

Results from 1993 Company Organization Survey (COS) Computerized Self-Administered Questionnaire (CSAQ) Pilot Test

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Executive Summary

To test claims that selected Company Organization Survey (COS) respondents were interested in reporting electronically via Computerized Self-Administered Questionnaire (CSAQ), EPCD conducted the 1993 COS CSAQ pilot test. The objectives of the test were: (1) to measure the Census Bureau's capability to develop a CSAQ instrument and efficiently handle the diskette mailing/receipt operation, and (2) to determine the survey respondents' ability to use the electronic questionnaire and measure their acceptance of this reporting alternative. The test included mostly large companies interested in CSAQ reporting that had the hardware requirements necessary. A paper questionnaire was also sent to the companies included in this test.

The results of the test indicate that the Census Bureau can develop specifications and direct the development of a CSAQ for the COS survey. This ability probably applies to many other surveys as well. Given similar processing and follow-up operation as offered to the COS test cases, we estimate that companies self-identified to answer via CSAQ have a 77 percent rate of following up with an electronic response. Of the CSAQ respondents who answered the evaluation questionnaire, we found that approximately 85 percent were satisfied with the instrument and most of them would use it in the future. In addition approximately 10 percent of the users said that they might use it again even though they found it somewhat difficult to use. Many had suggestions for improvements that need to be addressed if the CSAQ option is offered again for the COS. From this perspective, the pilot test was a success. We can develop a CSAQ and the selected user community embraces our efforts.

However, this test left many unanswered questions. The test was not designed to test cost or actual processing operations if CSAQ were developed for a larger audience. The Census Bureau needs to clearly define what questions it needs to answer and develop appropriately designed tests that can be clearly monitored with established record keeping to attempt to answer these questions effectively. More importantly, we need to prioritize the importance of those questions. In particular, we need to specify if cost is a determining factor or if the Census Bureau is committed to develop and offer the electronic reporting alternative regardless of cost, especially start-up cost, because we believe that electronic reporting will eventually become the expected form of reporting and because as a statistical organization we want to keep up with, if not advance, this technological revolution.

1. Introduction

A Computerized Self-Administered Questionnaire (CSAQ) is an electronic questionnaire alternative to the paper forms traditionally used to collect data for many Census Bureau Surveys. "For CSAQ, the survey agency sends an executable computerized questionnaire (usually on disk) to the respondent who then installs and runs it on his/her own personal computer (PC) with no interviewer present. The automated questionnaire controls the flow of survey questions, provides on-screen instructions and help, and may include edit checks (and items to reconcile edit failures) performed as the data are entered by the respondent. The system will eventually also be designed to allow the respondent to import

data from a Lotus, D-Base, etc. file. The respondent returns the answered questionnaire by mailing the disk or transmitting the data by modem to the survey agency." (Appel and Nicholls, 1993)

During the fall of 1992, the Economic Census and Surveys Division (ECSD), currently the Economic Planning and Coordination Division (EPCD) conducted the Reporting Medium Preference Survey (RMPS). In this survey, a sample of the Company Organization Survey (COS) respondents was asked to indicate if they were interested in reporting electronically to the Census Bureau in the future and what type of reporting medium they preferred. The choices were: magnetic tape, menu-driven diskette, electronic data interchange (EDI), and other. Overall, 74.51% of the total responses said that they would like to report in some electronic form. Of the respondents who reported that they were interested in reporting electronically, 51.5% indicated they would be willing to report via menu-driven diskette (i.e., CSAQ). The 1993 COS CSAQ test is the first attempt to ascertain the respondents acceptance of the CSAQ alternative.

2. COS Background

The purpose of the COS is to update and maintain the multiunit portion of the Bureau of the Census file of company and establishment records, the Standard Statistical Establishment List (SSEL). The SSEL is a computerized list of all employers and their establishments with one or more employees. For each organizational unit, it contains the latest and most accurate information available on name, address, physical location, Standard Industrial Classification (SIC) code, employment size code, company affiliation, annual payroll, and first quarter employment and payroll.

The COS is an annual mandatory survey. However, in survey years ending in 2 and 7, the survey is integrated into the economic censuses to obtain basic company affiliation information and information on establishments in industries outside the scope of the economic censuses.

For 1993, the COS sample consisted of approximately 40,000 companies which account for over one million establishments. Normally, the COS panel is between 70,000 to 100,000 companies. However, it is usually lower the year after the economic census, because there is less need to include the smaller companies to determine deterioration of the small company multi-unit file.

3. Objectives

The objective of the 1993 COS CSAQ pilot test was twofold: (1) to measure the Census Bureau's capability to create/develop/test a CSAQ instrument and efficiently handle the diskette mailing/receipt operation, and (2) to determine the survey respondents' ability to use the electronic questionnaire and measure their acceptance of this reporting alternative.

4. Test Description

4.1 COS CSAQ Test Sample Selection

The COS CSAQ test sample universe consisted of the companies previously sampled for the 1992 Reporting Medium Preference Survey (RMPS). Of the 81,786 companies in the 1991 COS, 527 were in sample for the COS RMPS. The sample included all COS companies that did not already report electronically and that had *at least 300 establishments*. The sample also included a stratified sample of smaller companies.

