- 1 Amtrak transfer
- 2 Metrolink transfer
- 3 Both Amtrak and Metrolink transfers
- 4 No Amtrak and no Metrolink transfers

10. How many minutes is your typical work commute, starting from the time you leave your home until you reach your place of work?

- 1 _____ minutes
- 2 Don't know

11. Do you know that Metrolink passes and tickets are accepted as EZ Transit Pass on many connecting buses?

- 1 Yes
- 2 No
- 3 I am not familiar with the EZ Transit Pass

12. Are you a member of the AAA Automobile Club of Southern California? (Choose one)

- 1 Yes
- 2 No, I am a member of a different Auto Club, name: _____
- 3 No, I am not a member of any Auto Club
- 4 Don't know

These next questions ask about the current one-way Metrolink trip you are taking, including this train and all other Metrolink trains which are a part of this trip (for example: this may be your trip from home to work, or from work to home). . .

START OF THIS ONE-WAY TRIP	END OF THIS ONE-WAY TRIP																																																																																
<p>13. Which best describes where you just came from?</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> 1 Work</td> <td><input type="checkbox"/> 6 Shopping</td> </tr> <tr> <td><input type="checkbox"/> 2 Home</td> <td><input type="checkbox"/> 7 Leisure, entertainment, or social visit</td> </tr> <tr> <td><input type="checkbox"/> 3 Business appointment</td> <td><input type="checkbox"/> 8 Sight-seeing (just for fun)</td> </tr> <tr> <td><input type="checkbox"/> 4 Personal appointment</td> <td><input type="checkbox"/> 9 Other (please specify:)</td> </tr> <tr> <td><input type="checkbox"/> 5 School</td> <td></td> </tr> </table> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <p>14. What is the nearest known street intersection, city, and zip code for that starting point? (this information helps us estimate travel distance and improve access to Metrolink.)</p> <p style="text-align: center;">_____ & _____ Primary Street Cross Street</p> <p>City: _____ Zip code: _____</p> <p>15. At which Metrolink station did you <u>get on</u> the train?</p> <p style="text-align: center;">_____ station</p> <p>16. How did you travel to that METROLINK station ? 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(this information helps us estimate travel distance and improve access to Metrolink.)</p> <p style="text-align: center;">_____ & _____ Primary Street Cross Street</p> <p>City: _____ Zip code: _____</p> <p>19. At which Metrolink station will you <u>get off</u> the train?</p> <p style="text-align: center;">_____ station</p> <p>20. How will you travel from that METROLINK station to where you are going? 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These next questions ask about how well METROLINK service meets your needs...

21. Before you began using METROLINK, how did you make this trip?

- | | |
|---|--|
| <input type="checkbox"/> 1 Didn't make this trip | <input type="checkbox"/> 5 Took a bus |
| <input type="checkbox"/> 2 Used AMTRAK | <input type="checkbox"/> 6 Other (please specify:) |
| <input type="checkbox"/> 3 Drove alone | |
| <input type="checkbox"/> 4 Drove with someone/carpooled/
vanpooled | _____ |

22. How satisfied are you with METROLINK services over all? (choose one)

- | | |
|---|---|
| <input type="checkbox"/> 1 Very dissatisfied | <input type="checkbox"/> 4 Satisfied |
| <input type="checkbox"/> 2 Dissatisfied | <input type="checkbox"/> 5 Very satisfied |
| <input type="checkbox"/> 3 Neither dissatisfied nor satisfied | |

23. Please rate each feature associated with traveling on METROLINK trains.

	How <u>important</u> is this feature to you?					How <u>satisfied</u> are you with this Feature?					Don't know or does not apply (check if not applicable to your trip)
	Not Important	(circle number)			Very Important	Dissatisfied	(circle number)			Satisfied	
Travel time on Metrolink vs. car	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
On-time arrivals	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Connecting transit buses at station	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Availability of free unreserved parking at station	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Availability of paid and reserved parking at station	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Availability of seating on the train	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Cleanliness of train interior	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Safe operation of trains	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Personal security on the train	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Personal security at the station	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Trains free of defects (heat, doors, etc.)	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Ease of purchasing tickets	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Cost of a Metrolink ride	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Courtesy of Metrolink conductors	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Communication of schedule changes	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Communication of delays	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Schedule convenience	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>
Ease of getting information at 800-371-LINK	1	2	3	4	5	1	2	3	4	5	<input type="checkbox"/>

