EXPERIENCE WITH THE USE OF COGNITIVE METHODS IN DESIGNING BUSINESS SURVEY QUESTIONNAIRES

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ABSTRACT

Statistics Canada has been using cognitive evaluation methods in an effort to develop more respondent-friendly survey questionnaires and materials, and to reduce response burden. This paper focuses on the use of such techniques to assess establishment survey questionnaires. The redesigned questionnaires for the Survey of Employment, Payrolls and Hours and the Census of Construction have recently been subject to cognitive testing. Focus group sessions, in-depth interviews, and think-aloud interviews were conducted with representatives from small samples of firms. These studies based on direct feedback from respondents provided many valuable results that were incorporated in the final redesigned materials for these surveys.

Keywords: Respondent Feedback, Focus groups, Response burden

0. Introduction

Over the last few years, Statistics Canada has undertaken a series of public consultations, field tests and cognitive research projects to redesign questionnaires for a number of its surveys. The objective of the projects was to develop collection tools which would reflect the new priorities and changing needs of respondents. While the redesign generally focused on issues related to the content components, extensive work has also been done on the cognitive aspects of the forms. These techniques are used to study the sources of variability associated with the processes that respondents undertake when completing a questionnaire. They include understanding of questions, remembering and retrieving of information, judging and estimating, and formulating of answers.

The initiative was first undertaken for household survey questionnaires. For example in 1988, cognitive methods were used to examine the 1991 Canadian Census of Population Questionnaires (Gower and Dibbs 1989). More recently, Statistics Canada has used cognitive research to evaluate establishment survey questionnaires. The aim of the research was to improve the respondent friendliness of materials and take the interests of respondents into adequate consideration.

This paper focuses on two applications of cognitive research to establishment survey questionnaires at Statistics Canada. The experience with the use of such techniques to redesign the Survey of Employment, Payrolls and Hours forms and the Census of Construction forms is presented. These projects, which represent the Bureau's first attempts to conduct cognitive research on the design of economic forms, were successfully completed and insights from the research were incorporated into the redesigned materials for these surveys.

The first section of the paper provides background information on the two surveys. The second section presents the objectives and scope of the cognitive evaluations. Sections 3 describes the overall work plan and the methodology of the studies. The results of the research as well as the revisions of materials for the SEPH are presented in section 4. Section 5 describes the results of the evaluation and the final revision of materials for the COC. Finally, a brief summary of the results and conclusions are presented in sections 6 and 7.

1. Background

1.1 The Survey of Employment, Payrolls and Hours (SEPH)

The SEPH is a monthly survey which is designed to provide, for each province of Canada and for sixteen industry groups, statistics on the number of employees, hours worked, wages and salaries paid to those employees (Schiopu-Kratina and Srinath 1986). The SEPH questionnaire is completed by active business establishments with employees. Companies with 200 or more employees and most government respondents are sampled with certainty. Other types of companies are sampled using rotating panels. The population size is approximately 700,000 and the sample size is about 70,000. For 85% of the units, data collection is done by mailout from the regional offices, with mailback to the regional offices. These questionnaires are self-completed by respondents, accounting firms or other such services to businesses. Most of the remaining 15% respond via a telephone interview initiated from the regional office. Finally, about 600 of the larger companies report the required information in computer form directly to head office.

Data collected on the first page of the questionnaire include number of employees, regular and overtime pay, and total number of regular and overtime hours paid. This information is collected for employees paid by the hour, salaried employees and other employees and refers to the last pay period of the reference month. Additional information for the entire reference month is collected on the second page of the questionnaire. It includes irregular payments, total gross taxable payroll, information on the employees absent without pay, and the reasons for large variation in reported data compared to previous month's report. For new entrants to the survey, a set of detailed instructions and definitions, and a brochure which introduces them to the survey and solicits their cooperation accompany the questionnaire.

1.2 The Census of Construction (COC)

The COC is an annual survey that provides comprehensive statistics on the construction industry in Canada. The target population consists of all establishments whose main revenue is derived from construction activity, and includes contractors as well as construction divisions of real estate developers and manufacturers. Two large sub-groups make up the industry: general contractors and trade contractors (Giles 1983). There are approximately 130,000 businesses in the population. The 9,000 largest firms, representing two-thirds of the total industry activity, complete a detailed questionnaire and are subject to a census. For the small businesses, statistics are estimated based on a sampling scheme. Taxation-source data are used to estimate financial activity for these firms, and only the information not available from income tax returns is collected via a simplified questionnaire.

