Customer Surveying For Public Transit: A Design Manual for On-Board Surveys

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16. Abstract
Presented is a best practices manual that describes the necessary steps in conducting a successful on-board survey of public transit customers. It was specifically developed for the public transit professional that has at least a rudimentary understanding of the purposes and procedures in survey research and is searching for specific guidance on how to "best" conduct an on-board survey of its customers. This how-to manual provides public transit professionals with a much better understanding of the total customer surveying process and its importance in planning and ultimately the highest quality service to the riding public. It describes the various components or steps of the on-board transit customer surveying process from specifying and clearly defined objectives, various methods of data collection, questionnaire construction, sample size, appropriate level(s) of analysis, accurate and truthful reporting of results, data entry, report writing, and data archiving.

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EXECUTIVE SUMMARY

INTRODUCTION

In recent years, there has been a growing awareness of the need to use public transportation resources more efficiently. As a result, it has become very important for public transit systems to carefully evaluate all services so as to provide the most efficient and desirable transit services to the communities that they serve. Public transit customer surveys can play an important role in the evaluation of current and planned public transit services. When a public transit system decides to evaluate current or planned services via the use of a customer survey, there are a number of important issues that need to be addressed to facilitate the data collection process and to ensure that reliable and high quality data are collected, analyzed, and responsibly reported. In some cases, however, the collection of important information about public transit customers and the resulting evaluation has not been supported by comprehensive and methodologically valid surveying techniques.

There are a number of important steps that should be followed in the development and conduct of such surveys. This includes simple statistical procedures such as the sampling frame, questionnaire design, and at what level within the transit system information will be collected about customers, for example.

Despite the time and cost associated with such surveying efforts, the results obtained from surveys of public transit customers can be extremely useful to a public transit system's planning and operations functions, as well as to governmental boards, commissions, and councils. Therefore, it is in the best interest of public transit systems to conduct annual periodic surveys of its customers and to make sure that its surveying process is appropriate and correct to meet the desired information needs. The archiving of historical databases should be initiated and used for yearly comparisons of changes in customer demographics, travel patterns, and overall satisfaction with services provided, at a minimum.

SURVEY ELEMENTS

In order to fully identify the many aspects of public transit customer surveying, it was important to examine, review, and summarize the various types of survey instruments (questionnaires) and final reports from as many sources as possible. To achieve the project objective of producing a how-to manual for surveying public transit customers, a review of literature related to surveying, in general, and actual surveys of public transit customers was conducted.

In order to gather and summarize as much literature as possible about surveying public transit customers, the American Public Transit Association (APTA) was contacted and solicited to provide its complete transit system membership mailing list. APTA is a membership organization charged with serving and leading its diverse membership through advocacy, innovation, and information sharing to strengthen and expand public transit in North America. APTA graciously agreed to the use of its complete membership mailing list.

Using APTA's membership mailing list, a letter was sent to over 400 transit systems in both the US and Canada. This effort resulted in over 100 reports and other types of important information being sent for review.

The results from the review of literature illustrated the different techniques, methods, and elements used by various transit systems operating various modes such as buses, heavy and light rail, and paratransit, in both urban and rural environments.

Perhaps the most surprising finding from the literature was the absence of a comprehensive source(s) that specifically addressed the unique aspects of the public transit customer surveying. While there are many sources such as textbooks and the like that cover

statistical and other general methodological issues of surveying, none cover the unique aspects surrounding surveying customers of public transit.

The results from the literature review made it clear that there are a number of important issues that must be addressed and logical steps followed in the design and conduct of surveys of public transit customers. As noted previously, many important issues such as the statistics related to sampling and the like, are covered extensively in textbooks and other similar publications. The statistical and other methodological issues related to surveying in public transit will be briefly touched on in this how-to manual for reference and general understanding by the end user.

The literature notes that all surveys have the following features in common, regardless of the group or topic being surveyed:

- Specific and clearly defined objectives
- Method of data collection
- Questionnaire construction
- Sample size
- Appropriate level(s) of analysis
- Accurate and truthful reporting of results

From this list of survey basics above, there are many interrelated steps involved in the design, planning, and administration of a survey of public transit customers. Before a survey can be conducted, important and sometimes subtle decisions must be made about the objectives and the purpose of the survey as well as its unique characteristics. A survey of public transit customers usually originates when transit system planning staff are confronted with an information need for real data about existing customers, their preferences, and overall satisfaction with the transit system. It is often the case that information about customers is either insufficient, outdated, or does not exist at all.

The following steps should be followed when planning and ultimately conducting a survey of public transit customers:

Step 1: Define and Clarify Objectives
Step 2: Identify Sample
Step 3: Data Collection Methodology
Step 4: Questionnaire Design
Step 5: Surveyors
Step 6: Conduct Pre-test of Questionnaire and Survey Methods
Step 7: Conduct the Survey
Step 8: Data Processing and Analysis
Step 9: Reporting Results and Other

Within each of these nine steps, there are a number of important issues to consider. For illustration, some of the issues are listed below. The main body of this report contains detailed information about each of these issues.

- Sampling Methods
- Response Rate
- Minimizing Sampling Error
- Sample Bias

- Concise Questions
- Acronyms
- Types of Responses
- Coding of Responses
- Use of Standard Questions
- Pre-Testing
- Data Collection Methods
- Surveyor Training
- Survey Data Weighting
- Data Entry and Accuracy
- Analyzing Survey Results
- Reporting Survey Results
- Final Checklist
- Quality Control
- Shortcuts to Avoid

OTHER CONSIDERATIONS

In 1991, the Federal Transit Administration began a project to implement a transit performance monitoring system (TPMS). The TPMS was designed to collect data on transit customers through an ongoing, systematic program of on-board surveys. The long-term goal of the TPMS initiative is to standardize the collection of data and, thereby, provide a basic, but comprehensive analysis of the performance and benefits of transit service.

The project has consisted of two rounds of surveys, each involving 14 transit systems. The Round 1 surveys were performed in 1997 and 1998. The Round 2 surveys were conducted in 1999 and 2000.

Twelve core questions were included on the survey questionnaire during rounds one and two. The survey form contained in Appendix C shows that the twelve core questions are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, and 15. The rationale for inclusion of these questions is as follows:

- Questions 1, 3, 8, and 15 are used to determine trip purpose, automobile availability, and income. The responses to these questions are used to define the functions or benefits provided to the customer such as congestion management, low cost mobility, and livable communities. These functions or benefits are discussed in the chapter entitled Survey Results.
- Question 5 addresses trip frequency and also is used to estimate the number of people in the community that use transit service. For example, each response of one day a week might be given a weight of 7.0 to estimate the number of people using transit service one day a week.
- Question 6 is used to assess the degree of turnover in transit ridership.
- Questions 7 and 9 help assess the level of added mobility that transit provides to customers.
- Questions 2 and 4 provide information on access and egress modes.
- Questions 10 and 12 are used to examine the survey responses in terms of age and gender

When conducting an on-board survey of public transit customers, serious consideration should be given to the inclusion of as many of these twelve core questions and exact response choices as possible.

It has become very important for public transit systems to carefully evaluate both current and planned services in order to provide the most efficient and desirable public transit services to the community that it serves and funds its existence. Surveys of public transit customers can play an important role in the evaluation of current and planned services. When a public transit system decides to evaluate current or planned services through the use of a customer survey,

there are a number of important issues that need to be addressed to facilitate the data collection process and to ensure that reliable and high quality data are collected, analyzed, and ethically reported. In some cases, however, the collection of important information about customers of public transit and the resulting evaluation has not been supported by comprehensive, thorough, and methodologically valid surveying techniques.

This report presents a how-to manual that describes the steps to follow when conducting an on-board survey of public transit customers. It was specifically developed for the public transit professional that has at least a rudimentary understanding of the purposes and procedures in survey research and is searching for specific guidance on how to "best" conduct such a survey. It is hoped that this how-to manual will help provide public transit professionals with a much better understanding of the total customer surveying process and its importance. This how-to manual describes the various components or steps of the on-board transit customer surveying process.   It also touches on several other widely used methods for gathering information about public transit customers such as telephone (CATI), computer assisted personal interviews (CAPI), and standard mail surveys.

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This report presents a best-practices manual that describes the steps about how to conduct a successful on-board survey of public transit customers. It was specifically developed for the public transit professional that has at least a rudimentary understanding of the purposes and procedures in survey research and is searching for specific guidance on how to "best" conduct an on-board survey of customers. It is hoped that this how-to manual will help provide public transit professionals with a much better understanding of the total customer surveying process and its importance. This how-to manual describes the various components or steps of the on-board transit customer surveying process. It also touches on several other widely used methods such as telephone mail surveys for gathering information about public transit customers.

The following CUTR staff assisted in the preparation of this how-to manual:

Project Managers: Michael Baltes, Senior Research Associate

Staff Support: Dennis Hinebaugh, Transit Program Planning Director
                       Francis Cleland, Senior Research Associate

CUTR Director: Ed Mierzejewski

1.0   INTRODUCTION

In recent years, there has been a growing awareness of the need to use public transportation resources more efficiently. As a result, it has become very important for public transit systems to carefully evaluate all services so as to provide the most efficient and desirable transit services to the community that it serves. Public transit customer surveys can play an important role in the evaluation of current and planned public transit services. When a public transit system decides to evaluate current or planned services via the use of a customer survey, there are a number of important issues that need to be addressed to facilitate the data collection process and to ensure that reliable and high quality data are collected, analyzed, and ethically reported. In some cases, however, the collection of important information about customers of public transit and the resulting evaluation has not been supported by comprehensive and methodologically valid surveying techniques.

There are a number of important steps that should be followed in the development and conduct of such surveys. This includes simple statistical procedures such as the sampling frame, questionnaire design, and at what level within the transit system information will be collected about customers, for example.

Despite the time and cost associated with such surveying efforts, the results obtained from surveys of public transit customers can be extremely useful to a public transit system's planning and operations functions, as well as to governmental boards, commissions, and councils. Therefore, it is in the best interest of public transit systems to conduct annual periodic surveys of its customers and to make sure that its surveying process is appropriate and correct to meet the desired information needs.   The archiving of historical databases should be initiated and used for yearly comparisons of changes in customer demographics, travel patterns, and overall satisfaction with services provided, at a minimum.