24. How likely are you to recommend METROLINK to others? (choose one)

- 1 Very unlikely
- 2 Unlikely
- 3 Neither unlikely nor likely
- 4 Likely
- 5 Very Likely
- 6 Don't know

25. Have you moved or changed residence during the last year?

- 1 No
- 2 Yes ➔ If Yes, has Metrolink been a factor in your choice of residence?
 - 1 No
 - 2 Yes

26. Have you changed your place of work during the last year?

- 1 No
- 2 Yes ➔ If Yes, has Metrolink been a factor in your choice of work location?
 - 1 No
 - 2 Yes

27. Did you have an automobile to make today's trip (if you had wanted to use one instead of METROLINK)? (Choose one)

- 1 Yes
- 2 No

28. How many times do you expect to fly out of these airports over the next 12 months? (write in number of times)

- 1 LAX (Los Angeles International Airport) _____ times per year
- 2 Ontario _____ times per year
- 3 Burbank _____ times per year
- 4 Orange (John Wayne Airport) _____ times per year

29. How likely are you to take an Express bus to the airport if one left from the nearest Metrolink station with baggage check-in and boarding pass service so you could go straight from the bus to boarding the plane? (choose one)

- 1 Very unlikely
- 2 Unlikely
- 3 Neither unlikely nor likely
- 4 Likely
- 5 Very Likely
- 6 Don't know

30. Please think about when you first started riding Metrolink, What was the single most important reason that made you take Metrolink? (choose one)

- 1 I had moved to a new residence and needed a new way to commute
- 2 I got a new job or job location and needed a new way to commute
- 3 My employer gave me a free Metrolink ticket
- 4 My employer paid for part of my Metrolink pass
- 5 A family member, friend, or co-worker told me about Metrolink
- 6 I have seen advertising for Metrolink and was curious
- 7 The MTA strike forced me to find alternate transportation
- 8 I took the train to a special event
- 9 I was traveling in a group
- 10 My car was being repaired
- 11 My car was being used by another family member
- 12 I could not drive my car for medical reasons
- 13 The high cost of gas
- 14 I served on Jury duty and received a free Metrolink ticket
- 15 I received an offer in the mail
- 16 Other (please specify:) _____

31. How often do you visit the Metrolink website Metrolinktrains.com (Choose one)

- 1 At least once per day
- 2 A few times per week
- 3 A few times per month
- 4 A few times per year
- 5 Never
- 6 Don't know

32. Please indicate your gender:

- 1 Male 2 Female

33. Year you were born 19 _____

34. What is your home Zip code: _____

35. Which of the following best describes your ethnic background ?

- 1 African American 4 Hispanic
 2 Asian/Pacific Islander 5 Other (please specify:)
 3 Caucasian _____

36. Which category includes your total annual household income before taxes in 2003 ?

- 1 Less than \$20,000 6 \$60,000 - \$74,999
 2 \$20,000 - \$29,999 7 \$75,000 - \$99,999
 3 \$30,000 - \$39,999 8 \$100,000 - \$149,999
 4 \$40,000 - \$49,999 9 \$150,000 - \$199,999
 5 \$50,000 - \$59,999 10 \$200,000 or more

37. Which of the following best describes your employment status ?

- 1 Employed full-time (Answer question 38a-d)
 2 Employed part-time (Answer question 38a-d)
 3 Self-employed (Answer question 38a-d)
 4 Retired
 5 Not employed or seeking employment
 6 Full-time student (please indicate type of school you are attending):
 7 High School 9 College/University
 8 Trade/Technical School 10 Other School

If you are employed, please answer the following questions:

38a. Which category best describes your occupation ?

- 1 Senior Executive 7 Public Safety Officer
 2 Professional Managerial 8 Sales/Clerk
 3 Professional Non-Managerial 9 Healthcare worker
 4 Business Owner 10 Teacher
 5 Admin. Assistant 11 Consultant
 6 Skilled Worker 12 Scientist
 13 Other (please specify:)

38b. Which category best describes the industry you work in?