Data collected on the detailed questionnaire include general information on the statement of income: revenues, direct costs, expenses, net income; on capital expenditures; on labour force: number of hours worked, number of employees; and other information on output distributions: number of dwelling units sold, percentage and type of work done in each province. The detailed questionnaires are targeted at seven different sub-groups of Constructions. The questionnaires include a tear-off instruction and definition sheet and are accompanied with an introductory brochure to the survey.

2. Objectives and Scope of the Qualitative Evaluation Studies

The main objective of the research project was to obtain qualitative information from respondents about their opinions and reactions to the survey questionnaires. The results of the evaluations were used to guide project priorities and direction by providing a check list of identified problem items to be reviewed during the redesign of the materials.

The specific objective for the SEPH was to simplify the survey questionnaire. When the project was initiated it was felt that more information about the problems encountered by respondents was necessary before attempting the redesign. Consequently, a cognitive evaluation with respondents participation was undertaken on the existing questionnaire. The questionnaire was then redesigned, and a qualitative evaluation of the new materials was carried out to assess the impact of the changes. The specific objective for the COC was to reduce the number of forms and to simplify their content. When the redesigned had been completed, a qualitative study was carried out to evaluate their cognitive aspect.

Specific cognitive processes to be addressed by the qualitative research were as follows.

2.1 Motivation

- What **conditioning** strategies should be utilized for new respondents entering the survey panel?
- Are respondents aware and satisfied with the **assistance/support** from Statistics Canada?
- What is the **response burden** in completing the questionnaire in terms of cost, time and effort?

2.2 Comprehension

- **Problems** encountered by respondents. Concepts/instructions/questions that are difficult to understand, misleading or confusing.
- Are **exclusion/inclusion** criteria known, understood and used by survey respondents?
- Do respondents understand and conform to the **reference period(s)** to be used for reporting?

2.3 Ability to Retrieve the Information

- Is the questionnaire **compatible** with respondents' record keeping practices?
- Is **accurate** information provided by respondents? Which data items are subject to error?

2.4 Format/Readability

- Is the **layout** and **presentation** of the form adequate in assisting the respondent to answer the questionnaire?

3. Methodology of the Qualitative Evaluation Studies

The research was designed and coordinated by Statistics Canada's Questionnaire Design Research Centre with the cooperation and support of subject matter divisions responsible for the surveys and the Methodology Team. The fieldwork and report of the findings were completed under contract by external management consultants.

Consultations with head office survey operation staff and field personnel were organized in order to determine the questions and instructions which most commonly lead to respondent inquiries. Then the consultants undertook a revision of the questionnaires and the accompanying materials and documents. Based on this review, a list of potential problems was developed.

Think-aloud and in-depth interviews were conducted with respondents. Respondents were asked to complete the questionnaire in the interviewer's presence and give their impressions of the form as they completed it. Interviewers acted as silent observers taking notes of the comments as they observed. After the questionnaire was completed, they probed responses, as required, to obtain a clear understanding of the process through which a response was obtained.

Focus group sessions were conducted with participants where they shared their experiences in completing or reviewing the form, their areas of difficulty or ease, the amount of time required to complete certain sections and the type of records consulted. The moderator then reviewed the questionnaire, question by question. The interaction process allowed participants to clarify, elaborate and refine their opinions and thoughts with other group members.

The consultants developed interview guides and coding formats that were used during interviews with respondents. These guides permitted the recording of information concerning the areas of the form read, reference to instructions, time required to complete sections of the questionnaires and confidence ratings of any estimates made during completion of the questionnaire. These guides also made it possible to record compatibility, accuracy and format problems for each section of the questionnaire. In addition, a more formal questionnaire which focused on a comparison of the original and the modified materials, and the degree of satisfaction with the assistance provided by Statistics Canada was administered to participating respondents.

A major consideration in the design of these studies was the selection and recruitment of respondents. It was felt that problems with the questionnaires would be especially apparent with new entrants who are not familiar with the survey. The studies also included experienced respondents. In addition, an effort was made to recruit small businesses which may be those most likely to experience problems when completing the questionnaires. Most interviews took place in Ottawa but some were also conducted in Montreal and Toronto in order to include very large companies that do business in more than one province. Interviews were held both in English and French. For the COC study, the scope of the research included general contractors and developers as well as trade contractors and sub-contractors. For the SEPH, participants in manufacturing, construction, transportation and wholesale and retail trade were recruited.

