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Publication Date

2001-02-01

CALIFORNIA PATH PROGRAM
INSTITUTE OF TRANSPORTATION STUDIES
UNIVERSITY OF CALIFORNIA, BERKELEY

TravInfo Evaluation: Traveler Response Element; TravInfo 817-1717 Caller Study; Phase 2 Results

**Ronald Koo
Y.B Youngbin Yim**

**California PATH Working Paper
UCB-ITS-PWP-2001-7**

This work was performed as part of the California PATH Program of the University of California, in cooperation with the State of California Business, Transportation, and Housing Agency, Department of Transportation; and the United States Department Transportation, Federal Highway Administration.

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, or regulation.

Report for MOU 363

February 2001

ISSN 1055-1417

Tats2nd.fin

TravInfo Evaluation
Traveler Response Element:
TravInfo 817-1717 Caller Study
Phase 2 Results

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June 2000

MOU363

ACKNOWLEDGMENT

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ABSTRACT

TravInfo was a federally funded Field Operational Test (FOT) of the Advanced Traveler Information System (ATIS) in the San Francisco Bay Area. The general public can obtain most current traveler information through TravInfo's Traveler Advisory Telephone System (TATS) and privately offered information services including traffic Web sites. As part of the TravInfo FOT Evaluation, two waves of TATS callers were surveyed. The first wave of the TATS caller survey was conducted in April 1997. The second wave TATS caller survey was completed in April 1999. This paper presents the findings of the second survey of TravInfo 817-1717 callers. The second survey used basically the same survey instrument to compare the results with the initial survey of April 1997. The key findings of the second survey were that although TATS has not substantially increased its customer base, it has been effective in providing quality information and in maintaining a high level of customer satisfaction. Offering easy access to traveler information via a single telephone number was one of the highly desirable features of TravInfo TATS.



Key Words: Traveler information, TravInfo evaluation, Field Operational Test.

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EXECUTIVE SUMMARY

TravInfo is a Field Operational Test (FOT) sponsored by the Federal Highway Administration (FHWA) of the US Department of Transportation and the California Department of Transportation (Caltrans). Its objective is not only to provide benefits to San Francisco Bay Area travelers, but also to stimulate the deployment of privately offered traveler information products and services. In operation since September 1996, TravInfo disseminates free, most current traffic information and multi-modal travel options to Bay Area travelers through a landline telephone system called TravInfo Traveler Advisory Telephone System (TATS) and through the Internet offered by Information Service Providers. As part of the TravInfo FOT evaluation project, two surveys of the TravInfo TATS callers were conducted, the first survey in April 1997 and the second survey in April 1999. The paper reports on the findings of the second survey of TravInfo TATS, 817-1717 callers.

The purpose of the first TravInfo TATS caller survey was to establish a baseline profile of the callers with respect to their call and travel behavior. The purpose of the second survey was to assess the changes in callers' behavior and to measure the effectiveness of TATS in helping callers make informed travel decisions. The first survey was conducted seven months after TravInfo began in operation and the second survey was conducted seven months after the field test was formerly ended. The effectiveness of the TravInfo telephone system was measured by the satisfaction of callers with the TravInfo TATS service, the impact on their travel behavior, and the benefits perceived by them.

Prior to telephone surveys, incoming calls were randomly intercepted to obtain a representative sample of TravInfo TATS callers and to create a pool of individuals who were willing to participate in the follow-up telephone interviews. An attempt was made to impose an intercept quota in area code 510 because of the high volume of calls inquiring about transit information but this quota was not achieved due to the repeat intercept of frequent calls that inquired about traffic information. Within 48 hours of intercept, a follow-up survey was conducted using the computer-aided telephone interview (CATI) method. In both surveys,

approximately 500 interviews were completed with an over 70% response rate of those who initially agreed to participate in the survey (511 in the first survey; 513 in the second survey). The sample of the first survey consisted of 283 transit information callers (transit survey group), 173 traffic information callers (traffic survey group) and 55 callers who inquired about other information, such as Caltrans' construction schedules or bike routes. The sample of the second survey consisted of 308 transit information callers, 158 traffic information callers and 47 callers who inquired about other information. Only the transit and traffic information survey groups were analyzed and presented in this report because of the low volume of calls inquiring about other TATS information.

The results of the second survey are quite similar to the results of the first survey. This may be due to the fact that the second survey was taken too close to the first survey and over two years, not much behavioral change could take place. However, one noticeable change was found in the second survey; it showed that a greater number of calls were made from a vehicle via cellular phones en route (46.8% in the second survey vs 31.5% in the first survey) in the traffic information caller group. In the first survey, about one third of the calls came from a vehicle via cell phones en route, one third from home and the remaining one third from the workplace. In the second survey, these numbers are changed to half from a vehicle via cell phones and the other half from home (30%) or workplace (20%). The other noticeable change was mode shift; it appeared that more people switched their mode from personal vehicle to public transit in the second survey. However, the sample size is fairly small to make any definitive conclusion.

Both surveys showed that:

- In the first and second surveys, an overwhelming majority of the callers in the first and second surveys were satisfied with the information they obtained from TravInfo 817-1717. In both surveys, the traffic survey group showed a greater appreciation of the traffic information service availability than the quality of information that they received while the transit survey group had a greater appreciation of the quality of information that they

received from TravInfo TATS. This may be due to the fact that no such service was available in the Bay Area.

- In both surveys, callers found that TravInfo TATS traffic information was more useful, reliable and accurate than radio or television reports. They valued the service because it allowed them to save time, choose the best route to avoid congestion, and reduce stress.
- Both the first and the second surveys showed that about half of the TATS traffic information callers changed their travel behavior as a result of obtaining information from TravInfo TATS regarding a traffic problem. However, the effects of the TravInfo TATS service on mode shifts was minor even though three times as many people switched to take public transit from personal vehicle when they learned about the traffic congestion.
- The second survey also indicated that TravInfo TATS has been effective in providing quality information and in attaining a high level of customer satisfaction although its customer base has not increased significantly. By offering easy access to most current traffic information, TravInfo TATS was able to attract travelers who never or seldom listen to radio traffic reports.
- As shown in the first survey, the second survey showed that TravInfo TATS has attracted a segment of the driving population that rarely relies on any traffic reports in making travel decisions. The second survey also showed that half of the traffic information callers seldom or never listen to radio traffic reports
- Over 80% of the callers who inquired about traffic information were repeat customers, while only half of those who inquired about transit information had previously used the TATS service. These statistical numbers were very similar in both the first and second surveys.

- Most participants in the transit survey group said they would use TATS in the future because of its easy access to information via a single telephone number while the traffic survey group said they would use it again and recommend it to others because of its most current traffic information pertaining to their own trip.
- TravInfo TATS provide both transit and traffic information services. However, the market for these information services is significantly different. Transit information callers are interested in the availability of the service and service schedules while traffic information callers are interested in getting traffic conditions to avoid congestion. Therefore, very few calls were rerouted from traffic calls to transit calls or visa versa. However, it was apparent that the transit survey group favored TravInfo TATS having a single phone number for getting all travel related information.

Finally, no significant net change could be detected from the second survey. The results of the second survey were highly similar to that of the first survey except in a couple of cases. One was a significant increase in the calls made from a vehicle en route via cellular phones. The other is the increased level of customer satisfaction with the TravInfo TATS service. One possible explanation of obtaining similar results between the first and the second surveys was that travel behavior might not change noticeably over a two-year span. Assessing the effects of TravInfo TATS over the next five to ten year horizon is highly desirable.

1. INTRODUCTION

TravInfo was a Field Operational Test (FOT) sponsored by the Federal Highway Administration (FHWA) of the US Department of Transportation (DOT) and the California Department of Transportation (Caltrans). The field test officially began in September 1996 and ended in August 1998. Over its two-year field test lifetime, TravInfo aimed to deploy an Advanced Traveler Information System for the San Francisco Bay Area, combining public and private sector resources (Metropolitan Transportation Commission, 1995). TravInfo's objective was not only to provide benefits to Bay Area travelers, but also to stimulate the deployment of privately offered traveler information products and services. The FHWA intended to make the results of this test accessible nationwide to those who might wish to engage in similar enterprises. To achieve this aim, California PATH was commissioned to perform an independent evaluation of the TravInfo field test (Hall, et al, 1995)

The evaluation project as a whole includes four test elements: institutional, technology, traveler response, and network performance. The traveler response element, of which this working paper is a part, investigates the effectiveness of TravInfo TATS on travel decisions. This element is thus concerned with acquisition and dissemination of TravInfo data. The traveler response evaluation consists of four coordinated studies, all of which employ a survey methodology. The impacts on the entire Bay Area traveler population are assessed in the *Broad Area Study* (Yim, et al, 1996; Wolinetz et al, 1999; Khattak et al, 1999). The site-specific impacts (i.e., impacts on a selected corridor during incidents) are assessed in the *Target Study* (Koo, et al, 1998, 1999). The impacts on the travelers with ATIS (Advanced Traveler Information System) devices are assessed in the *ISP (Information Service Providers) Customer Study*. Finally, the impacts on travelers who directly access TravInfo by telephone are assessed in the *Traveler Advisory Telephone System (TATS) Caller Study*. This working paper presents the results of the second wave of the TATS caller study.