The RMPS sample was selected as follows:

<u>Number of Establishments in Company</u>	<u>Number of Companies Selected for RMPS Sample</u>
300 or more	377
200 to 299	50
100 to 199	50
10 to 99	50
<hr/> TOTAL	<hr/> 527

Of the 527 RMPS companies, 402 responded. Of the 402 respondents, 154 companies reported interest in reporting via CSAQ. Companies were pre-screened via telephone by EPCD to determine if they had the hardware configuration necessary to be included in the CSAQ test. Contacted respondents meeting the hardware requirements and that were still interested in reporting via CSAQ for COS were included in the test. **Note that the resulting CSAQ test sample is not random and that it is concentrated mostly on the large companies indicating interest and the ability in CSAQ reporting.** Of the 154 companies, 61 were originally selected to receive a CSAQ. This figure was supplemented by some companies calling and requesting separate CSAQs for their subsidiaries. Additionally some companies which originally received another medium requested a CSAQ. We loosely call each of the CSAQ recipient a company. Actually they might be a company or a subsidiary of a company. Even the original 61 contained a few companies broken into their subsidiaries.

4.2 Development of Requirements for the COS CSAQ Instrument

A team consisting of representatives from EPCD, CASIC, Statistical Research Division, and Systems Support Division determined the general requirements of the COS CSAQ. A sub-team of EPCD COS experts concentrated on screen design, consistency checks, simple edits, help screens, menus, navigational needs, and function keys that specifically apply to the COS. One of the most important requirements for the CSAQ was a "friendly" user interface since the CSAQ was to be used with little or no training. It took approximately 3 months for development of the CSAQ specifications.

4.3 Programming the CSAQ Instrument

Contrary to original plans for the CASIC Office to oversee all procurement requests for these types of tests, the EPCD contracted the Washington Publishing Company to author (i.e., program) the electronic questionnaire. Washington Publishing Company charged a total of \$20,000 for the development of the CSAQ instrument. The CSAQ instrument was programmed in "C" and CLIPPER and was designed to collect the same information as the 1993 COS paper questionnaire. The CSAQ included on-line help, instructions and edits. The EDI software was also included with the CSAQ so the output of the CSAQ data that was to be mailed or transmitted to EPCD was converted into EDI transaction set 152 format. This operation was transparent to the respondent. The CSAQ instrument did not include the capabilities for importing data from predefined company files into the CSAQ.

We originally planned to include an evaluation questionnaire as part of the CSAQ instrument. However, due to time constraints a paper evaluation form was mailed instead. The evaluation questionnaire was included in the original mailout package.

There were additional plans to incorporate into the CSAQ an assessment portion to keep track of the time spent by the respondent using the CSAQ, how often reference screens, help screens and function keys were used, how often previously entered data was changed, and tallies of error and verification messages. These capabilities were also not developed in time for the pilot test.

EPCD staff developed additional software and utilities to load historic data for each company to the CSAQ diskette, set flags in the COS database for the CSAQ companies, and handle the returned data by performing a computerized pre-edit to the reported data before merging the returned CSAQ data into the paper-based COS data entry processing flow.

4.4 Testing the CSAQ

Census Bureau employees, acting as proxy for respondents, tested the CSAQ at several points during development. Staff from the Economic Statistical Methods and Programming Division (ESMPD) and the Center for Survey Methods Research (CSMR) participated extensively in the testing phase of the operation. Many suggested changes were incorporated in the final instrument, however, there were others that were not included. Time and vendor constraints were the main reasons for EPCD's decisions to not incorporate some of the suggestions. In summary, the instrument mailed was functional, but could have been further improved. In addition, ESMPD noted that it would have been helpful for planning future CSAQ tests to have had a question on the paper and CSAQ COS questionnaire to determine potential CSAQ respondents. However, it was too late to do that for the 1993 COS.

The test plans originally included obtaining respondent feedback before mailout by sending a demo of the CSAQ to a small voluntary sample of the companies (2 - 3) to obtain their reactions and suggestions concerning the helpfulness, design, clarity, and general appeal of the COS CSAQ. However, this step was also skipped mainly due to timing issues. By the time the CSAQ instrument was ready to be tested by respondents, it was already time to mail the regular COS paper questionnaire. We attempted to keep the two mailouts concurrent.

4.5 Diskette Preparation and Mailout for 1993 COS CSAQ

The name and address information of the establishments in the CSAQ test sample was extracted from the COS database and incorporated in the CSAQ diskette. This was a clerical operation that consisted of someone sitting at a computer and running this operation for each company (or diskette) mailed. EPCD processed a maximum of 50 CSAQs in a week; however at the same time they were also processing new magnetic tape and EDI instruments.

A code was entered in the COS database to indicate which companies were selected to receive a CSAQ. This information will be used when selecting CSAQ samples for other surveys, such as the Annual Survey of Manufactures, as well as future COS CSAQ processing. The initial intention of this code was to prevent the mailout of the paper questionnaire for companies selected to receive the CSAQ. However, during the telephone screener (see Section 4.1), a number of companies requested a paper form be sent as well as the CSAQ. Because of these requests the EPCD staff decided to mail both the paper and CSAQ questionnaires to each test company. As we will see in the results, this caused problems, primarily because the paper and CSAQ contact names were sometimes different.

