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Publication Date

1998-09-01

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

TravInfo Evaluation Traveler Response Element: TravInfo 817-1717 Caller Study Phase 1 Results

**Youngbin Yim, Randolph Hall,
Ronald Koo, Mark A. Miller**

**California PATH Working Paper
UCB-ITS-PWP-98-25**

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.

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Report for RTA 65V389

September 1998

ISSN 1055-1417

Tats1st.fin

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Traveler Response Element:
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Phase 1 Results**

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**March 1998
RTA389**

ACKNOWLEDGMENT

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ABSTRACT

This paper presents the findings of the first survey of TravInfo 817-1717 callers. TravInfo is a federally funded Field Operational Test (FOT) of an open-access traveler information system for the San Francisco Bay Area. In operation since September 1996, TravInfo Traveler Advisory Telephone System (TATS) disseminates real-time traffic information and multi-modal travel options to Bay Area travelers through a landline telephone system. As part of the TravInfo evaluation, an initial survey of TATS callers was administered over a two week period in April 1997. The purpose of the TATS evaluation was to measure the effectiveness of TravInfo in helping callers make informed travel decisions. The majority of the participants were satisfied with the service and thus TATS was able to attract repeat customers. Nearly half of the traffic information survey group modified their trips as a result of obtaining TATS information. Although TATS has a small customer base, it has been effective in providing quality information and in attaining a high level of customer satisfaction. By offering easy access to traveler information via a single telephone number, TATS was able to attract travelers who seldom or never listen to radio traffic reports.

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

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EXECUTIVE SUMMARY

This working paper presents the findings of the first wave survey of TravInfo Traveler Advisory Telephone System (TATS), 817-1717 callers. TravInfo is a Field Operational Test 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, real-time traffic information and multi-modal travel options to Bay Area travelers through a landline telephone system and through the internet offered by Information Service Providers. This study is limited to the evaluation of the TravInfo TATS service.

The purpose of the TravInfo TATS caller survey was to measure the effectiveness of TATS in helping callers make informed travel decisions. The initial survey was conducted in April 1997, seven months after TravInfo began formal operation. The effectiveness of the TravInfo telephone system was measured by the satisfaction of callers with the TATS service, the impact on their travel behavior, and the benefits perceived by them. The second wave of the TATS caller survey will be administered in October 1998, immediately after the completion of the TravInfo Field Operational Test. The effectiveness of TravInfo will also be measured through studies of internet users.

From April 17 to May 2, 1997, incoming calls were randomly intercepted to obtain a representative sample of 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. 511 interviews were completed with an 87.4% response rate of those who initially agreed to participate in the survey. 72.8% of the interceptees declined to participate. The sample 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.

Only the transit and traffic information survey groups were considered in the evaluation because of the low volume of calls inquiring about construction schedules. The sample

represented 0.85% of the transit information calls and 2.52% of traffic information calls in the month of April 1997.

The key findings of the survey are:

- An overwhelming majority of the callers were satisfied with the information they obtained from TATS; both traffic and transit survey groups gave high marks to the service. However, traffic information callers were somewhat more satisfied with the TATS features (i.e., convenience, availability, ease of use) than with the quality of information (i.e., accuracy, relevance, coverage); transit information callers were somewhat more satisfied with the quality of information than the timeliness of receiving information (speed of information retrieval).
- Compared with radio traffic reports, callers found that TATS traffic information was more useful, reliable and accurate (better than radio, 60.4%; about the same, 22.4%; worse than radio, 8.6%). They valued the service because it allowed them to save time (35.6%), choose the best route to avoid congestion (32.2%), and reduce stress (17.8%).
- Of those who inquired about traffic conditions, 94.3% completed their trip after calling TATS; in contrast, of those who inquired about transit service, only 54% completed their trip. A possible explanation is that information on traffic conditions is typically applied to their immediate trip (i.e., to avoid congestion on a planned trip or *en route*), whereas transit information is more likely applied to trips planned sometime in the more distant future.
- Nearly half (46.7%) of those who learned about traffic problems from TATS changed their travel behavior. This percentage is significantly higher than that for the Broad Area survey participants who modified their trips based on radio traffic reports (15.2%). Similar to radio traffic reports, TATS was able to influence changes in route or departure time but had a negligible effect on mode shift. Very few calls were rerouted to the transit menu after information regarding traffic problems was obtained.
- TATS has attracted a segment of the driving population which rarely relies on radio or television traffic reports in making travel decisions. Nearly half of the traffic information callers (48.3%) seldom or never listen to radio traffic reports. Only half of those who regularly listen to traffic reports also call TATS frequently (more than three times a week).

