# Memo

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| To: | Michael Berman / Kelly Dunn, Sound Transit |
| From: | Rebecca Elmore-Yalch, ComEngage |
| Subject: | Sound Transit Passenger Experience Survey (PXS) Fall 2021 Recommended Approach for Sampling and Data Collection |
| Date: | 08/02/2021 |

Because of COVID-19 and stay-at-home restrictions, a different approach to Sound Transit’s annual Passenger Experience Survey (formerly Customer Satisfaction Survey) was used in 2020. A broad-based outreach strategy was used asking Sound Transit passengers to voluntarily participate in the research, via an on-line, self-administered survey. The broad-based outreach included posting on Sound Transit website, texts or emails sent to those on Sound Transit’s rider alert system, emails to registered ORCA Card users, and limited direct outreach at stops or in stations via on-site signage and intercepts. Data collection personnel posted on-site distributed survey response cards with instructions on how to complete the survey online. Finally, instructions were included in all outreach materials that the survey was available in English and 7 languages and respondents had the option to complete the survey online in their preferred language or by calling a toll-free number and completing the survey by phone with an in-language interviewer.

Because of the broad-based outreach, those completing the survey followed two paths:

* Those who indicated that they are currently riding completed the entire survey.
* Those indicating that they rode before the stay-at-home restrictions were put into place but are not currently riding answered one survey question and provided their demographic information.

More than 34,000 individuals accessed the survey.; more than 18,000 fell into the two categories above and completed the survey. Of those, one-fourth were current Sound Transit riders. The balance either started but did not complete the survey or failed one or more of the embedded quality control measures (e.g., multiple responses from the same IP address, incorrect answer to quality control questions).

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| Qualifed Completes (Current Riders) | Not Qualified Completes (not Current Riders) |
| 4,500 | 13,644 |
| 18,144 | |
| 25% | 75% |

The vast majority of all completes came through as a result of outreach to those with a registered ORCA Card.

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| --- | --- | --- | --- |
|  | Qualified Completes (current Riders) | Not Qualified Completes (not current [former] riders) | Total |
| ORCA registered | 71% | 94% | 89% |
| Email alerts | 6% | 4% | 5% |
| ST Website | 10% | 0% | 2% |
| text Alerts | 4% | 1% | 2% |
| Survey Response Card | 3% | 0% | 1% |
| Signs | 3% | 0% | 1% |
| Unknown (typed in URL code) | 3% | 0% | 1% |

The advantage of this broad-based outreach is that it achieved a large number of completed surveys for a cost that was equivalent to and potentially less than the traditional intercept methodology. This larger sample allows for more reliable analysis when looking at specific subgroups. At the same time, there are some potential weaknesses with this approach that should be considered in future surveys.

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| While the majority of those accessing the survey came in from the ORCA Card holder outreach, this approach was the least effective reaching current riders.  Text and email alerts were more effective but reached fewer potential respondents. Text alerts were more effective in reaching current riders than email alerts.  The most effective outreach methods to reach current riders was via Sound Transit’s website and limited distribution of Survey Response Cards and signage at stops and stations. |  |

Additional analysis shows that there are significant differences in demographics among current riders who completed the survey reached through these different outreach methods.

* Higher percentages of women were reached through the ST website, alerts, and intercepts. On the other hand, a higher percentage of men were reached through ORCA Card outreach.
* Younger passengers were more likely to be reached through the ST website or intercepts.
* Those with below average or very low incomes were more likely to be reached through the intercepts. In addition, a relatively high percentage of very low income were reached through the ORCA outreach, most likely because of the ORCA Lift program.
* All outreach methods were equally effective in reach people of color. However, intercepts were more effective in reach Hispanic passengers.
* Alerts and ORCA were the most effective methods to reach those who speak a language other than English at home. Intercepts were the most effective in reach those who speak English less than very well.
* The ST website and intercepts were most effective in reach those who continued to work outside the home.