A letter, user's guide, evaluation questionnaire and diskette return mailer were included in the same package as the CSAQ diskette. These packages were prepared by EPCD, including the quality control operation to assure the confidentiality of the respondents' data. The data on the diskette, the diskette label, and the diskette mailer label were 100

percent verified to ensure they all matched. The diskettes were checked for viruses before mailout. The CSAQ mailout started at the same time as the 1993 COS paper questionnaire's. The suggested due date was 30 days after receipt of the instrument, although it was known that time extensions were available for the larger companies.

As intended, 61 companies were mailed a COS CSAQ during the original mailout period (mid March to April 1). However, when one of the CSAQ recipients attempted to transmit the company's CSAQ report, they were unable to do so. After getting assistance from the EPCD staff and Washington Publishing Company (WPC), the problem was identified. The WPC was unaware the field for "contact person name" would be originally filled with the contact person provided by EPCD and therefore there was only space on the file for one contact name. If the company decided to change the contact name, neither the transmission function nor the downloading of the CSAQ was operational. This problem resulted in a correction or upgrade to the CSAQ instrument that was mailed to the 61 original companies. Another minor problem was also corrected at the time of the upgrade. Only the CSAQ software update was mailed the second time. There was no need to re-mail the companies' establishment information again.

In addition to the re-mail, some companies wanted separate CSAQs to distribute to their subsidiaries which had independent payroll systems. EPCD met these requests.

Similarly, some companies which received a medium (either paper or magnetic tape), also requested a CSAQ for some portion of their company. Their requests were met. The figures below reflect all these changes. It is not noted which companies switched from one medium to another. One new magnetic tape company requested a CSAQ the week of 9/26, three days before close-out. The CSAQ was sent on 9/27. We called this company out-of-scope for the CSAQ pilot test.

Several staff members in EPCD were working on the COS Electronic reporting pilot test. There were two independent records kept of mailout and mailback. These two sets of records differed slightly. The task of keeping track of mailout and mailback was difficult because some companies switched media during the pilot test. We determined that neither report was error free. We reconciled the differences in the records as much as possible.

The mailout took place as follows:

<u>Week of (1994)</u>	<u>Number of CSAQs Mailed</u>	
3/10	3	
3/18	50	
3/25	8	
4/7	61	(update REMAIL)
4/15	39	(33 were all one parent company with 32 subsidiaries)
4/20	3	
4/29	2	
5/13	1	
5/20	1	
5/27	2	
6/10	1	
6/17	2	
7/1	1	
7/25	1	
Total	114	

There was another problem encountered during the CSAQ mailout. Because the company data on the diskettes was not encrypted, EPCD decided to mail all CSAQ packages using Federal Express to ensure the packages went to the intended address. The CSAQ packages were prepared in EPCD and sent to the Census mail room. It was expected that the package would be put "as is" in the Federal Express envelope. However, the mail room staff decided to open the mailout envelopes and put its contents into the Federal Express envelope. This resulted in two companies diskettes being interchanged. One respondent called EPCD and informed them of the mixup. EPCD contacted the second company who also returned the mailing package intact. After this, EPCD was allowed to put the CSAQ packages into the Federal Express envelopes before sending them to the Census mail room. There were no more mailout problems detected after this change.

4.6 Data Collection

After completion of the CSAQ, the respondent had the option to return the diskette via mail or transmit the data via modem. All CSAQ diskettes contained appropriate communications software (PROCOMM) to allow the respondents to transmit the COS CSAQ data to a stand alone personal computer in EPCD. A CSAQ screen was designed to give the respondent the option of modem transmission. The CSAQ did not provide encryption capabilities. Only four companies used the modem transmission option. Upon receipt of the CSAQ data (both diskette and modem transmissions), there was a virus check and then EPCD staff printed a small portion of the data and later conducted a computerized pre-edit. After this, the data was sent to the ESMPD programmers to be

merged with the appropriate COS files. It took four weeks to process and incorporate all the data from CSAQ, new magnetic tape, and EDI reporters, with the regular COS files. The data were used in production. There were over 200 electronic filers. Processing of the CSAQ data then followed the normal COS data processing.

The receipt of the CSAQs was as follows¹:

<u>Week of (1994)</u>	<u>Number of CSAQs Received</u>
3/31	1 (received before remail, but data were correct)
4/22	1
4/29	2
5/6	5
5/13	3
5/20	2
5/27	4
6/3	5
6/10	3
6/17	3
7/8	27
7/15	5
7/22	6
7/29	3
8/5	5
8/12	1
8/19	1
9/2	1
9/9	2
9/16	4
9/16--29	2
Sub-total	86
Late Receipts	2
Paper Respondents	24
Other media (spreadsheet)	2
Total	114

Help desk - An EPCD number was provided to the CSAQ respondents to answer questions. This help desk handled and maintained records of respondent problems. A count of the problems encountered will be provided in the results section.

¹ Note the disclaimer in Section 4.5 concerning the record keeping.