- The majority of the callers (86.2%) who inquired about traffic information were repeat customers, while only half (51.3%) of those who inquired about transit information had previously used the TATS service.
- Most participants (98.3% of the traffic survey group and 88% of the transit group) said they would use TATS in the future because of its easy access to information via a single telephone number (61.6% of the transit group) and its up-to-the-minute traffic information pertaining to their route (71.3%% of the traffic group).
- Approximately one third (30.5%) of the traffic survey group requested the information by cellular phone *en route*. 58.6% of traffic information callers and 20.8% of transit information callers have cellular phones. Nearly 60% of the participants who requested traffic information had called TATS via cellular phone in the past. The implication is that more cellular subscribers have sought traffic information from TATS than from the traffic information services offered by cellular providers (GTE Mobilnet, Cellular One). The Broad Area survey showed that only 6% of cellular subscribers had ever called for the traffic information disseminated by cellular phone providers (Yim, et al, 1995).

The success of TATS depends largely on the quality of service and a strong customer base. The survey suggests that TATS callers are satisfied with the service and that the effect on their travel behavior, especially on departure time and route modification, is fairly significant. Nearly half of the TATS traffic information callers changed their driving behavior compared to those of radio traffic-report listeners. (Yim, et al, 1997). In the context of the Bay Area network performance, TATS does not yet appear to have made a significant impact, mainly because of the relatively small number of calls for traffic information. Since the beginning of its operation in September 1996, TATS traffic information call volume has been consistent, at approximately 8,000 calls per month (Miller and Loukakos, 1997).

Although TATS currently serves only a small segment of Bay Area travelers, it has been effective in providing quality information and in attaining a high level of customer satisfaction. By offering easy access to real-time traffic information, TATS was able to attract travelers who rarely or never listen to radio traffic reports.

Transit information and traffic information services deal with distinctly different markets and thus few people call for both types of information. These groups have different motivations and thus behave differently, especially with respect to trip completion. Nonetheless, the

majority of participants liked easy access to TravInfo for both types of information via a single phone number.

1. INTRODUCTION

TravInfo is 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). Over its two-year lifetime, TravInfo has aimed to develop a multi-modal traveler information system for the San Francisco Bay Area, combining public and private sector resources (Metropolitan Transportation Commission, 1995). TravInfo's objective is 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 intends to make the results of this test accessible nationwide to those who may wish to engage in similar enterprises. To achieve this aim, California PATH was commissioned to perform an independent evaluation of the test (Hall, et al, 1995; Yim, 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 impact on the entire Bay Area traveler population will be assessed in the *Broad Area Study*. The site-specific impacts (i.e., impacts on a selected corridor during incidents) will be assessed in the *Target Study*. The impacts on the travelers with ATIS (Advanced Traveler Information System) devices will be assessed in the *ISP (Information Service Providers) Customer Study*. Finally, the impacts on travelers who directly access TravInfo by telephone will be assessed in the *Traveler Advisory Telephone System (TATS) Caller Study*. This working paper presents the results of the first wave of the TATS caller study.

As part of the TravInfo FOT, a TravInfo Traveler Information Center (TIC) was established in August 1996 in order to disseminate real-time 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 first TATS caller survey was administered in April 1997, eight months after TravInfo began operation. The second TATS caller survey will be conducted in October 1998, immediately after the completion of the TravInfo FOT.

The objectives of the first TATS caller study were:

1. To establish a baseline customer profile of the TATS service for purposes of comparison in the subsequent survey,
2. To measure the effectiveness of TATS in helping callers make informed travel decisions.

More specifically, the effectiveness of TATS was measured by the following attributes:

- 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.

The results of the 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 sample of TATS callers and the Broad Area survey participants. To compare the level of satisfaction with TATS to that of other media, responses of those who inquired about TATS traffic information were compared with responses of those who listened to radio traffic

reports in the Broad Area survey. (Note that the Broad Area survey participants were representative of the Bay Area population.)

The methodology used for the survey is presented in Section 2, the results of the survey in Section 3, and the conclusions in Section 4.

2. METHODOLOGY

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. This quota, however, was not achieved due to concerns by the Management Board that frequent TATS callers would be alienated by the inconvenience of repeat intercepts.

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.

