

## **A Comparison of the Use of Telephone Interview to Telephone Audio CASI in a Customer Satisfaction Survey**

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**KEYWORDS:** Telephone Audio; CASI; Customer Satisfaction Survey

### **Abstract**

For the last six years, the Energy Information Administration (EIA) has conducted an annual satisfaction survey of customers calling the National Energy Information Center (NEIC) during a three-day period. In this survey, volunteer staff conducted interviews and asked callers to rate EIA's products and services on five attributes, such as courtesy and timeliness. This year the satisfaction survey was conducted by volunteer staff interviews, as well as, by Telephone Audio Computer Assisted Self-Administered Interviewing (CASI). The Telephone Audio CASI, TA CASI, used a pre-recorded interview in which respondents pressed the appropriate buttons on their telephones to respond to the same set of questions. It was hoped that this relatively inexpensive use of technology would not only free up staff time in the future, but more importantly, would allow the survey to be conducted over a longer time period, thereby producing larger sample sizes and a greater ability to distinguish statistically significant changes in customer preferences and satisfaction. This paper compares the results of the two modes for conducting this customer satisfaction survey.

### **Background**

The EIA over the last six years has been very active in determining its customers' satisfaction for the products and services provided by EIA. This determination has been made for various customer segments, defined by their chosen information mode--telephone call, hard copy subscription, CD ROM subscription, list serve, or web page. The telephone mode customer survey has been conducted in January or February each year since 1995. During three consecutive days of the survey month, callers to the NEIC are asked at the end of their call requesting information if they would be willing to participate in a customer satisfaction survey. If the customer agrees to participate at that time, the caller is transferred to another line where a volunteer EIA staff member is waiting to conduct the interview. The caller can also choose to be called back later and their name, phone number and call back time requested

is recorded.

The telephone survey is comprised of a core set of customer and usage categorization questions, a set of satisfaction questions, and a set of questions targeted at specific issues for that survey year. The core satisfaction questions ask on a scale of one to five, overall satisfaction with EIA's information products and specific satisfaction with each of five aspects, and overall satisfaction with customer service and specific satisfaction with each of five aspects of that service. In particular, customers are asked to rate timeliness, accuracy, comprehensiveness, relevance, and for customer service rate availability of products, and ease, courtesy, familiarity, understanding, and promptness

Over the six survey years, it has become more difficult to obtain staff volunteers to conduct the interviews. While volunteers have found their participation to be valuable and rewarding, it has become more difficult to find time away from their regular duties. Even more problematic, though, has been the small number of interviews that are conducted during the three survey days. The number of surveys completed has limited the ability to discern statistically significant changes in aggregate satisfaction ratings. For example, one area of interest addressed in the survey is whether customers continue to want a paper copy of EIA's information products. The percentage still wanting paper copies has been: 61%, 59%, 53%, 63%, 56%, and 38%, for 1995 through 2000, respectively. Yet, even the large percent decrease for 1999 to 2000 was not statistically significant with the confidence range for the 1999 estimate being 44-67% and the 2000 estimate being 25-50%. Increasing the number of days that the survey is conducted was not an acceptable solution given the volunteer staff situation. However, the use of Telephone Audio Computer Assisted Self-Administered Interviewing (CASI) was an appealing solution to both problems. This technology employees a pre-recorded interview in which the questions are posed to the respondent who answers the questions using by touch-tone data entry.

### **The 2000 Survey**

For the year 2000, the traditional three-day telephone customer survey using volunteer staff was conducted in February. The following week for the full five days, the telephone audio CASI was conducted on callers to NEIC.

