

Earlier Versus Later Respondent Assessments on Customer Surveys: Is There a Difference?

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Introduction

Federal agencies are increasingly using customer surveys as one measure among several to evaluate their services and products. This is due in part to the more widespread use of performance measures and strategic planning as mechanisms to improve the quality of their products and effectiveness in providing services. Toward that end, the Energy Information Administration (EIA) administered customer surveys on a sample of customers twice in 2004. With the utilization of customer surveys the issue always arises concerning response rates and whether or not the results obtained are truly representative of the results if all of the initially surveyed persons had responded.

While it is impossible or impractical to actually receive a completed survey from every person initially asked to complete a survey, it is widely recognized that a reasonable amount of non-response follow-up be undertaken and/or other measures taken to minimize non-response bias. However, without actually obtaining surveys from all of the respondents, it is never possible to determine (without estimating) the actual non-response bias. In effect, how large is the difference in the opinions of those who responded versus those who did not respond?

While this paper does not presume to provide an answer to that question, the multiple iterations of non-response follow-ups enabled the researchers to study the issue of differences in early versus late responses provided by respondents. It is generally thought that respondents to customer surveys tend toward having more extreme positions than non-respondents, and are thus not representative of the overall customer base. The data obtained through multiple iterations could shed light on the issue of whether or not earlier respondents are more extreme in their opinions than later respondents.

This paper will generally present the findings of the customer surveys and specifically present what was learned concerning the responses of earlier versus later respondents.

Methodology

The first study was conducted in March 2004; the products evaluated were EIA's annual publications, *The Annual Energy Outlook* (AEO) and *The International Energy Outlook* (IEO). The population surveyed was the registrants to the National Energy Modeling System Conference. This is an annual conference in which the latest edition of *The Annual Energy Outlook* is discussed. All of the non-EIA pre-registrants to the conference were surveyed; this amounted to a first mailing of 397². The e-mail system was employed as the vehicle for distribution.

The second study was conducted in September 2004; the product evaluated was the *Short Term Energy Outlook* (STEO). The target population was the non-EIA users of that product. A random sample of 500³ was drawn from approximately 4,000 users registered on the Listserv. Again, e-mail was employed as the vehicle for distribution.

The third and fourth studies were conducted in May-June 2005. The products evaluated again were the AEO and the IEO. However, this time the population surveyed were the non-EIA registrants listed on the EIA Listservs for those respective

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² The number of registrants was 450. However, some registrants did not provide e-mail addresses and some of the e-mail addresses were not usable.

³ The number of usable e-mail addresses was 472.

publications. A random sample of 500 was drawn from the 1,500 users registered on the AEO Listserv⁴ and an additional 500 from the 3,500 users registered on the IEO Listserv⁵.

In all of the studies, a total of four mailings were administered; in the cases of the 2004 AEO/IEO and the STEO studies, this was actually due to a time limitation. In the first case, this time limitation involved the conference for which the respondents were pre-registered actually taking place. It was thought that actual attendance at the conference⁶ by respondents could contaminate the results of the survey. In the second case, this time limitation also involved a conference⁷ that is widely covered in the media, also potentially contaminating the results of the survey.

Results

The total number of respondents for the AEO/IEO 2004 study, the STEO 2004 study, the AEO 2005 study and the IEO 2005 study were 132 (33.2%), 122 (25.9%), 115 (24.0%) and 68 (17.4%), respectively. The cumulative breakdown by mailing is shown in Table 1.

Table 1: Number of Responses and Response Rate Stratified by Mailing Number

Mailing Number	AEO/IEO (2004)	STEO (2004)	AEO (2005)	IEO (2005)
1	42 (10.6%)	36 (7.6%)	54 (11.3%)	25 (6.4%)
2	81 (20.4%)	83 (17.6%)	79 (16.5%)	38 (9.7%)
3	128 (32.2%)	111 (23.6%)	98 (20.4%)	53 (13.6%)
4	132 (33.2%) ⁸	122 (25.9%)	115 (24.0%)	68 (17.4%)

The number of questions employed in evaluating each of the three products varied, but was approximately 14 for each. The evaluation questions employed a five-point Likert scale where 1 was the least favorable assessment and 5 the most favorable assessment for a particular question.

For each study, the survey data were stratified into two strata: respondents to the first mailing and respondents to the second through fourth mailings. It was thought that the highly motivated respondent would quickly respond to the survey without requiring further reminders. These first mailing respondents then became operationally defined as early respondents, while the respondents to the second through fourth mailings became defined as late respondents.

Tables 2-6 show the results obtained for early and late respondents for the AEO 2004, IEO 2004, STEO, AEO 2005, and IEO 2005, respectively.

Table 2: AEO 2004 Rating Results

N = 132

Question	Early Avg (n=42)	Late Avg (n=90)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
1. The AEO is used extensively in my work.	4.00	3.78	18.4%	9.5%	78.9%	63.5%
2. The AEO is clearly written.	4.16	4.04	0%	2.7%	84.2%	78.7%
3. The AEO is relevant.	4.42	4.27	5.3%	1.4%	86.8%	88.7%
5. The AEO incorporates the changing industry structure.	3.33	3.60	12.5%	4.4%	41.7%	53.3%

⁴ The actual number of usable e-mail addresses was 480 for the AEO.