As part of the TravInfo FOT, a TravInfo Traveler Information Center (TIC) was established in August 1996 (Miller, et al, 1999). The TIC collects and disseminates most current traffic information and multi-modal travel options through a landline telephone system. For the TATS service, a single telephone number (817-1717) was designated for all four of the area codes (510, 415, 408, and 707) in the Bay Area, allowing travelers to obtain information about: 1) traffic conditions on major freeways, 2) public transit, para-transit, and rideshare/carpooling, 3) ground transportation to and from the San Francisco airport, 4) freeway construction in general and at specific locations, and 5) bike routes and public parking locations. The four area codes were later split into five.

The first TATS caller survey was administered during the later two weeks in April 1997, eight months after TravInfo began operation. The second TATS caller survey was conducted in the first two weeks in April 1999, seven months after the field test was over in order to capture the full effects of TravInfo. If the time between the first and second wave surveys was too close, the effects may not show at all.

The purpose of the first TATS caller survey was to establish the baseline profile of the TATS customers and their behavior for comparison with the second survey results. The purpose of the second wave survey was to measure the changes in the customer profile and the effects of the TravInfo TATS on travel behavior. Specifically, the second TATS caller survey aimed to assess how the customer profile of TATS callers and the perceived effectiveness of TATS may have changed since the time of the first survey.

The effectiveness of TravInfo TATS service was measured based on:

- Caller profile: demographic characteristics (age, income, race, education) of TATS callers compared to the overall demographics of the Bay Area population
- Usage: frequency of TATS calls in comparison with frequency of listening to traffic or transit information disseminated by other media (radio, television)

- Service satisfaction: satisfaction (rated on an ordinal scale) with the features provided by TATS in comparison with features provided by other media including radio and television broadcasts.
- Cost of information: caller willingness to pay the cost of phone calls, waiting time, and the value of TATS information to callers.
- Benefits: computed benefits based on behavioral changes resulting from the utilization of TATS, such as reduced travel time, ability to avoid traffic congestion, and meeting anticipated arrival time.

As done in the first wave survey report, the results of the second TATS caller survey are presented in six parts: 1) the demographic characteristics of the callers in relation to the TATS information they acquired, 2) the frequency of calls and call characteristics, 3) travel decisions made based on the information received, 4) callers' perceptions of the value of the TATS service, 5) a comparison of TATS with other sources of traffic information, and 6) the consumer market issues of TATS. To understand the demographic characteristics of TATS callers, a comparison was made between the samples of the first and second TATS caller surveys.

In Section 2, the methodology used for both surveys is presented followed by the results of the second survey in Section 3. The conclusions are in Section 4.

2. METHODOLOGY

The second survey used exactly the same method as what was used in the first survey. Incoming calls to TATS were randomly intercepted to obtain a representative sample of the callers. From the pool of individuals who responded to initial intercept calls, a list of potential participants was created for follow-up telephone interviews using the Computer-Aided Telephone Interview (CATI) method. The intercept calls generated the first names of willing participants, their phone numbers, and the best times for the follow-up calls to be made within

48 hours. Repeat interceptees were rejected from the follow-up call pool in order to prevent multiple surveys of the same individual.

The random intercept method was used to obtain a representative sample of TATS callers except for area code 510. Since within 510 there was a high volume of calls inquiring about transit service, an attempt was made to impose an intercept quota of 80% traffic and 20% transit.

The follow-up telephone interviews were conducted within 48 hours of the intercept so as to ensure that participants could respond to questions with a clear recollection of their specific calls and the ways in which TATS influenced their travel decisions. The follow-up interviews took 15 minutes on average.

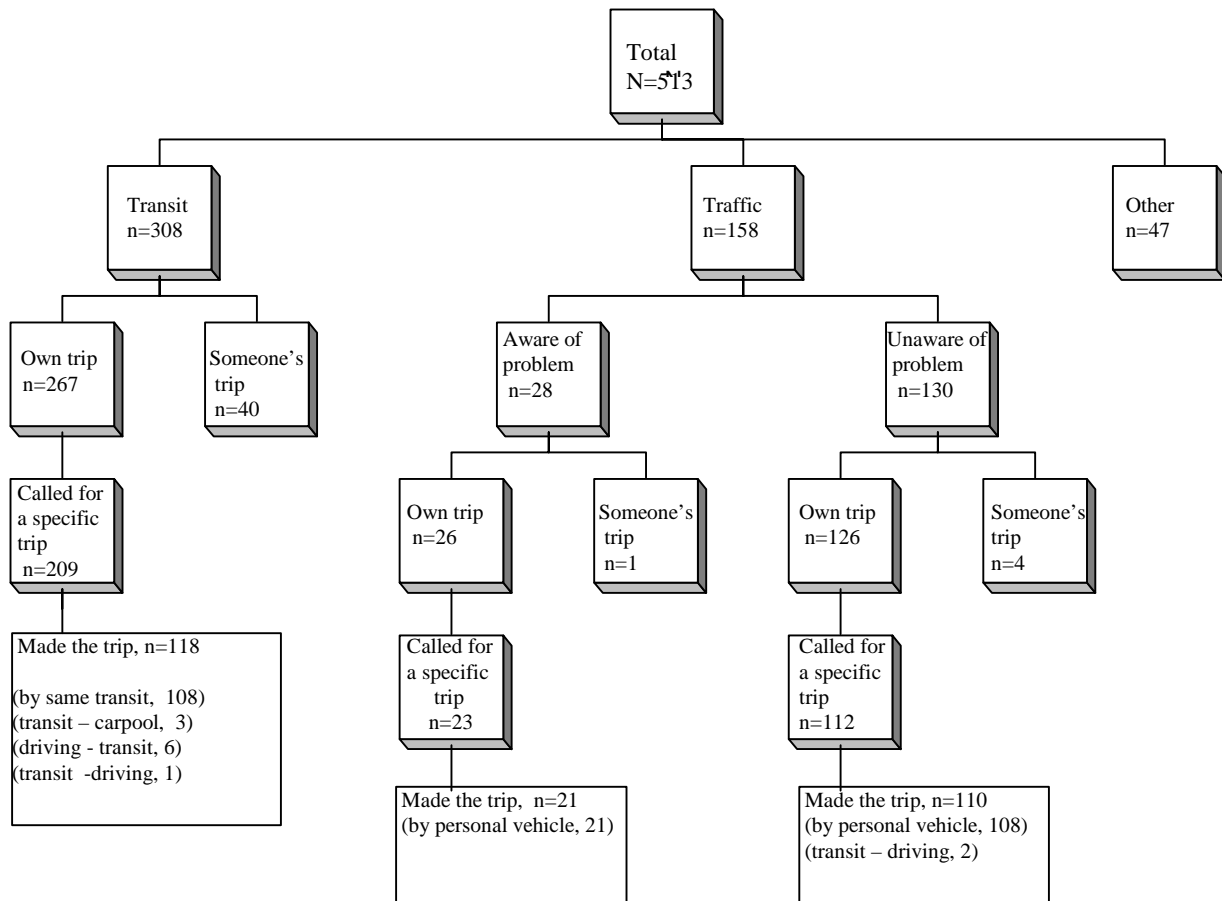
The same survey instrument used in the first survey was used for the second survey. The survey instrument was designed to obtain data regarding satisfaction with the information service, the likelihood that information acquired would affect travel behavior, and the benefits consequent on behavioral changes (such as reduced travel time, ability to avoid traffic problems and ability to arrive on time). A few demographic questions were included in order to develop a demographic profile of TATS patrons relative to the demographic characteristics of the Bay Area population. The response rate of those who initially agreed to participate in the survey was 76.7% (Appendecis A and B).

The survey data were analyzed for those who inquired about traffic information or transit information. Comparisons were made between the traffic and transit information callers. In addition, comparisons were made between the first TATS caller and the second TATS caller surveys. Cross-tabulations, Chi-square and t-tests were used to determine the distributional profile and to estimate any associations between behavioral and demographic variables such as gender, age, education, and income.