**Table 1. Telephone Audio CASI Eligible Caller Responses**

	Week 1		Week 2		Week 3		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<b>Non-response</b>	159	64.1%	127	71.3%	200	71.9%	486	69.0%
Outright Refusals	111	44.8%	79	44.4%	137	49.3%	327	46.4%
Pin Assigned/Not used	31	12.5%	33	18.5%	59	21.2%	123	17.5%
Transferred/Hang up	9	3.6%	12	6.7%	2	0.7%	23	3.3%
Break-off before Q10	8	3.2%	3	1.7%	2	0.7%	13	1.8%
<b>Completed Interviews</b>	89	35.9%	51	28.7%	78	28.1%	218	31.0%
<b>Total Eligible</b>	248	100.0%	178	100.0%	278	100.0%	704	100.0%

The telephone audio CASI was also repeated during the last week of March and the last week of April. The same questionnaire was used as in the traditional survey. Callers who agreed to participate were transferred immediately to the Telephone Audio CASI center. If a caller preferred, they were provided a toll-free telephone number for the interviewing center so that they could call at their convenience using a Personal Identification Number (PIN) that would allow access to the center. The combined telephone audio and touch-tone data entry provided the additional benefits of standardizing any interviewer effect in administering the survey and providing the respondents full privacy to promote candid responses to the survey questions.

Due to EIA's lack of technological capability in this area, a contractor was selected for the TA CASI center. While the survey questions and instructions for the respondents and the data capture requirements for the contractor were designed by EIA, the contractor provided the professional voice and recorded the questions, modified their existing software to capture the responses, conducted the survey during the three one-week periods, and provided a machine-readable data set of the responses. The contractor also provided the toll-free number to the NEIC rerouted callers who agreed to participate in the survey and be immediately interviewed. They also provided the PIN numbers so that respondents not immediately available could call in later. The PIN numbers were also used to track these call-back callers and determine how many actually participated in the survey.

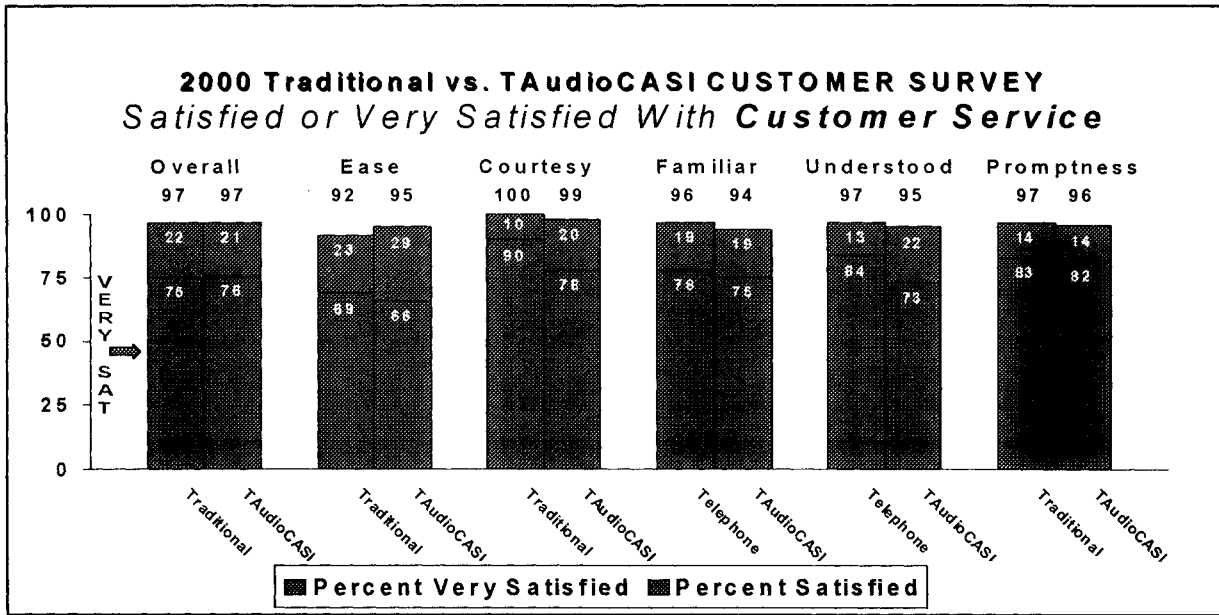
### Response

Based on the traditional survey, it had been projected that approximately 550 callers to NEIC would be interviewed over the three one-week survey periods. This was not the case, however. While 1,272 calls were received for the three survey weeks (477, 408, 387), 362 of those calls (151, 211, 0), 28%, were not recorded, i.e., not even asked if they would participate in the survey. When it was realized prior to week three of the survey