|  | ST Website | Alerts | ORCA | Intercept |
| --- | --- | --- | --- | --- |
| GENDER |  |  |  |  |
| mALE | 46% | 48% | **53%** | 44% |
| fEMALE | **54%** | 49% | 43% | **53%** |
| nON-bINARY | 1% | 3% | 4% | 3% |
| aGE |  |  |  |  |
| uNDER 35 | **70%** | 18% | 35% | **62%** |
| 35 – 64 | 29% | **68%** | **48%** | 38% |
| 65 AND OLDER | 1% | **15%** | **17%** | 0% |
| iNCOME |  |  |  |  |
| vERY lOW inCOME | 4% | 14% | **18%** | **26%** |
| bELOW aVERAGE | 42% | 32% | 31% | **59%** |
| aVERAGE OR aBOVE | **53%** | **55%** | **50%** | 15% |
| rACE |  |  |  |  |
| wHITE aLONE (NON-hISPANIC) | **75%** | **70%** | **73%** | 57% |
| hISPANIC (ANY RACE) | 7% | 7% | 6% | **25%** |
| pERSON OF cOLOR (NON-hISPANIC) | 19% | 23% | 22% | 19% |
| eNGLISH pROFICIENCY |  |  |  |  |
| eNGLISH oNLY | 98% | 88% | 86% | 94% |
| sPEAKS ENGLISH vERY WELL | <1% | **10%** | **10%** | 1% |
| sPEAKS eNGLISH LESS THAN VERY WELL | 1% | 2% | 3% | **5%** |
| EMPLOYMENT (Multiple Responses) |  |  |  |  |
| eMPLOYED (FULL OR PART-TIME) | **94%** | **82%** | 69% | **87%** |
| STUDENT (FULL OR PART-TIME) | 2% | 1% | 3% | 3% |
| uNEMPLOYED / sEEKING wORK | 4% | 4% | 8% | 9% |
| RETIRED | <1% | **11%** | **17%** | 1% |
| UNABLE TO WORK / Other | <1% | 3% | 4% | 0% |
| WORK STATUS |  |  |  |  |
| EXCLUSIVELY WORKING FROM HOME | 20% | 19% | 31% | 24% |
| wORKING FROM HOME AND OUTSIDE | 9% | 44% | 34% | 15% |
| eXCLUSIVELY OUTSIDE THE HOME | **71%** | 37% | 34% | **61%** |

In addition, there are some significant changes in reported travel based on how the respondent was reached.

* ST website, alerts, and intercept were most effective in reach those riding once a week or more often. Those reached through the ORCA outreach ride Sound Transit infrequently. This could be due to the fact that ORCA is used by all systems. Thus, someone may be a frequent rider of one of the other regional systems but ride Sound Transit infrequently (or not at all).

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| Frequency of Riding | ST Website | Alerts | ORCA | Intercept |
| 4+ Days / week | **27%** | **31%** | 13% | **28%** |
| 1-3 Days / week | **50%** | 28% | 23% | **61%** |
| Less than once / week | 24% | 41% | **64%** | 12% |
| Trip Purpose |  |  |  |  |
| Commute | 45% | **65%** | 37% | **67%** |
| Non-Commute | 55% | 35% | **63%** | 33% |
| Years Riding |  |  |  |  |
| Less than 1 Year | 8% | 3% | 5% | **16%** |
| 1 – 4 Years | 85% | 36% | 42% | 46% |
| 5+ Years | 8% | 61% | 53% | 38% |

This analysis clearly indicates that outreach through different methods is effective in reach a diverse group of passengers. However, some approaches may reach a more representative population than others. In addition, some approaches are more effective in reaching those passengers who are difficult to reach and are often under-represented in a passenger survey. Thus, we recommend the following:

* **Continue to use the Sound Transit website**. This is effective in reach younger riders and those who may be regular ST passengers. It is a relatively simple system to implement for little to no cost. Those wishing to complete the survey can simply click on the URL on the website and go directly to the survey.
* **Increase the use of intercepts**. Assuming that we are able to conduct on-site intercepts, we recommend increasing the use of intercepts. We propose three approach methods:
  + **Have data collection personnel approach passengers at stops / stations and on-board vehicles and ask them to provide their contact information**: a cell phone number or email address. The interviewer will enter that information into the survey link and the passenger will receive the survey URL via text or email. The advantage of this approach is that we will have a unique contact number for reach respondent; this may discourage people from taking the survey more than once.
  + If the passenger refuses to provide contact information, the interviewer will **give the passenger a Survey Response Card** with instructions on how to complete the survey.
  + **Use respondent-driven sampling** (to approximate a probability sample). Here we are assuming that those who we intercept and who provide contact information are the closest approximation we have to a probability sample (a similar assumption to the past). With respondent-driven sampling, we give those who provide contact information and complete the survey a limited number of uniquely identified coupons to pass to some of their contacts, making them potentially eligible for participation.