⁵ The actual number of usable e-mail addresses was 391 for the IEO.

⁶ The conference at issue here was the 2004 National Energy Modeling Conference (NEMS)

⁷ The conference at issue here was the 2004 Winter Fuels Conference.

⁸ The last mailing on the AEO/IEO customer evaluation was conducted on a sample of 40 of the remaining non-respondents. This last iteration involved changing the mode to the telephone.

Question	Early Avg (n=42)	Late Avg (n=90)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
6. Appropriate assumptions are used in the AEO.	3.50	3.72	12.5%	4.7%	54.2%	62.8%
The methodology is suitable to the analysis of the following:						
7a. End-use Sectors: Residential	3.71	3.68	14.3%	10.5%	64.3%	68.4%
Commercial	3.86	3.74	7.1%	5.3%	64.3%	68.4%
Industrial	3.53	3.40	20.0%	5.0%	53.3%	45.0%
Transportation	3.33	3.50	26.7%	7.1%	53.3%	57.1%
7b. Supply: Petroleum	3.80	3.72	13.3%	0%	66.7%	66.7%
Natural Gas	3.71	3.45	14.3%	18.2%	50%	54.5%
Coal	4.07	3.72	0%	0%	71.4%	66.7%
Renewables	3.50	3.40	28.6%	13.3%	50.0%	53.3%
Electric Power Generation	3.88	3.75	18.8%	8.3%	75.0%	70.8%
7c. Petroleum Refining	3.45	3.31	18.2%	12.5%	36.4%	43.8%
8. The conclusions reached in the report are supported by the analysis in the AEO.	3.67	4.07	16.7%	0%	66.7%	81.0%
9. The information in the AEO is high quality.	4.10	4.14	9.5%	0%	85.7%	80.9%

Table 3: IEO 2004 Rating Results

N = 36

Question	Early Avg (n=12)	Late Avg (n=24)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
1. The IEO is used extensively in my work.	3.42	3.30	16.7%	17.4%	50%	34.8%
2. The IEO is clearly written.	4.08	3.88	0%	4.2%	83.3%	75%
3. The IEO is relevant.	4.27	4.04	0%	0%	81.8%	84%
5. The IEO incorporates the changing industry structure.	4.00	3.55	0%	9.1%	66.7%	54.5%
6. Appropriate assumptions are used in the IEO.	4.33	3.91	0%	0%	66.7%	81.8%
8. The conclusions reached in the report are supported by the analysis in the IEO.	4.67	3.83	0%	0%	100%	66.7%
9. The information in the IEO is high quality.	4.67	4.00	0%	0%	100%	83.3%

Table 4: STEO 2004 Rating Results

N = 122

Question	Early Avg (n=36)	Late Avg (n=86)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
1. The STEO is used extensively in my work.	3.28	3.48	27.8%	18.1%	47.2%	56.6%
2. The STEO is clearly written.	4.08	4.23	2.8%	2.5%	86.1%	89.9%
3. The STEO is relevant.	4.28	4.37	0%	1.2%	94.4%	92.8%
4. The STEO incorporates the most up-to-date market information	3.88	4.08	2.9%	8.0%	76.5%	84.0%

Question	Early Avg (n=36)	Late Avg (n=86)	Early %1 & 2	Late %1 & 2	Early % 4 & 5	Late % 4 & 5
5. Appropriate data inputs are used for the projections in the STEO	3.67 ⁹	4.01	0%	0%	50.0%	81.2%
6.Appropriate assumptions are used in the STEO.	3.88	3.96	0%	0%	75.0%	82.2%
7. The methodology is suitable to the analysis of the following:						
a. Summer gasoline supply	4.17	3.95	0%	4.8%	83.3%	85.7%
b. Winter heating fuel supply	4.00	4.00	0%	4.8%	80%	81.0%
c. Natural gas demand and supply	3.80	4.30	0%	5.0%	60%	95%
d. Summer and winter electricity market	3.33	4.00	0%	5.6%	33.3%	88.9%
8. The projections provided in the report are in-line with other independent sources.	3.69	3.70	0%	8.6%	61.5%	74.3%
9. The information in the STEO is of high quality.	4.00	4.13	0%	1.3%	82.3%	81.3%
10. It would be useful to add regional data for prices, demand, and supply to STEO.	3.94	4.24	8.8%	6.0%	64.7%	80.7%