Since it was felt that the recruitment of businesses for this type of research might be difficult and that respondents might be reluctant to participate, various measures were taken to encourage participation. Respondents were motivated by pointing out the importance of the survey data, the goals of the research, and the importance of respondents participation. Very strong guarantees of confidentiality of the data reported were undertaken. An innovative incentive was provided to respondents in recognition of their participation: the consultants made a donation to the non-profit organization of each participant's choice.

The first cognitive evaluation for the SEPH consisted of four major components. Meetings with over 25 Statistics Canada experts including 20 field personnel from four regional offices were organized. A first focus group was carried out with seven business people previously unfamiliar with the questionnaire. A total of 40 one-on-one interviews were held with respondents from firms that represented as wide a base as possible. Finally, a second focus group was conducted with seven individuals to whom the initial recommendations were presented. This group was recruited from the 40 one-on-one interviews. The second cognitive evaluation of the SEPH questionnaires consisted of the same four parts, but on a reduced scale. A few interviews were conducted with respondents who had participated in the previous qualitative evaluation.

The COC study consisted of interviews with 41 participants, including 25 in-depth and 16 think-aloud interviews. In addition, two focus groups were held in Ottawa with four participants attending each session. The first focus group was conducted with business representatives of newly birthed construction companies with an emphasis on small firms. Overall, ten large companies, ten mid-sized companies and 21 small companies were observed.

4. Results of the Research for the SEPH

The following section gives a summary of the results of the two-stage evaluation of the SEPH questionnaires. The final reports including findings and recommendations were submitted in April 1989 (Statistics Canada 1989) and in June 1990 (Statistics Canada 1990A). A brief description of the major problems identified and their relationship with cognitive processes involved is presented below. In addition, final revisions to the questionnaires that account for most of the problems identified are presented.

4.1 Motivation

The report indicated that the initiation procedures and the support materials for the survey could be improved. Respondents want to know the purpose of the survey, the reason for their participation and the time in sample. They also are interested in examples of survey data and publications. Even if this information was already part of the materials, a thorough revision of their content was undertaken to provide more satisfactory information to respondents. More specifically, the brochure now includes examples of survey data as well as information on how to access detailed survey publications.

The current instructions that accompany the questionnaire are not used by most respondents because they do not have access to them. In most cases they were either not kept on file or discarded by a predecessor. Since the instructions are only provided for the first month in survey, many respondents did not even know of their existence. The content of the instructions was simplified to refer only to the questions and they will be distributed to all new entrants, to all respondents once per year, and to respondents who indicate a change in contact name at any time during the year.

4.2 Comprehension

Some respondents confused the different reference periods to be used for reporting. As mentioned earlier, page one of the questionnaire refers to the last pay period of the reference month and page two refers to the entire reference month. In addition, the last pay period of the month could refer to a week, two weeks or a month depending on the pay period type in practice in the company. Also, some information on the second page may be reported for more than a month. An effort was made to better delineate these differences. Definitions of reference periods used were enhanced both on the questionnaire and in the instructions. Colour shading is also used when there is a change in the reference period.

Some questions on page two of the questionnaire are subject to significant under-reporting because the concepts involved are not clear or the instructions not comprehensive and respondents tend to skip them. For example, many respondents did not use the question on irregular payments because they had not realized that it had relevance for them. General changes to the questions include enhanced wording by adding instructions, definitions and examples as part of the question and conforming to the definitions of Revenue Canada.

4.3 Ability to Retrieve the Information

The question on total gross taxable payroll is a major irritant to respondents, inaccurate data is frequently provided and entails a high response burden. Although the question does ask for the total of either the reference month or the year-to-date, many respondents still believe that both should be reported. Massaging their payroll data in two different ways to find the information increases response burden. Respondents that noticed the option perceived this intended flexibility as a lack of clarity and were annoyed by it. The question was reworded using the formulation found on the instructions. In order to decrease the confusion, the redesigned question now asks for the total of the month only.

The question on employees absent without pay is also problematic in that the respondent must think in terms of individuals instead of simply aggregating payroll records as they can for the rest of the questionnaire. The research indicated that payroll personnel are unlikely to be aware of these absences and to answer this question the respondent must consult many sources and it increases the response burden. This question is used to make adjustments to reported data in case of strikes for example. Clarification of concepts and examples as to where to find the information were part of the modifications to the instructions for this question.

4.4 Format/Readability

The most critical problem with the SEPH questionnaire in terms of format is that the front page is difficult to grasp due to the large number of boxes and the difficulty in identifying at a glance the relevant parts. This section has the appearance of an array of five columns of cells. Each column represents a pay period type and the rows correspond to the questions associated to each employee category. This layout is especially intimidating to the new respondent who will not yet have realized that only a few of the questions and only one or two columns actually apply to his case. The front page was revised to provide for a one-column version of the form on which the respondent has to check off the appropriate pay period type. This new multi-type column version, that allows an expansion of the size of print and has a significantly less cluttered appearance, will be used by about 90% of respondents. An enhanced version of the existing five-column questionnaire will be used by all other respondents that have more than one pay period type to report for a given category of employees.

Many respondents commented that while they found the instructions clearly written, they found the layout to be unattractive and uninviting to read. The new instruction sheet is tumbled English and French and each question is addressed in succession. The information consisting of survey purpose, federal/provincial agreements to share information and confidentiality assurance, all originally found on the front page of the instruction sheet, have been put in the brochure to simplify the instructions.

5. Results of the Research for the COC

The following section gives a summary of the results of the study on the redesigned questionnaires. The final report including findings and recommendations was submitted in March 1990 (Statistics Canada 1990B). The major problems identified and their relationship with cognitive processes are presented below. The final revisions that account for most of the problems identified are also presented.

5.1 Motivation

Respondents tended to overlook the sentence indicating the location of the instructions. Typically, respondents did not notice the availability of instructions until they reached the last page of the form where the instructions are attached. Most respondents used the instructions only for the questions requiring reference to the output codes. Increased visibility of the statement indicating the presence of instructions and definitions at the beginning of the new form will ensure more respondent awareness of their availability. In addition, specific instructions have been included above each particular section or question to ensure the collection of uniform and accurate data. The content of most questions has been changed to add more precise information. In addition, specific information, definitions and examples are part of most questions.

5.2 Comprehension

For the reporting of direct costs a choice is given between actual dollar values or a percentage of total direct cost for each item incurred. A few respondents reported both, indicating that more emphasis is needed on the fact that the percentage breakdown is not necessary if dollar detail is reported. This was achieved by writing the word OR bigger and in bold face type on the questionnaire and adding a statement to that effect in the instructions.

A similar problem occurred in the section on labour force. The respondent is asked to report either hours worked or an average hourly rate for the derivation thereof. The new wording for this section indicates that the number of hours is the target value and that the average hourly rate is to be reported only if the former is not available. Many respondents experienced difficulty determining the average number of employees because of the seasonal nature of employment with their company. Most respondents incorrectly included owners, partners and unpaid persons in the numbers. The inclusions/exclusions criteria for wages paid, average number of employees are now clearly defined as part of the question.

5.3 Ability to Retrieve the Information

For the question on direct costs, some respondents had problems matching their information with the questionnaire items. Respondents' statements sometimes aggregate many of questionnaire's individual items, and it is time-consuming to provide breakdowns. The new instructions and wording for this question now mentions that the financial statements do not have to exactly match the questionnaire and how to use the 'other' category. In addition, the respondents have now the option of attaching a financial statement instead of completing the question. In the section on labour force, a number of respondents indicated that they were unsure as where to easily find the required information. Reference to the Workers Compensation Board as an example as to where this information can be found has been incorporated into the instructions.

5.4 Format/Readability

In the section on output types of construction, the respondent is asked to refer to a comprehensive set of codes describing each output type that are provided in the attached instructions and report the data in a matrix format. Since these codes are located in the very last section of the second page of the instruction sheet, and most respondents did not detach the instructions, they found the layout difficult to use and found it awkward to flip between the codes provided in the instruction sheet and the questionnaire. The order of items on the attached instructions has been changed so that the actual list of codes is provided just beside the questions to which they refer. The second page includes the instructions and definitions for all other questions.

The layout of the questionnaire has been improved to make better use of space. When possible, the questions were placed in columns side by side. Bold face type is used throughout the questionnaire to better delineate the different sections. More lines were added to the comment section to further highlight its presence and encourage its use. A thank you statement has been added at the end of the questionnaire.

6. Summary

At the general level, the following characteristics underlying the response process in respondent-completed questionnaires were illustrated. Respondents wanted to know the purpose of completing the questionnaire and questioned the value of the information for themselves. They wanted a better explanation of why their firm was selected and for how long they were required to participate. Respondents indicated that completing the questionnaire was not a priority, and viewed the survey form as only one of the many forms and questionnaires that they were required to complete each year. On the other hand, many respondents remarked that filling the form took less time and was easier than they had anticipated and that the response burden was more perceived than real.