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A thoughtful letter was crafted that specifically asked public transit systems on APTA's mailing list for assistance in gathering information about the various types of customer surveys that they have conducted over the past decade or so. The letter asked, if possible, for each of the transit systems to provide a hard copy of all of the on-board or other survey reports that it has or has had completed for the system either internally, by a private consultant, or other entity. The letter stated that it is of particular importance that the research team obtains complete reports that list, in detail, all of the specifics about the customer

surveys such as survey design, survey distribution technique(s), and any other relevant methodological issues.

Using APTA's membership mailing list, the letter was sent to over 400 transit systems in both the US and Canada. This effort resulted in a total of 100 reports and other types of important information being sent for review.

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2.1 What is a Survey?

A survey is a system for collecting information to describe the characteristics or attitudes of a particular group of individuals, in this case, public transit customers.

Outside of the arena of public transit, surveys are conducted to determine political and consumer preferences and the opinions and beliefs of just about every conceivable issue.

The literature notes that all surveys have the following features in common, regardless of the group or topic being surveyed:

- Specific and clearly defined objectives
- Method of data collection
- Questionnaire construction
- Sample size
- Appropriate level(s) of analysis
- Accurate and truthful reporting of results

From this list of survey basics above, there are many interrelated steps involved in the design, planning, and administration of a survey of public transit customers. Before a survey can be conducted, important and sometimes subtle decisions must be made about the objectives and the purpose of the survey as well as its unique characteristics. A survey of public transit customers usually originates when transit system planning staff are confronted with an information need for real data about existing customers, their preferences, and overall satisfaction with the transit system. It is often the case that information about customers is either insufficient, outdated, or does not exist at all.

2.2 Survey Objectives

The objectives of any survey should be as specific, clear-cut, and unambiguous as possible. Trade-offs typically exist and sometimes this only becomes apparent as the survey planning process goes forward.

The objectives of any survey come from a defined need for specific information about a certain group. For example, suppose a public transit system wants to increase ridership by five percent each of the next three years. The overall objective of a survey designed to provide information related to this objective could be to find out

what combination of incentives would entice current and potentially non-customers to use the transit system. Specific objectives of such a survey could be to identify attitudes and opinions concerning the transit system, its routes and schedules, its levels of performance, and perhaps its perceived overall value to the community. Other specific objectives could be to assess attitudes toward public transit that affect possible transportation choices and to profile customers and non-customers into specific categories such as their travel patterns, preferred travel modes, and the importance of specific service characteristics.

The literature pointed out that when planning a survey and the type of questionnaire and methods used to ultimately collect information, it is necessary to define all of the potentially imprecise and ambiguous terms and issues in the objectives. When refining the objectives, trade-offs will typically exist and sometimes this will only become apparent as the objectives are put into motion. The statement of objectives will guide the selection of respondents as well as the construct of the questionnaire and it questions so as to ensure to the greatest extent possible that the survey design meets the specified objectives.

In addition, objectives should be stated so as to clearly provide end-users with the exact data (results) and information that they will need to make informed decisions about the transit system. For example, if the overall objective of a survey is to establish baseline information about what service aspects public transit customers prefer, it should contain the exact questions needed to collect this information. Questions to collect such information should be as simple, unambiguous, and straightforward as possible. Question design and types of questions will be touched on later in this how-to manual.

As an example, consider the following five simple objectives listed in the final 1991 on-board survey report completed by the Regional Public Transportation Authority in Phoenix, Arizona. They are:

- Assess changing patterns among riders in terms of demographics and trip-making characteristics.
- Evaluate riders' needs that may dictate changes in routes.
- Identify riders' needs that may impact upon marketing efforts and the public information product.
- Provide a database for long-term planning.
- Provide a benchmark for an annual customer satisfaction survey.

2.3   Sampling Methods

The word survey is used most often to describe a method of gathering information from a sample of individuals. In the case of this how-to manual, the "sample" will, in most cases, consist of public transit customers (past or potential users can be surveyed as well). For various reasons such as cost and logistics, the sample is usually just a portion of a larger group (termed population) from which information is being sought; however, this is not always the case. For example, it may be feasible for smaller public transit systems (say those operating fewer than 50 buses in maximum service) to do a complete census of all customers during a particular day of revenue service. Or, in contrast, much larger public transit systems may elect to survey customers only on a sample mainline routes and then project the results to the entire system. Or, in some cases, the larger public transit systems may be able to afford a comprehensive and methodologically rigorous telephone survey of customers. Often the rule of thumb is that the size of the sample depends on the objective(s) of the survey. Usually, sampling is used when the pool of possible cases is too large, thus costing too much and taking too much time to conduct the survey. Also, it may not be necessary to survey all possible cases. In most instances, taking a sample will yield results

that are accurate enough to be projected to the entire group or population.

The trade-off with sampling is that it introduces some level of error into the results since all possible members of a given population will not be surveyed, so certain answers or combinations of answers may not be represented in the information that is gathered. When the population being surveyed is very diverse, the sample cannot possibly include all of the many combinations of characteristics and attributes that may be found such as blacks, whites, Hispanics, men, women, teenagers, seniors, low-income, transit captives, choice customers, etc.

Sampling methods are usually divided into two groups: probability and non-probability. Probability sampling is any sampling method in which the probability or odds of choosing each individual, or public transit customer in this case, is the same. These are also commonly referred to as random sampling methods. The major difference between the two sampling methods is that non-probability sampling does not involve the random selection of individuals. With probability sampling, the odds or probability that the population has been represented can be determined by estimating the expected error. With non-probability sampling, the population may or may not be represented very well. In general, the literature noted that researchers prefer probability or random sampling methods to that of non-probability ones. They also consider random methods to be more accurate and methodologically sound. For this reason, the four most commonly used types of probability sampling methods are explained in further in the paragraphs that follow.

When using probability sampling methods, the sample is not selected haphazardly or only from persons who volunteer to participate. It is selected with precision so that each individual in the larger population will have a measurable chance of selection, or completing a questionnaire. By sampling in this manner, the results can be reliably projected from the sample to the larger population, i.e., to perhaps portray the total transit system customer base. The type of sampling method selected may also have to do with the overall objectives of the survey.

Simple Random Sampling

Simple random sampling is the basic sampling technique most commonly used. Random sampling is where a group of individuals (a sample) is selected for study from a larger group (a population). Each individual within the group is chosen entirely by chance and each member of the population has an equal chance of being included in the sample. Every possible sample of a given size has the same chance of selection; i.e., each member of the population is equally likely to be chosen at any stage in the sampling process. For example, if Route 6X has 100 sampling units (boarding customers), each has a 0.01 percent chance of being selected.

Stratified random Sample

If the sample is divided into several groups of smaller sampling units, each group is called a stratum. From each stratum, if a random sample was selected, it is then referred to as a stratified random sample. The reason for using a stratified random sample is to achieve a more efficient sample. In this case, efficiency is directly related to the magnitude of the error in the results. A stratified sample is more "efficient" than a random sample if the standard error (will be touched on later) computed from the stratified sample is smaller than the standard error computed for a random sample. This situation will occur if the variability within each stratum is low.

Cluster Random Sample

If a sample is divided into many groups of sampling units, each group is called a cluster. If several of the clusters are selected at random, then it is referred to

as a cluster sample. The reason for using a cluster sample is generally related to cost; it may be less expensive to conduct the survey between each of the selected clusters of sampling units compared to conducting the survey among randomly selected sampling units. If cluster sampling is to be as efficient as simple random sampling, it is necessary that each cluster exhibit about the same degree of variability as the sample as a whole.

Systematic Sample

Another name for systematic sample is an interval sample. Suppose a route within a transit system's network contains 4,000 individual trips and a sample of 500 trips is to be selected for use in surveying customers. The 4,000 trips can be divided into 50 groups of 80 trips per group, for example. A random number would then be selected between 1 and 80, say 42. Then the 42nd trip would be selected in the first group and so on until the desired sample size of 500 trips has been reached. This process produces a systematic or interval sample. A systematic sample does not satisfy both requirements of a random sample, but does afford each sampling unit an equal probability of being selected. In 1999, the Lane Transit District (LTD) in Eugene, Oregon conducted an on-board survey of its transit bus customers. To illustrate a systematic sampling plan, its method of developing a sample is shown in Exhibit 1. It was taken verbatim from the methods section of its final on-board survey report.

In summary, whether simple or complex, the goal of a properly designed probability sample is that all of the units in the population have a known, positive chance of being selected. The sample plan also must be described in sufficient detail when reporting results to allow a reasonably accurate calculation of sampling errors. These two features make it scientifically valid to draw inferences from the sample results about the entire population that the sample represents.

Ideally, the sample size chosen for a survey should be based on how precise the final estimates or results must be. In practice, usually a trade-off is made between the ideal sample and the expected cost and logistics of the survey effort.

Exhibit 1. Lane Transit District On Board Survey Systematic Sample Plan

- The researcher began with a complete list of LTD's runs for weekdays, Saturdays, and Sundays. The list was utilized for the bid effective 09/20/1998.

- A basic skip pattern was utilized to select an initial sample. Starting at a random point, every n^{th} run was selected. This procedure was repeated to select the desired runs for weekdays, Saturdays, and Sundays. The result was a random sample of 92 runs – 60 for weekdays, 20 for Saturday, and 12 for Sunday.

- The selected runs were places in a spreadsheet along with a list of the routes covered by each run.

- The total picture of all routes covered was reviewed to insure that no significant routes had been omitted. A small number of runs (approximately 5) were replaced in order to provide full route coverage.

- Once the final set of runs had been developed, a skip pattern was again used to assign a first half or second half designation to each run. This

When sampling, information is collected by means of standardized procedures so that every individual is asked the same questions in more or less the same way. For example, the overall intent of an on-board survey of public transit customers is not to describe the particular individuals who, by random chance, are part of the sample, but could be to obtain a

composite profile of all customers that comprise its system-wide customer base.

2.4 RESPONSE RATE

One of the main objectives of a sampling plan should be to yield the highest number of responses or returned questionnaires that improve the response rate. This translates into higher response rates that, in turn, translate into higher quality data. The response rate is defined as the number of returned questionnaires (either completed partially or entirely) as a ratio of the number of questionnaires that were distributed. For example, if a total of 5,260 questionnaires were distributed and a total of 1,446 of these partial or entirely completed questionnaires were collected, this would equate to a response rate of 27.5 percent (1,446 divided by 5,260).