that a significant number of calls were not being recorded, the information specialists were spoken to and it became apparent that a second category, directory calls, was necessary to distinguish those customers who were not actually provided energy information and, therefore, not surveyed. This category, however, did not exist in weeks one and two, so it is not clear how many of the calls categorized as "not recorded" (and not asked to participate) should have been classified as directory calls. In addition, another 134 calls (78, 19, 37) were not asked to participate because they had participated already. As a result, the net number of callers that were eligible for the survey was reduced to 704 (248, 178, 278), only 55% of the original total calls received. A break out of these remaining eligible callers' status is presented in Table 1.

Across weeks, we can see that of the customers eligible to participate, only a combined 31% actually completed the survey. This percent completed decreased across the three weeks from a high in week one of 36% to a low of 28% in week three. The largest component of the three week combined total non-response of 69% was the outright refusals which represented 46% of those eligible to participate. The second largest component, 18% of those eligible to participate, was customers who agreed to participate at a later time but never used the PIN that was assigned to them. In total, 150 PINs were assigned but only 27 (18%) resulted in completed surveys. On the other hand, 84% of immediately transferred callers completed the survey. Of the eligible customers, only 2% initiated the survey but broke off the interview before Question 10. Unfortunately, the projected response of approximately 550 was not achieved because of the substantial number of calls, 28% of calls received, that were classified as not recorded and the significant number of refusals. If not-recorded-calls for weeks one and two were also directory calls, it would be expected in the future that only 66% of callers would be in scope. The outright refusals, 26% of all calls received, but 46% of those that were recorded and were eligible, therefore, severely limited the increase in sample size desired. All said, though, the overall response of

Figure 1. Customer Service Satisfaction



218 (17% of all calls received/ 31% of recorded and eligible callers) was larger than its counterpart, the traditional survey, which for 2000 achieved only 138 completed interviews.

### Customer Satisfaction Results

As previously described, customer satisfaction is measured for both information quality and customer service for five satisfaction aspects. The customers rate these aspects from one to five, where one indicates very dissatisfied and a five indicates very satisfied. Figures 1 and 2 compare the customer service and information quality satisfaction ratings overall and for the individual aspects for the two collection modes. The TA CASI total percent of customers satisfied or very satisfied with customer service is very similar overall and for each of the five satisfaction aspects to the traditional survey results for 2000. The difference in results between the two collection modes appears for customer service in the percent of customers very satisfied with the aspects of courtesy (90% vs. 78%), and understanding (84% vs. 73%) with the traditional survey receiving the higher ratings. In both cases, the percent very satisfied was lower for TA CASI. These may be the result of interviewer effect in the traditional telephone survey or the perception of privacy in the TA CASI survey. These very satisfied percent differences with p-values below .025 were statistically significant at the 95% confidence level. In addition, the difference in the percents of

customers satisfied with the aspect of understanding was also statistically significant at the 95% level.

The TA CASI percent of customers satisfied or very satisfied results for information quality varied more from the traditional survey results for both the overall rating (95% vs. 86%) and for two aspects, availability (80% vs. 88%) and timeliness (76% vs. 82%) for the combined satisfied and very satisfied ratings. These were not, however, statistically significant at the 95% confidence level. Interestingly, even though the TA CASI results were higher for these two aspects, the overall satisfaction rating was lower. Given that the other aspects were only 2-3% lower for the TA CASI than the traditional survey, it appears that respondents cognitively weighted the aspects differently in the TA CASI than the traditional survey to form the overall rating. The respondents to the traditional survey appeared to put more weight on the higher scoring aspect of comprehensiveness and less weight on timeliness. The TA CASI respondents appeared to have done the reverse and placed more weight on timeliness, which was the lowest scoring of the aspects for both modes, and less weight on comprehensiveness. In addition, these differences are magnified when comparing just the percent of customers very satisfied. Timeliness (59% vs. 38%) and relevance (73% vs. 52%) deviated the most. These differences were statistically significant at the 95% confidence level.