Telephone follow-up--The follow-up operation was conducted in early July. This was approximately three months after the remail of the CSAQ. One person full-time and two persons part-time conducted the follow-up calls. A total of 21 telephone calls were conducted. Given that large companies were selected to participate in the CSAQ test, it was suspected that the 30 day due date would not be met by many of the companies. At the time of the follow-up calls most of the companies simply hadn't gotten around to filling out the CSAQ yet. At this time a 30 day time extension was given. Companies were informed that the CSAQ should be completed and returned by August 1 or 15 at the latest. A few companies still had not completed the CSAQ by the August due date. They were called throughout August and given a close-out date of September 16. Even so, two companies filed late CSAQs. No other issues were encountered during these telephone follow-ups.

Only 25 percent of the CSAQ mailouts had responded by June 17. This rate shouldn't be compared with the response rate for COS companies which only received the paper questionnaire. CSAQ companies were in general large companies and the follow-up was different. The COS paper follow-up included sending a maximum of four paper follow-ups: three of which were reminder cards, one at 30 days, 60 days, and 90 days. A new questionnaire was sent on the fourth follow-up, after which large delinquent companies were telephoned.

Mail-- EPCD noted that some CSAQs were post-marked well before their receipt at headquarters. In one case the CSAQ was post-marked 10 days prior to EPCD receiving it. The diskettes were shipped back in first-class mail. Two diskettes were misrouted once inside the Census Bureau. One diskette was delivered to the Director's Office, another to Services Division (then called Business Division). Perhaps because the diskettes were shipped back to headquarters and the mail room staff may not be accustomed to handling data, the mixups occurred.

4.7 Constraints

The COS paper questionnaire is usually mailed to the headquarters of the company; some companies however require that a COS form be sent to a number of company subsidiaries. The same option was offered with the CSAQ alternative. In total, there were 61 original companies included in the test. A few of these were really subsidiaries. Seven companies requested more than one CSAQ. One of the seven companies requested 33 separate CSAQs. The large return the week of 7/8 was due to this company returning most of the 33 CSAQs.

There was one extra constraint which made the CSAQ somewhat different from the paper questionnaire. The COS respondents are usually instructed not to report employment and payroll information for their establishments that are included in the Annual Survey of Manufactures (ASM). In the paper questionnaire all ASM establishments are listed first with instructions to not report on the COS form. On the CSAQ, however, the ASM

establishments were not listed at all, that is, they were excluded from the list of company establishments. Even so, the respondents were requested to exclude ASM establishments from their CSAQ responses and instead complete the enclosed paper MA-1000 form for those plants.

5. Pilot Test Results

5.1 CSAQ instrument creation -

(a) How many hours did it take to create originally?

Washington Publishing Company started work on August 1, 1993 and provided the final instrument in the beginning of March 1994. This is a total of 7 months.

The development of specifications took approximately 4 months, starting in April 1993 and ending July 30, 1993.

(b) What was the level of the staff?

There were many people involved in the different aspects of the project. The ASM/COS CSAQ Team consisted of approximately 15 people that reviewed what EPCD staff provided. From EPCD one professional person was in charge of developing specifications. One other professional person was in charge of developing communications capabilities and associated programming. One professional person reviewed material part-time.

(c) What software was used?

The vendor, Washington Publishing Company (WPC) used C and Clipper to develop the COS CSAQ based on an approximately 100 page specification provided by the Census Bureau. The functionality of the instrument had to be custom coded since unlike CASES, Clipper and C do not contain built-in functionality for computer assisted interviewing. Unless, WPC creates a generic shell that can be used for all CSAQs and a tool kit for incorporating new survey items screens into this generic shell, we will either need to pay WPC to custom code future CSAQs or perform the custom coding in-house.

(d) How many hours did it take to test in-house?

No good records of testing hours were maintained. There were 15 versions of the instrument. The first version was received on September 24, and the second was received on October 12. Although there is approximately a three week period during the two versions, the time between revisions decreased as the deadline drew closer. The final version was received in early March 1994.

Everyone on the ASM/COS CSAQ Team was asked to test the instrument starting in mid December 1993. Two mathematical statisticians from ESMPD and one staff from CSMR reviewed the questionnaire for user friendliness and comparability to the COS paper questionnaire.

- (e) How many hours did it take to revise after in-house testing?

No good records were maintained of this. See (d) above.

- (f) How much did the Census Bureau pay Washington Publishing Company to develop the 1993 COS CSAQ?

\$20,000

5.2 Diskette processing -

- (a) How many companies selected CSAQ?

A total of 88 of the 114 companies or subsidiaries mailed a CSAQ (77 percent), responded using the that medium. Four of the 88 companies used modem transmissions. The other companies responded either on paper or sent a spreadsheet printout.

- (b) How many diskettes were mailed, if more than one diskette per company?

114 diskettes were mailed. Sometimes duplicate diskettes were mailed to companies to distribute to their subsidiaries. Refer to Section 4.7 for details.

- (c) How long did it take to prepare the diskettes?

A maximum of 50 CSAQ diskettes were mailed during one week. Other electronic media were prepared during that time as well by the EPCD staff.