Response rates vary widely for different types of surveys. Experience has shown that a good response rate for an on-board survey of public transit customers is usually in the 20 percent to 40 percent range. However, the higher the response rates the better. A higher response rate increases the likelihood that the respondents are representative of the sample. Regardless of the type of survey that is being conducting, its design can have a major effect on the number of respondents who complete the questionnaire.

Usually, a low response rate does more damage in rendering the results of a survey questionable than does a small sample size. This is partly due to the fact that there may be no valid way of scientifically inferring the characteristics of the population represented by the customers that did not respond to the questionnaire.

2.5 MINIMIZING SAMPLING ERROR

The concept of a confidence interval is quite difficult for persons not familiar with the statistics of surveying. A confidence interval gives an estimated range of values that is likely to include an unknown population parameter or the estimated range being calculated from a given sample. Or, stated in more simple terms, the confidence interval indicates what percentage of time those conducting the survey are willing to be wrong (or right). If independent samples are taken repeatedly from the same population, and a confidence interval is calculated for each sample, then a certain percentage (confidence level) of the intervals will include the unknown population parameter. Confidence intervals are usually calculated so that this percentage is represented as 95 percent, but confidence interval is also commonly reported as 85 percent, 90 percent, 99 percent, or even 99.9 percent. If the confidence interval is specified as 95 percent, then this means that those conducting the survey are willing to be wrong only 5 percent of the time.

The width of the confidence interval may give some idea about how uncertain those conducting the survey are about the sample and the final results. A very wide confidence interval of say 85 percent (wrong 15 percent of the time) may indicate a great deal of uncertainty and that more data should be collected before anything very definite can be stated about the sample and population.

Exhibit 2 shows various sampling error rates at the 95 percent confidence level. For example, say that 100 surveys were returned from a particular on-board survey. This means that with the same sampling procedures, 95 times out of 100 the maximum error will be within 9.8 percentage points of the true value, that is, those values that would be obtained if a 100 percent census of all transit customers on all trips were conducted.

To ensure valid, useful data about public transit customers, it is recommended that larger samples be used. In addition, the survey design should include calculations for sampling error. It is recommended that the error rate be equal to or less than ±10 percent. A sample size of about 100 would produce results with a

sampling error of within 9.8 percent (see Exhibit 2). An error rate of ±10 percent provides a sufficient level of validity to make accurate statements about the population. Decreasing the error level to ±5 percent increases the ability to apply the sample to the entire population, but it also increases the number of completed questionnaires required to 384, an increase in time and cost that may be unnecessary.

Exhibit 2. Maximum Sampling Error (95 Percent Confidence Interval)

Sample Size	Maximum Sampling Error Rate
10	±30.99%
50	±13.86%
100	±9.8%
250	±6.2%
500	±4.38%
750	±3.58%
1000	±3.1%
≥1500	≤ ±2.53%

It should be noted that despite the best efforts at correction, even the most well planned and sound surveys are subject to some degree of error and the sources of the error cannot always be accounted for and, subsequently, corrected.

Several simple guidelines can be followed that will increase response rates, perhaps minimize bias, and reduce sampling error when conducting a survey of public transit customers. These are:

- Use trained and effective surveyors
- Ensure that the survey topics and questions are of interest, concern, and value to customers
- Communicate ahead of time with flyers and adverts on transit vehicles and at stations. Alert customers and transit agency staff that the survey is coming
- Make participation voluntary, anonymous, and confidential
- Produce a professional looking questionnaire and be professional in every step of the survey process

- Promise to communicate feedback on survey findings with customers in newsletter, meetings, etc.
- Make the questionnaire simple and user-friendly
- Provide concise and clear directions about how to complete and return the completed questionnaire
- Inform customers about all of the what, why, who, and how of the survey effort
- Provide gift or cash incentives to customers for completing a questionnaire

2.6   Sample Bias

Sample bias refers to the systematic errors produced by a given sampling procedure. In technical terms, it refers to how far the average statistic lies from the parameter it is estimating, that is, the error that arises when estimating a quantity. Errors from chance will cancel each other out in the long run, those from bias will not.

According to the literature reviewed, sample bias has the following possible attributes:

- Sample bias does not decrease with sample size and may even increase, depending on the source of the bias
- Sample bias can even be present in a census (a 100 percent survey), if it arises from measurement problems and instrument problems.
- Sample bias cannot be calculated in most cases and bears no relation to sample size, population size, or variability of the measures being collected.
- Sample bias may arise from a large variety of sources, including, but not limited to:
  - Failure to adhere to the random sampling procedures
  - Omission of specific subgroups of the population from the sampling frame and therefore from the sample
  - Faulty measuring devices such as the specific questions used on a questionnaire

- Violations of equal probability of selection principles because of duplicate listings in the sampling frame, or other causes
- Non-response to a survey by specific subgroups of the population that are relevant to the survey

There are three types of common sample bias. They are noted in the following subsections.

Non-coverage Bias

When the sample does not contain all individuals that belong to a given population, it is possible that the results of the sample are biased. In this case, bias means that if a surveyor took a census (a 100 percent survey of all individuals in the population) of the individuals (customers) in the sample, and compared that result with a census of the target population, a difference would be found that is significant. Whether, in fact, non-coverage bias is present is often unknown because a census is almost never taken of a given population. The potential for bias exists whenever the sample fails to contain individuals belonging to a given population. This type of bias is highly controllable.

Self-selection Bias

In this type of bias, the sample size was not pre-determined. For example, a transit system may include a small survey along with mailed pre-purchased monthly passes and invite these customers to respond. Because each customer decides whether to respond or not, those that respond are termed self-selected. Whether, in fact, self-selection bias is present is often unknown, but the potential for self-selection bias exists whenever those who respond are self-selected, as described. This type of bias is somewhat controllable.

Non-response Bias

When a probability sample is used in conducting a survey, the minimum sample size should be planned in advance. However, it is not uncommon that only a fraction of the originally selected individuals in the sample yields a response. Non-response may cause a bias if the responses obtained differ substantially from those who do not respond. While this is similar to self-selection, it differs in that it is often known, based on observation or other method, who does not respond. This type of bias is the least controllable.

In summary, in almost all types of surveys, some bias will be present, because of such issues as non-response and because it is impossible to design a self-administered survey that is completely free of bias. Even though measures can be taken to minimize bias, it is present, to some degree, in every survey conducted on any segment of the population.

2.7 Concise Questions

Because questions are the real focus of surveys, structuring and wording them on written questionnaires and asking them during spoken surveys is essential to a successful survey effort. The literature noted that survey questions often take two primary forms: open-ended and closed-ended. When respondents are required to use their own words, the questions are open-ended. When the answer or responses are pre-selected or provided for the respondent such as in a list, the question is closed-ended.

Open questions are useful when the details of a particular issue are unknown, in getting unanticipated answers, and for describing the issue as the respondent or customer views it. The answers to open-ended questions usually provide the most useful and interesting responses on a survey of public transit customers. Customers get a chance to say whatever they want in response to an open-ended question by allowing them to express

themselves and their feelings fully about important issues. For example, an open-ended question that would elicit a number of interesting responses from customers would be to ask, "If you could make one and only one recommendation to improve public transit service, what would it be?"

One limitation of open-ended questions is that they must be cataloged and interpreted, and this may not always be the easiest information to work with especially when there are a lot of responses. However, open-ended questions provide customers with the chance to state views in their own words, which experience has shown elicit the most thoughtful and useful information.

A closed-ended question asks what is needed in an unambiguous fashion and extracts accurate and precise information from the respondent. An example of a straightforward question would be to ask a customer, "How old are you in years?" This question simply asks a respondent to write a number indicating his or her age in years.

It is important to make sure that transit system staff has reviewed all of questions on the survey. It is also important that a pre-test of the questionnaire be conducted prior to its actual administration. The main reason for doing the pre-test is that respondents (transit customers in this case) have different reading and comprehension levels and some may not be able to provide responses to questions. The pre-test of the questionnaire and other steps in the survey process are touched on in a subsequent section.

Exhibit 3 provides a checklist for deciding between open- and closed-ended question types.

2.8 Question Wording

There are a number of general rules-of-thumb when wording questions. It should be kept in mind that the questions should be constructed to meet the objectives or purposes of the overall survey effort (see Section 1.2). One of the major difficulties in constructing sound survey questions is getting the wording correct. Even slight differences in wording can confuse respondents and lead to incorrect interpretations of the question. Without trying to generate an exhaustive list, below are a few of the major problems questions writers often encounter.

Exhibit 3. Deciding Between Open- and Closed-Ended Question Types

	Question Type	
	Open	**Closed**
Purpose	Respondents' own words are critical	You want information that are rated or ranked on a scale
Respondents' Characteristics	Respondent's are willing and capable of providing answers in own words	Need respondents to answer using a predetermined set of response choices
Asking the Question	Prefer to ask only open-ended question because response choices are unknown	Prefer that respondents not answer in their own words
Analyzing the Results	Skills and resources are available to analyze the various respondents answers	Prefer to count the number of choices
Reporting the Results	Able to provide individual or grouped responses	Report only statistical data

Source: Fink, Arlene. How to Ask Survey Questions. Sage Publications. 1995.

Ambiguous Meaning

The meanings of words on a questionnaire must not be ambiguous to respondents. For example, take a question asking them to indicate whether they are white, Hispanic, African-American, Asian, or Other. The question is likely to be confusing because it is not completely clear what "white" means. Does it mean a Hispanic who is not white? Further, transit customers might interpret a question that asked how many times they have ridden by transit bus over the past few months differently. Time frames mean different things to different people and can produce meaningless results. To avoid such ambiguity, questions should be as short and concise as possible and use ordinary and everyday language.

Biased Wording

Questions that include bias are those that make one response more likely

than another regardless of how the respondent feels or opinion. To avoid bias, an important guideline is to word questions so that respondents can just as easily say no to questions as say yes. For example, instead of asking customers, "Should the penalty for fare evasion be made stricter?" it is may be preferable to word the question to ask, "Some customers feel the penalty for fare evasion should be made stricter, while others feel that they should be made less strict. Do you favor a stricter penalty or not?"