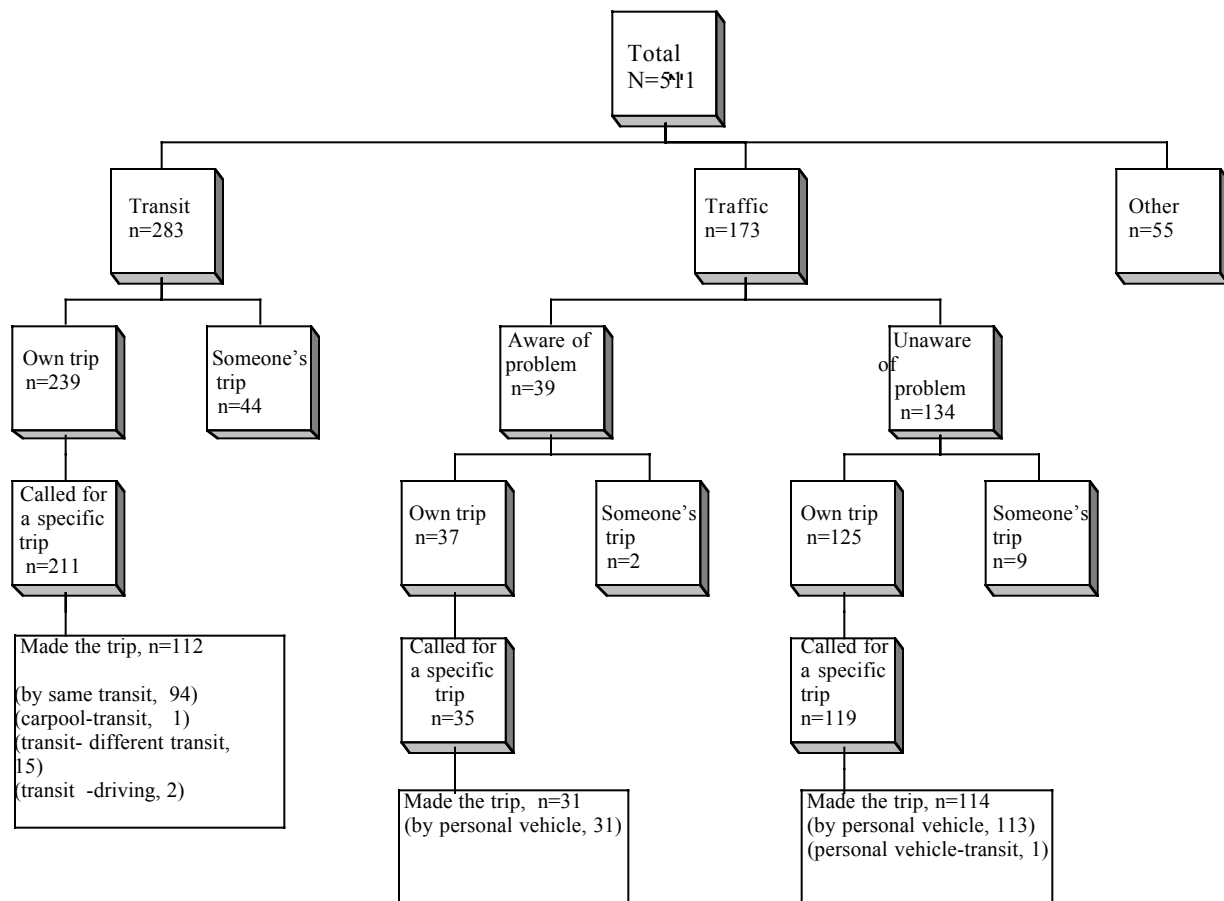
The survey instrument was designed to obtain data regarding satisfaction with the information service, the likelihood that information acquired would affect travel behavior, and the benefits consequent on behavioral changes (such as reduced travel time, ability to avoid traffic problems and ability to 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 87.4% (Appendix A). 72.8% of the intercepts declined to participate in the survey.

The data analysis focused on 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 TATS callers and the Broad Area survey participants. 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 FIRST TATS CALLER SURVEY

The results of the 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 survey responses.

Figure 1. Distributional Profile of Survey Responses



3.1 Demographic Characteristics of the Sample

The 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). The sample represents 0.85% of transit information calls and 2.52% of traffic information calls in April, 1997 (Table 1). 48.5% of the respondents were male and 51.5% were female, well representing the male-to-female ratio in the Bay Area population over 18 years of age.

Table 1. The Sample Compared with TravInfo Calls in April 1997

Area code	Total Calls in April 1997					Sample Calls				
	Transit	%	Traffic	%	Total	<i>Transit</i>	% *	<i>Traffic</i>	% *	<i>Total</i>
510	30,899	90.7	3,177	9.3	34,076	126	65	69	35	195
415	1,496	40.8	2,168	59.2	3,664	109	60	73	40	182
408	689	34.1	1,333	65.9	2,022	38	60	25	40	63
707	122	38.9	192	61.1	314	10	55	8	45	18
Total	33,206	82.9	6,870	17.1	40,076	283	62.1	173	37.9	456

* Estimated participants per area code based on the trip origin and destination table.

TATS is utilized by a disproportionately higher percentage of transit users than personal vehicle users. Control variables like age, income, and ethnicity reveal some differences with the Broad Area survey demographics. The TATS callers were slightly older, with an over representation of the 45-54 age bracket of those who called for traffic information, and in the 55-64 bracket who called for transit information. In general, transit information callers had lower incomes and were more frequently Black/African-American than were the Broad Area survey participants. Traffic information callers had higher incomes and were more frequently white or Asian-American than were the Broad Area survey participants (Appendix B). The TATS participants who inquired about traffic information were generally more educated than the Broad Area survey participants. Three quarters of the TATS participants who inquired

about traffic information were college graduates, while only one third of those Broad Area survey participants who listened to radio traffic reports had completed college.