3. FINDINGS OF THE SECOND TATS CALLER SURVEY

The results of the second TATS caller survey are presented in six parts: 1) demographic characteristics, 2) call characteristics, 3) travel behavior, 4) perceived benefits of the TATS service, 5) service satisfaction and suggested improvements, and 6) willingness to pay for the TATS service. **Figure 1** shows the distributional profile of the second survey responses.

Figure 1. Distributional Profile of Second Survey Responses



The distribution of the second survey responses in terms of transit and traffic information callers is similar to that of the first survey. As shown in Figure 1, the mode shifts from personal vehicle to transit is not significant.

3.1 Demographic Characteristics of the Second TATS Caller Survey Sample

The second survey sample consisted of 308 participants who inquired about transit information, 158 participants who inquired about traffic conditions and 47 participants who called for other information. The first survey sample consisted of 283 participants who inquired about transit information, 173 participants who inquired about traffic conditions and 55 participants who called for other information. The data presented in this paper are divided into two caller groups, transit information callers (transit survey group) and traffic information callers (traffic survey group). In the second survey, 49% of the respondents were male and 51% were female, representing a reasonably balanced male-to-female ratio in the Bay Area population over 18 years of age.

As indicated in the first TravInfo TATS caller survey, the second survey also showed that TATS callers are disproportionately higher among transit users than among personal vehicle users. Control variables like age, income, and ethnicity reveal some differences with the Broad Area survey demographics. The Broad Area surveys were representative of the Bay Area driving population. The Chi-square tests showed that the demographic characteristics of the traffic and transit survey groups are significantly different ($p < .05$).

In general, transit information callers had lower incomes and were more frequently in the minority group (Black/African-American, Asian/Asian-American, Hispanic/Latino, and Mixed race) than were the Broad Area survey participants. The TATS traffic information service was most frequently requested by the age group between 35 and 64. It is because the value of travel time is important to this age group. In contrast, the transit information was sought frequently among the younger (age between 18-24) and older (age over 65) age groups.

Traffic information callers had higher incomes and were more frequently white or Asian/Asian-American American than were Black/African-American or Hispanic/Latino (Table 1). The traffic survey group was generally more educated than the transit survey group (Figure 2). Three quarters of the TATS participants who inquired about traffic information in both surveys were college graduates while only one third of those Broad Area survey

participants who listened to radio traffic reports had completed college. Age, Income, educational and ethnic characteristics between the first and second survey samples are shown in Figures 3, 4, 5, and 6.

Table 1. Ethnicity between Traffic and Transit Survey Groups – Second Survey

	Traffic survey group N=157	Transit survey group N=307
White	47.8%	52.2%
Black/African-American	5.3%	94.7%
Asian/Asian-American	27.5%	72.5%
Hispanic/Latino	15.0%	85.0%
Native American	0	100%
Mixed race	23.1%	76.9%

Figure 2. Education between the Traffic and Transit Survey Groups – Second Survey

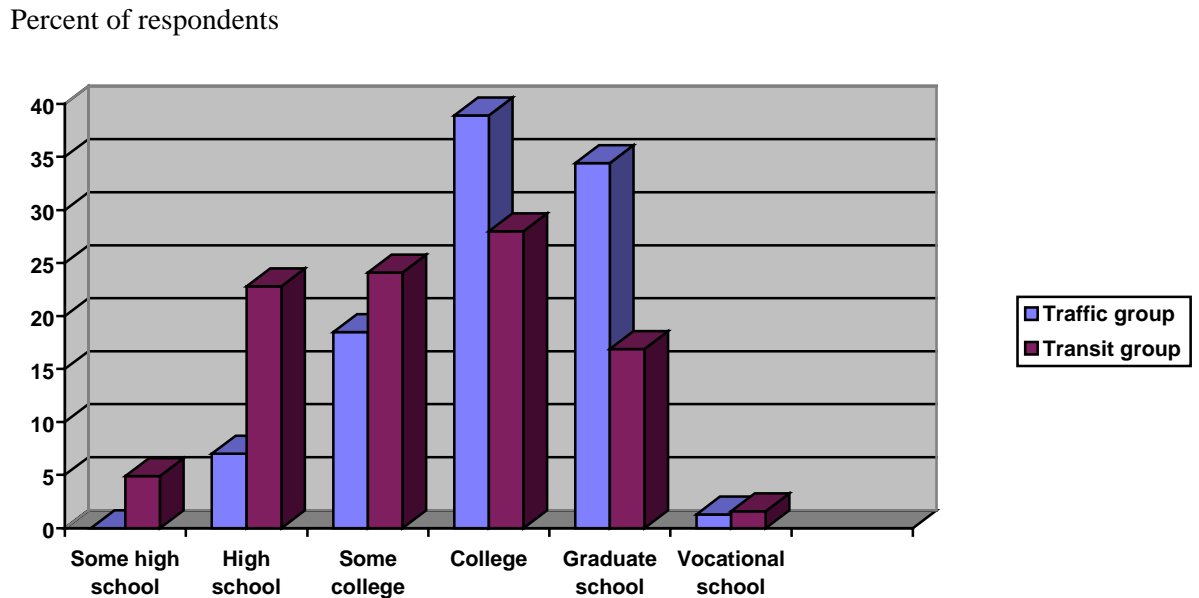


Figure 3. Age Distribution – First and Second Surveys

Percent of respondents

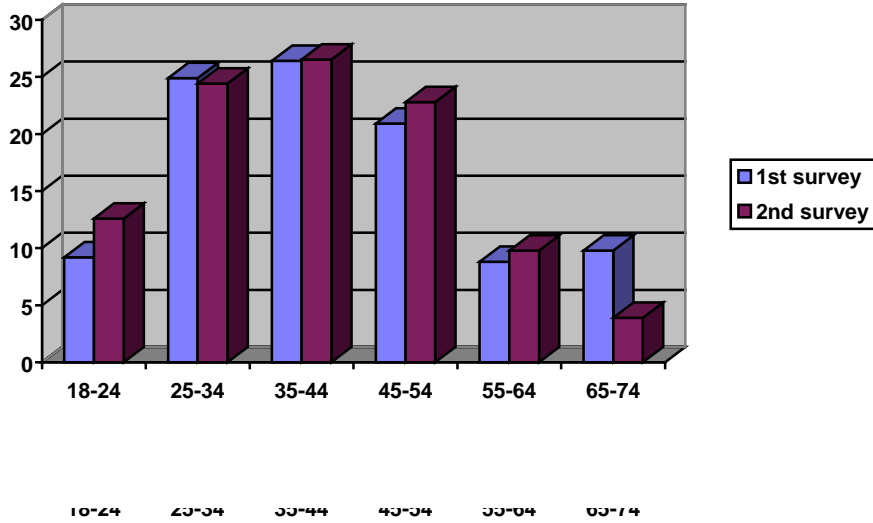
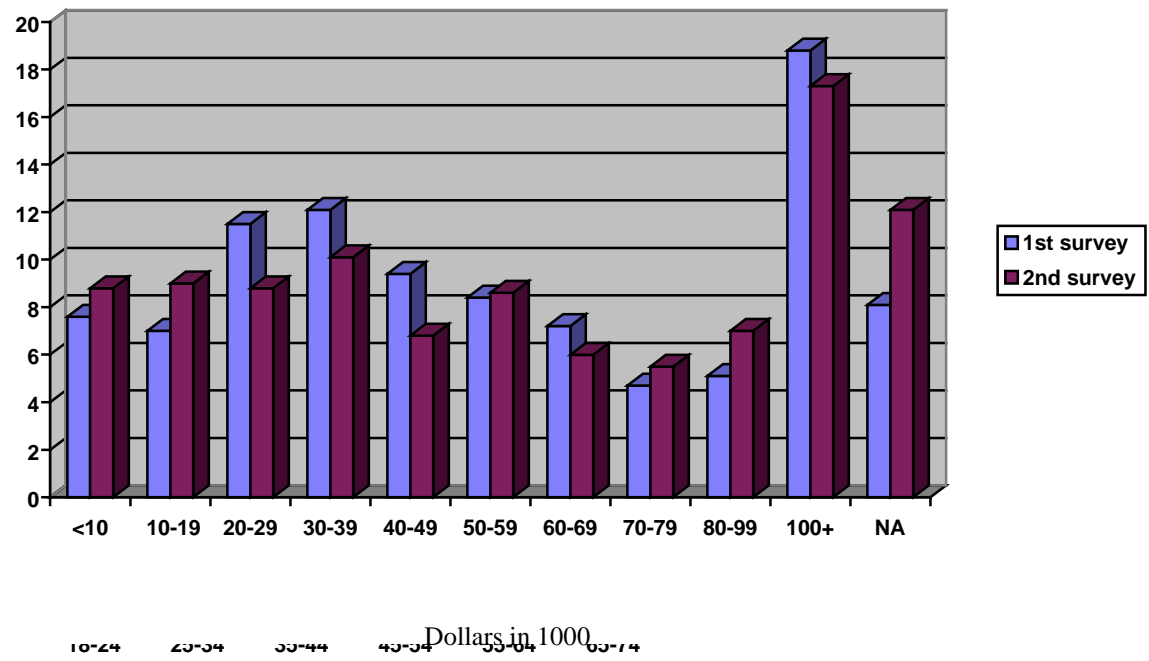