Double-Barreled Questions

Questions that ask two questions simultaneously are termed double-barreled. For example, asking customers if they favor a 1¢ sales tax increase to fund improvements to public transit service. This question presents two issues: a tax increase and improvements to transit service.

Double-Negatives

Another common wording problem is the use of double negatives. This type of question wording confuses respondents because it typically presents two distinct views in a single question. For example, asking public transit customers, "Does it seem possible or does it seem impossible that the transit agency never arrives on-time to bus stops, according to its published schedule?"

Hypothetical Questions

Questions that contain hypothetical situations are another problem that should be avoided, if possible. Respondents may provide an answer to such a question, but more times than not the answer will be of little value.

Acronyms

Also avoid the use of acronyms when wording questions unless they will be clearly understood by respondents. For example, the use of the abbreviations IRS, CIA, and FBI are well understood, but abbreviations for states, colleges, or other governmental agencies may be less understood.

With a change of just a few words, a question can go from being relatively impersonal to probing. There are times when asking a question too directly may be too threatening or disturbing for respondents. The nuances of language guarantee that the task of the question writer will be endlessly complex. In much of literature reviewed related to surveying public transit customers, questions related to income, age, and ethnicity are sensitive to respondents.

It should be remembered when constructing questionnaires and wording questions that surveying "imposes in the life" of the sample of customers by asking for their time, attention, trust, and often, for very personal information.

Based on the literature, there is no single, best way to word a question perfectly. But, it is important to remember that what is asked and how it is asked often determines the type and quality of the information that is received. Questions must be worded with the objectives of the customer survey as the guiding factor.

2.9   Types of Responses

According to the literature, the responses or answer choices provided on most surveys take one of the following three forms:

- Nominal (sometimes called Categorical)
- Ordinal
- Numerical

Nominal choices have no numerical or preferential values. For example, asking whether a customer is male or female is a type of nominal response. Ordinal choices ask respondents to rate or order their choices or preferences. For example, asking customers to rate certain aspects of

public transit service performance such as on-time performance, cleanliness of vehicles, and driver courteousness on a scale ranging from very good to very bad. Numerical choices ask for numbers such as age and how long a customer has been using transit service in either days, weeks, months, or even years, for example.

Questions that provide ordinal rating scales often raise issues about the optimal number of response points. For example, is it better to use 3, 4, or 7 or more response options or is it better to use an odd or even number of response points? Unfortunately, the literature indicated that the only answer is that it depends. The literature noted that the best response scale is one that is easily understood by respondents, discriminates well between respondents' perceptions, is easy to interpret, and has minimal response bias. Whether a scale has an odd or even number of choices is another matter. The literature suggested that scales with anywhere from 3 to 9 scale points can be recommended for most purposes, while others recommend as few as 4 points. So, based on the literature, there appears to not be one perfect scale for all uses. Instead, it should be based on the objectives of the survey effort and what will be done with the results. For example, is it best to provide respondents the option of replying "neutrally" (e.g., "Neither Agree nor Disagree;" "Neither Satisfied nor Dissatisfied")? Some experts in the literature do, while others firmly believe that people are rarely neutral or without opinion and, therefore, this option is unnecessary.

Additionally, it is important to determine what types of questions need to be asked. For example, will it be important to determine the extent to which customers agree with statements, are satisfied with services provided, or have their expectations been exceeded? It is possible that all three will result in different response options and need to be considered when developing the ordinal scales.

The main concerns when selecting the number of response options is the effect on the scale's reliability and ability to discriminate between degrees of the respondents' perceptions of an item. Given these rather simple requirements, it appears that more scale points would be better than less, but, again, the literature noted that this is not necessarily always the case.

There has been a great deal of research devoted to the topic of scales in surveying. In general, researchers agree that at least 3 points should be used and up to 9 points can be managed effectively by respondents. However, beyond that, the literature provides conflicting evidence.

An issue worth considering is that it may not be the number of scale points (i.e., 3 vs. 9) that is the primary issue, but rather the labels given to these scales. When addressing this issue, it is worthwhile to first determine whether to allow respondents the opportunity to be neutral on a particular topic. As noted, opinions exist for including or not including a neutral point, and it is reasonable to ask what effect adding a neutral point will have on responses.

Some research has suggested including a neutral point has the effect of reducing the percentage of positive responses, i.e., introducing response bias into the results. Once a determination has been made regarding the inclusion of a neutral label, attention then needs to be turned to which type of scale to use. When making this decision, it is important to remember that not all questions fit well with all types of response options.

Exhibit 4 shows the several commonly used labeling options. Exhibit 4 shows that there is no single best or correct scale to use. Determining which scale to use should be specified when establishing the survey objectives.

After deciding on the wording and types of questions that will be used on the final questionnaire, the questionnaire must be constructed or put together. This usually involves deciding on the order of the topics and the order of the questions on each topic. This is an extremely important step in the overall development of the final questionnaire.

Typically, on-board surveys of public transit customers have three main topic areas (but not always). They are:

- Demographics – i.e., age, gender, ethnicity, annual household income
- Travel Behavior/Patterns – i.e. frequency of use, mode of access, origins and destinations
- Customer Satisfaction – i.e., on-time performance, cleanliness of buses, courteousness of operators

Exhibit 4. Common Balanced Scales Questionnaire Construct

Option	Response Choices				
1	Far too much	Too much	About right	Too little	Far too little
2	Much higher	Higher	About the same	Slightly lower	Much lower
3	One of the best	Above average	Average	Below average	One of the worst
4	Very good	Good	Fair	Poor	Very poor
5	Never	Occasionally	Fairly many times	Very often	Always
6	None	Some	Quite a bit	An extreme amount	All
7	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied

When constructing the final questionnaire, one of the most difficult tasks anyone will face involves the ordering of questions, i.e., which topics should be introduced early in the survey, and which later. If the most important questions are left until the end of the questionnaire, it may be revealed that respondents are too tired to give them the kind of attention necessary or not answer them at all. If introduced too early, respondents may not yet be ready to address the topic, especially if it is difficult, personal, or probing. There are no easy answers to these problems and judgment should be exercised. Whenever question placement is considered, the following questions should be considered:

- Is the answer influenced by prior questions?
- Does question come too early or too late to arouse interest?
- Does the question receive sufficient attention?

Just as when meeting a new person, first impressions are very important in surveying. The first few questions asked on a questionnaire will determine the overall tone for the survey, and can help to put respondents at ease. With that in mind, the opening few questions should, in general, be easy for respondents to answer. The literature indicated that it is best to start with some simple descriptive questions that will get respondents rolling such as what route number they are currently riding or what method of fare payment they used to board. It is important to remember that questionnaires should never begin with questions that are sensitive, threatening, or probing to respondents.

Each question on a questionnaire should flow from question to the next and from one section to the next. The layout of the questionnaire should be such that it is very easy to read and understand. If the layout of the questionnaire is cluttered and confusing, the respondent may skip questions or not even complete a questionnaire.

There are two broad issues to consider when ordering questions and answer choices. The first is how the question and answer choice order can encourage potential respondents to complete the questionnaire. The second issue is how the order of questions or the order of answer choices could affect the results of the survey. Ideally, as noted, the early questions in a survey should be easy and pleasant to answer. These kinds of questions will encourage customers to continue completing the questionnaire. Whenever possible leave difficult or sensitive questions until near the end of the questionnaire. Any rapport that has been built up will make it more likely that customers will answer the difficult or

sensitive questions. If customers decide to quit filling out the questionnaire at that point anyway, at least they will have answered most of the questions.

Answer choice order can make individual questions easier or more difficult to answer. Whenever there is a logical or natural order to answer choices, try to make use of it. For example, always present agree-disagree choices in that order. Experience has shown that presenting them in a disagree-agree order may confuse respondents. For the same reason, positive to negative and excellent to poor scales should be presented in those orders. When using numeric rating scales higher numbers should mean a more positive or more agreeing answer. Sometimes answer choices have a natural order (e.g., Yes, followed by No). There are certain types of questions, particularly questions about preference or recall or questions with relatively long answer choices that express an idea or opinion, in which the answer choice order is more likely to affect which choice is picked.

Question order can affect the results in two ways. One is that mentioning something (an idea or an issue, for example) in one question can make customers think of it while they answer a later question, when they might not have thought of it had it not been previously mentioned.

The other way question order can affect results is habituation. This problem applies to a series of questions that all have the same answer choices. It means that some customers will give the same answer, without really considering it, after being asked a series of similar questions. Persons tend to think more when asked the earlier questions in the series and so give more accurate answers to them.

Another way to reduce the problem of habituation is to ask only a short series of similar questions at a particular point in the questionnaire. Then ask one or more different kinds of questions, and then another short series.

The order in which the answer choices are presented can also affect the answers given. People tend to pick the choices nearest the start of a list when they read the list themselves.

One of the last issues addressed when constructing the final questionnaire is its length, or how many questions it should include. Long questionnaires are apt to induce respondent fatigue and errors arising from inattention, refusals, and incomplete responses. They may also contribute to higher non-response rates in subsequent surveys involving the same respondents.

The final questionnaire may be very brief with only a few questions, taking respondents on a few minutes or less to complete or it can be quite long requiring an hour or more. When deciding on the length of the questionnaire for an on-board survey, it is important to have an idea of the average trip length (in minutes) of respondents in the sample.

Another issue that should be addressed after the questions have been constructed is the look and feel or the physical design of the questionnaire. When designing the look and feel of the questionnaire, several issues need to be addressed. These include what size, color and weight of paper it should be printed on; whether it should be folded; printing on front or both; number of columns, if any at all; font; text size; and color of the ink. In particular, the weight of the paper (thickness) that the questionnaire is printed on is a critical issue. The thicker or greater the weight of the paper the sturdier the writing surface will be for customers completing a questionnaire. This is particularly important when conducting on-board surveys of customers riding rubber-tired vehicles (buses). In addition, the size of the text is important due to certain customers who may be elderly and/or vision-impaired. For example, the final design and look and feel of a questionnaire for a particular on-board survey could be printed on legal-sized, light-blue 60-pound cardstock, questions printed in 12-point text, and double-sided.