- 1 Construction/Manufacturing 8 Health/Human Services
 2 Research/Education 9 Engineering
 3 Transportation/Communication/Utilities 10 Business Services
 4 Wholesale and Retail Trade 11 Arts/Entertainment
 5 Finance/Insurance/Real Estate 12 Government
 6 Legal Services 13 Military
 7 Food Services/Hotels 14 Other (please specify:)

38c. How many people does your company employ at your work location ?

- 1 Under 25 4 100 - 249
 2 25 - 49 5 250 or over
 3 50 - 99

38d. Does your employer provide any of the following to employees ? (check all that apply)

- 1 Time tables and brochures 4 My employer does not promote public transit
 2 Trial ride tickets 5 Other (please specify:)
 3 Shuttle/van to station

Have a Comment ?

Comments can also be made by e-mail at the Metrolink web site www.metrolinktrains.com or through the customer service center (800) 371-LINK.

Complete surveys will be entered into a random drawing to win a FREE monthly pass. For your chance to win please provide your name, address and phone number below

Name: _____

Address: _____

City: _____ Zip: _____ - _____

Home Phone: (_____) _____ - _____

Work Phone:(_____) _____ - _____

E-mail Address: _____

Please give the survey to one of our attendants!

Thank you for completing the survey, and helping to make METROLINK the nation's premier commuter rail service!

Metrolink respects your privacy! We will not sell your address information or use it to identify survey responses! Thank you very much for your participation.



Blue Line Customer Survey

CTA would like to know more about your travel needs, in order to serve you better. Please fill out this brief survey, and return it to the person who gave it to you. ✕ or ✓ your selections.

1. Where did you begin *the trip you are making now?* (Please check only the **one best** answer.)

- ① Home ② School ③ Shopping ④ Work or Work-related location
 ⑤ Child care provider ⑥ Medical Facility ⑦ Airport ⑧ Social/Recreational Place

⑨ Other (Please specify) _____

2. Where is this place? (Please give **address, nearest street intersection or name of the location.**)

3. How did you get from that place to the station where you boarded this train?

- ① Walked (Skip to Question 5)
 ② CTA bus (Skip to Question 5)
 ③ CTA train (Answer Question 4)
 ④ Drove/Got a ride (Skip to Question 5)

⑤ Other (specify) _____ (Skip to Question 5)

4. Which rail line did you transfer from?

- ① Red ② Green ③ Orange ④ Brown ⑤ Purple

5. At which station did you board this train? _____

6. At which station will you get off this train? _____

7. What will you do when you leave this train?

- ① Walk to destination (Skip to Question 10)
 ② Transfer to CTA bus (Skip to Question 10)
 ③ Transfer to CTA train (Answer Questions 8 and 9)
 ④ Drive/Get a ride (Skip to Question 10)

⑤ Other (specify) _____ (Skip to Question 10)

8. Which rail line will you transfer to?

- ① Red ② Green ③ Orange ④ Brown ⑤ Purple

9. At which station will you exit the CTA rail system? _____

10. Where will you end the trip you are making now? (Please check only the **one best** answer.)

- ① Home ② School ③ Shopping ④ Work or Work-related location
 ⑤ Child care provider ⑥ Medical Facility ⑦ Airport ⑧ Social/Recreational Place

⑨ Other (specify) _____

11. Where is this place? (Please give **address, nearest street intersection or name of the location.**)

_____ *More* ↻

Now, please think about any trips you may have taken LAST WEEKEND.

12. What kinds of places did you travel to last Saturday and/or Sunday? (check *all that apply*)

- ① To/from Home ② School ③ Shopping ④ Work or Work-related location
- ⑤ Child care provider ⑥ Medical Facility ⑦ Airport ⑧ Social/Recreational Place
- ⑨ Other (*specify*) _____
- ⑩ Did not travel anywhere (Skip to Question 17)

13. Did you travel to the Loop last Saturday and/or Sunday?

- ① Yes ② No

14. What travel methods did you use last Saturday and/or Sunday? (check *all that apply*)

- ① Walked
- ② CTA buses (Answer Question 15)
- ③ CTA train (Answer Question 16)
- ④ Drove/Got a ride
- ⑤ Other (*specify*) _____