Figure 4. Income Distribution – First and Second Surveys

Percent of respondents



white black Asian hispanic native mixed no

Figure 5. Education – First and Second Surveys

Percent of respondents

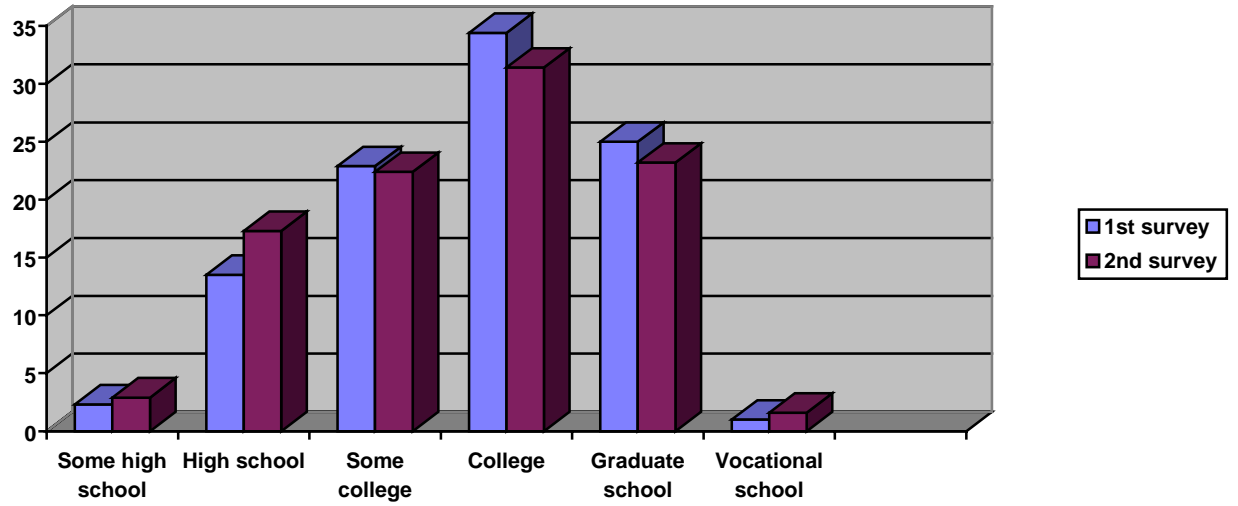
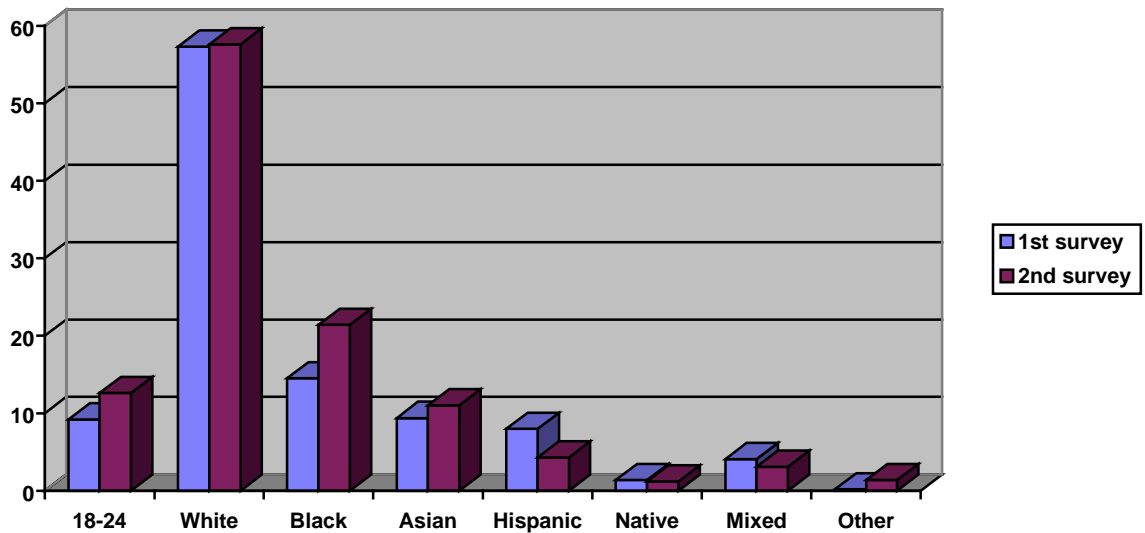


Figure 6. Ethnicity – First and Second Surveys

Percent of respondents



3.2 Call Characteristics

As was done in the first wave survey, the call characteristics were evaluated based on the following factors: 1) calls made for specific trips or for general purposes, 2) calls made pre-trip or *en route*, 3) calls made using a conventional telephone or a cellular phone, and 4) calls made at home, work or other locations.

3.2.1. Reasons for calling TATS

The traffic information callers are concerned in this section. The callers indicated that they inquired about traffic information either to check traffic conditions prior to making a trip (traffic problem unaware group) or to verify the accuracy of traffic congestion information learned from other sources (traffic problem aware group). About four-fifths (82.3% of 158 calls) of the calls fall into the former category, typically commuters checking traffic conditions before leaving home or work; the other calls were for report verification. Of the 28 calls in the latter category, 8 (29%) said they called TATS prior to departure because they had heard about traffic congestion on their planned route from the radio, 5 (18%) heard about congestion by word-of-mouth, and 3 (11%) could not recall how they first heard about traffic congestion. 12 (42.9%) callers said they called TATS via car phone *en route* because they had encountered congestion.

The second survey also indicated that very few calls were rerouted to the transit menu after first obtaining information about traffic problems.

3.2.2. Calling for yourself or for someone else

As indicated in the first survey, most people (89.9%) in the second survey called TravInfo 817-1717 for their own trip. Of the 153 callers in the traffic information caller group, 96.8% of the traffic information group called for their own personal trip. Of the calls, 88.9% (or 136 calls) were related to a specific trip they were about to make and 97.1% (or 132 callers) made

this planned trip. Of the 307 callers in the transit information group, 87.0% called regarding a personal trip. 75.8% (232 callers) asked for specific trip information but only 56.9% (132 callers) made this planned trip. (4 callers of the traffic group and 100 callers of the transit group did not complete their trip.) Of the four callers of the traffic survey group who did not complete the trip, one said the decision was based solely on TravInfo. Of the 100 callers in the transit group that did not complete their trip, 59 said their decision was based solely on TravInfo, one said the decision was based in part on other information sources, and 38 could not recall whether TravInfo was their only source of information.

In the first survey, 94.2% of the traffic information group (173 callers) called for their personal trip. 89% of the calls were related to a specific trip they were about to make and 83.8% (146 participants) made this planned trip. Of the 283 calls in the transit information group, 84.5% called regarding a personal trip. 74.6% (211 callers) asked for specific trip information but only 39.6% (112 callers) made this planned trip. (9 callers of the traffic group and 98 callers of the transit group did not complete their trip.) Of those who did not complete the trip, about half (44.4%) of the traffic survey group and one third (29.4%) of the transit survey group said their decision was based solely on TravInfo.

3.2.3. Trip frequency and call making

The average trip frequency is significantly different among the traffic information group from the transit information caller group. As indicated in the first wave survey, traffic inquiries were associated with frequent trips made and transit inquiries were associated with infrequently made trips ($p < .05$). 85.3% of the traffic information survey group indicated that their call regarded a trip they make at least once a week, while this was true for 40% of the transit survey group. The first survey showed similar results; 80.6% of the traffic information survey group indicated that their call regarded a trip they make at least once a week, while this was true for only 18.7% of the transit survey group ($p < .05$).