2.10 Coding of Responses

In most instances it will be impossible to manually analyze the potentially large amounts of information that are collected from public transit customer surveys in an accurate fashion. For most surveys, computers are required to analyze the gathered information. In order to use a computer and statistical analysis software of some kind in order to analyze the gathered data about customers, a coding process and schemes will need to be developed for each question on the survey. All responses, whether verbal or written, must be translated to numbers during the data entry process so that the computer can understand what it is analyzing. Some current statistical software can analyze text-based data but is usually limited to simple frequency distributions and cross-tabulations. In order to compute simple statistics such as means or perform other statistical procedures, the textual information from the survey must be translated to numbers.

It is much easier to develop coding schemes for closed-ended questions than for open-ended ones since the responses to closed-ended questions are mutually exclusive. Exhibit 5 shows some examples of coding schemes for three closed-ended questions taken directly from an on-board survey of LYNX LYMMO customers in Orlando, Florida. As the Exhibit shows, each possible answer choice is coded with a number indicating a discrete response. When the survey effort is complete and information from the questionnaires is ready for analysis, each number representing one of the possible answer choices is then entered into the computer.

Developing a coding scheme for open-ended questions represents more of a challenge than developing a coding scheme for closed-ended ones. This results from the fact that respondents can say whatever they like in response to an open-ended question.

Perhaps the best method for developing a coding scheme for open-ended questions is to enter all of the responses then develop codes by grouping similar responses together. For example, responses to the open-ended question, "Please tell us the <u>one thing</u> that you like <u>least</u> about riding your public transit system." would elicit a number of interesting answers. Based on this question, it might be revealed that on-time performance, operator courtesy, and cost of riding the bus was mentioned by a number of customers, so a category and then a discrete coding or numbering scheme would be created for each.

Exhibit 5. Examples of Coding Schemes for Closed-Ended Questions

<u>Trip Purpose</u>

Where did you come from before you got on the bus for this trip?

1 Home
2 Work
3 School
4 Doctor/Dentist
5 Shopping/Errands
6 Visiting/Recreation
7 Other_____(specify)

<u>Gender</u>

You are...   1   Male 2   Female

<u>Mode of Access</u>

How did you get to the bus station/stop for this trip?

2.11 Use of Standard Questions

Experience has shown that a very useful strategy for wording questions when constructing a survey of public transit customers is to use standard questions that have been developed and extensively tested on other customer on-board surveys. By using standard questions, the final questionnaire will benefit greatly from the experiences of others by learning from their mistakes. Also, standard questions can be

modified or tailored to meet the specific objectives of a particular survey. Appendix B contains a host of questionnaires that contain examples of standard questions from various surveys of public transit customers.

2.12 Pre-Testing

Pre-testing the questionnaire and data collection procedures is one of the best ways of finding out if everything works as planned or envisioned, especially if a survey employs new techniques or a new set of questions. Because it is rarely possible to foresee all of the potential misunderstandings or biases as a result of different questions and procedures, it is vital for a well-designed survey effort to include provision for a pre-test, or even pre-tests. There should usually be one or a series of small-scale pilot or pre-test efforts to test the feasibility of the individual techniques for distribution and collection (if new or altered) and to perfect the questionnaire concepts and question wordings. These small-scale efforts could be followed by a small-scale dress rehearsal to find out if everything connects together as intended.

The Orange County Transportation Authority (OCTA) in Orange County, California provides documentation of its pre-test of an on-board survey it conducted in 1998 in the final survey report. In its report, it stated that the pre-test occurred one month prior to the actual survey to ensure "effective survey design and adequate time to make revisions." Four bus routes were selected that were representative of the demographic composition of Orange County. Surveyors on the four routes were met by OCTA staff at the end of their shifts for a debriefing about the pre-test while comments and concerns were still fresh in their minds. OCTA's pre-test produced a number of changes and improvements to the overall on-board survey effort including revisions to the ordering of questions to increase participation, increased importance of hiring bilingual surveyors, and to have surveyors intensify spot checks of certain

information prior to customers alighting the bus.

As noted, a pre-test of the questionnaire is an opportunity to give it a test drive before it is made final. During the pre-test of a self-administered on-board survey, at a minimum, the following questions should be asked of a small sample of customers:

- Are instructions for completing the questionnaire clearly written?
- Are the questions easy to understand?
- Do respondents understand how to indicate responses, i.e., checks, circles, etc.?
- Are the response choices mutually exclusive?
- Are the response choices exhaustive?
- Are the questions poorly phrased or misleading?
- Are there any missing questions?
- Did respondents have enough time to complete the questionnaire?
- Are the questions as "neutral" as possible?

Once the pre-test is complete, it will be prudent to solicit information from the surveyors that participated in the pre-test about certain questions, distribution methods, the questionnaire itself, and any other important issues related to the overall survey effort. Another good idea would be to conduct focus groups and/or brainstorming sessions with surveyors after the pre-test to gain additional insights into how to improve the overall survey effort.

2.13 Data Collection Methods

Once the questionnaire has been finalized, the next step is to collect the data. There are three primary methods for collecting data about public transit customers: face-to-face, telephone, and self-administered. The third method, self-administered, involves giving questionnaires to respondents on-board to personally complete. Typically, during an on-board survey, questionnaires are distributed to

customers on board transit vehicles for them to complete during their trip. The distribution of questionnaires on board vehicles can include seat drops prior to customers boarding, drivers assisting in which drivers hand questionnaires to boarding customers, or surveyors assisting in which surveyors hand questionnaires to boarding customers. The literature indicates that the later is by far the most commonly used method for distributing questionnaires on board transit vehicles, usually using transit agency staff or temporary staffing or both. The literature indicated that other methods of self-administered surveys include intercepting customers while waiting to board at transit stations, stops, or major transfer points.

Data collection using telephone surveys is usually accomplished through the use of computer-assisted telephone interviewing or CATI, for short. With CATI, surveyors or interviewers read questions from a computer screen and type responses into the computer as the respondent gives them. CATI has a number of advantages and disadvantages when compared to other methods of data collection. Perhaps the major advantage of CATI is that responses are immediately entered and recorded into a computer, which all but eliminates manual data transfers. Also, the elimination of manual data entry also cuts down on transcription errors that ultimately lead to improved data quality. The major disadvantage of CATI is the cost and the time required to get the survey set up and in place. As a result, based on the literature, CATI is not recommended for smaller efforts such as surveying customers of small-sized public transit systems. Again, according to the literature reviewed, the most commonly utilized data collection method for gathering information about public transit customers is self-administered questionnaires on board actual transit vehicles using agency staff.

One more recent data collection method is the use of portable laptop computers for in-person interviewing. Portable computers can be taken into the field or on a public transit vehicle, and either the interviewer or the respondent can directly enter data in responses to questions. Data collection carried out in this way is referred to as CAPI or Computer-Assisted Personal Interviews. Usually, the CAPI laptops are not directly connected with a centralized computer at the time of interviewing. Nonetheless, most of CATI quality and speed advantages also occur with CAPI. Clearly, as electronic technology becomes more widely available, friendlier to use, and cheaper, traditional paper and pencil data collection methods may eventually disappear.

When selecting a data collection method, the best question to ask is what is the best procedure for accomplishing the goals and objectives of the survey effort. It should be noted that what method works best in one situation might not necessarily be the best method for another situation. In designing an on-board survey of public transit customers, several important issues must be balanced such as cost, response rates, data collection time, and the overall quality of the data. Data collection procedures vary greatly in cost, with mail and self-administered surveys being the least expensive and CATI, CAPI, and face-to-face (similar to how information is collected for the Decennial US Census) surveys usually being the most expensive.

Typically, CATI, CAPI, and face-to-face personal interviews or surveys provide the best response rate and mail surveys typically provide the lowest. Self-administered, the type most commonly used, fall in the middle between the two extremes. Based on the literature reviewed and personal experience, self-administered surveys on board transit vehicles typically have response rates in the 20 to 40 percent range. However, it is critical, when conducting self-administered surveys on board transit vehicles, that all customers on the vehicles be encouraged to complete a questionnaire, sometimes every time they board a transit vehicle that is part of the sample. This should increase the overall response rate of the survey effort and increase the quality of the data collected.

Compared to other data collection methods, self-administered surveys save the most time since transit customers can complete questionnaires on board vehicles shortly after distribution. Typically, mail surveys take the most time to complete since respondents need a period of time to complete and mail back the surveys. In addition, mail surveys will most likely require a follow-up mailing to increase the overall response rate.

2.14 Surveyor Training

If a self-administered, on-board survey is selected as the preferred data collection method, then it will be important to extensively train the persons who will ultimately distribute the questionnaires on board vehicles. In addition to distributing the questionnaires, these persons will also be responsible for collecting completed questionnaires and assisting customers complete their questionnaires. For example, during the training typical real-life scenarios could be discussed or even acted out as well as techniques to ensure the highest completion or response rate possible.

Surveyors should undergo extensive training and briefing prior to conducting the actual survey. During training, each surveyor should be given a questionnaire to look over. This will help them get a "feel" for the work they will be doing. Surveyor training should include, at a minimum, the following key concepts and information items:

- Arrive 15-20 minutes prior to the start of surveying work
- Make sure that you have ample supplies prior to the start of surveying (pencils, clip boards, survey packets, etc.)
- Bring a watch so that a questionnaire distribution log can be accurately kept
- Approach every customer on the bus and ask them to complete a questionnaire

- Always wear your surveyor badge when surveying so that customers and bus operators can easily identify you
- Come up with a pleasant line or two when approaching customers to get them to complete a questionnaire. For example:

> *Hello, I'm working with LAMTA and we are distributing a customer survey so that we can find out more about you and your transportation needs in order to improve your bus service. Would you mind taking a minute to complete a questionnaire? It will only take you about 5 minutes to complete. You can give the survey back to me when you are finished and, if you finish it completely, I will give you one free trip pass.*

- If someone refuses a questionnaire, be polite and move on to the next customer. Some customers will refuse a questionnaire
- Stress to the customers that they need to complete a questionnaire every time they board a bus during the period of surveying
- It is preferred that you try to get customers to complete their questionnaires while riding your bus
- Keep all of the blank and completed surveys together in their original packet
- Assist customers that have some type of physical limitation that precludes them from completing a questionnaire on their own
- Station yourself in the seat directly behind the operator
- Dress casually, but professionally. T-shirts are fine as long as they are clean and not wrinkled. Shorts are fine as well. No holes, stains, etc.
- You may bring snacks/small cooler with drinks on the bus
- If you need something (for example, bathroom break), ask the operator when he/she will have a layover so that you can take care of your personal business at that time
- Make a periodic scan of the bus seats and floor to make sure that no

questionnaires or other supplies have been left
- You might want to consider bringing a seat cushion; the seats can be hard
- Be careful of motion sickness. Bring proper medication is you are prone to it
- An emergency phone number is placed on the back of your name badge. A business card for someone from the transit agency is helpful, perhaps road supervisors

The training should also include ample and repeated instruction on the mechanics of questionnaire distribution and collection. As noted prior, real-life scenarios should be discussed or even acted out as well as the proper distribution techniques to ensure the highest questionnaire completion rate possible. If the questionnaire is provided to customers in various languages, it is a good idea for some of the surveyors to be multi-lingual. In most instances, the literature points out that most transit agencies provide the questionnaires in at least English and Spanish, although service area characteristics will dictate the language(s) of the questionnaire.