3.2 Call Characteristics

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 results presented in this section pertain only to the traffic survey group. The participants 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 three-quarters (77.5% of 173 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 latter category, 8.1% said they called TATS prior to departure because they had heard about traffic congestion on their planned route either from radio (5.8%), television (0.6%), or word-of-mouth (1.7%). 5.7% were not sure of the source. 8.7% of the callers said that they called TATS via car phone *en route* because they had encountered congestion.

Very few calls rerouted to the transit menu after first obtaining information about traffic problems.

3.2.2. Calling for yourself or for someone else

Most participants said that the calls were made in regard to their own trip. 94.2% of the traffic information group (173 callers) called regarding a 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. 84.5% of the transit information group (283 participants) called regarding a personal trip. 74.6% (211 callers) asked for a 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

Our hypothesis was that the average trip frequency is significantly different for the traffic information group and the transit information group. Indeed, the results showed that traffic inquiries were closely associated with the trips made frequently, and transit inquiries with trips made infrequently ($P < .05$). 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.

3.2.4. Call characteristics and trip purpose

Relating calls to trip purpose, more than 70% of traffic inquiries regarded a commute (30.3% to work, 43.2% from work). Only 13.3% related social or recreational events. In contrast, transit inquiries regarded a variety of trips including commute (19.9% to work, 11.8% from work), social or recreational (18.5%), personal business (9.5%), and job-related business (6.5%).

3.2.5. Pre-trip and en route calls

The call distribution by location reveals whether calls were made pre-trip or *en route*. Most people called TATS before leaving for work or leaving for home. For traffic inquiries, one third of the calls (30.5%) were made from a vehicle *en route*, 37.4% were made from the workplace, and 29.3% were made from home. For transit service inquiries, the breakdown was 29.3% workplace and 58.1% home.

The 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. This trend is significantly different from the findings of the Broad Area survey conducted in November 1995. The Broad Area survey showed that only 6% of cellular subscribers had ever used car phones to obtain traffic information from their cellular providers. The implication is more cellular subscribers have sought traffic information from TATS than from the traffic information services offered by

cellular providers. Of the transit information callers who had cellular phones, only 15.9% had used it to call TATS in the past.

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 so that changes in the customer profile can be assessed over the duration of the FOT. Repeat customers would tend to correlate well with caller satisfaction. New customers would tend to correlate well with market penetration of the service. 85.8% of the traffic information callers were repeat customers. Compared to the traffic information survey group, nearly half (47.9 %) of the transit information survey group were first-time callers ($P < .05$). This difference is largely due to the fact that the information content of transit users differs significantly from those for personal vehicle users.

The TATS transit menu does not provide real-time transit service. Transit users are typically concerned with information about unfamiliar transit routes while personal vehicle users are concerned with possible traffic congestion on their planned route. A transit information study in the Los Angeles metropolitan area showed that transit inquiries were closely associated with routes unfamiliar to callers (Le Colletor, et al, 1992). Most callers were tourists, occasional transit users, or transit dependent patrons with an unfamiliar destination.

3.2.7. TravInfo TATS compared with radio traffic reports

We were interested in the percentage of TATS callers who obtain traffic information from other sources. A cross-tabulation of the frequency of listening to radio traffic reports with the frequency of calls to TATS indicates that there is a significant difference between those who only make calls and those who also listen to radio traffic reports ($p < .05$). 40.1% of those who never listen to radio traffic reports were first-time TATS callers. 26.4% who frequently listen to radio traffic reports (5 or more times a week) were first-time callers. The survey showed that only 3.3% of those who frequently listen to radio traffic reports also call TATS frequently.

3.3 Travel Behavior

With regard to whether callers actually made the specific trip once they obtained TATS information, the responses between the traffic and transit survey groups were significantly different ($P < .05$). Of the traffic group, 94.3% made the trip after calling TATS while 54% of the transit group made the related trip. A possible explanation is that 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. In fact, the majority of the participants who did not make a trip after obtaining transit information stated that their inquiries regarded future trips.

5.7% of the traffic group and 46% of the transit group did not make their related trip after calling TATS. Nearly half (44.4%) of those who did not make the trip in the traffic group and 8.7% in the transit group stated that their decision to cancel the trip was based solely on the information they acquired from TATS.

The survey also showed that there is a direct association between the type of information requested (traffic or transit) and mode choice. Of the people who requested traffic information, 98% intended a personal vehicle as their mode for the related trip; similarly, of those who requested transit information, 97.4% intended transit.

3.3.1. *Changes in travel behavior based on TATS information*

Travel behavior of traffic group and transit group is presented individually because these groups receive different types of information.