- (d) How long did it take to prepare the diskette mail packages?

No records maintained.

- (e) How long did it take to verify the diskette mail packages?

No records maintained.

- (f) What percentage of diskette mail packages were prepared incorrectly?

None

- (g) Were there any disclosure complaints from respondents after mail out?

There were two companies where the CSAQ diskettes were interchanged by the Census mail room staff. The diskettes included the list of establishments for each company. However, EPCD staff say that the company contacts did not seem upset because of the mixup. Each returned the entire mail package to EPCD. Even so, these occurrences need to be avoided in the future,

- (h) What percentage of diskettes were damaged in the mail?

None

- (i) Other

As noted earlier, one problem was detected when respondent could not complete the questionnaire and resulted in a need to update the CSAQ software and re-mail to the respondents.

There were no viruses detected.

We assume there were no requests for missing inserts. There were requests for additional materials. The reason for these requests was not documented.

5.3 Electronic assessment- Due to lack of time, this was not accomplished. Therefore we are unable to analyze time spent using the instrument and usage of reference screens, help screens and data changes and error messages.

5.4 Help desk - An EPCD number was provided to the CSAQ respondents to answer questions. This help desk handled and maintain records of respondent problems. A phone sheet was completed for each call received. There were a total of 113 calls received from 44 companies. The average number of help calls per these 44 companies was 2.57. Sometimes more than one problem was discussed during the phone call. The following counts of phone calls reflect the most prominent problem identified from each respondent phone call.

<u>Type of Problem:</u>	<u>Count</u>
nonspecific/general information	11
diskette damaged in the mail	0
misrouted diskette	1

question on data	19
computer problems with installing, memory, or deinstalling CSAQ data	17
requests for split mailings	7
request for time extension	28
problems with the CSAQ instrument	8
transmitting data	10
request for different reporting medium	12
CSAQ to Paper (6)	
Magnetic tape to CSAQ (5)	
Paper to CSAQ (1)	

5.5 Processing problems- No processing problems were encountered for the CSAQ cases. Examples of a processing problem could have been: returned data not assimilated into database at all or correctly or failed pre-screen edit. Refer to EPCD's draft memorandum, titled, "Preliminary Results of the 1993 Company Organization Survey's Electronic Reporting Experience" for further detail.

5.6 Analysis of the COS CSAQ Evaluation Questionnaires -

All 114 COS CSAQ recipients were asked to complete a paper evaluation of the CSAQ instrument. In this section we provide general response results to the evaluation form. Results from the evaluation form include topics of satisfaction, use of help features and comments for improvements.

5.6.1. General Response Results

Table 1 provides the response distribution of this COS CSAQ experiment and evaluation form. There were 56 paper evaluation forms completed. One of the evaluation forms was completed by respondents who used the paper version of the COS questionnaire. Since some companies requested separate CSAQs for their various subsidiary companies, each of these COS CSAQs is treated as an individual response.

Table 1: General Results from CSAQ Evaluation

Who Responded to the Evaluation	Total	Percent
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CSAQ user and responded to evaluation	54	47.4%
CSAQ user and didn't respond to evaluation	32	28.1%
Reported by paper or by another media (some of the paper respondents gave comments as to why they responded by paper)	26	22.8%
Late response	2	1.8%
Total	114	100.0%

Approximately 77 percent (88 of 114) of all respondents who were selected to receive the COS CSAQ responded using that mode of reporting. From Table 1 we know that only 47.4 percent of all respondents who were selected to receive the COS CSAQ completed the evaluation form. Some establishments provided reasons why they responded by paper. For two of these companies the paper version had already been completed prior to starting the CSAQ. This occurred because sometimes the paper form and the CSAQ were sent to different contacts within the company. Five of these companies were too large to use the CSAQ. Two companies claimed not to have enough disk space. They were large companies. These results are provided in Table 5.

5.6.2 Summary of Responses to the Evaluation Questions

5.6.2.1 Listing of Evaluation Questions

There were six questions on the evaluation form.

- (1) In general, how satisfied were you with the overall diskette reporting system?
- (2) In general, how easy or difficult were the diskette questionnaire items to complete?
- (3) What improvements or enhancements would you recommend for the diskette reporting system?
- (4) During any point in the interview, did you use one or more of the [HELP] features?
- (5) Which [HELP] topics did you find the most/least useful or informative?
- (6) How likely is your company to use the diskette reporting system to provide data when the next Report of Organization is conducted?

5.6.2.2 Were the respondents satisfied with the COS CSAQ?

Question 1 (Q1) and Question 2 (Q2) on the evaluation form were used to answer this question. Q1 and Q2 used a 5 point scale. The Q1 scale ranged from very satisfied to very dissatisfied and the Q2 scale ranged from very easy to very difficult. For this analysis Q1 and Q2 were collapsed together. A response of Very satisfied, Satisfied, or No opinion to Q1 coupled with a response of Very easy, Easy, or No opinion to Q2 was considered "Satisfied" in Table 2. Collapsing "No opinion" with the "Satisfied" category

appeared reasonable because there were very few responses of "No opinion" (only 6 responses to either Q1 or Q2 out of all the evaluations). Any other combination of Q1 and Q2 implied that perhaps something could be improved with the current CSAQ, and thus we assumed that these respondents were "not completely satisfied." Using this definition, Table 2 shows that approximately 85 percent of the respondents who completed the evaluation form were satisfied with the COS CSAQ.