Careful screening and selection of surveyors should be a priority. Emphasis should be placed on the professionalism of the surveyors including dress, punctuality, mannerisms, courteousness, and efficiency. Experience has shown that labor from temporary staffing agencies works well for obtaining staff for the distribution and collection of questionnaires for on-board surveys. Other sources of labor could be students, senior citizens, or transit agency staff.

2.15 Survey Data Weighting

Survey data are weighted so that each route, time period, or other segmentation will be equally represented in the survey total. A weighting factor for a particular segmentation is usually calculated by dividing the total number of boarding customers by the total number of returned questionnaires or responses. The data in

Exhibit 6 illustrates an actual example of weighted survey data. In the Exhibit, the Gold route was surveyed for an entire day of service and had 14,917 total boardings or customers and 132 collected questionnaires. In the reporting of survey results, the Gold route would be weighted by a factor of 113.01. Without weighting, the data collected on the Gold route with 14,917 customers during the day of surveying could be either under- or over-represented when compared to other routes that were surveyed. In essence, the weighting of survey data "smoothes out" the differences in customers by some defined period of service so that the system-wide reporting of results more accurately reflect the actual customer base. The simple formula for calculation of the data weights is to divide the total boardings by the number of completed and partially completed returned questionnaires.

Exhibit 6. Calculation of Survey Data Weights

Route	Collected Quests.	Riders	Weight
Gold	132	14,917	113.01
FAMU/FSU	64	2,467	38.55
FAMU/FSU/ENG	109	3,903	35.81
Garnet	33	23,118	700.55
Tomahawk	6	423	70.50
Venom Express	43	6,658	154.84
Venom Trippers	88	4,295	48.81
Old Town Trolley	49	38	0.78

Source: 1999 TALTRAN On-Board Survey. Tallahassee, Florida.

2.16 Data Entry and Accuracy

With advancements in computer hardware and software, the most practical method of entering the information gathered from an on-board survey of public transit customers is with the use of a computer and one of the commercially available spreadsheet software packages such as Microsoft Excel™ and Lotus 1-2-3™.

A spreadsheet is essentially a grid with a column for each question and rows that represents each respondent or returned questionnaire, as shown in Exhibit 7. The spreadsheet example shown in Exhibit 7 is a grid system with the columns representing

questions and the rows representing unique survey identification numbers. By setting up data entry in this fashion, it allows for unique question-respondent cells to be created that correspond to discrete answer choices that were coded on the questionnaire (see Exhibit 5).

Exhibit 7. Data Entry Spreadsheet Example

Survey ID#	Q1	Q2	Q3	Q4
45	1	2	5	2
34	2	3	4	4
44	3	3	4	1
65	4	7	5	1
23	4	1	6	3
12	3	1	3	3
112	5	2	7	4
98	7	1	1	3

The creation of a template for data entry is a good method for avoiding transcription errors during the data entry process. The creation of such a template with preset number ranges for individual cells eliminates most of the human error associated with data entry. For example, if a particular closed-ended question has five possible answer choices and the choices are numerically coded 1 through 5, and then the preset number ranges would not allow the entry of a number other than 1 through 5. However, undetectable errors such as an incorrect entry within the preset number ranges may be unrecoverable. Because of these types of data-input errors, it will be necessary to "clean" the completed spreadsheet computer file by randomly spot-checking the data for inconsistencies and logic. Once errors are located, the "cleaner" can reference the returned and completed questionnaires by using the unique identification number assigned to each to verify and input the correct answer.

2.17 Analyzing Survey Results

For purpose of this how-to manual, analyzing means categorizing, ordering, manipulating, and summarizing raw data, with the goal of answering questions and satisfying survey objectives. Depending on the type of questions asked, answers to

each closed-ended question could be provided in one of the following two forms:

- Frequency distributions (e.g., 47% Male and 53% Female)
- Averages (medians and/or means) (e.g., 1.3 on a point scale between 1 and 5)

While simple frequency distributions and averages are useful for presenting data that is easily understandable by a wide audience, it is often even more revealing to use cross-tabulations as a method to gain a wider depth of understanding of the data. Cross-tabulation (or cross-tabbing, as it is often called) is used to segment the responses of public transit customers. The results often mean more if they are presented so that they show segmentation among different customer groups such as frequent vs. non-frequent customers, male vs. female, cash users vs. monthly pass users, and/or lower-income vs. middle-income customers. As long as there is a question or some other indication on the survey that will allow identification of these different groups, cross-tabulation is possible. There are several ways to perform cross-tabulations. Any credible database or statistical software program that is used to analyze data should be capable of cross-tabulation.

Analyzing the data requires strict attention to detail and, in some cases, rudimentary knowledge of statistics and computer software packages such as Microsoft Access™ or Excel™ and statistical software such as SPSS™ or SAS™. How these steps are ultimately conducted will depend on the scope of the overall survey and the audience to whom the results will be intended.

2.18 Reporting Survey Results

The final stage of the survey is to report the results. There is not an established format for reporting the results of public transit customer on-board surveys. The report may follow a pattern similar to formal report writing practices or the

analysis may be presented in departmental meetings to aid in planning service. A formal report might contain contextual information, a literature review, a presentation of the research objectives under investigation, information on survey participants, a section explaining how the survey was conducted, the survey instrument itself, a presentation of the quantified results, and a discussion of the results. Based on the review of literature, most results from on-board and other surveys are presented in a variety of simple graphical and tabular representations, as shown in Exhibit 8. When presented in this manner, the information is easiest to interpret by others within and outside of the transit system. For example, most of the actual reports reviewed make extensive use of simple bar graphs, pie charts, and tables.

A useful written report that presents the objectives, methods, findings, and conclusions of a customer survey should provide enough clear and detailed content so that general audiences can be easily informed. It should be assumed that the general public is very smart but not experts well versed in the methods of surveying. In most situations, transit agency staff is on their own in deciding what information to include and how long the written report should be. The following is a suggested table of contents for a written customer survey report.

Suggested Table of Contents

Executive Summary
Table of Contents
List of Tables
List of Figures
Preface
Acknowledgements
Introduction
  Organization of Report
  About Palm Tran
  Customer Survey Objectives
  Survey Methodology and Procedures
  Sampling Procedures and Issues
    Sampling Constraints
    Data Weighting
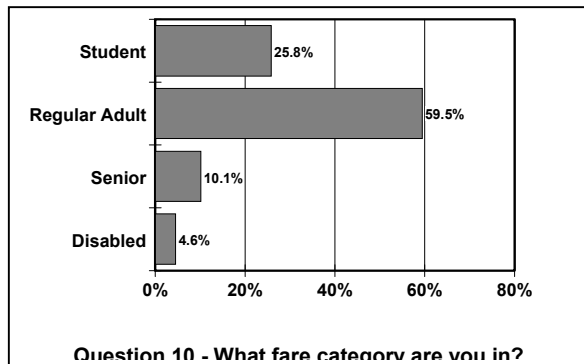
Questionnaire Design and Administration
Labor Recruitment and Training
Conducting the Survey
Data Entry and Geo-coding
Data Collection Results
Questionnaires Collected
Response Rate
Confidence Levels
Non-English Surveys
Analysis of Results
Customer Demographics
Travel Behavior
  Trip Characteristics
  Transfer Analysis
  Fare Usage
  Boarding Time Analysis
Customer Satisfaction
  Service Aspects Customers Like Most and Least
  Customer Comments
  Customer Satisfaction Ratings
Recommendations and Summary
Appendices
  Questionnaires
  Assignment Sheets
  Trip Logs
  Training Manual
  Route Maps
  Origin and Destination Maps

When writing customer survey reports for general audiences, the report should be no longer than about 100 pages (short is best) and always include an executive summary (especially if the report is excessively lengthy). An executive summary provides all potential readers with a concise "summary" of the report's major objectives, methods, findings, and recommendations. The executive summary varies in length usually from 3 to 10 pages.

2.19 Final Checklist

A checklist of important items, such as the one presented below, will be useful in estimating total survey costs (whether measured in time or money or both) and other issues to consider when developing and carrying out a survey of public transit customers. The checklist is as follows:

Exhibit 8. Graphical Representation of Survey Results

Student — 25.8%
Regular Adult — 59.5%
Senior — 10.1%
Disabled — 4.6%

0% 20% 40% 60% 80%

Question 10 - What fare category are you in?