15. Which CTA bus routes did you use *last weekend*? _____ Did not ride CTA bus

16. Which CTA rail lines did you use *last weekend*? (check *all that apply*)

- ① Red ② Green ③ Orange ④ Brown ⑤ Purple ⑥ Blue ⑦ Yellow Did not ride CTA train

17. **Thank you**, for answering our questions. Use the space below for any comments or suggestions you'd like to make about CTA service in your community.



check here if you have completed a form like this during the past two weeks. IF YOU HAVE, answer only questions 1- 11 and return this form to the surveyor.

Please tell us how you use LTD.

Instructions: Please tell us about your one-way trip. For example, going from home to work is a one-way trip even if you have to change buses. The return trip home counts as a separate one-way trip. (Circle the correct answer.)

- From where you started to where you are going on this one-way trip, how many buses will you use? (Please circle only a or b)
 - Only one -- the bus you are on right now
 - Two or more → In other words, you already changed buses or you will have to change buses to get where you are going now. If so, what route numbers or route names do you take on this trip?
 1st Route # used: _____
 2nd Route # used: _____
 3rd Route # used: _____
- Where did you board the first bus on this one-way trip? What were the major cross streets OR the name of a major landmark there (like a mall, school, office building, park, etc)?
 Major street: _____
 Circle one: Av Dr Hwy Pkwy Rd St Other _____
 Cross street: _____
 Circle one: Av Dr Hwy Pkwy Rd St Other _____
 Landmark: _____
 City (Circle one): Eugene Springfield Other: _____
- How did you get to the LTD stop where you boarded the first bus you used for this trip (this bus if you use only one bus to get where you are going now)? (Please circle only one)
 - Walked
 - Drove
 - Driven by someone else
 - Bicycle
 - Other: _____
- How far did you have to come to get to this bus stop?
 - 0 to 3 blocks
 - 4 to 6 blocks
 - more than 6 blocks

Nº 2095

- How long did it take to get to the bus stop?
 - 1-5 minutes
 - 6-10 minutes
 - 11 - 20 minutes
 - Longer
- Where will you get off the final bus on this one-way trip? What are the major cross streets OR the name of a major landmark there (like a mall or school).

Major street: _____
 Circle one: Av Dr Hwy Pkwy Rd St Other _____
 Cross street: _____
 Circle one: Av Dr Hwy Pkwy Rd St Other _____
 Landmark: _____
 City (Circle one): Eugene Springfield Other: _____

- After getting off the LAST bus, how far will you have to go to get to your destination?
 - 0 to 3 blocks
 - 4 to 6 blocks
 - more than 6 blocks
- How long will that take?
 - 1-5 minutes
 - 6-10 minutes
 - 11 - 20 minutes
 - Longer
- How did you pay your bus fare today?
 - Cash fare
 - Day pass
 - Monthly pass
 - Token
 - Employer or Student Pass (like UO, LCC, SHMC)
- What is the main purpose of your bus trip today? (Choose one)
 - Work
 - Shopping
 - Visit friends or family or recreation
 - School
 - Job seeking
 - Health or medical
 - Other _____
- How many separate one-way bus trips will you make today? (for example, going to work is one trip; going from work to home is a second trip)
 - 1 trip
 - 2 trips
 - 3 trips
 - 4 trips
 - Other _____ (how many?)

If you have completed the rest of the survey in the past 2 weeks, please stop and return the survey to the surveyor

- In the past seven days, how many days have you ridden on an LTD bus (including this bus, today)?

1	2	3	4	5	6	7
---	---	---	---	---	---	---
- Last year at this time, how many days per week were you riding LTD buses?

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---
- In what year did you begin using LTD buses?

19____	2000	2001	2002	2003	2004
--------	------	------	------	------	------

Continue on back, please.

For you personally, how important is each of the following as a reason to use LTD?

	Very Important				Not important at all		
15. Save money	7	6	5	4	3	2	1
16. No parking available	7	6	5	4	3	2	1
17. Don't like to drive in traffic	7	6	5	4	3	2	1
18. My employer pays for bus pass	7	6	5	4	3	2	1
19. Only transportation available to me	7	6	5	4	3	2	1
20. Concern for the environment	7	6	5	4	3	2	1

How do you rate LTD service?