Travel behavior of the traffic information survey group

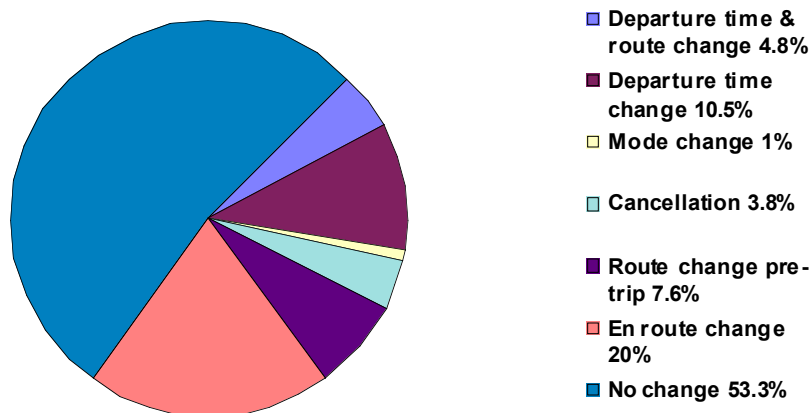
A question was to what extent callers changed their travel behavior as a result of obtaining TATS traffic information. As mentioned earlier, we have identified two types of TATS traffic information seekers within the sample: the callers who were already aware of traffic congestion on their planned route (problem-aware group, 39 participants), and the callers who wanted to check traffic conditions before leaving home or work (problem-unaware group, 134 participants).

Of the problem-aware group, 10.3% did not receive information on traffic congestion from TATS; thus, they kept their original travel plan. Of those who received information on traffic congestion from TATS (35 respondents), 54.3% modified their trips. 2.9% changed both departure time and route, 5.7% changed departure time only, and 42.9% changed route only (22.9% before departure and 20 % after departure). In this problem-aware group, no one shifted mode of travel from personal vehicle to public transit.

Of the problem-unaware group (126 respondents), 55.5 % learned from TATS of a traffic problem on their planned route. Of those, 5.7% changed both their departure time and route, 12.9% changed their departure time, 2% switched their route after departure, and 1.4% switched to public transit from personal vehicle due to information they received from TATS. This showed that 42.9% of those who learned about traffic congestion directly from TATS changed their travel behavior.

In total (problem-aware plus problem-unaware), the overall effects of TATS on travel behavior of the traffic survey group appear to be significant; nearly half (46.7%) of those who received TATS information about a traffic problem changed their travel behavior (Figure 2). More specifically, 4.8% changed both departure time and route, 10.5% changed departure time only, and 27.6% changed route only (7.6% decided to change route prior to departure and 20% changed route while driving). 1% took transit instead of a personal vehicle and 3.8% canceled the trip altogether.

Figure 2. Travel Behavior of the Traffic Survey Group



53.3% of the traffic survey group who received TATS information regarding traffic problems did not change their plans in any way. The most commonly cited reason was that they did not believe a substantial benefit would result (36.2%).

53.3% of the traffic survey group who received TATS information regarding traffic problems did not change their travel plans in any way. The most commonly cited reason was that they did not believe changing travel behavior would result in substantial savings in travel time (36.2%).

Travel behavior of the transit information survey group

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. Of those who made the trip after calling TATS (40% of this survey group), 41.6% changed their travel behavior. More specifically, 12.4% changed both departure time and route, 19.5% changed departure time only, and 9.7% changed route only.

14.3% 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.

3.4 Benefits of TATS to Callers

TravInfo 817-1717 callers value TATS because the service allowed them to save time, find the best route to avoid congestion, and reduce stress. Over 35% of the respondents who received traffic reports perceived that they had reduced their travel time (Table 2). The t-test showed that savings on travel time were perceived to be more significant to the traffic survey group than to the transit survey group ($P < .05$). Other significant benefits were that drivers were able to choose the best route possible to avoid traffic congestion and transit users were able to reach destinations without getting lost.

Table 2. The Benefits of TATS to Callers

Benefit Category	Drivers n=173 %	Transit users n=283 %	t-test Probability
Saved travel time	35.8	21.5	0.999
Reduced stress/anxiety	17.9	15.2	0.545
Helped making travel decisions:			
To change departure time	4.6	2.8	0.664
To take the best route	32.4	14.1	0.999
To take mass transit	1.1	20.8	1
To cancel the trip altogether	0.6	0.7	0.104
To inform someone for late arrival	0.6	0	0.693
To get information for someone else	0	3.5	0.998
No benefit	4.1	4.6	0.202
Not sure/do not know	2.9	19.8	1

When comparing the benefits of the TATS service to the benefits of radio traffic/transit reports, the TATS callers' responses were significantly different from the responses of traffic information listeners ($P < .05$). 37.9% of the TATS traffic survey group perceived a saving of time as a result of calling TATS while 25.9% of the Broad Area survey participants perceived to have saved time as a result of listening to radio traffic reports. No significant difference was found between the TATS service and radio traffic reports with respect to the benefits of reduced stress or the ability to make informed travel decisions. (Table 3).