Respondents tend to read only what they think is necessary to read; they tend to proceed directly to the questions and rarely read instructions. Respondents are assisted by the layout of the form which directs them to the parts that should be read and indicates where answers should be placed. Respondents tend to omit questions that do not seem to apply to them. The meaning that respondents attach to words and concepts may differ from one individual to the next and may not be the same meanings that questionnaire designers attach to them.

Respondents fell into two groups when completing the questionnaires. The first group included the owner, president or vice-president of the company, who were less concerned about differences between the questionnaire and the source of information used to complete the form. The other group, respondents such as office managers, accountants and comptrollers, were much more concerned with details and providing accurate answers. They were more likely to use multiple sources of information and make calculations to complete the questionnaire.

Respondents were quite interested in the cognitive study and were pleased that we took their interests in consideration for the redesign of the survey materials. They were quite interested in the purpose of the survey in general and were curious about information specifically relating to their industry.

The redesigned questionnaires were well received and understood by respondents, interviewers and field personnel and they appreciated their business-like appearance. They found the new materials to be less intimidating, simpler to follow, clearer to read and easier to use. The new questionnaires will have beneficial impacts on respondent motivation and cooperation, response rate and data quality.

7. Conclusions

The research consisted of applying cognitive evaluation into the development of more respondent-friendly questionnaires for business surveys. The questionnaires were redesigned by assessing the respondents' perceived value of the survey information, their perception of response burden, the compatibility of the questions asked with their record-keeping practices, the placement and use of instructions, the availability of data, the accuracy of data reported, and the complexity of the response task.

A major outcome of the research with the SEPH and the COC forms was that it demonstrated the viability of using cognitive research techniques to examine establishment survey questionnaires and that business respondents can be successfully recruited to participate in this type of research (Gower and Zylstra 1990). However, use of qualitative research with business respondents presented a whole new set of challenges. Business people are typically busy and they will only participate if their cost and time is minimal. Selling of the project was a critical step in getting a satisfactory participation rate from survey respondents. The cognitive techniques utilized in this research were a relatively fast and cost-effective means of obtaining useful feedback about these business questionnaires. However, these techniques do not replace but rather complement other forms of field testing. Together with the results of the pretests, many of the findings and recommendations of the cognitive studies were incorporated into the design of the final version of these questionnaires (Gower and Zylstra 1990).

The Industry Division of Statistics Canada successfully used the redesigned questionnaires for the COC in June 1990 in reference to the 1989 fiscal year. The Labour Division of Statistics Canada has just implemented the redesigned version of the questionnaires for the SEPH for the survey reference month of July 1991. The collection is being done now and preliminary results are very positive.

8. References

- DEMAIO, T.J., JENKINS,C., (1991), "Questionnaire Research in the Census of Construction Industries", Presented at the ASA 91 Meetings, to appear in proceedings.

- GILES, P. (1983), "Construction Division: Census of Construction", Technical Paper, Business Survey Methods Division, Statistics Canada.

- GOWER, A.R., DIBBS, R. (1989), "Cognitive Research: Designing a Respondent-Friendly Questionnaire for the 1991 Census", Presented at the Fifth Annual Research Conference (ARC V), United States Bureau of the Census.

- GOWER, A.R. and ZYLSTRA, P.D., (1990), "The Use of Qualitative Methods in the Design of a Business Survey Questionnaire". Proceeding of the International Conference on Measurement Errors in Surveys, Tucson, Arizona.

- SCHIOPU-KRATINA, I. and SRINATH, K.P. (1986), "The Methodology of the Survey of Employment, Payrolls and Hours". Technical Paper, Business Survey Methods Division, Statistics Canada.

- STATISTICS CANADA (1989), "Qualitative Research to Evaluate the Questionnaire of the Survey of Employment, Payrolls and Hours (SEPH)", Final Report, Goss, Gilroy & Associates Management Consultants.

- STATISTICS CANADA (1990A), "Qualitative Research to Evaluate the Redesigned Survey Materials of the Survey of Employment, Payrolls and Hours (SEPH)", Final Report, Goss, Gilroy & Associates Management Consultants.

- STATISTICS CANADA (1990B), "Qualitative Research Related to the Redesign of the Census of the Construction Industry Questionnaires", Final Report, Price Waterhouse Management Consultants.