- Staff time for planning the survey and guiding it through the various stages until completion
- Sample selection costs, especially important for large-scale surveys
- Labor and material costs for pre-testing the questionnaire and field procedures taking into account that pre-testing step may need to be done more than once and funds and time should be set aside to accomplish this important task
- Supervisory costs for interviewer hiring, training, and monitoring
- Surveyor labor and travel expenses, including meals, lodging, and mileage reimbursement (if necessary)
- Labor and material costs associated with data entry
- Cost of "cleaning" the final data, i.e., spot-checking the computer files for inconsistent or impossible answers. This may also include the costs of "filling in" or imputing any missing information
- Analyst costs for preparing tabulations and special analyses of the data (if necessary)
- Possible computer time for the various tabulations and analyses (mainframe)
- Labor time and material costs for substantive analyses of the data and final report preparation
- Incidental telephone charges, postage, reproduction, supplies (badges, pencils, packets) and printing costs for all stages of the survey, from planning activities to the distribution of the final report

2.20 Quality Control

The overall survey process should include a number of quality control measures to ensure the highest volume of reliable data about transit customers. In order to ensure the highest quality data possible, several quality control measures should be adhered to throughout the duration of the on-board survey. First, questionnaires should be sequentially numbered from 1 to some number N. The sequential numbering of questionnaires will allow for orderly distributed by route as well as analyzed by route, once the surveying is complete and the data have been entered into a computer database. It is imperative that an accurate log of the range of the questionnaire numbers that are distributed by route. For example, questionnaires 1-55 could be distributed on Route 1 and so on.

Another measure that can be taken to ensure high quality control over the survey process is the use of large manila envelopes or other suitable packet to group questionnaires by route using the sequential numbers for ease of pick-up as well as distribution by the surveyors to customers. Typically, the survey packets will be sorted by route then by departure time then by day of surveying and stored in a designated place within the transit agency for easy retrieval. Experience has shown that the best place to leave the packets is with the transit agency's Dispatch function. Arrangements have to be made with Dispatch prior to the start of surveying to ensure that process of distributing and collecting the packets runs smoothly.

Yet another measure to ensure overall quality in the survey process is to use surveyor assignment and control schedules. For example, all trips in the final sample can be grouped together by trip number, direction, departure and end times, block number, route number, and start and end locations. Using this information, assignment schedules can be developed, given a unique identification number, and then distributed to the surveyors to indicate what "assignments" they will be working.

This unique number should be written on the outside of the manila envelopes containing the questionnaires so that surveyors can match up the packets with their assignment. A set of assignment sheets should be given to the field supervisors as well to use during the field supervision.

A data entry quality control team should be established to inspect all returned questionnaires for legibility, accuracy, and consistency. This team can assist data entry staff with any questions that they may have about a particular response.

Last, a high level of effective field supervision should be maintained throughout the surveying. A supervisor should routinely and randomly meet up with each surveyor while they are in the process of surveying transit customers. During these random checks, supervisors can look over the work being done by surveyors and make any corrections. Mechanisms should be in place to dismiss and quickly replace any surveyor found not performing the job adequately. In addition, supervisors can carry additional survey supplies such as questionnaires and pencils. The supervisor can also temporarily relieve the surveyor for personal breaks, if necessary. One consideration is the use of cellular phones by supervisory staff as it may be necessary to communicate with other supervisors or the transit agency regarding a host of unforeseen issues that could directly impact surveying.

2.21 Shortcuts to Avoid

A good and thorough survey does not come cheap, although some can be conducted more economically than others. Conducting a credible and reliable survey of public transit customers entails scores of activities as outlined in this literature review, each of which must be carefully planned and controlled. Taking shortcuts can and will invalidate the overall results. When conducting surveys, shortcuts should be avoided at all cost that often come about due to various issues, such as a lack of budget or even time constraints. The major shortcuts to avoid are as follows:

- Not pre-testing all field procedures and the questionnaire itself
- Ineffective field supervision
- Inadequate data entry quality controls

Finally, the standard for all reputable on-board and other surveys is that individual respondents (customers) should never be identified in reporting survey findings, unless express permission is received. All of the results from the survey should be presented in completely anonymous summaries, such as simple graphs, pie charts, and tables or other appropriate illustration method.

3.0   DESIGN STEPS

Developing, administering, and reporting the results of an on-board survey or other survey of public transit customers includes a number of important steps that should be followed to ensure the highest degree of success with the survey effort. The steps to follow are provided in an outline format. The intent of presenting the steps in this manner is so the end-user of the how-to manual can refer back to previous sections for specific guidance.

Step 1: Define and Clarify Objectives

- Define expectations
- Define what information needs to be gathered about customers
  - Demographics
  - Travel Patters
  - Satisfaction
  - Other
- Confirming all related costs
  - Staffing, materials, equipment, travel, etc.
- Establishing a reasonable timeline
- Investigate any previous survey efforts
- Coordinate with persons knowledgeable about surveying including academics, consultants, etc.

- Familiarize with this how-to manual

Step 2: Identify Sample

- Decide sampling method
- Probability or non-probability
  - Simple random sample
  - Stratified random sample
  - Cluster random sample
  - Systematic Sample
- Representative of the whole population
- Degree of accuracy
  - Confidence Level
    , 95 percent or other
- Minimize sampling error
- Minimize sampling bias
- Influenced by available resources
- Randomly selected routes
  - Inbound and outbound

Step 3: Data Collection Methodology

- Data collection methodology
  - Self-administered
    , On-board survey
    , Seat drop
    , Driver assist
    , Surveyor assist
    , Intercept
  - Mail
  - Telephone
    , CATI
  - Personal interview
    , CAPI

Step 4: Questionnaire Design

- Develop clearly worded and simple questions
- Keep the questionnaire as short as possible
- Avoid question writing problems
  - Double negatives
  - Probing questions
  - Hypothetical
  - Acronyms
  - Bias
  - Ambiguous wording
  - Double-barreled

  - Cryptic
- Don't assume customers know terminology
- No way to word a question perfectly
- Questions should be relevant to objectives
- Short questions are best
- Avoid slang, jargon, and technical terminology
- Develop consistent response methods (i.e., checks, circles)
- Make questions as impersonal as possible.
- Sequence questions from the general to the specific
- Closed-ended questions should use exhaustive and mutually exclusive response choices
- Place questions with similar content together (i.e., demographics and so on)
- Make the questions as easy to answer as possible
- Provide clear and concise directions
- Define unique and unusual term
- Use an attractive questionnaire format that conveys a professional image
  - Landscape
  - Folded
  - Front-back
  - Paper selection
    , Card stock
    , Copier
    , Color
- Coding of response choices
- Coding schemes
- Numeric or alpha
- Research design
- Consecutive numbering
- Distribution logs

Step 5: Surveyors

- Obtain surveyors (if necessary)
- Extensively train surveyors
  - Refer to checklist in how-to manual

Step 6: Conduct Pre-test of Questionnaire and Survey Methods

- Conduct a pre-test of draft questionnaire using actual persons who will be surveyors
- Fine tune questions and overall survey methods
- Ensure surveyors are trained properly
- Solicit information from the surveyors that participated in the pre-test
- Conduct focus groups and/or brainstorming sessions with surveyors
- Make appropriate modifications

Step 7: Conduct the Survey

- Undertake the survey
  - Operator assistance
  - Surveyor assistance
  - Other assistance
- Collect surveys
  - Operator assistance
  - Surveyor assistance
  - Drop boxes on vehicles
  - Mail return provision

Step 8: Data Processing and Analysis

- Data entry type
  - Manual
  - Electronic
- If manual, then data entry staff
- Data weighting
- Template design
- Software
  - Spreadsheet
    , Microsoft Excel™, Lotus 1-2-3™
  - Database
    , Microsoft Access™
  - Other
    , SPSS™, SAS™
- Data cleansing
  - Transcription errors
  - Logic checks

Step 9: Reporting Results and Other

- Consider audience
  - General or academic
  - Organize tightly
  - Do not overwhelm reader
  - Consider sensitive topics
- Use simple bar graphs, pie charts, tables
- Accuracy of reported results
- Describe survey design
- Describe sampling methods
- Ethical reporting of results
- Data Archiving
- Historical Comparisons
- Consistency between instruments
- Multi-year comparisons
- Length of time between surveys

4.0   OTHER CONSIDERATIONS

In 1991, the Federal Transit Administration began a project to implement a transit performance monitoring system (TPMS). The TPMS was designed to collect data on transit customers through an ongoing, systematic program of on-board surveys. The long-term goal of the TPMS initiative is to standardize the collection of data and, thereby, provide a basic, but comprehensive analysis of the performance and benefits of transit service.

The project has consisted of two rounds of surveys, each involving 14 transit systems. The Round 1 surveys were performed in 1997 and 1998. The Round 2 surveys were conducted in 1999 and 2000.

Twelve core questions were included on the survey questionnaire during rounds one and two. The survey form contained in Appendix C shows that the twelve core questions are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, and 15. The rationale for inclusion of these questions is as follows:

- Questions 1, 3, 8, and 15 are used to determine trip purpose, automobile availability, and income. The responses to these questions are used to define the functions or benefits

provided to the customer such as congestion management, low cost mobility, and livable communities. These functions or benefits are discussed in the chapter entitled Survey Results.

- Question 5 addresses trip frequency and also is used to estimate the number of people in the community that use transit service. For example, each response of one day a week might be given a weight of 7.0 to estimate the number of people using transit service one day a week.
- Question 6 is used to assess the degree of turnover in transit ridership.
- Questions 7 and 9 help assess the level of added mobility that transit provides to customers.
- Questions 2 and 4 provide information on access and egress modes.
- Questions 10 and 12 are used to examine the survey responses in terms of age and gender

When conducting an on-board survey of public transit customers, serious consideration should be given to the inclusion of as many of these twelve core questions and exact response choices as possible.

5.0   SUMMARY

It has become very important for public transit systems to carefully evaluate both current and planned services in order to provide the most efficient and desirable public transit services to the community that it serves and funds its existence. Surveys of public transit customers can play an important role in the evaluation of current and planned services. When a public transit system decides to evaluate current or planned services through the use of a customer survey, there are a number of important issues that need to be addressed to facilitate the data collection process and to ensure that reliable and high quality data are collected, analyzed, and ethically reported. In some cases, however, the

collection of important information about customers of public transit and the resulting evaluation has not been supported by comprehensive, thorough, and methodologically valid surveying techniques.

This report presents a how-to manual that describes the steps to follow when conducting an on-board survey of public transit customers. It was specifically developed for the public transit professional that has at least a rudimentary understanding of the purposes and procedures in survey research and is searching for specific guidance on how to "best" conduct such a survey. It is hoped that this how-to manual will help provide public transit professionals with a much better understanding of the total customer surveying process and its importance. This how-to manual describes the various components or steps of the on-board transit customer surveying process. It also touches on several other widely used methods for gathering information about public transit customers such as telephone (CATI), computer assisted personal interviews (CAPI), and standard mail surveys.