Table 3. The Benefits of TATS compared with the Benefits of Radio Traffic Reports

Benefit Category	TATS n = 161 in percent	Radio n=310 in percent	t-test
Travel time savings	37.9	25.8	0.991
Reduced stress/anxiety	19.3	20.6	0.283
Informed travel decisions	42.8	53.6	0.411

3.5 Service Satisfaction and Suggested Improvements of TATS

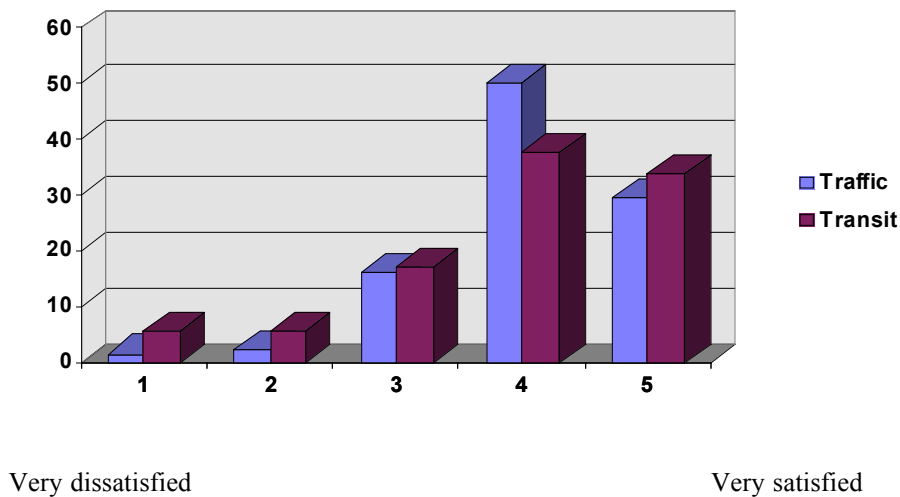
TATS provides a number of features which allow travelers to acquire desired information on traffic conditions, public transit services, and other transportation related information such as Caltrans construction schedules. How satisfied are TATS callers with the information provided, compared to radio 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

The 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 3). 79.8% of the traffic information survey group and 71.4% of the transit information survey group gave high marks, either "very satisfied" or "somewhat satisfied."

Figure 3. Customer Satisfaction with TATS

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 are shown in Table 4. 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 than were those who obtained transit information. 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 ($p < .05$). The traffic information survey group rated the accessibility of the TATS service (such as "convenience, availability, ease of use, timeliness of getting information") higher than the quality of information (such as "accuracy, completeness, real-time information"). The transit group rated the "accuracy and the completeness of the information" of the service higher than its accessibility to service features.

Table 4. Satisfaction with TATS Attributes

TravInfo TATS attributes	Satisfaction Traffic Group	Level Transit Group	Pearson
1) Service Features			
a) convenience	4.44	3.98	.001
b) ease of use	4.31	3.96	.001
c) timeliness	4.28	3.40	.001
d) availability	4.33	3.94	.005
subtotal score	4.34	3.83	
2) Information Quality			
a) accuracy	3.63	4.06	.001
b) specificity	3.84	4.04	.001
c) completeness	3.57	3.96	.001
d) up-to-the-minute data	3.42	4.10	.001
e) understandability	4.39	4.19	.07
f) number of routes covered	4.18	3.88	.05
g) relevance	4.13	4.03	.2
subtotal score	3.88	4.04	
Total score	4.05	3.96	

3.5.2. Perception of TATS Compared with Radio Traffic Reports

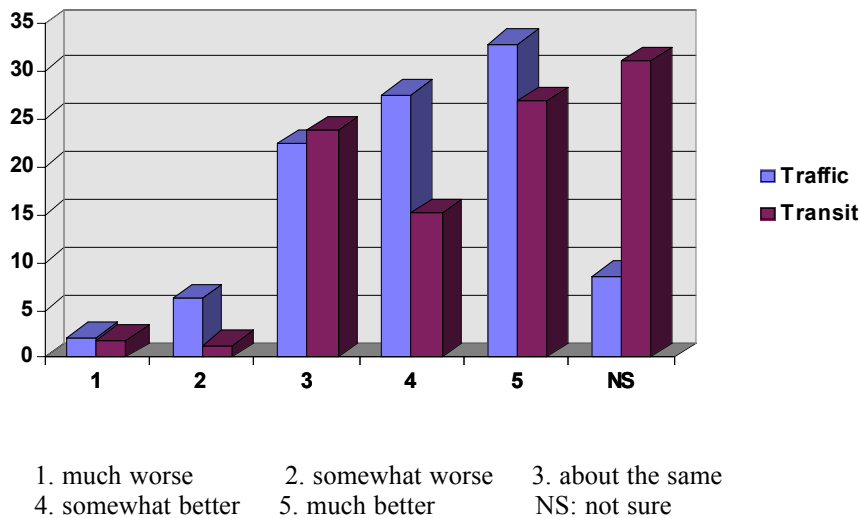
A question was how does the information received from TATS compare to traffic or transit information obtained from radio or television. A majority of the traffic survey group perceived TATS to be better than radio or television traffic reporting (Figure 4). Two thirds (60.4%) perceived it to be better 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.