To more specifically focus on the question of whether the differences in satisfaction as measured by the TA CASI versus the traditional telephone survey are statistically significant, the actual p-values on the

Figure 2. Information Quality Satisfaction

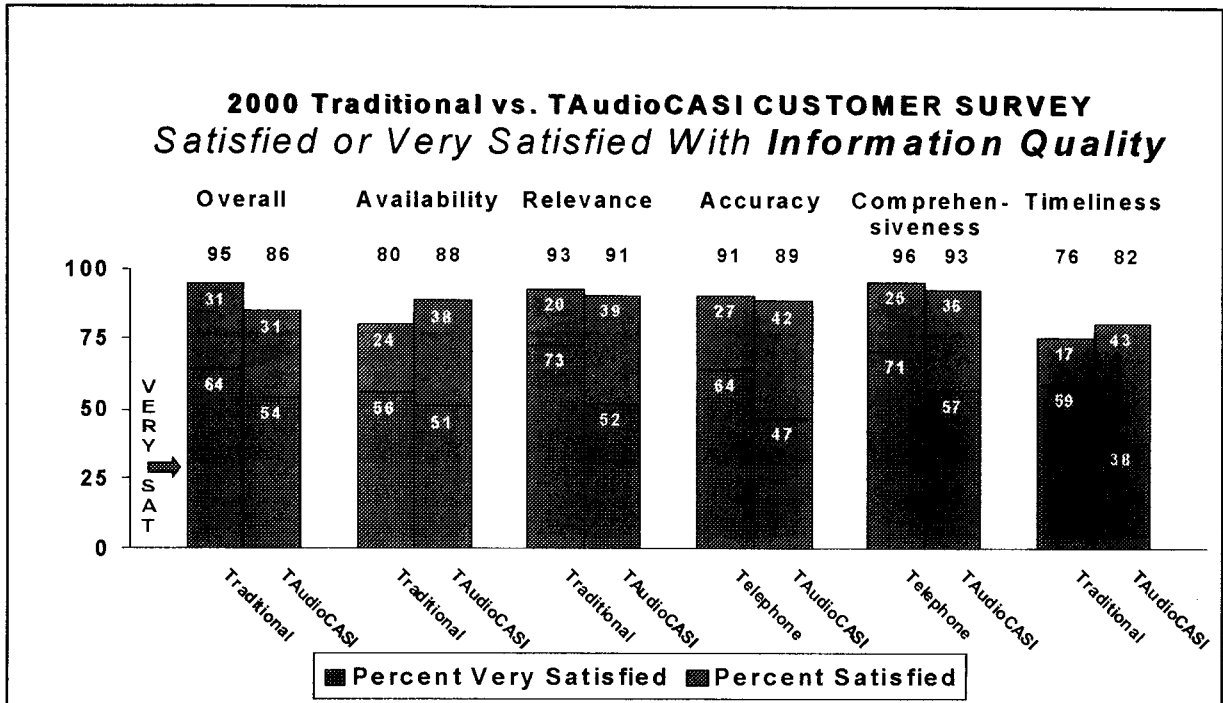


Table 2. P- Values for Differences in Customer Service and Information Quality Satisfaction