Table 2: Results from Question 1 and Question 2 of the COS CSAQ Evaluation Forms

Category	Total	Percent
1. Satisfied and likely to use in future	36	66.7%
2. Satisfied and didn't know if would use in future	10	18.5%
3. Difficult but would likely use in future	5	9.3%
4. Either dissatisfied or difficult to use or both and don't know if would use in future	2	3.7%
5. Dissatisfied and wouldn't use in future	1	1.9%
CSAQ user and responded to evaluation	54	100.0%

5.6.2.3 Would COS respondents use the CSAQ in the future?

When deciding if CSAQ is the future mode of choice for reporting data, it is important to ask respondents if they would use CSAQ in the future. Question 6 (Q6) on the evaluation form asked this question specifically. This question had four responses: Very likely, Not likely, Too early to decide and Don't know. The last two categories of Q4 are similar and were collapsed into a "Don't know" in Table 2. Seventy-six percent of the respondents who completed an evaluation form would likely use the CSAQ in the future. Only approximately two percent claimed that they wouldn't use the CSAQ in the future. Table 4 suggests that computer illiteracy is a possible reason for the negative feedback from this one respondent. Approximately 19 percent of the respondents were satisfied, and yet they did not know if they would like to report using this mode in the future. In the comment sections of these forms, there were no obvious reasons for this response.²

5.6.2.4 Did the "Help" Screens help?

There were numerous "Help" screens available in the CSAQ to assist the respondent if (s)he had questions. Perhaps the first question to ask is, "Did the respondents use the 'Help' screens?" Question 3 on the evaluation form asked this. Results are in Table 3. Overall a little less than half of the respondents used the "Help" screens; the rest did not.

Table 3: How many of the COS CSAQ Respondents used the Help Screens

² One respondent said that a manager would have to make that decision.

Category	Total	Used Help Screens	Didn't Use Help Screens
1. Satisfied and likely to use in future	36	16	20
2. Satisfied and didn't know if would use in future	10	4	6
3. Difficult but would likely use in future	5	1	4
4. Either dissatisfied or difficult to use or both and don't know if would use in future	2	1	1
5. Dissatisfied and wouldn't use in future	1	1	0
CSAQ user and responded to evaluation	54	23 (42.6%)	31 (57.4%)

Table 4 summarizes data collected from Question 5 (Q5) on the evaluation form. Q5 asks about the usefulness of each "Help" screen. Overall, most respondents with an opinion found the help screens at least somewhat useful. Also, it appeared that the "Notes" were either very useful, not used at all, or the respondent did not have an opinion. In the comment section there were no additional comments pertaining to the "Help" screens; thus we conclude that they are sufficient as is.

Table 4: Which Help Screens were Useful

Help Topic	Very Useful	Somewhat Useful	Not Useful	Did not use	No opinion	Blank
Instruction	9	5	3	1	0	6
Census Bureau Contact	5	2	1	6	1	9
COS terms and concepts	8	3	1	4	2	6
Health plan description	6	6	2	2	2	6
Special use keys	5	4	2	1	3	9
State abbreviation	4	1	0	7	4	8
Survey authority	2	1	0	7	4	10
Notes	8	0	0	5	3	8
Total	47	22	9	33	19	62

5.6.2.5 What were suggestions for improving the COS CSAQ?

Table 5 provides a summary of all the comments written in the open ended Question 3 of the evaluation form. We attempted to note the number of times these comments were repeated by the categories developed in Table 2. Comments varied. Comments from respondents who were classified as "satisfied" were not different from comments from respondents who were "not completely satisfied." Likewise comments didn't vary much for respondents who would definitely use the CSAQ in the future compared to those who weren't sure about future use. Companies which responded by paper appeared to have computer problems more often than those companies which responded by CSAQ. Thus we shouldn't conclude that companies which responded by paper are adverse to CSAQ in the future.

Several companies had similar suggestions. See Table 5. There seemed to be several problems with Item 5 of the questionnaire, including comparability to the paper COS questionnaire. Also companies had trouble printing a hard copy of their answers. Some mentioned that this CSAQ was not compatible with "Windows." Several companies wanted to delete duplicate or erroneous establishments or sort differently and they couldn't. It also seemed that big companies had trouble responding by CSAQ.