Responses of the transit survey group were, however, significantly different from those of the traffic survey group ($p < .001$). Of the transit survey group, 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.

The study found that these responses were closely associated with the level of satisfaction with TATS. 61% of the participants who were satisfied with the TATS service stated that TATS is much better or somewhat better than radio or television broadcasts. 18.9% said that the quality of information obtained from TATS and radio or television are about the same. Only 1.9% of those who were dissatisfied with TATS traffic information said TATS was worse than radio reports.

Figure 4. TATS Compared with Radio Traffic Reports

Percent of participants



3.5.3 Personalized Information Service

The current TATS service requires a series of menu options in order for callers to retrieve traffic or transit information. One possible improvement is 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). The 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."

Between the traffic and transit information group, significant differences were found in their responses ($p < .001$). The traffic group perceived the personalized service to be more important than did the transit group (Table 5). This may be due to the fact that the majority of traffic information callers use the TATS service fairly frequently.

Table 5. Importance of the Personalized Information Access System

Information Content	Not important 1	2	3	4	Very important 5	Not sure
Traffic information	21.8%	10.3%	19.0%	20.1%	28.7%	0%
Transit information	31.3	9.2	14.1	23.0	23.9	8.5

When the TATS satisfaction level was cross-tabulated with an interest in a personalized information service, there was no significant difference between the satisfaction level and interest in the personalized service. The people who highly rated the current service also showed a strong interest in using the personalized information service. At the same time, those who were dissatisfied with TATS thought that the personalized information access service was not at all important.

3.6 TATS deployment issues

Over the past eight months of TATS operation, the monthly call volume of the traffic and transit information services has been constant, about 8,000 calls per month for traffic and about 30,000 per month for transit information (Miller and Loukakos, 1997). Recognizing the low market penetration of the TATS service, several questions were asked to understand 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 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. It appears that most participants have tried at least one other option in addition to the traffic or transit information service. Most drivers have tried the transit information menu and most transit riders have tried the traffic information menu. Several of the TATS service features such as Caltrans construction schedules, parking information, and bike routes were seldom used.

3.6.2. Preferred source of traffic information

From 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%) said they would prefer to receive it from TravInfo TATS, compared to 27.1% of transit information callers (Table 6).

Table 6. Desired Means to Receive Traveler Information

Information Source	Traffic information inquirers, n=174 in percent	Transit information inquirers, n=284 in percent
TATS	48.9	27.1
Radio	32.2	23.6
Television	2.9	20.8
Internet/on-line service	4.0	8.8
Other telephone information service	4.0	8.5
Variable message signs	6.3	4.2
Brochure	1.1	3.5

Most survey participants (92.4%) have not used the Internet or any other On-Line Service to retrieve traffic information. Even among those who have used the internet at least once, less than 5% of the TATS callers retrieve information daily through the internet.

3.6.3. Willingness to use TATS

What proportion of the participants are willing to use TATS in the future? More than 90% of the participants said that they will use it again (98.3% of traffic survey group and 88.0% of transit survey group). 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.

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 (41.5%). 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 (50.8%).

Although it is not certain exactly how many first-time callers actually became repeat customers of the traffic information service, it appears that TATS was not able to draw sizable numbers of new traffic information customers. Less than 15% of the traffic information callers were new customers while nearly half of transit information callers were first-time callers. A possible explanation of this apparent trend is that Bay Area auto commuters are generally not aware of the TATS traffic information service.

3.6.4. The Best media to advertise TATS

To increase the TATS customer base, we asked callers their opinion on the best mass media for TATS to advertise. The participants were also asked whether they have referred anyone to TATS and whether they would recommend TATS to other people. The participants indicated that in their opinion the best method to advertise TATS would be through commercial radio (33.5%) or television (25.8%).

Three quarters (75.3%) of the traffic survey group have told other people about TATS while only one third (29.6%) of the transit survey group have done so. Nonetheless, an overwhelming majority of the participants (95.4% traffic, 89.4% transit group) said that they would recommend TATS to other people.

3.6.5. Willingness to Pay for the TATS Service

For the duration of the FOT, the TATS service is to be 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, the cost of TATS is about 50 cents per call, 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. With the shrinking size of public funds for transportation projects, the TravInfo partners are interested in finding ways to make TATS self-sustainable. A key question is to what extent would Bay Area travelers use TATS if it was only available for a moderate service charge?

Like most other products or services in the US consumer market, the survey showed that TATS callers were sensitive to the price of the service. If TATS was only available for a per-call service charge, the survey 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 responses of the traffic and transit information survey groups. Potential frequency of use was also associated with the price of the service. 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.

With regard to payment plans, options are a per-call fee or a monthly subscription fee. The majority of the participants said they would rather pay for each call (61.5% traffic and 66.5% transit information inquirers).