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APPENDIX A: SAMPLE OF SATISFACTION-RELATED QUESTIONS

- Ability to use travel time productively
- Absence of graffiti
- Absence of offensive odors
- Access to transit system website
- Access/egress to stops/stations
- Accessibility to those with a disability
- Are drivers/operators good at waiting for people and helping make connections
- Are you aware of our alternative shuttle that operates at night?
- Are you aware that passes can be used on sister transit systems?
- Would you be more willing to use this route due to extended service/hours?
- ATM or bank at park-n-ride/hub
- Availability of alternate transportation
- Availability of bicycle parking
- Availability of car
- Availability of handrails or grab bars
- Availability of information by phone and mail
- Availability of merchandise/concession at transit vehicle station
- Availability of monthly/discount passes
- Availability of parking at station
- Availability of schedules/maps at stops
- Availability of seats on the transit vehicle
- Availability of shelter and benches
- Availability of showers/lockers
- Availability of shuttle to/from work site/destination
- Availability of station personnel
- Availability of stops close to home/work
- Availability of trash/recycling containers at stops/stations
- Cameras on transit vehicle?
- Cleanliness of lavatories at stations/on transit vehicles
- Cleanliness of the transit vehicle exterior
- Cleanliness of transit system, in general
- Cleanliness of transit vehicle interiors
- Cleanliness of transit vehicle stops/stations
- Clear and timely announcement of stops
- Clocks on transit vehicles/at stops
- Comfort of seats on the transit vehicle
- Condition of phones next to stops
- Connecting transit vehicle service
- Convenience of system
- Cost and convenience
- Cost effectiveness, affordability, and value
- Cost of making transfers
- Customer service when calling transit system

- Did you know that system had Transit Police
- Displaying of customer service number
- Do safety concerns affect your choice of travel options
- Do you feel unsafe at certain times/locations
- Drivers friendly and helpful
- Drivers that are safe and competent
- Drivers that enforce the rules
- Dry cleaning at park-n-ride hub
- Ease of getting on and off transit vehicles
- Ease of opening doors of the transit vehicle
- Ease of paying the fare
- Ease of reading maps and schedules
- Ease of transfer
- Elevator/escalator reliability and availability
- Enforcement against fare evasion
- Explanations and announcement of delays
- Fairness and consistency of fare structure
- Freedom from the nuisance behavior of others
- Frequency of delays for repairs/emergencies
- Frequency of service on Saturdays and Sundays
- Frequency of use
- Frequency of use of other sister transit systems in city
- Frequency of holiday/off-peak service/special events
- Frequent service so that wait times are short
- Friendly, courteous and quick service
- General condition of stations/stops
- General satisfaction with transit system
- Handling of construction at stops/stations
- Have you ever felt stranded
- Have you ever used another transit system besides this one
- Have you seen our advertisements
- Hours of service
- How good are drivers at reporting security incidents
- How would you rate importance of more park-n-ride services
- How would you rate importance of links between Downtown and the suburbs by commuter or light rail
- How would you rate importance of public transportation to airport
- How would you rate importance of transportation for elderly, disabled, and people without cars
- How would you rate importance of relieving traffic congestion
- How would you rate importance of widening and expanding expressways
- How would you rate transit system's contribution to quality of life for community
- Importance of transit system providing a way to work for those on welfare
- Importance of transit system providing an alternative transportation during

bad weather
- Information signage at transit vehicle stops/stations
- Initiate new routes
- Internet access and computer training at park-n-ride hub
- Is position of signage helpful
- Leadership in solving transit problems
- Length of lines & efficiency of ticket sellers
- Length of time making commute
- Lighting at transit vehicle stops
- Lighting on transit vehicles
- Lighting & safety in parking lots
- Mass transit better for environment
- Mass transit is faster
- More frequent service during rush hours
- Noise level
- Number of transfer points outside downtown
- Number of transfers you make on a typical trip
- Office services at park-n-ride hub
- Overall crowding of station
- Overall public communication
- Were you able to easily schedule a current trip
- Parking availability & cost at destination
- Park-n-ride lots are clean
- Performance compared to previous year
- Personal knowledge of information about schedules/route
- Personal safety while in transit system areas
- Physical condition of transit vehicle stops
- Physical condition of transit vehicles and infrastructure
- Police/guards at stops
- Police/guards on transit vehicle
- Posted minutes to next transit vehicle
- Prefer privacy of private auto travel
- Presence of transit police
- Process for receiving ticket refunds
- Professional appearance of driver
- Provision of signs and information in Spanish
- Purpose of trip
- Quietness of the transit vehicles
- Recreation at park-n-ride hub
- Reliability of fare gates (turnstiles)
- Reliability of ticket vending machines
- Reliable transit vehicles that come on schedule
- Resume old routes
- Route/direction visible on transit vehicles
- Routes that go to convenient places for you

- Safety from crime at transit vehicle stops
- Safety from crime on transit vehicles
- Safety of car in parking lots
- Security efforts effective
- Short wait time for transfers
- Signage easy to read
- Signage easy to understand
- Signage tells when and where transit system runs
- Smoothness of the ride and stops
- Snow and ice removal in transit areas
- Stop names visible from transit vehicle
- Stress level getting to and from destination
- Take bicycle on transit vehicle
- Tax money used wisely
- Temperature on the transit vehicle/stations
- Transit personnel taking appropriate action to handle situations
- Transit personnel who know the system
- Transit system is safer than driving
- Transit system listens to public opinions
- Transit vehicle traveling at a safe speed
- Transit vehicles that are not overcrowded
- Travel time on transit system
- Using mass transit is more economical
- Using transit saves wear & tear on personal vehicle
- What is one thing transit system does exceptionally badly
- What is one thing transit system does exceptionally well
- What services should be offered to ease congestion
- Witnessed violence on our transit system
- Would you recommend this transit system
- Would you use a day care that was close to transit system
- Would you use a stored value fare pass

Appendix B: Sample On-Board Survey Questionnaires

a. Rail Questionnaires
b. Bus Questionnaires
c. Paratransit Questionnaires

Appendix C: Sample Questionnaire from Transit Performance Monitoring System

GCRTA (Cleveland) Questionnaire
Questions

REGISTER HERE TO WIN A FREE MONTHLY PASS!

Name:_____ Ph.( )_____

Home address: _____

City, State:_____ Zip:_____

ABOUT THIS TRIP

1. Where did you come from before you got on this bus/rapid service?
- ☐ Work
- ☐ College
- ☐ Home
- ☐ Other school
- ☐ Shopping
- ☐ Medical services
- ☐ Social, church, or personal business
- ☐ Other:_____

2. How did you get to this bus/rapid service?
- ☐ Walked
- ☐ Drove my car
- ☐ Dropped off by someone
- ☐ Rode my bicycle
- ☐ Rode an RTA bus (Route:_____)
- ☐ Rode another bus (Route:_____)
- ☐ RTA Rapid / Red, Blue, or Green Line / Waterfront
- ☐ Rode with someone who parked

3. Where are you going now?
- ☐ Work
- ☐ College
- ☐ Home
- ☐ Other school
- ☐ Shopping
- ☐ Medical services
- ☐ Social, church, or personal business
- ☐ Other:_____

4. When you get off this vehicle, how will you get to your final destination?
- ☐ Walk
- ☐ Drive my car
- ☐ Get picked up by someone
- ☐ Ride my bicycle
- ☐ Ride an RTA bus (Route: _____)
- ☐ Ride another bus (Route: _____)
- ☐ RTA Rapid / Red, Blue, or Green Line / Waterfront
- ☐ Ride with someone who parked

5. How many days a week, do you usually make this trip?
- ☐ 7 days a week
- ☐ 2 days a week
- ☐ 6 days a week
- ☐ 1 day a week
- ☐ 5 days a week
- ☐ Twice a month
- ☐ 4 days a week
- ☐ Once a month
- ☐ 3 days a week
- ☐ First time riding

6. How long have you been using the bus to make this trip?
- ☐ Less than a month
- ☐ 1 - 6 months
- ☐ 7 - 11 months
- ☐ 1 - 2 years
- ☐ 3 - 4 years
- ☐ More than 4 years

7. Do you have a car or other personal vehicle that you could have used to make this trip?
- ☐ Yes
- ☐ No

8. How many vehicles are in your household?
- ☐ None ☐ One ☐ Two ☐ Three ☐ Four or more

9. If this bus/rapid service was not available, how would you make this trip?
- ☐ Use my car
- ☐ Use a taxi
- ☐ Walk
- ☐ Bicycle
- ☐ Ride with a friend
- ☐ I would not make this trip

ABOUT YOURSELF

10. I am . . . ☐ Male ☐ Female

11. I am . . .
- ☐ African-American
- ☐ Asian
- ☐ Hispanic
- ☐ White
- ☐ Other:_____

12. My age is . . .
- ☐ Under 15
- ☐ 35 to 49
- ☐ 15 to 18
- ☐ 50 to 64
- ☐ 19 to 24
- ☐ 65 or more
- ☐ 25 to 34

13. Do you have an ADA card issued by RTA?
- ☐ Yes
- ☐ No

14. Do you have a Handicapped Parking Permit?
- ☐ Yes
- ☐ No

15. What is your total household income?
- ☐ Under $10,000
- ☐ $40,000 - $49,999
- ☐ $10,000 - $19,999
- ☐ $50,000 - $59,999
- ☐ $20,000 - $29,999
- ☐ $60,000 - $79,999
- ☐ $30,000 - $39,999
- ☐ $80,000 or greater

WHAT DO YOU THINK?

16. Please rank your satisfaction with RTA's performance in the following areas. (5 is very satisfied and 1 is very dissatisfied)

	Very Satisfied				Very Dissatisfied
Courteous drivers	5	4	3	2	1
Bus/rapid on-time	5	4	3	2	1
Clean RTA bus/rapid	5	4	3	2	1
Dependable service	5	4	3	2	1
Adequate shelters	5	4	3	2	1
Convenient routes	5	4	3	2	1
Convenient schedules	5	4	3	2	1
Overall performance	5	4	3	2	1
Clean shelters	5	4	3	2	1
Crime level at RTA stops	5	4	3	2	1
Crime level on RTA vehicles	5	4	3	2	1