	Excellent				Very poor		
21. Overall, how do you rate LTD?	7	6	5	4	3	2	1
22. How quickly your bus gets you there	7	6	5	4	3	2	1
23. How often your bus runs	7	6	5	4	3	2	1
24. How often your bus is on schedule	7	6	5	4	3	2	1
25. Cleanliness of bus interior	7	6	5	4	3	2	1
26. Enough seats on the bus	7	6	5	4	3	2	1
27. Comfort while waiting for the bus	7	6	5	4	3	2	1
28. Feel safe waiting for the bus	7	6	5	4	3	2	1
29. Feel comfortable with other passengers	7	6	5	4	3	2	1
30. Ease of figuring out route information	7	6	5	4	3	2	1
31. Time buses stop running tonight	7	6	5	4	3	2	1
32. Helpfulness of LTD drivers	7	6	5	4	3	2	1
33. Helpfulness of customer service employees 0 = Have not talked with them	7	6	5	4	3	2	1
34. Helpfulness of automated phone information 0 = Have not called	7	6	5	4	3	2	1
35. Information obtained from LTD web site 0 = Have not used the website	7	6	5	4	3	2	1

36. Do you have access to the Internet on a regular basis?

(1) Yes (2) No

Comments:

How important are the following improvements?

	Very Important				Not important at all		
37. Bus service to new areas	7	6	5	4	3	2	1
38. More direct service	7	6	5	4	3	2	1
39. Faster service	7	6	5	4	3	2	1
40. Earlier morning service	7	6	5	4	3	2	1
41. Later evening service	7	6	5	4	3	2	1
42. More frequent weekday service	7	6	5	4	3	2	1
43. More frequent weekend service	7	6	5	4	3	2	1
44. Lower fares	7	6	5	4	3	2	1
45. More bus stop shelters	7	6	5	4	3	2	1
46. More bus stop seating	7	6	5	4	3	2	1
47. More lighting at bus stops	7	6	5	4	3	2	1
48. More LTD information at bus stops	7	6	5	4	3	2	1
49. More LTD information on the Internet	7	6	5	4	3	2	1
50. More park and ride lots	7	6	5	4	3	2	1
51. Other:	7	6	5	4	3	2	1

What other improvement?

52. How old are you? _____ years old

53. Please circle all of the following that apply to you. Are you:

(1) Employed for pay outside your home (2) Employed for pay at home
(3) Student (4) Homemaker (5) Unemployed (6) Retired

54. If you are a student, which school or grade do you attend?

(1) UO (2) LCC (3) K-8th grade (4) 9-12th grade

55. How many cars or other motor vehicles are owned or leased by your household?
0 (None) 1 2 3 4 5 or more

56. How many licensed drivers live in your household?

0 (None) 1 2 3 4 5 or more

57. Are you female or male? (1) Female (2) Male

58. What is your total annual household income?

(1) Less than \$10,000 (2) \$10,000 to \$14,999 (3) \$15,000 to \$24,999
(4) \$25,000 to \$34,999 (5) \$35,000 to \$44,999 (6) \$45,000 to \$54,999
(7) \$55,000 to \$74,999 (8) \$75,000 to \$99,999 (9) \$100,000 or more

Please return the completed form to the survey personnel on this bus or to LTD staff at any LTD transit center or on any bus. THANK YOU!



2002 Onboard Transit Survey

The San Diego Association of Governments, and your transit operators, want your help to improve transit service by answering the questions below and returning this form before you get off the bus. All responses are confidential. Please fill out this form each time you get one. Thank you.