3.2.4. Call characteristics and trip purpose

Interestingly, over 80% of traffic inquiries regarded a commute (36.0% to work, 45.6% from work) in the second survey while about 70% inquiries (30.3% to work, 43.2% from work) regarded a commute in the first survey. Only 2.9% related to social or recreational events in the second survey while 13.3% related social or recreational events in the first survey. It appears to be that more people are seeking traffic/transit information for commute trips. Of the call inquiries in the second survey, 2.9% were to personal business and 6.6% were to job-related business. In contrast, transit inquiries regarded a variety of trips; the second survey showed 12.8% to work, 9.0% from work, 8.1% social or recreational, 29.5% personal business, and 8.6% job-related business. In the first survey, 19.9% to work, 11.8% from work, 18.5% social or recreational, 9.5% personal business, and 6.5% job-related business.

3.2.5. Pre-trip and en route calls

The second survey shows that there is a significant change in call distribution from where calls are made. In the first survey, about one third of the traffic calls were from a vehicle en route, one third from the workplace and the remaining one third from home. In the second survey, for traffic inquiries, nearly half of the calls (46.8%) were made from a vehicle *en route*, 36.1% were made from the workplace, and 17.1% were made from home. For transit service inquiries, the breakdown in the second survey was 33.8% workplace and 61.4% home. The breakdown in the first survey was 29.3% workplace and 58.1% home; that is not significantly different from the first survey results in the part of the transit callers.

The second survey showed that 74.4% of traffic information callers and 26.5% of transit information callers usually have a mobile phone while traveling. Of the traffic information callers traveling with mobile phones, 82.8% had used it to call TATS in the past. Of the transit information callers traveling with mobile phones, only 8.1 % had used it to call TATS in the past.

The first survey showed that 58.6% of traffic information callers and 20.8% of transit information callers were cellular subscribers. Of the traffic information callers who had

cellular phones, 79.4% had used it to call TATS in the past. The second survey suggests that there has been an increase in the subscription to cellular phones and also in an increase of cellular calls for the TravInfo TATS service (Table 2).

Table 2. Locations of the Traffic Information Calls

	First survey In %	Second survey In %
Calls made en route via cell phone	31.5	46.8
Calls made from work	38.4	36.1
Calls made from home	30.1	17.1

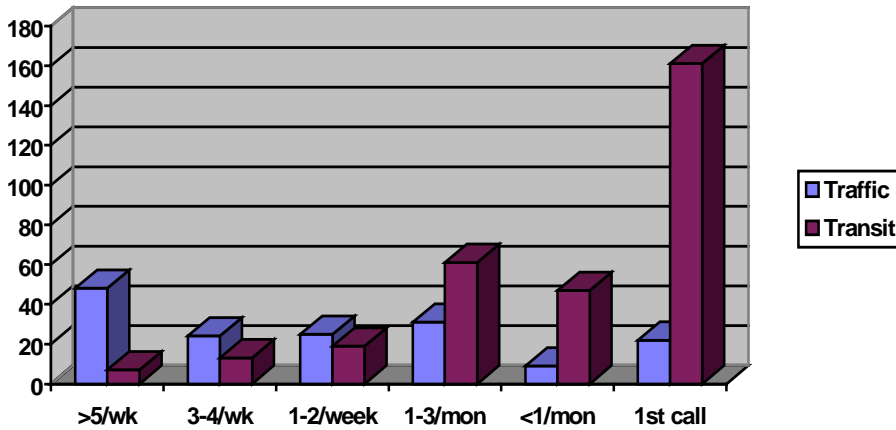
3.2.6 Repeat customers and first-time callers

The objective of the initial TATS caller survey was to establish a baseline caller profile of the TATS service. One of the objectives of the second TATS survey is to assess changes, if any, in the customer profile over the duration of the FOT. Repeat customers should tend to correlate well with caller satisfaction. New customers should tend to correlate well with market penetration of the service. The first TATS survey found that 85.8% of traffic information callers were repeat customers; the second survey found this rate essentially unchanged (86.1%). Likewise, the first survey found 47.9% of the transit information survey group to be first-time callers; the second found 47.7% were new to TravInfo (Figure 7).

Both surveys found that the call characteristics of the traffic information seekers are significantly different from the transit information seekers ($p < .05$). The different call characteristics between the traffic and transit groups are attributed to the fact that callers are looking for different information contents. TravInfo TATS does not provide real-time transit information. Transit users are typically concerned with information about unfamiliar transit routes, and thus have little reason to return to TATS with any frequency other than to inquire about other routes. In contrast, personal vehicle users are concerned with possible traffic congestion on their planned route, information that is constantly variable.

Figure 7. Frequency of calling TravInfo – Second Survey

Number of respondents



3.2.7. *TravInfo TATS compared with radio traffic reports*

Some TATS callers obtain traffic information from sources other than TATS as well. The cross tabulation of the second survey showed that TATS callers do not usually listen to radio traffic reports and vice versa ($p < .05$). 36.5% of those who frequently listen to radio traffic reports (5 or more times a week) call TravInfo five or more times a week. In contrast, 22.6% of those who never listen to radio traffic reports call TravInfo with such frequency. These results are quite similar to the first survey results.

3.3 Travel Behavior

With respect to making an actual trip after obtaining TATS information, the traffic callers' behavior was significantly different from that of the transit callers ($P < .05$). The results of the second survey were similar to that of the first survey. Of the traffic group in the second survey, 97.1% made the trip after calling TATS while 56.2% of the transit group made the related trip. Of the traffic group in the first survey, 94.3% made the trip after calling TATS while 54% of the transit group made the related trip. The second survey suggests that a possible explanation is traffic information is typically acquired for immediate needs (i.e., to avoid congestion on a trip just prior to departure, or to learn more about a traffic problem

encountered *en route*), whereas transit information is typically utilized to guide riders regarding trips in the more distant future.

Of the traffic group, 2.9% and 43.8% of the transit group did not make their related trip after calling TATS. One of the four who did not make the trip in the traffic group and 13% of the 92 transit respondents stated that their decision to cancel the trip was based solely on the information they acquired from TATS.

3.3.1. Changes in travel behavior based on TATS information

Evidenced in the first survey was that travel behavior of the traffic information group was vastly different from the transit information group and thus the survey results of travel behavior of these groups are presented individually. It should be noted that Traffic information seekers received different types of information from the transit information seekers.

Travel behavior of the traffic information survey group

To what extent did traffic information callers change their travel behavior as a result of obtaining TATS reports? Two types of TATS traffic information seekers within the sample: the callers who were already aware of traffic congestion on their planned route (problem-aware group, 28 participants), and the callers who wanted to check traffic conditions before leaving home or work (problem-unaware group, 130 participants).

Of the problem-aware group, as a consequence of information obtained from TravInfo, 41% modified their route, 14% changed their departure time, and none changed their method of travel. Of the problem-unaware group, as a consequence of information obtained from TravInfo, 10% modified their route, 5.5% changed their departure time, and 1.8% changed their method of travel.

In total (problem-aware plus problem-unaware), the overall effects of TATS on travel behavior of the traffic survey group in the second survey appear to be significant. Of those who received TATS information about a traffic problem, 55.7% changed their travel behavior as a consequence of this information: 5.7% cancelled their trip altogether, 11.4% changed the mode of travel, 10% changed departure time, 25.7% changed route, and 2.9% changed both departure time and route. When compared with the first survey, more people appeared to have changed their mode from personal vehicle to public transit. However, the results are inconclusive because of the small sample size of mode shift (Figures 8 and 9).

Figure 8. Travel Behavior of the Traffic Survey Group - First Survey

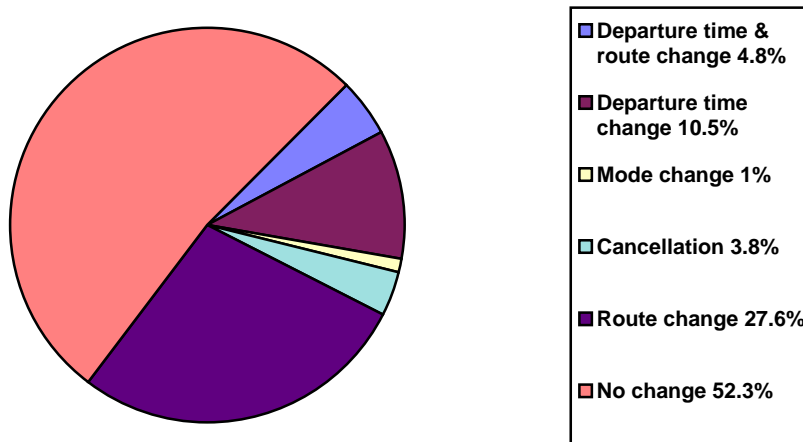
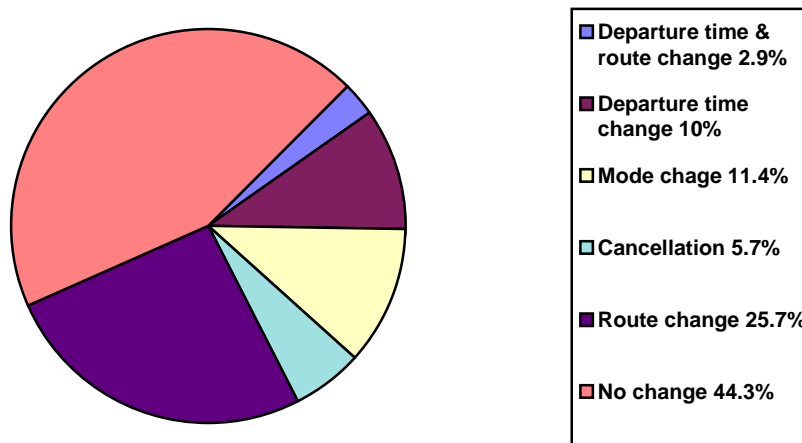