All passengers will be directed to complete the survey online. We do not recommend having interviewers administer the survey unless a passenger tells them they do not have access to or are unable to complete the survey online. Having interviewers “stand by” while waiting for someone to complete the survey on-site using a tablet provided by the interviewer will reduce the number of surveys that could be completed.

* **Continue to use Alerts**. This outreach is effective in reaching frequent riders and like the ST website is relatively simple to implement for little to no cost.
* **Use ORCA on a targeted basis**. As the analysis shows, broad ORCA outreach resulted in a sample that is potentially less representative of a typical Sound Transit passenger both in terms of demographics and travel behavior. Because of the number of ORCA Card users regionwide, the number of completes through this outreach overwhelms all other methods. However, it may be possible to target key demographic groups that are hard to reach and/or are under-represented through ORCA. At a minimum, we recommend targeting ORCA Lift Card holders. This will be effective in reaching lower-income riders and potentially increase representation of those with limited English proficiency. If possible, more broad-based ORCA outreach could be used if it is possible to target those who have used their ORCA Card on one or more Sound Transit services. It would be particularly effective if we could target those using Express bus routes with low ridership, Tacoma Link, and Sounder North, services that are more difficult to sample using intercepts.
* **Add additional outreach using local organizations** that work directly with immigrants who do not speak English at all or have limited English proficiency. This segment of riders is the most difficult to reach. They are often skeptical of surveys and are less likely to respond when approached directly. They are also less likely to be in customer databases (e.g., alerts). We propose working with Sound Transit’s equity and inclusion staff to identify local organizations that might be willing to post signage and “recruit” those they are working with to complete the survey. These organizations could also provide access to a computer or tablet to complete the survey.

The proposed approach uses what should be considered multiple sample frames and is designed to reach the broadest and most representative mix of Sound Transit passengers. However, all should be considered non-probability sample frames. Moreover, there is no effective or efficient means to take a sample that ensures a known (and ideally equal) probability of being selected to complete the survey. This is because there is no single existing frame that is inclusive of all Sound Transit passengers from which to draw a sample. In addition, some riders may be included in more than one frame, thus having a greater probability of being included in the sample than those in a single frame.

A considerable body of research has been developed recently supporting the use of non-probability samples such as this. The best single discussion of what should be considered when using a non-probability sample is a 2013 AAPOR Report ([Non-Probability Sampling - AAPOR](https://www.aapor.org/Education-Resources/Reports/Non-Probability-Sampling.aspx)). This report also includes a comprehensive list of references for additional information. But here are some key findings that impact the Sound Transit PXS design:

* Non-probability samples are largely and appropriately used when there is little or no access to a sample frame that would be considered a probability sample or to supplement a probability sample frame or when the cost to develop a probability sample would be prohibitive as is the case in low-incidence populations (within the general population).
* Intercept surveys (interviewers attempt to recruit passersby at central locations to take part of a study) should be considered non-probability samples. While a random sample of locations and times can be developed, and some systematic method may be used to determine who gets approached (intercepted) at the sampled location, the cost and inefficiencies of developing a true probability sample using intercept surveys makes it nearly impossible to do. However, intercept surveys are widely accepted and have been used in legal research. Moreover, they are the “go-to” methodology for transit surveys where it is not possible to do a probability sample due to the low incidence of qualified respondents in the general population.
* Too often, researchers use non-probability samples to draw quantitative conclusions that treat the data as though they came from a probability sample (e.g., citing a margin of error, computing standard errors, and conducting significant tests). There have been some efforts to address these concerns by using some type of correction procedures. This is feasible only if there are population characteristics (e.g., Census data) that can be used as the basis for correction. This, however, is only a partial remedy to the problem. And in the case of Sound Transit, there is no known and reliable source of population data that can be used to establish the characteristics of riders in the general population.
* Supplementing the intercepts with respondent-driving sampling (RDS) offers a viable approach when no valid sampling frame for traditional sampling is available, and where exploiting social ties between known and unknown members of the target population may be the best means to study a population of interest.
* Use propensity score adjustments (PSA) to adjust for the combined effects of coverage errors, nonresponse, and non-probability sampling. In the ideal world, a reference (or calibration) survey from a probability sample is required. Using data from both samples, a logistic model is used to estimate the probability of participating in the non-probability study. In the absence of a probability sample, one of the sample frames could be used as most reflective of the general population and used as the reference survey. Questions that are independent of the existing survey measures (e.g., openness to innovation) should be included to account for the differences between those who do surveys as a result of a direct approach and those who are approached indirectly.