PLEASE ANSWER THESE QUESTIONS FIRST

1. Where are you coming from?

- 1. Home
- 2. Work
- 3. School
- 4. Shopping
- 5. Recreation/visit friends
- 6. Other (specify: _____)

2. What is the address of that place?

(Specify street name AND cross street OR address)

Street No. Street Name

Nearest Cross Street City

3. What is the zip code where you live? _____

4. Where are you going?

- 1. Home
- 2. Work
- 3. School
- 4. Shopping
- 5. Recreation/visit friends
- 6. Other (specify: _____)

5. What is the address of that place?

(Specify street name AND cross street OR address)

Street No. Street Name

Nearest Cross Street City

6. Where did you get on THIS bus?

(Specify street name AND cross street OR address)

7. How did you get to THIS bus?

- 1. Transferred from bus route _____
- 2. Transferred from trolley
- 3. Transferred from Coaster
- 4. Walked _____ blocks
- 5. Drove alone
- 6. Carpooled, then parked
- 7. Was dropped off
- 8. Other (specify: _____)

8. Where will you get off THIS bus?

(Specify street name AND cross street OR address)

9. After you get off THIS bus, will you...

- 1. Transfer to bus route _____
- 2. Transfer to trolley
- 3. Transfer to Coaster
- 4. Walk _____ blocks
- 5. Drive alone
- 6. Carpool (ride with others)
- 7. Be picked up
- 8. Other (specify: _____)

10. Did you have a car that you could have used today instead of the bus?

- 1. Yes
- 2. No

11. How did you pay to use THIS bus?

- 1. Transfer slip
- 2. Cash
- 3. Monthly pass
- 4. Other (specify: _____)

12. How often do you ride the bus?

- _____ days a week
- 9. Less than one day per week

13. Are you:

- 1. Male
- 2. Female

14. Do you consider yourself:

- 1. Hispanic
- 2. White (non-hispanic)
- 3. Asian (non-hispanic)
- 4. African American (non-hispanic)
- 5. Other (specify: _____)

15. What is your age? _____

16. What is the total yearly income of all the people in your home?

- 1. Under \$10,000
- 2. \$10,000 - \$19,999
- 3. \$20,000 - \$29,999
- 4. \$30,000 - \$39,999
- 5. \$40,000 - \$49,999
- 6. \$50,000 - \$59,999
- 7. \$60,000 or more

17. How do you rate transit service in your area?

- 1. Good
- 2. Average
- 3. Poor

18. How many vehicles are available for use by all the people in your home? _____ vehicles

19. Have you previously filled out this form for THIS bus route?

- 1. Yes
- 2. No

20. Comments: _____

APPENDIX D

Sample of Other Types of Questionnaires

- Chicago Transit Authority (CTA) West Side Customer Travel Study
- CTTransit Customer Survey
- LYNX On-Board Survey of Bus Riders

APPENDIX I



West Side Customer Travel Study

Spring 2004

CTA wants to learn more about your travel patterns on this route. Your information is important to us. Please complete this survey and return it to the person who gave it to you. Thank you!

1. Which bus route are you riding now? Route # _____

2. How often do you ride THIS route?

- 6-7 days/week 4-5 days/week 1-3 days/week 3 days/month or less It's my first time

Tell us about the trip you are making right now. A trip "means" one-way travel from one place to another (ex. home to work) NOT a round trip (home to work to home).

3. Where did you get on THIS bus? (major street intersection)

street 1: _____ AND street 2: _____

4. Did you transfer from another bus or train to get to THIS bus?

- Yes, from another CTA Bus: Route # _____ Yes, from a CTA Train Yes, other: _____ No, I did not transfer

5. Where are you coming from? (including transfers)

- Home Work School Shopping Recreation Other: _____

5a. Where is this place located? (major street intersection or address and ZIP code)

street 1: _____ AND street 2: _____ ZIP: _____

6. Where will you get off THIS bus? (major street intersection)

street 1: _____ AND street 2: _____

7. Will you transfer to another bus or train after you get off THIS bus?

- Yes, to another CTA Bus: Route # _____ Yes, to a CTA Train Yes, other: _____ No, I will not transfer

8. Where are you going or what is your final destination? (including transfers)

- Home Work School Shopping Recreation Other: _____

8a. Where is this place located? (major street intersection or address and ZIP code)

street 1: _____ AND street 2: _____ ZIP: _____

About THIS bus route in general:

9. Overall, how satisfied are you with THIS route?

- Very Satisfied Somewhat Satisfied Neutral Somewhat Dissatisfied Very Dissatisfied

10. What improvement(s) would you recommend for THIS route?

11. What improvement(s) would you recommend for the bus service on the WEST SIDE?

JVA

Thank you for your time and cooperation and for riding the CTA!