Table 5 : Comments for improvements for the COS CSAQ

Comment	Total	Category ³					
		1	2	3	4	5	6
No comment	33	19	4	1	1		8
CSAQ needs capability of deleting duplicate or erroneous establishments	6	5	1				
Need capability of saving changes even before all items are finished	2	1		1			
Need capability of changing the order of establishments/ organize data (current record number means nothing)	4	3		1			
(Item 5) when referring to the status of an establishment, give "other" as category	1				1		
Form (previous form) and CSAQ not consistent (Item 5a) and other items	3	2		1			
For item 5a, wanted to change "major activity" for all establishments and it wasn't able	1	1					
Need easier way to bypass prelisted companies with no data	1	1					
Need to accept foreign address for sales	1	1					
Need to print hardcopy	6	3	2				1
Need prior notification of disks	1		1				
Need to be compatible with windows	2	1	1				
Current process is inefficient because only 1 person could work on it at a time	1		1				
Instruction manual not helpful	1	1					
Don't have computer automatically do things to hardware	1	1					
Transmission feature is faulty/let user alter modem set-up	2	1		1			
Computer problems/installation/memory	4						4
Our company is too large for CSAQ	4						4
Computer illiterate	2					1	1

³ Category 1=Satisfied and would use in future. Category 2=Satisfied but unsure of future use.
Category 3=Difficult but would use in future. Category 4="Difficult" and unsure of future use.
Category 5=Dissatisfied and wouldn't use in future. Category 6=Responded to COS by paper.

6. Analysis

It is important to remember that this test was not designed to compare the results of the test group to those of a control group and that the sample used for this test consists of mainly large companies that had indicated from the Reporting Medium Preference Survey their willingness to report via CSAQ. These companies were later screened by telephone to verify commitment to participate in the pilot test and that they possessed the hardware necessary to run the CSAQ. Therefore, no inferences to the entire COS survey universe can be made based on the results of this test. The test only provides answers on the feasibility of using a CSAQ for large companies who express an interest in CSAQ.

What have we learned:

- a Can the Census Bureau develop and process a CSAQ without any major problems?

Authoring--The answer is probably yes, but it might depend on the authoring language. Census Bureau staff developed specifications with all COS CSAQ requirements. However for this test it was a vendor who develop the instrument. It is uncertain if the Census Bureau can afford to pay vendors for CSAQ development. One alternative would be to train staff for C and Clipper (or other similar software) programming. We do not have information on whether this would be feasible from either cost or staffing perspectives. This has to be decided soon. Another alternative is to use CASES as the authoring language. CASES is an off-the-shelf software package. The CASIC staff at the Census Bureau currently uses CASES and will be implementing a pilot test in 1995 to collect data from a sample of the 1994 Industrial Research and Development Survey cases using this software.

Current plans for the 1994 COS CSAQ include contracting again with the Washington Publishing Company to update the current instrument. It is unclear if this plan or the option of Census Bureau staff taking over the instrument and updating it without outside intervention is better.

Regardless of who authors the instrument, we feel that customer needs could be better met if some respondents were involved in the CSAQ development from the start. Testing of the instrument should occur early in development of the instrument and should be accomplished by a wide audience. By testing earlier, i.e., before certain screen or questionnaire logic is defined and fixed, we think that accepting and incorporating comments would be easier than it was during the development of this CSAQ.

Communications package--Procomm software was used for modem transmission of CSAQ responses. Only 4 companies used this option. It is unknown if the

proportion of companies choosing modem transmission will increase in the future. It is also unclear whether we would be charged a Procomm license fee for each company. If this is the case, then as CSAQ respondents increase, the cost could be prohibitive.

Processing--Can the Census Bureau efficiently prepare, verify, and package the diskettes for mail out? The COS pilot test operation was handled with only minor problems for the 114 COS companies. EPCD was able to accommodate special requests for mailout of more than one diskette per company. This however does not answer any questions on cost, processing time, or equipment necessary for a larger operation. The size and stage of this COS CSAQ test did not warrant the purchasing and use of automatic disk duplicating equipment for the preparation of the diskettes and packages. Therefore, this test did not reveal the potential problems or costs associated with this processing activity.

The 10 day period between mailing the completed CSAQ and its receipt is an issue. Perhaps this return rate was slower than a typical paper form because the diskettes had to be shipped back in a package and not an envelope. Although FEDEX guarantees overnight delivery, the cost is \$3 to \$4 per mailer. FEDEX was not used in mailback of the COS CSAQ. Instead, the diskette was returned via the U.S. Postal Service in a prepaid diskette mailer.

b Can the respondent run and complete the CSAQ?

All of the CSAQ recipients were contacted prior to receiving the instrument. During this contact it was determined that they were interested and had the hardware to complete a CSAQ instrument. Because they claimed they were willing to complete a CSAQ, we can conclude that the respondents who completed the paper questionnaire instead of the CSAQ had trouble running the instrument or were too large in terms of number of establishments to efficiently complete the instrument. Twenty-four of the 114 CSAQ recipients completed a paper form. Two CSAQ recipients responded using another media. Two of the 24 respondents claimed that they sent in the paper form because it was completed prior to realizing that a CSAQ had also been sent. Thus we estimate that approximately 21 percent of the respondents (24/114) had trouble completing the CSAQ, primarily because of one of these two reasons.

Many of the respondents called into the help desk. There were 113 help calls made. Forty-four of the companies called into the help desk at least once. This averages to 2.57 calls per company. Five of the calls were from magnetic tape respondents who wanted to report via CSAQ. One call was from a paper respondent who wanted to report via CSAQ. Six calls were from CSAQ recipients who requested another paper form or were just calling to inform the Census Bureau that they were going to report by paper. So 12 of the 113 calls were

concerning changing media. In twenty-eight (25%) of the calls a time extension was requested. Some of the companies wanted their subsidiaries to receive an individual CSAQ. Their request for a split mailing was granted. About 31 percent of the calls concerned computer/ CSAQ/ transmitting problems. The remaining calls were either general in nature or concerned the data to report. See Section 5.4 for counts.