Customer Service	Traditional	TA CASI	P	Information Quality	Traditional	TA CASI	P
<b>Overall</b>	97	97	.446	<b>Overall</b>	95	86	.045
Very Satisfied	75	76	.418	Very Satisfied	64	54	.139
Satisfied	22	21	.391	Satisfied	31	31	.481
<b>Ease</b>	92	95	.198	<b>Availability</b>	80	88	.091
Very Satisfied	69	66	.273	Very Satisfied	56	51	.297
Satisfied	23	29	.135	Satisfied	24	38	.054
<b>Courtesy</b>	100	99	.083	<b>Relevance</b>	93	91	.357
Very Satisfied	90	78	.001*	Very Satisfied	73	52	.009*
Satisfied	10	20	.003*	Satisfied	20	39	.011*
<b>Familiarity</b>	96	94	.171	<b>Accuracy</b>	91	89	.343
Very Satisfied	78	75	.281	Very Satisfied	64	47	.035
Satisfied	19	19	.462	Satisfied	27	42	.052
<b>Understanding</b>	97	95	.166	<b>Comprehensiveness</b>	96	93	.183
Very Satisfied	84	73	.008*	Very Satisfied	71	57	.053
Satisfied	13	22	.018*	Satisfied	25	36	.110
<b>Promptness</b>	97	96	.287	<b>Timeliness</b>	76	82	.227
Very Satisfied	83	82	.421	Very Satisfied	59	38	.012*
Satisfied	14	14	.466	Satisfied	17	43	.001*

Note: Totals may not equal sum of components due to independent rounding.

\*Statistically significant at the 95% confidence level.

differences are presented in Table 2 for the satisfaction in customer service and information quality, for the 2000 surveys. Tables 3 and 4 address the question of whether customer satisfaction as measured by TA CASI provides more precision in measuring change from one year to the next than the traditional survey. The change in satisfaction percent satisfied or very satisfied from the 1999 traditional survey and the corresponding p-values are presented in Tables 3 and 4 for customer service and information quality, respectively. These results indicate for customer service differences between the two collection modes in measuring change for the aspect of understanding which showed a statistically significant increase from 1999 to 2000 of 11% in the percent of customers very satisfied and a statistically significant decrease of 10% satisfied under the traditional survey while the TA CASI survey showed virtually no change. For courtesy, the traditional survey showed an increase of 4% in the percent of customers very satisfied, and a decrease of 2% for the percent of customers satisfied while the TA CASI showed the opposite movement, a decrease of 8% in the percent very satisfied with an increase of 8% in the percent satisfied. However, none

of these differences were statistically significant. Decreases in the percent very satisfied and increases in the percent satisfied for the aspect of ease of service are reflected in both collection modes, with TA CASI indicating larger difference from 1999 to 2000. The respective p-values for these changes show only the TA CASI differences in the percent of customer satisfied and very satisfied as statistically significant.

Percent changes are more dramatic for information quality overall and for the individual aspects of information quality than for customer service. These changes from 1999 to 2000 are also larger as measured by the traditional survey compared to the TA CASI survey for both overall satisfaction and for each of the five aspects. For example, the percent very satisfied with relevance of the information was up 30% and the percent satisfied down 28% (both significant) for the traditional survey, but only up 9% for very satisfied and down 9% for satisfied (not significant) for the TA CASI survey. It should also be noted that none of the changes in the satisfaction ratings from the traditional survey in 1999 to the TA CASI in 2000 were statistically significant for eight cells that were significant for the

**Table 3. P-Values for Change in Customer Service Satisfaction Percents from 1999 to 2000  
Traditional versus TA CASI**

	Percent Difference (Traditional 2000 -Traditional 1999)	P	Percent Difference (TA CASI 2000- Traditional 1999)	P
<b>Overall</b>	-2	.128	-2	.099
<b>Very Satisfied</b>	-1	.431	0	.498
<b>Satisfied</b>	-1	.417	-2	.311
<b>Ease</b>	-2	.349	1	.357
<b>Very Satisfied</b>	-8	.091	-11	.023*
<b>Satisfied</b>	6	.110	12	.010*
<b>Courtesy</b>	2	.059	1	.392
<b>Very Satisfied</b>	4	.124	-8	.050
<b>Satisfied</b>	-2	.230	8	.037
<b>Familiarity</b>	2	.181	0	.471
<b>Very Satisfied</b>	11	.031	8	.065
<b>Satisfied</b>	-8	.064	-8	.054
<b>Understanding</b>	1	.389	-1	.268
<b>Very Satisfied</b>	11	.020*	0	.468
<b>Satisfied</b>	-10	.020*	-1	.411
<b>Promptness</b>	1	.361	0	.443
<b>Very Satisfied</b>	4	.226	3	.261
<b>Satisfied</b>	-3	.262	-3	.216

Note: Totals may not equal sum of components due to independent rounding.