Moisten, fold and seal before mailing. No staples, please.

Moisten, fold and seal before mailing. No staples, please.

CTTRANSIT CUSTOMER SURVEY

CTTRANSIT would like to hear from you. We welcome feedback on our service ideas on what may need improvement. When you are finished, please place this form in the envelope at the front of the bus or drop it in any mailbox. To ensure your comments are tabulated, return completed survey within one week.

Check as many answers in each category as are applicable.

1. Which bus route do you most often use? (check one)

- B-Congress Avenue, B-Whalley Avenue, C-North Haven, D-Dixwell Avenue, D-Grand Avenue, F-East Haven, G-West Chapel Street, G-Shelton Avenue, G-East Chapel Street, J-Kimberly Avenue, J-Whitney Avenue, L-North Branford, M-Washington Avenue, M-State Street, O-Sylvan Avenue, O-Winchester Avenue, Q-State Street, Q-Edgewood Avenue, Z-Goffe Street, Post Mall Flyer, Commuter Connection Downtown, Commuter Connection Sargent Drive

2. Why do you choose to ride the bus?

- Convenience, Auto not available, Cost savings, Other

3. Where did you come from before you got on this bus?

- Work, Home, Medical Services, Social, church, personal business, Shopping, College/Other School, Other

4. Where are you going now?

- Work, Home, Medical Services, Social, church, personal business, Shopping, College/Other School, Other

5. Do you have a car or other personal vehicle that you could have used to make this trip? Yes No

6. How did you get to this bus?

- Walked, Rode a bus (route), Drove my car, Rode the train, Dropped off by someone, Rode my bicycle, Rode with someone who parked

7. When you get off this bus, how will you get to your final destination?

- Walk, Drive my car, Ride my bicycle, Get picked up by someone, Ride a bus (route), Ride the train, Ride with someone who parked

8. How often do you use transit?

- 7 days a week, 6 days a week, 5 days a week, 4 days a week, 3 days a week, 2 days a week, 1 day a week, First time riding, times a month, More than 4 yrs

9. How long have you regularly—at least once a month—been riding transit?

- less than a month, 1-6 months, 7-12 months, 1-2 years, 2-4 years, More than 4 yrs

10. If transit service was not available, how would you make this trip?

- Use my car, Walk, Use a taxi, Ride with a friend, Bicycle, I would not make this trip, Other

11. How did you pay your fare today?

- Cash, 3-Day pass, 5-Day pass, Token, 7-Day pass, 31-Day pass, UniTicket, All-Day pass, 10-Ride ticket, Promotional Coupon

12. Where do you receive bus service information?

- On Bus, Telephone, Sales Outlet, Work, Online, At Bus Stop (Guide-a-Ride)

13. The printed timetables are:

- Easy to Read, Need Improvement

14. Do you have internet access? Yes No

15. Have you visited the CTTRANSIT web site at www.cttransit.com? Yes No

16. Where would you like to go in the region that is currently inaccessible by bus?

17. Comments & Suggestions on the bus service:

Blank lines for comments and suggestions.

Please rate the CTTRANSIT services by checking one statement under each question:

18. My bus arrives between 0-minutes before or 5-minutes after the posted time:

- Always, Most times, Sometimes, Not very often

19. The bus operator is courteous:

- Always, Most times, Sometimes, Not very often

20. The bus operator is a safe driver:

- Always, Most times, Sometimes, Not very often

21. The interior of the bus is clean:

- Always, Most times, Sometimes, Not very often

22. I can get copies of timetables and notices:

- Always, Most times, Sometimes, Not very often

23. The Customer Service Telephone Center representatives are helpful:

- Always, Most times, Sometimes, Not very often, I don't call the Telephone Center

24. Overall, the bus service is usually:

- Excellent, Good, Fair, Poor

The following is for statistical use only. (Answers are strictly confidential.)