Figure 9. Travel Behavior of the Traffic Survey Group - Second Survey (n=70)



Travel behavior of the transit information survey group

From the first survey it was learned that travel behavior of the transit survey group was somewhat unrelated to traffic problems. Rather, changes in travel behavior of this group were found to be closely associated with expected travel time and accessibility of transit service. In the second survey, 63.6% of the transit caller group who made the trip after calling TATS (56.5% of this survey group) changed their travel behavior. More specific, 9.3% changed both departure time and route, 24.6% changed departure time only, and 9.3% changed route only.

5.1% of those who made a trip switched to a personal vehicle from transit as a result of obtaining transit information. Overall, for both groups, traffic or transit information had an insignificant impact on mode shift. The Chi-square test showed that the traffic survey group's travel behavior in departure time change is significantly different from the transit survey group ($p < .05$). **Table 3** shows travel behavior between the traffic and transit survey groups in the second survey.

Table 3. Changes in Travel Behavior between Traffic and Transit Groups

N = 249	Traffic caller group n=131	Transit caller group n=118
Changed route	18	11
Changed departure time	7	29
Changed both departure time and route	2	11
Changed mode	8	7
Changed both departure time and mode	0	11
	35	69

Note: The number of respondents, n, includes people who heard of no traffic problem from TravInfo TATS.

3.4 Benefits of TATS to Callers

TravInfo callers valued TATS because the service allowed them to save time, find the best route to avoid congestion, and modify their departure time (Table 4). 31% of the respondents who received traffic reports perceived the greatest benefit of TravInfo to be a reduction in travel time, while 43.1% cited TravInfo’s advice on route to be its most valued feature (Table 2). Other significant benefits were that drivers were able to modify their departure time (7.6%) and reduce stress (4.4%). Among transit users, the greatest perceived benefits were reduction in travel time (22.7%), help with route selection (16.5%) and help with deciding whether to take mass transit (8.8%). The benefits perceived by traffic callers and transit callers are significantly different ($p < .05$).

Table 4. The Benefits of TATS to Callers – Second Survey

Benefit Category	Drivers n=158 %	Transit users n=308 %
Saved travel time	31.0	22.7
Reduced stress/anxiety	4.4	2.6
Helped making travel decisions:		
To change departure time	7.6	5.8
To change route	8.9	5.8
To take the best route	34.2	10.7
To take mass transit	0	8.8
To take bicycle	0	0.6
To cancel the trip altogether	1.9	1.6
To telecommute instead	0	0.6
To inform someone for late arrival	1.9	0.6
Other	10.1	15.6
Not Sure / NA	0	24.3

3.5 Service Satisfaction and Suggested Improvements of TATS

The TravInfo TATS service offers a number of features that allow travelers to acquire desired information on traffic conditions, public transit services, and other transportation related information such as Caltrans construction schedules. The interest was to understand the level of satisfaction with the TATS information features. The survey participants were asked to respond to how satisfied are TATS callers with the information provided, compared to radio

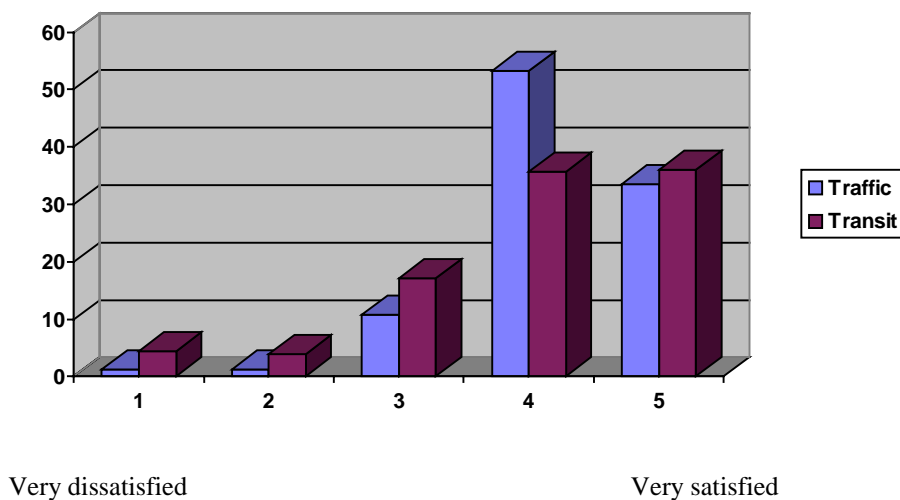
or television traffic reports, and what improvements would they suggest which would lead them to use the service more often?

3.5.1. Satisfaction with the TATS Service

As done in the first survey, the second survey participants were asked to rate their satisfaction with the quality of the TATS service, a rating of 1 being "very dissatisfied" and 5 being "very satisfied." The vast majority of participants said they were satisfied with the service (Figure 10). 86.7% of the traffic information survey group and 71.7% of the transit information survey group gave high marks, either "very satisfied" or "somewhat satisfied."

Figure 10. Customer Satisfaction with TATS in the Second Survey

Percent of participants



To measure the effectiveness of the TravInfo telephone system, the participants were asked to rate the service attributes on a one to five scale. Among the attributes were: 1) *service features* - a) convenience, b) ease of use, c) speed of information retrieval, d) availability; 2) *information quality* - a) accuracy, b) specificity, c) completeness, d) real-time traffic information, e) understandability, f) the number of routes covered, g) coverage of specific information relevant to their trip.

The satisfaction levels of the traffic survey group and the transit survey group in the second survey are shown in Table 3. Although the overall level was relatively high for both the traffic and transit information services, the participants who obtained traffic information were in general more satisfied with the service features than were those who obtained transit information, while those who obtained transit information were more satisfied with the quality of information. This difference may be attributable to the two-sample test for the mean scores also showed that the satisfaction levels of the traffic information callers were significantly different from those of the transit information callers when the responses to individual attributes were examined ($p < .05$). Overall, the second survey group rated the TATS service slightly higher than the first survey group (Table 5).

Table 5. Satisfaction with TATS Attributes

TravInfo TATS attributes	Satisfaction Traffic Group	Level Transit Group
1)Service Features		
a) convenience	4.61	4.16
b) ease of use	4.51	4.09
c) timeliness	4.37	3.68
d) availability	4.45	4.02
subtotal score	4.49	3.99
2) Information Quality		
a) accuracy	4.03	4.53
b) specificity	4.09	4.22
c) completeness	3.90	4.28
d) up-to-the-minute data	3.90	4.68
e) understandability	4.54	4.37
f) number of routes covered	4.61	4.69
g) relevance	4.37	4.37
subtotal score	4.21	4.45
Total score	4.31	4.28

3.5.2. Perception of TATS Compared with Radio Traffic Reports

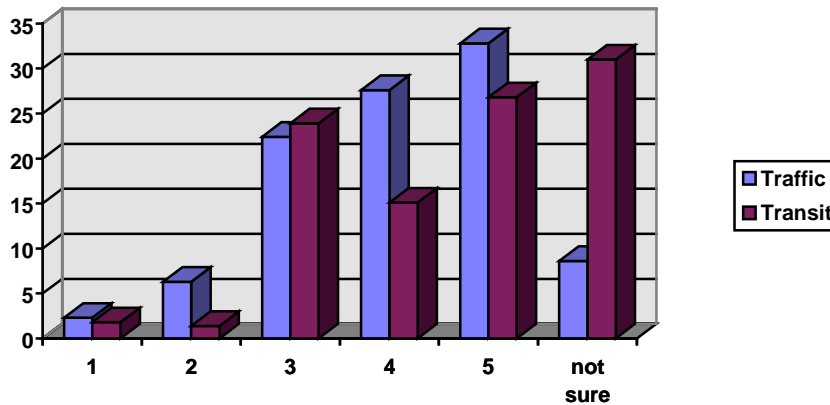
How does the information received from TATS compare to traffic or transit information obtained from radio or television? The first survey showed that a majority of the traffic

survey group perceived TATS to be better than radio or television traffic reporting (Figure 4). Two thirds (60.4%) perceived it to be better than radio or television, 22.4% perceived it to be about the same, 8.6% perceived it to be worse than radio or television and 8.6% were not sure.