CONCLUSION

TATS is a regional traveler information service available to Bay Area travelers. Its success depends largely on quality of service and a strong customer base. The TATS caller survey showed that the customers were generally satisfied with the service. However, traffic information callers were somewhat more satisfied with the availability of the service than the quality of information, and transit information callers were somewhat more satisfied 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.

According to the survey, nearly half of the TATS traffic information callers changed their travel behavior as a result of obtaining information from TATS. The effects of TATS on travel changes were significantly greater than the effects of radio reports as evaluated in the Broad Area study. The Broad Area study showed about 15% of Bay Area travelers who listen to radio traffic reports change their travel behavior. However, it should be noted that the sample size of the TATS traffic information survey group was fairly small (105 respondents who obtained information on traffic problems) compared to the Broad Area survey sample (230 participants). The relative impact of TATS may be assessed only when the second wave of the TATS caller survey is completed. Although the survey participants were fairly satisfied with the service, TATS does not yet appear to have made a significant impact on the Bay Area transportation network mainly because of the relatively small call volumes of traffic information inquiries.

Although TATS has a small customer base, it has been effective in providing quality information and in attaining a high level of customer satisfaction. By offering easy access to real-time traffic information, TATS was able to attract travelers who never or seldom listen to radio traffic reports.

Transit and traffic callers are distinctly different markets. Few people called for both types of information. The transit and traffic information groups have different motivations and thus behave differently, especially with respect to trip completion. Nonetheless, the majority of participants favored easy access to TravInfo via a single phone number.

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APPENDIX A. Call Record Summary of Telephone Interviews

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

Dialed Sample by Source

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

APPENDIX B. TATS Sample Compared with Broad Area Sample

Table 1. Age comparison

Age	Traffic Information			Transit Information		
	TravInfo n = 173	Broad Area n = 504	t-test	TravInfo n = 283	Broad Area n = 88	t-test
18-24	4.0 %	12.5%	0.99	11.6%	14.8%	0.55
25-34	23.7	29.4	0.86	25.0	29.5	0.58
35-44	30.6	28.0	0.48	25.4	29.5	0.54
45-54	26.6	19.8	0.92	16.2	17.0	0.14
55-64	5.8	7.9	0.67	10.9	6.8	0.79
65+	9.2	2.4	0.99	10.9	2.3	0.99

Table 2. Income comparison

Income	Traffic Information			Transit Information		
	TravInfo n = 134	Broad Area n = 307	t-test	TravInfo n = 117	Broad Area n = 50	t-test
<10k	1.5%	9.4%	0.99	29.2%	12.0%	0.99
10-19k	3.0	3.9	0.37	24.8	12.0	0.96
20-29k	5.2	9.4	0.90	37.6	10.0	0.00
30-39k	11.9	14.3	0.51	33.3	10.0	0.99
40-49k	7.5	14.7	0.98	27.4	24.0	0.35
50-59k	11.9	12.1	0.00	17.9	18.0	0.00
60-69k	7.5	11.1	0.78	17.9	12.0	0.69
70-79k	8.2	16.9	0.99	10.3	8.0	0.37
80-99k	12.7	12.7	0.00	6.8	20.0	0.96
100k+	52.2	32.6	0.99	19.7	18.0	0.20

Table 3. Education comparison

Education	Traffic Information			Transit Information		
	TravInfo n = 172	Broad Area n = 505	t-test	TravInfo n = 196	Broad Area n = 89	t-test
grad/high	0.6%	16.0%	1	14.8%	3.4%	0.99
high grad	2.3	19.8	1	6.1	23.6	0.99
some colleg	17.4	27.3	0.99	14.8	23.6	0.91
colleg grad	44.8	19.4	1	22.4	30.3	0.83
grad school	34.3	11.1	1	23.0	9.0	0.99

vocation	0.6	6.3	0.99	18.9	10.1	0.96
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Table 4. Ethnic group comparison

Ethnicity	Traffic Information			Transit Information		
	TravInfo n = 166	Broad Area n = 480	t-test	TravInfo n = 265	Broad Area n = 76	t-test
White	78.9%	71.5%	0.95	50.9%	63.2%	0.95
Black	2.4	3.8	0.66	22.3	13.2	0.95
Asian	12.7	10.0	0.64	7.2	7.9	0.16
Hispanic	3.6	8.5	0.99	12.5	13.2	0.13
Native	0.6	1.3	0.62	1.5	0.0	0.96
Mixed	1.8	5.0	0.94	5.7	2.6	0.82

Table 5. Employment status comparison

Employment status	Traffic Information			Transit Information		
	TravInfo n = 172	Broad Area n = 505	t-test	TravInfo n = 281	Broad Area n = 87	t-test
full time	80.2%	66.9%	1	51.2%	69.0%	0.99
part time	4.7	14.3	1	11.7	14.9	0.55
self employ	8.7	10.9	0.61	11.7	4.6	0.98
unemploy	1.7	2.4	0.44	12.5	1.1	1
retired	4.7	0.6	0.99	8.2	1.1	1
student	0.0	5.0	1	4.6	9.2	0.83