We conclude from the number of calls and their context, that problems with the instrument, whether hardware or questionnaire wording, existed and required outside assistance. These problems however were solved and most of the mailed CSAQs were completed.

- c Does the respondent prefer the COS CSAQ over the COS paper questionnaire?

From the 47 percent of respondents who answered the evaluation questionnaire, we find that in general respondents were satisfied with the CSAQ instrument and that most of them would likely use the CSAQ in the future. We assume that the respondents who completed the CSAQ, but did not complete an evaluation, would have had similar responses to the evaluation questionnaire. The evaluation questionnaire did not directly ask for preference over the paper questionnaire.

- d Were respondents able to complete the CSAQ without formal training?

A brief user's guide, help screens, on-line instructions, and telephone assistance was available to the respondent. In general, it appears that this was sufficient for most respondents to complete the CSAQ. Although there seemed to be a large number of phone calls, 42% related to changing reporting media or asking for filing extensions. Better tracking of cost associated with telephone assistance for CSAQ cases and how this compares with telephone assistance for paper respondents is recommended for future tests.

As far as response rate, the test was successful in obtaining either a paper or CSAQ questionnaire for all test cases, although two were received a week after closeout. Still, the CSAQ response rate was 77 percent. We believe the special relationship developed with the companies could have been a contributing factor to the high response rate. These companies were contacted ahead of time, agreed to test the CSAQ alternative, were telephoned after three months to request a report, and were accommodated if they had special requests.

There were comments given on the evaluation questionnaire that could improve the quality and user friendliness of the current CSAQ. These comments should be given consideration, especially the comments which were consistent across several companies. Implementation of their suggestions would not only make a better instrument, but also meet our goal of customer satisfaction.

- e Were the returned CSAQ data easily assimilated into the Census Bureau files?

After customized manipulation of each respondent's CSAQ data, it was assimilated into normal COS processing. We need to investigate alternatives for automating this process as much as possible.

- f Data Quality

We expected that the quality of the reported data would be better because of the edits built into the CSAQ would reduce edit failures and resulting telephone calls to the respondents. This issue was not addressed during the evaluation. There was no control panel to test against.

- g Costs -

No formal tracking of costs was planned. A cost reduction was not anticipated. With such a small number of CSAQ companies, the cost of such things as the preparation, verification, and packaging of the diskettes was expected to be more expensive per case than if this operation were automated for large scale production. Additionally, even though the CSAQ eliminated data keying by the Census Bureau, it took longer to author the CSAQ instrument due to the expected learning curve.

7. Conclusions/Recommendations

We know from previous research the expected advantages of using a CSAQ to collect survey data. Advantages include (1) the elimination of data keying at the Census Bureau, (2) reduced mailout cost through the use of electronic transmission, (3) reduced printing of forms, (4) reduction of physical space for storage requirements, (5) reduction of follow-up calls to the respondents, (6) improved public perception by using current technology, and (7) reduction in time between the receipt and publication of data. Refer to the Initial Technical Assessment research documentation for more details.

From this pilot test we conclude that because the Census Bureau was successful in developing specifications and direct the development of a CSAQ for the COS survey, this capability probably applies to many other surveys. It also appears that (mostly large) companies self-identified to answer via CSAQ have a 77 percent rate of following up with an electronic response, given a similar processing and follow-up operation as that offered to the COS test cases. In general about 85 percent of the CSAQ respondents who answered the evaluation questionnaire were satisfied with the CSAQ alternative and most would likely use the CSAQ in the future. Another 19 percent reported to be satisfied but were unsure if they would try the CSAQ again. On the other hand, approximately 10 percent of the users said that they might use it again even though they found it somewhat difficult to use. Many had suggestions for improvement that need to be addressed if the

CSAQ option is offered again for the COS. From this perspective, the pilot test was a success. We can develop a CSAQ and the "selected" user community embraces our efforts.

However, this test left many unanswered questions. The test was not designed to test cost or actual processing operations if CSAQ were developed for a larger audience. The Census Bureau needs to clearly define what questions it needs to answer and develop appropriately designed split panel tests that can be clearly monitored with established record keeping to attempt to answer these questions effectively.

There is also an unanswered question of how long is too long for software development and whether this time frame would be similar for instruments developed in-house. This leads to the larger assessment of doing the work in-house through the CASIC staff compared to contracting the work out to a company such as WPC. The CSAQ for this pilot test took almost a year to develop, which included writing specifications for the instrument. We must determine if doing the work in-house would cost more or take more time. Hopefully, a second instrument for a different survey would take less time to develop either by an outside contractor or the Bureau. CSAQs will be used in the 1994 COS and the 1994 Annual Survey of Manufactures. We might be able to determine whether second instruments take less time to develop by an outside contractor by maintaining records on the implementation of these two CSAQ feasibility tests. Both of these CSAQs will be developed by the WPC.

8. References

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