In the second survey, about half (47.2%) of the respondents felt that the TATS information was better than radio or television. Similar to the first survey, the transit group's response was significantly different from those of the traffic survey group in the second survey ($p < .05$). Of the transit survey group in the first survey, 41.9% perceived it to be better than radio or television, 23.9% perceived it to be about the same, 3.2% perceived it to be worse and 31% said they were not sure. In the second survey, approximately one third (35.5%) of the transit group perceived to have the TATS information superior to that of the radio or television information and about one third (29.6%) felt the same. The remaining one third of the transit group was not sure (27.4%). However, over two thirds of the traffic group (72.7%) felt that TravInfo TATS information was better than radio or television reports (Figures 11 and 12).

Figure 11. TATS Compared with Radio Traffic Reports – First Survey

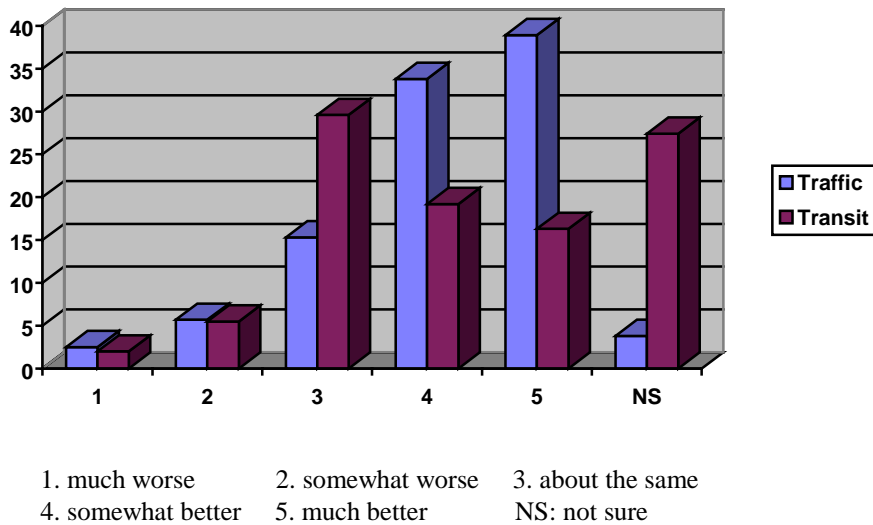
Percent of participants



1. much worse 2. somewhat worse 3. about the same
 4. somewhat better 5. much better NS: not sure

Figure 12. TATS Compared with Radio Traffic Reports – Second Survey

Percent of participants



3.5.3 Personalized Information Service

TravInfo TATS requires a series of menu options for callers to retrieve traffic or transit information. The first survey suggested that one possible improvement was to provide a personalized access service tailored to individual customer needs. Personalized information access would reduce retrieval time and enhance ease of use. TATS callers could input a personal identification number and the system would give them a traffic report on routes they had pre-chosen (e.g., US 101, the Bay Bridge, and Interstate 580). As was done in the first survey, the second survey participants were asked to evaluate this type of service using a scale from 1 to 5 where 1 represents "not at all important" to 5 represents "very important."

As in the case of the first survey, there was a significant difference between the traffic and transit information groups with regard to favoring the personalized traveler information service ($p < .05$). To the traffic group, the personalized service was more important than it was to the transit group (Table 6). This may be due to the fact that the majority of traffic information callers use the TATS service fairly frequently.

Table 6. Importance of the Personalized Information Access System

	Information Content	Not important 1	2	3	4	Very important 5	Not sure
First Survey	Traffic group	21.8%	10.3%	19.0%	20.1%	28.7%	0%
	Transit group	31.3	9.2	14.1	23.0	23.9	8.5
Second Survey	Traffic group	26.1%	12.1%	19.7%	22.3%	19.7%	0%
	Transit group	38.4	7.8	10.7	14.0	27.4	1.6

The cross-tabulation showed that there was no significant difference between the level of satisfaction with TATS and interest in a personalized information service among the traffic survey group and transit survey groups. However, the analysis showed that there was a significant difference between the satisfaction level and interest in the personalized service among all participants ($p < .05$).

3.6 TATS Deployment Issues

During the Field Operational Test, the monthly call volume of the traffic and transit information services has been fairly constant, about 8,000 calls per month for traffic and about 30,000 per month for transit information (Yim and Miller, 2000). Considering the low market penetration of the TATS service, we asked several questions relating to the TATS deployment issues: 1) what menu options have the callers used in the past, 2) from what information sources would they like to obtain traffic information, 3) do they plan to use TATS in the future, 5) would they recommend TATS to other people, 7) which media would be the best place for TATS to advertise, 8) how much would they be willing to pay for the TATS service.

3.6.1. TATS menus used in the past

The TATS service offers a wide range of menu options including current traffic conditions, freeway construction schedules, public transit schedules, parking information, rideshare/carpooling, and San Francisco airport shuttle information. The first survey participants indicated that most of them had tried at least one other option in addition to the

traffic or transit information service. Most repeat callers among drivers said they had tried the traffic information menu before and most repeat callers among transit riders said they had tried the transit information menu before (Table 7).

Table 7. TravInfo Information used in the Past –Second Survey

	Traffic group	Transit group	Chi-square test
Current traffic information	129	21	P<.05
Information on freeway construction	47	13	P<.05
Public transit information and transit schedule	26	124	P<.05
Parking information for park and ride	2	5	
Rideshare/carpooling information	4	19	P<.05
San Francisco airport shuttle information	3	20	P<.05
Bike ride information	1	6	
Para-transit information (for disabled)	2	14	P<.05
More information about TravInfo itself	10	20	

3.6.2. Preferred source of traffic information

When asked what information source (or media) would callers prefer to receive traffic information if all sources offer the same information? Nearly half of the traffic information callers (48.9% in the first survey; 45.9% in the second survey) said they would prefer to receive it from TravInfo TATS, compared to transit information callers (27.1% in the first survey; 20.8% in the second survey; Table 8). The cross-tabulation showed that traffic group’s response was significantly different from that of the transit group (p<.05).

Table 8. Desired Means to Receive Traveler Information

Information Source	First Survey		Second Survey	
	Traffic group n=174	Transit group n=284	Traffic group n=157	Transit group n=304

	in %	in %	in %	in %
TravInfo 817-1717	48.9	27.1	45.9	20.8
Radio	32.2	23.6	26.8	23.8
Television	2.9	20.8	1.3	22.8
Internet/on-line service	4.0	8.8	8.9	15.6
Other telephone information service	4.0	8.5	3.8	6.8
Variable message signs	6.3	4.2	10.2	4.9
Brochure	1.1	3.5	3.2	3.6

3.6.3. Willingness to use TATS

How many people are willing to use TATS in the future? In both surveys, more than 90% of the participants said that they would use it again. In the first survey, 98.3% of traffic group and 88.0% of transit group said they would use it again. Of those 137 first-time transit information callers, 82.4% said they would use it again, 7.4% said they would not, and 10.3% said they were not sure. Of those 24 first-time traffic information callers, 87.5% said they would use it again; 12.5% said they would not. In the second survey group, 99.4% of the traffic group and 86.3% of the transit group planned to use TravInfo in the future (Table 9).

As indicated in the first survey, the most commonly cited reason by the traffic survey group for wanting to use TravInfo in the future was to retrieve up-to-the-minute traffic information on specific routes relevant to their trip (28.2%). For the transit survey group, the most commonly cited reason was the ability to obtain information through one telephone number about many different routes and public transit schedules (34%). The traffic survey group's response was significantly different from the transit survey group ($p < .05$).

Table 9. TravInfo Call Frequency

Last Month, about how often did you call TravInfo or was this your first call to TravInfo?

	First Survey		Second Survey	
	Traffic group	Transit group	Traffic group	Transit group
Five or more times a week	23.1%	1.8%	30.6%	2.3%
Three to four times a week	23.7%	2.8%	15.3%	4.2%
One to two times a week	22.5%	8.1%	14.6%	6.2%
One to three times a month	14.5%	20.4%	19.7%	19.5%
Less than once a month	2.9%	17.3%	5.7%	15.3%
First call	13.3%	47.9%	14.0%	52.4%
Total	173	284	157	307

Although TravInfo TATS was not able to draw sizable numbers of new traffic information customers during the field test, over one third of the traffic information callers were repeat customers in the second survey, an increase of 25% from the first survey. As shown in the first survey, the second survey showed that less than 15% of the traffic information callers were new customers while more than half of transit information callers were first-time callers.

3.6.4. The best media to advertise TATS

The surveys conducted for the TravInfo evaluation project in the past suggested that the low call volume was associated with an inadequate TravInfo marketing campaign. Only ten percent of the public in the Bay Area was aware of TravInfo and very few ever tried it. To help to market the TravInfo project, callers were asked their opinion on the best mass media for TATS to advertise. In both surveys, commercial radio or television was chosen as the best medium to advertise TravInfo (33.5% radio and 25.8% television in the first survey; 28.8% radio and 24.6% television in the second survey).

Callers were also asked whether they have referred anyone to TravInfo TATS? Interestingly, the traffic group’s reaction was quite different from that of the transit group ($p < .05$). The vast majority of the traffic survey group had told other people about TATS while only one third of the transit survey group had done so. This was true in both the first survey and the second survey. Nonetheless, an overwhelming majority of the participants said that they would recommend TravInfo TATS to other people (Table 10).

Table 10. Recommendation of TravInfo TATS to Other People

	First Survey		Second Survey	
	Traffic Group n= 173	Transit Group n=284	Traffic Group n=157	Transit Group n=307
Have you told other people about TravInfo?	75.3%	29.6%	85.4%	29.3%
Would you recommend TravInfo to other people?	95.4%	89.4%	97.5%	89.9%

3.6.5. Willingness to Pay for the TATS Service

For the duration of the FOT, the TravInfo TATS service was offered without any user fee, except the basic cost of telephone service or a small regional telephone toll for calls originating from the outer circumference of the area code jurisdiction. If calls are made using a cellular phone, callers will have to pay for the cost of the cellular user fee, but this of course depends on the type of cellular service to which the customer subscribes. In some cases, subscribers have unlimited usage of cellular service for a monthly subscription fee. A question was how much would Bay Area travelers pay for the TravInfo TATS service if it were only available for a moderate service charge?

Both surveys showed that TravInfo TATS callers were sensitive to the price of the service. If TATS was only available for a per-call service charge, both surveys showed that TATS would lose about one third of its customer base if priced at 25 cents per call, would lose about half if priced at 50 cents per call, and would lose about two thirds if priced at \$1 per call. No significant difference was found between the traffic and transit information survey groups. The surveys indicated that the frequency of use would also be associated with the price of the service. The results of the first and second surveys were remarkably similar. Even among those who were willing to use a fee-based service, on average they said they would use the service only twice a week if priced at 25 cents a call, once a week if priced at 50 cents a call, and less than once a week if priced at \$1 a call.

In terms of the payment plans, two options were asked, a per-call fee or a monthly subscription fee. As shown in the first survey, the majority of the TravInfo callers in the

second survey said they would rather pay for each call (62% each call, 27.8% monthly subscription). In the second survey, it was found that the response of the traffic group was significantly different from that of the transit group ($p < .05$). The greater number of the transit group preferred the payment for each call (66.5% in the first survey; 65.5% in the second survey) than the traffic group (61.5% in the first survey; 54.2% in the second survey).

4. CONCLUSIONS

As part of the TravInfo Evaluation project, two surveys were conducted among the TravInfo 817-1717 callers, the first survey was in April 1977 and the second survey was in April 1999. Both surveys used an identical survey instrument to detect any changes that might have occurred during the TravInfo Field Operational Test with respect to TATS callers' behavior.

The second survey results showed a great deal of similarities with the first survey results. Among them were the callers' satisfaction with the TravInfo TATS service, their willingness to use the service in the future, and the perceived benefits of TravInfo. The second survey respondents rated the level of satisfaction slightly higher than those of the first survey respondents. Even though the traffic survey group had greater satisfaction with the service availability than the quality of information, and transit information callers showed a greater satisfaction with the quality of information than the timeliness of receiving information. Nonetheless, the majority of the participants rated all aspects of the TATS service highly. The second survey however showed that a greater number of calls were made from a vehicle via cellular phones en route (46.8% in the second survey vs 31.5% in the first survey) in the traffic information caller group.

Both the first and the second surveys showed that about half of the TATS traffic information callers changed their travel behavior as a result of obtaining information from TravInfo TATS regarding a traffic problem. However, the effects of the TravInfo TATS service on mode shifts was minor even though three times as many people switched to public transit from personal

vehicle when they learned about the traffic congestion. The second survey also indicated that TravInfo TATS has been effective in providing quality information and in attaining a high level of customer satisfaction although its customer base has not increased significantly. By offering easy access to most current traffic information, TravInfo TATS was able to attract travelers who never or seldom listen to radio traffic reports.

TravInfo TATS provide both transit and traffic information services. However, the market for these information services is significantly different. Transit information callers are interested in the availability of the service and service schedules while traffic information callers are interested in getting traffic conditions to avoid congestion. Therefore, very few calls were rerouted from traffic calls to transit calls or visa versa. However, it was apparent that the transit survey group favored TravInfo TATS having a single phone number for getting all travel related information.

In sum, no significant net change could be detected from the second survey. The results of the second survey were highly similar to that of the first survey except in a couple of cases. One was a significant increase in the calls made from a vehicle en route via cellular phones. The other is the increased level of customer satisfaction with the TravInfo TATS service. One possible explanation of obtaining similar results between the first and the second surveys was that travel behavior might not change noticeably over a two-year span. Assessing the effects of TravInfo TATS over the next five to ten year horizon is highly desirable.

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Appendix A: Total Sample Call Status – Second Survey

LSTAT Call status (sample summary)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 Busy	7	.1	.1	.1
	3 No answer	10	.1	.2	.3
	5 Soft Refusal	8	.1	.1	.4
	6 Terminated	7	.1	.1	.5
	11 Disconnected	46	.7	.8	1.3
	13 COMPLETED	512	7.4	8.5	9.8
	21 Answering Machine	11	.2	.2	10.0
	22 General callback	3	.0	.0	10.0
	23 Residential	1	.0	.0	10.0
	24 Hard refusal	37	.5	.6	10.6
	25 Not avail, no callback	32	.5	.5	11.2
	26 Rejected. by interviewer	1	.0	.0	11.2
	28 Resp. has moved	4	.1	.1	11.2
	29 Language barrier	1	.0	.0	11.3
	30 MaxCalls	67	1.0	1.1	12.4
	31 Terminated as incomplete	6	.1	.1	12.5
	32 Electronic signal	1	.0	.0	12.5
	37 Answering maching - message left	9	.1	.1	12.6
	40 Sample too old	306	4.4	5.1	17.7
	41 Screener App too old	55	.8	.9	18.6
	45 Age disqualification	146	2.1	2.4	21.0
	46 S2 - already participated	359	5.2	5.9	27.0
	47 S3 - no participation	25	.4	.4	27.4
	50 Decline intro	2775	40.1	46.0	73.3
	51 50/50 510 yes mass trans	1565	22.6	25.9	99.3
	56 S6 quota	43	.6	.7	100.0
	61 415 appoint M	1	.0	.0	100.0
66 408 appoint F	1	.0	.0	100.0	
	Total	6039	87.4	100.0	
Missing	System Missing	873	12.6		
	Total	873	12.6		
Total		6912	100.0		

Disposition codes 41 to 66 were used for the intercept screener. Disposition codes 2 through 40 were used for the actual questionnaire.

Appendix B: Dialed sample by Source

LSTAT Call status (sample summary) * SOURCE Area code Crosstabulation

Count

		SOURCE Area code				Total
		1 a. 510	2 b. 415	3 c. 408	4 d. 707	
LSTAT Call status (sample summary)	2 Busy	1	4	1	1	7
	3 No answer	2	5	2	1	10
	5 Soft Refusal	4				4
	6 Terminated	6				6
	11 Disconnected	22	9	6	2	39
	13 COMPLETED	212	207	72	21	512
	21 Answering Machine	2	8		1	11
	22 General callback		1	1	1	3
	23 Residential		1			1
	24 Hard refusal	16	14	7		37
	25 Not avail, no callback	12	18	1	1	32
	26 Rejected. by interviewer	1				1
	28 Resp. has moved	3	1			4
	29 Language barrier			1		1
	30 MaxCalls	40	21	5	1	67
31 Terminated as incomplete	2	2	2		6	
37 Answering machine - message left	2	7			9	
40 Sample too old	167	89	23	6	285	
Total	492	387	121	35	1035	

This sheet contains only disposition codes 2 through 40. Code numbers above 40 were used only to describe the disposition of the interrupt screener.