Table 5: AEO 2005 Rating Results

N = 115

Question	Early Avg (n=54)	Late Avg (n=61)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
1. The AEO is used extensively in my work.	3.49	3.65	15.1%	8.3%	49.1%	56.7%
2. The AEO is clearly written.	3.89	4.10	3.8%	3.3%	77.4%	86.7%
3. The AEO is relevant.	4.21	4.22	1.9%	3.3%	86.5%	93.3%
4. The AEO shows accurate results.	3.79	3.71	2.1%	3.6%	70.2%	64.3%
7. The AEO incorporates the changing industry structure.	3.35	3.53	12.9%	5.9%	54.8%	55.9%
8.Appropriate assumptions are used in the AEO.	3.69	3.65	7.7%	5.9%	65.4%	64.7%
9. The methodology is suitable to the analysis of the following:						
9a.End-use Sectors: Residential Sector	3.61	3.83	7.1%	0%	64.3%	66.7%
Commercial Sector	3.86	3.84	0%	0%	72.4%	68.0%
Industrial Sector	3.77	3.79	10.0%	3.6%	70.0%	75.0%
Transportation	3.73	3.75	3.3%	3.4%	63.3%	69.0%
9b. Supply: Petroleum	4.03	3.9	3.4%	3.3%	79.3%	73.3%
Natural Gas	3.73	4.07	9.7%	3.3%	67.7%	76.7%
Coal	3.88	4.04	3.7%	0%	74.1%	72.4%

⁹ Significantly lower at the 0.05 significance level.

Question	Early Avg (n=54)	Late Avg (n=61)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
Renewables	3.52	3.76	11.1%	0%	59.3%	63.3%
Electric Power Generation	3.86	3.97	0%	3.3%	75.9%	66.7%
9c. Petroleum Refining	3.83	3.81	4.2%	0%	70.8%	74.1%
10. The conclusions reached in the report are supported by the analysis in the AEO.	3.77	3.94	10.0%	0%	70.0%	75.8%
11. The information in the AEO is high quality.	4.18	4.18	0%	0%	87.9%	89.5%

Table 6: IEO 2005 Rating Results

N = 68

Question	Early Avg (n=25)	Late Avg (n=43)	Early % 1 & 2	Late % 1 & 2	Early % 4 & 5	Late % 4 & 5
1. The IEO is used extensively in my work.	3.65	3.90	8.7%	5.0%	56.5%	80.0%
2. The IEO is clearly written.	4.33	4.10	0%	7.5%	100%	87.5%
3. The IEO is relevant.	4.43	4.34	0%	2.4%	100%	92.7%
4. The IEO shows accurate results.	3.80	3.61	0%	11.1%	63.2%	55.6%
7. The IEO incorporates the changing industry structure.	3.36	3.81	7.1%	4.8%	42.9%	76.2%
8. Appropriate assumptions are used in the IEO.	3.64	3.68	7.1%	4.5%	71.4%	63.6%
9. The conclusions reached in the report are supported by the analysis in the IEO.	4.00	4.04	0%	0%	86.7%	87.0%
10. The information in the IEO is high quality.	4.13	4.13	0%	0%	81.3%	82.6%

A non-parametric analysis was conducted to determine whether significant differences existed in the responses of the early versus late respondents to each question. For the AEO and IEO, no significant differences were found for the responses to any question in either 2004 or 2005. For the STEO, the evaluations showed a generally lower score to the questions for the early respondents, but only the responses to one question showed a significant difference at the 0.05 level. This was Question #5: “Appropriate data inputs are used for the projections in the STEO.” The early respondents scored this significantly lower than the later respondents. Thus, our findings were not definitive on the issue of whether or not early respondents are different from the late respondents in terms of their evaluations of the product.

Tables 2 – 4 also show the percentage of early and late respondents who disagreed¹⁰ with the designated statements in the 4th and 5th columns and who agreed¹¹ with the designated statements in the 6th and 7th columns. These computed data are shown in order to shed light on the issue of whether early respondents are more extreme in their responses than the late respondents (i.e., a higher percentage of 1s and 2s and a higher percentage of 4s and 5s). Again, the data are not conclusive. For the 2004 AEO, for 13 of the 16 evaluation questions, the early respondents disagreed with the statement more frequently (as a percentage) than the late respondents. However, this pattern does not hold for the frequency of respondents agreeing with the

¹⁰ Responded to individual statements with either of the following: 1 = Strongly disagree or 2 = Disagree

¹¹ Responded to individual statements with either of the following: 4 = Agree or 5 = Strongly agree

statements. For the 2004 IEO, 2005 AEO, 2005 IEO and for the STEO data, there appears to be no pattern with respect to either the percentage disagreeing or agreeing with the statements.

Summary and Conclusions

This analysis of the data that was conducted due to the availability of the data from the customer survey research did not provide definitive answers concerning differences in the responses given by early in comparison to late respondents. For the AEO and IEO in 2004 and 2005, there were no significant differences between the average responses given to a statement by early versus late respondents. For the 2004 STEO, on only one question was there a significant difference at the 0.05 level; early respondents scored significantly lower. However, on 11 of 12 questions, the average score given by the early respondents was lower than those given by the late respondents.

When studying the table showing the percentage of responses given that were low, stratified by early and late respondents, no noticeable differences were shown, except where a pattern of lower scores was shown for the 2004 AEO. This indicated that there was a slight tendency on the part of the early respondents to be harsher on the evaluation statement responses than the late respondents.

When studying the percentage of responses that were high, no noticeable differences between early and late respondents were shown. Due to the relatively small numbers of elements in most of the cells, a statistical analysis of cell differences was not conducted for either the lower or higher scores.