\* Statistically significant at the 95% confidence level.

**Table 4. P-Values for Change in Information Quality Satisfaction Percents from 1999 to 2000  
Traditional versus TA CASI**

	Percent Difference (Traditional 2000 -Traditional 1999)	P	Percent Difference (Traditional 2000 - Traditional 1999)	P
<b>Overall</b>	7	.100	-2	.322
<b>Very Satisfied</b>	19	.017*	9	.135
<b>Satisfied</b>	-12	.075	-12	.071
<b>Availability</b>	-11	.034	-3	.301
<b>Very Satisfied</b>	9	.176	4	.334
<b>Satisfied</b>	-20	.011*	-6	.222
<b>Relevance</b>	2	.357	0	.500
<b>Very Satisfied</b>	30	.000*	9	.150
<b>Satisfied</b>	-28	.000*	-9	.148
<b>Accuracy</b>	0	.492	-2	.345
<b>Very Satisfied</b>	17	.043	0	.474
<b>Satisfied</b>	-17	.036	-2	.416
<b>Comprehensiveness</b>	4	.178	1	.491
<b>Very Satisfied</b>	23	.006*	9	.171
<b>Satisfied</b>	-19	.017*	-8	.169
<b>Timeliness</b>	6	.224	12	.056
<b>Very Satisfied</b>	26	.002*	5	.271
<b>Satisfied</b>	-20	.008*	7	.216

Note: Totals may not equal sum of components due to independent rounding.

\*Statistically significant at the 95% confidence level.

traditional survey. Also of note is the fact that a number of customers calling NEIC were first time callers unfamiliar with EIA's information products. As a result, these customers were not asked to rate satisfaction for information quality. Therefore, the sample sizes were 40-60% of the sample sizes for customer service and statistical significance was more difficult to achieve.

In comparing the changes from 1999 to 2000 between the two surveys, two points should be considered. The first is the timing. The 2000 traditional survey was conducted starting the day after a holiday, at the start of sharply rising diesel fuel prices. Prices are normally posted on the web on Monday afternoons with the exception of Monday holidays. In those cases, prices are posted on Tuesday afternoon. These price increases caused an influx of customer calls to the NEIC regarding the posting of these prices to EIA's web page on the first day of the traditional survey. The TA CASI survey was conducted one week later. The second issue is response. The TA CASI with 58% more respondents than the traditional was dominated by first time callers to the NEIC (57%) as compared to the traditional survey (39%). The traditional survey was more evenly distributed across the frequency of use categories. The

percent of respondents who contact NEIC more than once a month was 37% for the traditional but only 17% for the TA CASI survey. These differences in timing and respondent profiles may have had an effect on the satisfaction ratings and the resulting differences from 1999 to 2000. It is not clear from the results that the TA CASI provides more precision in measuring change from year to year. For ratings for customer service, larger changes from the previous survey year for satisfaction (satisfied or very satisfied) reported by TACASI for ease were a factor, as well as the larger response sizes in the determination of significance. Yet, large changes for very satisfied and satisfied for courtesy and familiarity, despite the large response sizes, did not yield significance in the TA CASI case. For information quality, the large increases in percent very satisfied and complementary decreases in percent satisfied measured by the traditional survey, and in many cases significant, were not confirmed by TA CASI. The small sample sizes for information quality by both modes, in addition to small percent changes in the satisfaction ratings, actually caused higher p-values for the TA CASI case.