25. I am: Female Male

26. My age is:

- Under 15, 15 to 18, 19 to 24, 25 to 34, 35 to 49, 50 to 64, 65 or over

27. Which of the following best describes you?

- Employed, Homemaker, Unemployed, Retired, Student, Other

28. Which of the following best describes you?

- Black, Hispanic, White, Asian, Native American, Other

29. What is your personal income?

- Under \$20,000, \$20,000-29,999, \$30,000-39,999, \$40,000-49,999, \$50,000-59,999, \$60,000-79,999, \$80,000 or greater

30. How many people in your household? _____

31. What is your home zip code? _____

Thank you for taking the time to complete this survey. Please drop the completed survey in the envelope at the front of the bus or mail within one week.



NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

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POSTAGE WILL BE PAID BY ADDRESSEE

SURVEY RETURNS CT TRANSIT 100 LEIBERT RD PO BOX 66 HARTFORD CT 06101-8535



APPENDIX B-3 ON-BOARD SURVEY OF BUS RIDERS

LYNX is planning to improve its service! You can help us by completing this questionnaire and returning it to the survey boxes on board this bus. Even if you have already filled one out on a previous trip, we would appreciate your filling this out again. Thank you for your cooperation.

Sincerely, LYNX

1. What bus route are you riding now? Route # _____
 2. How did you get to this bus?
 - Transferred from Route # _____
 - Walked Rode a bicycle
 - Drove and parked Was dropped off
 - Other _____
 3. Where are you coming from now? (check one)
 - Work Social or Recreational
 - Home School
 - Shopping
 - Medical or Dental appointment
 - Other _____
 4. Provide the address or intersection of the place where you came from _____
(for example: Orange & Central)
 5. Where are you going? (check one)
 - Work Social or Recreational
 - Home School
 - Shopping
 - Medical or Dental Appointment
 - Other _____
 6. How will you continue your trip after riding this bus? (check one)
 - Transfer to Route # _____
 - Walk Ride bicycle
 - Drive Be picked up
 - Other _____
 7. Provide the address or intersection of your final destination _____
(for example: Orange & Central)
 8. How many cars or trucks are in your household? _____
 9. What is your Home Zip Code? _____
 10. What is your Work Zip Code? _____
 11. How often do you ride the bus?
 - 5-7 days a week once or twice a month
 - 2-4 days a week less than once a month
 - once a week
 12. Is the value of LYNX service worth what you pay?
 - Yes No
 13. How do you get information about LYNX?
 - On the Bus Mail
 - Work Phone
 - Internet Word of Mouth
 - Newspaper/Magazine
 - Shopping center/convenience store
 - Other _____
 14. What bus service improvements are most needed? (check top three)
 - Frequency New routes
 - Night & Weekend Service Shelters
 - Pre-paid fare cards Free transfers
 - Additional transfer locations
 - Other _____
 15. How do you usually pay for your bus fare? (check one)
 - Cash Fare Kids In School (KIS) Pass
 - Weekly Pass AdvantAge Pass
 - Monthly Passport
 - Other _____
 16. Evaluate LYNX services:

	Excellent	Good	Fair	Poor	Very Poor	Don't Know
Routing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
On Time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cleanliness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operator Courtesy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hours of Operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 17. Where should rail service be provided in Orlando?
 - Sanford/Altamonte to Downtown Orlando
 - Downtown Orlando to Kissimmee
 - Mount Dora / Apopka to Downtown Orlando
 - Downtown Orlando to International Drive/Attractions
 - Airport to International Drive/Attractions
 - Downtown Orlando to Airport
 - Winter Garden/Ocoee to Downtown Orlando
 - UCF/Waterford Lakes to Downtown Orlando
 - Other _____
 - Service not needed
 18. Tell us about yourself:
 - Male Female
 - African American Hispanic
 - Caucasian Asian
 - Other _____
- What is your age? _____
- Do you have a Driver's License? Yes No
- What is your annual household income?
- Under \$10,000 \$40,000- \$49,999
 - \$10,000- \$19,999 \$50,000- \$74,999
 - \$20,000- \$29,999 \$75,000- \$99,999
 - \$30,000- \$39,999 Over \$100,000

THANKS AGAIN FOR YOUR HELP.

Abbreviations used without definitions in TRB publications:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NCHRP	National Cooperative Highway Research Program
NCTRP	National Cooperative Transit Research and Development Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation