

Some Important Issues in Questionnaire Development

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Abstract: The questionnaire is a critical component of the modern statistical survey. This article examines the role of the questionnaire in meeting information requirements, the relationship of the questionnaire to the other components of survey design, and the effect of the questionnaire on the quality of survey data. The requirements for proper organization of the questionnaire design

process are analysed in detail, and the potential benefits of institutionalizing the questionnaire design capability are described. Throughout the article, the importance of viewing the questionnaire as an integral part of the total survey design is stressed.

Key words: Questionnaires; questionnaire development; survey design.

1. Introduction

Questionnaire development may be viewed both as a science and an art. Whereas certain fundamentals of question phrasing, location interaction and response patterns can be studied scientifically, it becomes something of an art to apply these fundamental principles in the most appropriate manner. This is because there are so many factors and conditions affecting the questionnaire design process and such a variety of linguistic and conceptual shadings. For example, language is never precise. Words may assume different shades of meaning in different parts of one country and even more so in different parts of the world. There is also variation among different socio-economic groups or age groups. Different words or sets of words may be required to stimulate the recall of the same event by different respondents. Experiences of this kind are seldom directly transferable from one country to another and within one country from one

period to another. While recognizing these variations, it is extremely important that subjective input is well controlled by scientific evaluation.

The emphasis of this article is on the role that the questionnaire plays in meeting the need for information. It will discuss questionnaire interaction with survey design, the role of the questionnaire on data quality, and organizational aspects desirable for successful questionnaire development. The article examines whether questionnaire design can be viewed as a unique discipline and furthermore that in large statistical organizations there may be distinct advantages in institutionalizing the questionnaire design function.

2. Information Needs and the Role of the Questionnaire

The escalating demand for appropriate and timely information of various kinds and from various sources calls for an organized approach to the entire process of data collec-

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tion. The past forty years have seen the emergence of the statistical survey as an important tool to meet this challenge.

Over this period, survey design, data processing and data analysis have become recognized as disciplines to be represented on interdisciplinary survey teams and as important contributors to the overall success of the survey. Questionnaire design, while acknowledged to be important, has not been generally considered as a separate discipline in this practical sense. The function of questionnaire design, as a result tends to be approached on a

somewhat “hit or miss” basis depending on the experience of the survey teams. This can be quite dangerous considering that “what is asked” and “how it is asked” are obviously critical factors in determining the information obtained by the survey. This sort of approach also removes the opportunity for the questionnaire design function to contribute in other ways to the effectiveness and efficiency of surveys.

In order to investigate the potential role of questionnaire design it is necessary to view it in the context of the total survey design.

Table 1. Elements Affecting and Affected by the Questionnaire

- (1) Information Needs and Specification (Concepts and Objectives)
- (2) Type of Population
- (3) Subject Matter
- (4) Time Available (for Data Collection and Publication)
- (5) One Time or Continuous
- (6) Required Level of Accuracy
- (7) Budget
- (8) Sample Design
- (9) (Data) Collection
- (10) Data Processing (incl. Edit and Imputation)
- (11) Estimation
- (12) Tabulations and Analysis Methods
- (13) Publications, Reporting Dissemination

Table. 1. Lists a number of elements included in the total survey design of which questionnaires form an important part. All these elements interact; changes to one element of the design often require changes in several other elements as well.

2.1. Concepts and Objectives

The questionnaire plays a central role in the survey process in which information is transferred from those who have it (the respondents) to those who need it (the users). The questionnaire is the means through which the information needs of the users are expressed in operational terms. These are then presented to a respondent in such a way that he will supply the required information.

At the outset, the survey objectives are often broadly stated, for example:

- to provide a descriptive statistical background for developing national policies and programs;
 - to describe, on a continuing basis, and at national and regional levels, some social or economic trends and phenomena;
 - to provide a general framework for more specific studies, policies and programs, etc.
- These broad statements of information needs have to be reduced to more manageable objectives if they are to guide the questionnaire designer or his team in wording

questions, preparing instructions for interviewers and designing the questionnaire for rapid data capture and processing.

Redefining these broad statements of objectives into manageable forms suitable for a questionnaire is difficult to accomplish. However, content priorities are easier to set if one knows exactly the time, money, and human resources available for the survey operations.

On the whole, the questionnaire evolves and is refined as part of the overall survey development process. For example, users may want to plan a program of providing housing in a densely populated urban area and will need information on "housing." The typical user will approach the problem by asking himself the following questions:

- Q. What is the problem I am trying to solve?
 - A. Provide adequate housing to everyone who needs it.
- Q. What must I know to solve this problem?
 - A. I need to know present housing stock, demand for housing, production of housing and the impact of producing housing on other sectors (such as water, electricity, sewer system, education, recreation, etc.) family size and income.
- Q. How will I use the information once I get it, and how accurate and timely does the information have to be?
 - A. I'll write reports for expert committees; develop a program of financial assistance to purchasers; draft legislation to create an organization to deliver the program.

In answering these questions the user's thinking becomes more quantitative. At this stage specific question wording is not an issue, in fact it may be counter productive to try to formulate specific questions at this time. The user is deciding what is to be measured, not how this should be done. The questionnaire designer can assist users in clarifying and

refining their need for information by advising them on the potential difficulties of measuring certain characteristics. It may be that local customs and values make the information too sensitive to collect; it may be that too many questions will be needed which will make fieldwork too costly; it may be that other items of information are more urgently needed and that this particular request must be delayed; it may be that the information is already available and only its access needs to be negotiated.

Throughout this stage the user should determine the most appropriate concepts for the uses he wishes to make of the data. The questionnaire designer should reflect the user's needs and assist in developing concepts compatible with those from other sources of information.

A useful technique to assist the questionnaire designer in bringing precision to the user's need for information is to produce tabulation plans and dummy tables. Dummy tables are draft tabulations which include everything – titles, headings, column stubs – except the actual data. Production of such tables would indicate if the items of information to be collected could yield useable tabulations. Plans for all tabulations should be produced at the earliest stage possible. They will not only point out what is missing, but also reveal what is superfluous. Furthermore, the extra time that is spent on producing dummy tables is usually more than compensated for at data tabulation stages by reducing the time spent on the design and production of actual tables.

2.2. Wording and Format

Once information needs have been expressed in terms of specific survey concepts, the questionnaire becomes the instrument by which these concepts are measured. Through specific questions and accompanying instruc-

tions, the user specifies precisely how the survey concepts are to be measured in operational terms. Several questions may be required to measure complex concepts. In the Canadian Labour Force Survey, for example, as many as ten questions are needed to measure the concept "unemployed."

As well as being a vehicle for specifying the exact questions to be asked, the questionnaire often serves as a document for the recording of measurements as well. This benefits both the interviewer and the respondent, since it is convenient to record the answers immediately following the question. In theory, however, there is no reason why the questions and answers cannot be on two separate forms.

In the more structured types of surveys, the questionnaire is an important method of standardizing and controlling the data collection process. In statistical surveys, in contrast to other methods of investigation, the researcher usually cannot do his own data collection but must rely on interviewers hired for the job. Without specified question wording and instructions, interviewers would inevitably change the meaning or emphasis of questions and quite possibly influences the responses. The questionnaire helps ensure that the researcher measures what he wishes to measure with every respondent. It is, in effect, a "program" for the interviewer and respondent to follow in order to produce the desired results.

The questionnaire should not be too rigid, however. It must be flexible enough to adapt to respondents of different age/sex groups, language and social backgrounds. Different words or examples may be needed in order to convey the desired meaning to all respondents. The questionnaire must also anticipate all possible answers. This is especially true in the initial exploratory stages of research where an unstructured collection of data may be the most appropriate approach.

It must be recognized that the questionnaire is a complex and often imprecise measuring instrument. The subjects of measurement are human beings, and the process of measurement is based on language. As well as being a measuring instrument, the questionnaire is also a form of communication involving the researcher, the interviewer and the respondent. It transmits a request for information to the respondent, and it transmits the respondent's answer to the researcher in a form useable to him. Warren Weaver, in the *Mathematical Theory of Communication* (Weaver and Shannon (1949)), identifies three problems that must be faced in the design of any communication system:

- A. How accurately can the symbols of communications be transmitted? (The technical problem.)
- B. How precisely do the transmitted symbols convey the desired meaning? (The semantic problem.)
- C. How effectively does the received meaning affect conduct in the desired way? (The effectiveness problem – in the survey context this refers to generating a response to a given question.)

All three problems are directly relevant to the construction of questionnaires, and all three problems are closely linked. Within the context of statistical surveys, the way in which the questionnaire solves these problems plays a major role in determining how well the information needs of the user are met.

2.3. *Interaction With Other Elements of Survey Design*

The process of making the survey concepts operational in a specific document forces the researcher to consider not only question wording, sequencing and layout, but nearly every other aspect of the survey as well. The questionnaire design must take into account

elements such as the type of population being surveyed, the sample design and sample size, the subject matter of the survey, the collection method, the data processing techniques to be used, and the budget and time available. The sample design should be tailored to the questionnaire design since a certain degree of accuracy for a given budget is usually called for. The more complex the questionnaire the higher the cost per unit and if the budget is fixed, the sample design must take into account the higher cost per unit.

The questionnaire's total content, style of questioning, format, length, etc. are also closely linked to the method of data collection and the survey's subject matter. Each method of data collection, such as personal interviewing, telephone interviewing and mail surveys creates its own survey conditions and forms an important background to which a well designed questionnaire must be sensitive. In personal interviews, for example, it is often possible for the interviewer to collect certain data, such as the type of dwelling or the sex of the respondent, by direct observation rather than by questions. As well, the element of face-to-face communication is a powerful motivating factor for the respondent. A personal interview is often the only choice when a complex, long and demanding questionnaire is involved. In telephone interviews much of the social interaction between interviewer and respondent is lost and the respondent's co-operation may be affected. The questionnaire must rely entirely on verbal communication for its success and the subject matter may have to be less demanding. However, with certain sensitive surveys (e.g. criminal victimization surveys), the extra distance between the interviewer and the respondent may actually make it easier to answer questions. In mail surveys, the questionnaire itself assumes the role of interviewer. It must introduce the survey, motivate the respondent to co-operate and

guide the respondent in completing the interview.

Such elements as the type of population, the sample design and the required level of accuracy closely interrelate with questionnaire design as well. For example, the heterogeneous nature of many survey populations frequently results in a need for cross-classified data. These needs affect the sample size, the type and degree of stratification, and the reliability of the information. This in turn will affect the questionnaire through the types of questions asked and the level of detail requested. This will further have an effect on the cost and timeliness of the information, the amount of respondent burden, and so on.

The particular design of a questionnaire affects data processing and its cost. The format of questions, for example open or closed, has direct implications for operations such as coding, data capture, editing and tabulations. The presence of many open-ended narrative-type questions increases the time and effort required during coding operations. The required programs to edit and tabulate the data become more difficult and costly to write and test.

Whether the survey is executed once or on a continuing bases has an important effect on questionnaire design. With a continuing survey, there is often more scope for learning from experience and refining the questionnaire over time. It is very important to document one's own experiences with questionnaire development as well as those of other organizations and countries. Grouping surveys by subject matter (expenditure, employment and unemployment, health, etc.) and documenting problems associated with particular questions or any other aspects related to the questionnaire is an invaluable source of learning for future purposes. Experiments in question wording, programs to monitor response errors, and other methods of

evaluating and improving the questionnaire design may be feasible only with a continuing survey. However, the advantages of improving the questionnaire must be balanced against the disadvantages of change. For example, the ability to make comparisons over time, the need to retrain interviewers, and the need to change expensive computer software may all be affected by changes in the existing questionnaire.

In many continuing surveys, such as the Canadian Labour Force Survey (LFS), the same respondents are interviewed several times. The questionnaire must take into account the total response burden during the respondent's stay in the survey. In the LFS, subsequent interviews have fewer questions than the first, and in addition some information is preprinted on the questionnaire. The questionnaire may also have to adapt to different collection methods: for example in the LFS the first interview is conducted in person while in urban areas most subsequent interviews are conducted by telephone. Questionnaires designed for continuing surveys must be developed with the longer term in mind.

The questionnaire as an operational expression of user needs thus involves the total survey design itself. Survey design is a combination of intricate components, among which the questionnaire plays a central role. The questionnaire neither determines the form of the other components, nor is its form determined by the others. The process of questionnaire design must flow from and be a part of the total survey design process.

3. The Questionnaire and Data Quality

It is necessary to consider the purpose of each survey, how the data will be used and the effect of errors of various magnitudes on survey results. Experience shows that certain

types of surveys produce more respondent burden and are more prone to errors of various kinds than other surveys. Surveys whose subject matter is sensitive and complex tend to result in high nonsampling errors including both response variance and bias. The magnitude of these errors greatly affects the quality of data derived from the survey.

In the past several years nonsampling error has received increasing attention as a major component of total survey error (see, for example Anderson et al. (1979), Bailar (1976), Hansen, Hurwitz and Bershad (1961), Koch (1973) and Platek (1980)). The control of nonsampling errors is an integral and vital part of survey design, requiring specific programs for the diagnosis, measurement and prevention of errors. Further, each program will have its own costs and benefits which must be taken into account in the design of controls (Platek and Singh (1981)).

The questionnaire is both a potential source of nonsampling errors, and an important part of programs for their prevention and measurement. The scientific development of data collection has lagged behind that of sample design and estimation: improvements in sampling techniques often deal in fractions of a percent while experiments in question wording may reveal much higher variations. The following section discusses the relationship of the questionnaire to a few of the more important sources of nonsampling errors and illustrates the role of the questionnaire in minimizing these errors.

3.1. Nonresponse Errors

Nonresponse is a major source of nonsampling error. If the characteristics of interest differ between respondents and nonrespondents, bias will almost certainly be introduced into the results. Nonresponse is basically of two types: "no contact" type (e.g. no one home, temporarily absent, bad weather, etc.) and

the "refusal" type. The latter may be either a complete nonresponse or only nonresponse to some questions. The questionnaire can do little to eliminate the "no contact" type on nonresponse but it does play an important role in avoiding refusals.

Unrealistic demands on the respondent's knowledge or memory, the use of overly difficult and technical language, or excessive demands on respondent's patience are all sources of nonresponse which have their roots in the questionnaire. To understand how the questionnaire does it, it is important to first understand why respondents do or do not respond. Many different psychological forces motivate people to respond to surveys, including an interest in the topic, a desire to be helpful, a belief in the importance of the survey, a feeling of duty, or even a belief in their own importance. Other forces influence people to refuse: for example, difficulty in understanding questions, fear of strangers, the feeling of one's time being wasted, difficulty in recalling information, and embarrassing or personal questions. All of these forces will have an effect on the questionnaire design through the way in which survey topics are introduced, the question wording, the questionnaire's appearance and length, assurances of confidentiality, and so on. At the same time, these forces interact with the survey's subject matter, the type of population and the data collection method, which in turn influence the design of the questionnaire.

3.2. *Response Errors*

Response errors are a second category of non-sampling errors to which the questionnaire is closely related. Response errors can occur anywhere during the question-answer-recording process, and may be either systematic (response bias) or random (response variance).

Questions on sensitive topics, such as amounts and sources of income, use of alcohol

and tobacco, illegal activities or mental illness can be subject to large response errors. It is often felt, for example, that the respondent may distort the answer to avoid embarrassment or to appear to conform to societal norms (Warwick and Lininger (1975)). Many questionnaire design techniques have been devised to counter this "social desirability bias," including the anonymous questionnaire, the use of projective questioning techniques², or randomized response techniques in which the respondent chooses which of two (or more) questions he answers by a random choice. However, in a recent study which compared questionnaire responses to external criterion information (e.g. official records or test results) Marquis et al. (1981) found, rather surprisingly, that for most items which they studied the response bias was almost negligible, but that the response variance was quite large. This conclusion, if supported by other studies, indicates that measuring and reducing response variance may also be important in sensitive topic surveys. This might involve techniques such as re-interviews, internal consistency checks during the interview, and the collection of other information correlated with the variables of interest. This kind of emphasis has direct implications for questionnaire design.

Questions which depend on the respondent to remember events, such as the taking of a trip or the occurrence of a crime, are another source of response errors. Events may be forgotten, or events which occurred before

² An example of projective questioning might be the sequence:

1. What do you think most people feel about smoking marijuana?
2. How do you yourself feel about it?

The first question asks for the respondent's view of the societal norm and the second asks for his own view.

the reference period may be incorrectly included. Bushery (1981) in an experiment with the U.S. National Crime Survey, found that victimization rates with a 3 month reference period were much higher than those reported under a 6 month reference period, which were in turn higher than the victimization rates reported with a 12 month reference period. The bias due to recall loss with the longer reference period was a much more serious source of error than sampling variability. The choice of an appropriate reference period for questions involving recall has been examined in a number of different subject matter areas (Sudman (1980), National Centre for Health Statistics (1972)). Such techniques as interviewing respondents at the end of the reference period, or the use of prominent dates (e.g. Christmas) and calendar aids to jog respondents' memories have been shown to have some value in reducing under-reporting (Neter and Waksberg (1965), Ashraf (1975)). With some topics, however, the only possible way to collect the information is to make the questionnaire into a form of diary, where the respondent records the event during, or shortly after, it happens. Questionnaires of this type are used for the Food Expenditure Survey and the Fuel Consumption Survey of Statistics Canada.

Although questions demanding recall and sensitive topics are important sources of response errors, there are many other causes. For example, an important component of response error is that due to the interviewer, the so-called correlated response error. Each interviewer exerts, to some degree, a common influence on all of the respondents in his assignment through the way in which the questions are asked, the way in which the respondent's replies are interpreted and recorded, and so on. The contribution of this component of error to the total survey error is directly related to the size of the interviewer's assignment. In telephone surveys, which may

have quite large assignments, the correlated component can be a more serious error than in personal interviews (Groves and Kahn (1979 pp. 176-182)). In turn, the correlated response error is more serious in personal interviews than in mail surveys or other surveys of the "self enumeration" type where interviewer intervention is minimal. This consideration was a major reason why the Canadian Census of Population and Housing has adopted drop-off-mailback as the standard technique since 1971. The choice of data collection method in turn has a direct influence on the questionnaire design.

Poorly designed questionnaires may result in an ambiguity of the type of errors that occur during the interviewing process. Thus unanswered questions may be interpreted as nonresponse or as response errors depending on the way they occurred. The following example may help clarify the situation. Suppose that a survey deals mainly with such topics as employment, unemployment and not in labour force. The three classifications frequently serve as filter questions. Other filter questions may be age, sex, etc. The filter questions determine the sequence and type of other questions that will follow. Most of these questions are usually different for each classification. If, during the interview a person is classified erroneously at the level of a particular filter question, it is possible that many subsequent questions related to the filter question will be answered in error. Response errors will result if the errors are not detected by an edit procedure. However, if they are answered and detected through editing as response errors then we have two possibilities. They can be left as response errors or they can be converted into nonresponse and then they become subject to imputation. The assumption in the latter case is that an appropriate imputation would reduce the size of the bias which would be introduced by the original response error. On the other hand, the unit

may have been correctly classified by the filter question but subsequent questions relevant to the classification were erroneously left blank. Theoretically, these blank questions could be interpreted as response errors but in practice are treated as nonresponse.

Numerous other examples of response errors and related errors could be given. They depend on what question is asked, how the interviewer asks it, the way in which the respondent interprets and answers the question, and the way in which the interviewer interprets and records the answer. The interview is a dynamic, interactive process of communication between interviewer and respondent. How it is handled determines whether or not the interview produces the desired information in an accurate and efficient fashion. In the "heat" of the interview, it is the questionnaire through its content, question wording, instructions and layout, which must play the major role in controlling the situation.

3.3. Data Processing Errors

Once the interview is completed, the questionnaire becomes primarily a data processing document. Errors can occur at all phases of processing including coding, data capture, editing, imputation, estimation and tabulation. The way in which the questionnaire was designed will have a significant impact on the number and type of errors at this stage of the survey.

For example, by including data capture codes right on the questionnaire coding and transcription errors are usually reduced significantly. The data are captured directly from the questionnaire without first being transcribed on to another form. A step beyond this is the Computer Assisted Telephone Interview. The questionnaire is stored in a computer program, which controls the entire interview process. The questions appear one at a time on a video display terminal in front of the

interviewer, who then asks the question and types the respondent's reply directly into the computer. The data can be edited immediately and errors corrected while the respondent is still on the telephone. The process also reduces the incidence of questions missed or of incorrect application of skip instructions.

Editing and imputation errors are also closely related to the questionnaire design. Problems of missing or inconsistent data can often be traced back to faulty questionnaire design. The ability to construct or impute for missing values often depends on what concomitant variables were included on the questionnaire and what kind of fail-safe mechanisms were built in. For example, in a survey which requests information on several detailed components of income, cases where the information is not given or is incorrect can often be salvaged by including a question asking for total income.

Nonresponse errors, response errors, and data processing errors are a few of the non-sampling errors which are closely linked to the questionnaire and to the other components of the overall survey design. The questionnaire is inevitably a cause of nonsampling error, but it must also go as far as possible in preventing errors. The degree to which the questionnaire succeeds at this task depends largely on the survey designer's knowledge of the various sources of errors and on his skill in integrating the design of the questionnaire with that of the entire survey. Each new survey may present new problems and pitfalls which must be anticipated and taken into account in developing questionnaires.

As more surveys are undertaken, and as the pressure mounts to produce results quickly, the potential for costly errors of various kinds increases. An increased use of computers speeds processing and facilitates the application of edit and imputation strategies in order to produce "clean" data files.

It is possible however, to place too much reliance on imputation methods and to neglect sound collection procedures. A "clean" data file is necessary but not sufficient. A powerful edit and imputation program could produce a "clean" data file from totally unreliable data entered on questionnaires, therefore, the data on the "clean" file would still be totally unreliable. In spite of impressive advances in data processing technology, "quality" collection and "quality" questionnaires are still required in order to produce "quality" data from a survey.

4. Organizing the Questionnaire Design Process

The questionnaire, which is fundamental to the whole process of obtaining reliable survey data, must be designed in the context of other aspects of survey design. This clearly implies that, in addition to the sponsor or user, the data collection, capture, processing, retrieval and analysis specialists must be consulted and informed throughout the design of the questionnaire. It follows that the function of questionnaire design must be recognized at the outset and responsibility for this function assigned to an appropriate team or individual.

The team approach is particularly suited to effective questionnaire design. It is recognized however, that questionnaire design must often be assigned to a single individual for want of resources. Whether one person is responsible or a team can be constituted, the function and process remain essentially the same. What may be adversely affected is the efficiency or the quality of the end product. In the discussion that follows, the use of a team approach is stressed. However, this approach is interchangeable with a single person approach where the single person is the questionnaire designer solely responsible for its development.

4.1. Steps in Questionnaire Development

The first task for the questionnaire designer is to list all the activities involved in developing the questionnaire and estimate the resources required for each activity. These activities should be organized into a logical time sequence, the end of which is fixed by the date for presentation of the final questionnaire. Some activities can be carried out concurrently while others need to be done in sequence as the completion of one determines the beginning of another. An overall development plan should take into account unanticipated delays. The elapsed time to develop the questionnaire should be planned to be somewhat greater than the real time required to accomplish those steps which must be carried out in a sequential fashion, but it may be shorter than the time required for doing all steps. Finally, if resources cannot be made available when needed, time frames will have to be adjusted accordingly.

If unanticipated delays occur, the questionnaire designer should be able to cancel certain operations and still meet deadlines. Needless to say, the operations which could be cancelled should not include necessary tests of the instruments as they are being developed. Yet experience shows that, in practice, these are often the first to go.

A general summary listing some of the principal steps in questionnaire development is given below. The list is arranged into two columns: the left-hand side describes the steps where the questionnaire designer is indirectly involved while the right-hand column attempts to describe the steps in which the designer is more directly involved.

Some Principal Steps in Questionnaire Development

Indirect Designer Involvement

Decision makers develop a new program or policy or make some change to an existing program or policy and need information.

Program or policy analysts assess existing information, identifying gaps which require collection of data and propose a new survey.

A proposal is made to fund a survey and a survey manager is assigned.

Program/policy analysts describe their general plans and ideas with respect to:

- 1) Survey objectives
- 2) Subject matter
- 3) Target population
- 4) Timing of results
- 5) Budget
- 6) Expected uses of the data
- 7) Reports required

Consultation with producers/users to clarify:

- 1) major/minor objectives
- 2) content areas of inquiry
- 3) minimum quality
- 4) mode of production of results (tape, reports, tables)
- 5) sample size
- 6) respondent nature and characteristics
- 7) language of questionnaire
- 8) field method
- 9) data capture method

Designer Involvement Critical

A questionnaire designer is asked to advise on the possibility of collecting information on time and costs.

The questionnaire designer seeks clarification and assists the analyst to define the need for information in relation to specific objectives, subject matter, specific populations, timing etc. The questionnaire designer does a thorough review of the literature on the survey. The review will highlight design weaknesses in earlier surveys which dealt with a similar subject and allow the designer to determine the needs for a new design and what can be successfully modified.

Questionnaire designer identifies schedule of activities, resources requirements in terms of level and kind of skills and negotiates their availability. Questionnaire designer may plan this consultation with users/producers and even act as secretary to meetings, preparing agendas, minutes and recording decisions. It is his responsibility to ensure that all relevant constraints are identified and taken into account in written specifications.

Users/producers are involved in the drafting and testing of questions.

Questionnaire designer negotiates printing and production of the questionnaires and logistics of getting them into the field.

Questionnaire designer starts drafting questions, testing them, recording the results and reporting back to users.

Members of data processing collection operations and other survey takers provide input to the design and plans for coding, interviewing and data capture, and prepare manuals.

As questions are completed, including their codes and appropriate editing specifications, the questionnaire designer arranges them into logical groupings on the interview schedule or questionnaire.

Finally, the questionnaire draft and supporting instructions are ready. At this stage the material and procedures are subjected to a Pilot Test.

The Pilot Test is conducted. The questionnaire designer should observe the training and fieldwork noting particularly what presents difficulties and the various ways that interviewers resolve problems.

The data collected are subjected to all coding, editing, data capture and processing routines and reports are prepared on the quality of the resultant data.

Final modifications are made by the designer and his team on the questionnaire and supporting documentation. Reports on test results are written and filed, along with examples of all documents used in the survey.

The full-scale survey takes place. The results are analyzed. Observations of the field trials and the problems and solutions are recorded and reports prepared on the questionnaire, the field procedures, data capture, etc., so that recommendations can be made for future surveys.

Again the questionnaire designer should observe the fieldwork and help to resolve problems, also noting what difficulties are experienced. Once fieldwork is completed, observation reports and the results of quality checks should be summarized by the designer into final report on the questionnaire with supporting documents. This report should include the questionnaire designer's recommendations for future questionnaire design.



Working backward, the major critical dates for questionnaire design are:

1) date of start of fieldwork. Questionnaire and documents must be in their final form.

2) date of Pilot Test. A draft questionnaire and manuals are required. This test stimulates in all ways the real survey and again all documents must be ready in time.

- 3) date for completing the consultation with users. All priorities for the content of the questionnaire must be established. There will be few opportunities to make changes in the overall timing, budget and objectives of the survey, although minor modifications can be made, e.g., increases or decreases in sample size which do not influence major objectives of the survey; retention or rejection of less essential content areas; and
- 4) the date for assignment of the responsibility for questionnaire development.

4.2. *Developing an Organization to Design, Test and Administer the Questionnaire*

A successful questionnaire design requires the skills of a number of individuals working together to develop, test and administer the questionnaire. Ideally, therefore, a team should be set up to carry out the work. The team would include expertise in social, economic, behavioural, mathematical and computer sciences. But, if resources are scarce and the designer has to carry out many functions himself, he should obtain as much information as possible from reports of previous surveys of a similar nature and should make an even greater effort to ensure the input from collection, processing, and subject matter areas.

If conditions allow and a questionnaire design team is set up, each member of the team should be given specific responsibilities. These could include:

- *Questionnaire Designer*: The questionnaire designer should be principally responsible for overall planning and coordination. He should conduct the consultation with users to determine what information is required, when it is required and in what form it is required. He should carry out the review of the literature and consult colleagues in his department and in other departments to

obtain their advice and assistance in designing the questionnaire. He should identify the resources he needs, negotiate their acquisition, chair meetings, ensure that decisions are documented, and refer problems to the attention of “Content” or “Steering” Committees, where they exist. These committees would consist of senior researchers or managers who can commit resources to the project and advise on content issues when users and designers fail to reach agreement on their own. The Steering Committee can also help by obtaining technical assistance from national, regional or international organizations involved in or supportive of survey taking. Often a Steering Committee would include representation from major users’ departments, creating a forum for discussion of content and conceptual issues and dissemination of results.

The questionnaire designer usually has subject matter expertise and generally should have some background in the social sciences. His principal strength should be his ability to understand the needs of users and to translate these into a coherent set of questions and report specifications. There is not a great deal of formal training in questionnaire design. However some organizations (like Statistics Canada) have developed training workshops for their own staff and employees of other government departments. Experience shows that apart from an appropriate background and a keen interest in the subject, frequent participation in designing questionnaires develops and sharpens the required skills to be an effective designer.

- *Collection Expert*: The collection expert usually provides technical support on how to select and train interviewers, how to write instructions, how to supervise assignments and resolve problems in the field. Also, it is the collection expert who should

be familiar with the characteristics of respondents. His knowledge may be useful in designing an appropriate sampling plan. The collection expert should be familiar with the local language peculiarities. Generally, his experience is practical and has been acquired in the field or in the delivery of programs. He will also advise on collection cost implications.

- *Data Processing Expert:* The data processing expert usually provides advice on the best layout of the questions and answer spaces for rapid and easy data capture. He is familiar with the technology of computer processing. He should know which coding and capture practices to adopt, and how to facilitate manual editing and coding in the field, as well as mechanical editing and coding in the office. His principal concern should be to structure the questionnaire so that the information on it can be easily captured by the computer to produce a data file which can then be manipulated to produce tables and reports.

All team members must possess sufficient independent authority to make proper design and implementation possible. In the design phase these three kind of experts should work collectively. Once fieldwork begins, each expert should be responsible for his/her own area of expertise.

4.3. Institutionalizing the Questionnaire Design Capability

Survey organizations conduct a number of distinct surveys, each with its own questionnaire. These questionnaires will have been designed to suit specific needs or will have been adapted from questionnaires which have proven successful elsewhere. As new surveys are planned questionnaires will have to be assessed and modified to meet more current needs for information. The experience gained in designing or adapting questionnaires can be profitably applied to subsequent surveys once

it is documented, and referenced for ready access.

The questionnaire design experience can be institutionalized by requiring those who design questionnaires to properly document their work or by establishing a questionnaire design capability and allocating resources to it on a continuing basis. In the latter case, while a formally constituted group may at the outset design only questionnaires, with time and experience, such a group can expand its role to include developing guidelines and procedures for questionnaire design by others. Such a group could also assess the technical adequacy of the questionnaires of others with the intention of improving their quality, preventing duplication and reducing response burden.

Thus, institutionalizing questionnaire design can offer a number of benefits:

- 1) improved cost-effectiveness and efficiency in internal questionnaire design;
- 2) development of standards whose consistent application will gradually improve the quality of questionnaire design;
- 3) greater utilization of resultant data due to increased user confidence in questionnaires of predictably high quality;
- 4) capability to advise and train others in questionnaire design;
- 5) capability to approve questionnaires as a mechanism to control expenditures on information collection.

Most of these benefits will not be achieved, however, without conferring on some group which would constitute a questionnaire design focal point, the mandate, budget and resources to design questionnaires.

The Questionnaire Design Focal Point (QDFP) should concentrate on research and development in questionnaire design, the preparation and maintenance of an inventory of questions and questionnaires, and the development of standards and guidelines. These functions have been developed by a Task Force on Questionnaire Design (Statistics Canada June (1984)). It is true that the

existence of a permanent QDFP is only feasible for a large statistical agency. However, research and a developmental work conducted in the QDFP could be useful in general by being available to smaller organizations and individual persons.

4.4. *Research and Development*

The research and development function of the QDFP would involve reviewing questionnaire design activities and expertise, studying what needs to be done to improve questionnaire design and finally undertaking projects to address specific problems or needs.

There already exists a significant amount of research which pertains to questionnaire design. It is recommended that the QDFP develop and maintain a collection of materials on questionnaire design to be used by members of the focal point and by individuals seeking assistance. Papers of a synthesizing nature could be written on selected topics in order to summarize the information that is currently available.

The general strategy for investigating questionnaire design consists of the formulation of a problem or hypothesis followed by an empirical test. For example, one might want to evaluate the relative merits of two questions formulations. One way to shed light on this problem is to subject it to empirical testing by comparing responses to the two questions from similar (or identical) response units (e.g., companies, schools, individuals, government agencies). This can be done either with results from existing surveys or with new data generated in a test environment. Use of existing data is cheaper and does not increase response burden. On the other hand, this approach restricts the control of other factors that might influence the test results.

Use of new surveys is more expensive and contributes to increased response burden but it allows for more control. For example, the probability of having similar respondents for

the two questions can be increased. New surveys can be limited to small geographical areas or even to any group of readily available respondents. The alternative is a large-scale provincial or national survey carried out exclusively for testing purposes or, more likely as part of an existing survey. For example, in Canada, the Labour Force Survey, through its supplementary capacity, might be used to ask one question of part of the sample and the other question of another part.

Areas of questionnaire design that could be considered as part of the research and development function are:

- 1) Types of questions: unstructured (open-ended)/structured(close), multiple choice, checklist, ranking, rating scales, other scales.
- 2) Question wording: language level, specificity, imprecise quantification (e.g., "very often"), respondent interpretation, unidimensionality, sensitivity, response styles/sets (acquiescence, social desirability, position bias).
- 3) Sequencing: opening questions, location of sensitive items, location of classificatory items, logical flow, lead-ins, transitions, filters, funnel strategy.
- 4) Layout: physical organization and design, cover letter/front cover, length, type, graphic illustrations, symbols (mechanical devices – arrows, boxes, asterisks), numbering, instructions, back cover, paper colour, bilingual layouts, layout and method of data processing.
- 5) New developments: custom-made questionnaires, Computer Assisted Telephone Interviewing (CATI), collection of administrative data, computer-assisted questionnaire design.
- 6) Questions on sensitive issues (e.g., abortion): wording, timing, randomized response techniques.

- 7) The effect of methods of data collection on questionnaire design (e.g. face-to-face, telephone, mail) and of follow-up and screening plans. For example, a question that yields valid data with one method may not with another.
- 8) Techniques for selecting the individual who is to complete the questionnaire.
- 9) Response burden: measuring response burden, relationship of response burden to questionnaire design, effect of length of questionnaire.
- 10) Attitudinal questions.
- 11) Interviewer bias and variation.
- 12) Questionnaire design and administration in nonhousehold surveys (e.g., many business surveys).

4.5. *Develop and Maintain Inventory*

The QDFP should be required to have detailed knowledge of all questionnaires used by its organization. The most efficient way of doing this is to maintain an up-to-date inventory of all questionnaires and their supporting documents such as instruction books and reports on the quality achieved.

Questionnaire design and implementation should reflect, as much as possible, consistent concepts and procedures within and across surveys. The utility of statistical information is increased when data from many surveys are comparable. Thus another of the QDFP's contributions would be to facilitate comparison, via the inventory, of numerous questionnaires designed over many years and for a variety of surveys and objectives.

The hard copy of the inventory should be archived to serve as a historical record of the questionnaires used in the organization. This would help future researchers in understanding historical data and in modeling and analyzing time series.

In the interests of standardization, the inventory would make available to survey managers a large body of well-established

questions and knowledge of the data quality associated with them. This would enable survey managers to use existing questions and thereby both reduce their development and testing costs and enhance the comparability of their data. In addition, the inventory provides information to management on possible areas suitable for integration as it provides an overview of survey activity within the organization.

Finally, the inventory would allow the QDFP to assess the extent of redundancy in content and respondents (e.g., by searching similar questions or questionnaires for similar respondents). The QDFP could review the inventory of existing surveys to help managers identify questionnaires for two or more surveys which might be consolidated to reduce duplication and response burden. The QDFP would also resort to the inventory to measure and report on response burden.

4.6. *Develop and Maintain Standards and Guidelines*

A key element in the fulfilment of the QDFP's objectives is the promulgation of a set of standards and guidelines relating to the various aspects of questionnaire design. In particular, adherence to such standards could ensure that maximum multiple use can be made of data collected by various questionnaires and improved data quality.

The development of standards and guidelines would be partly based on the results of the QDFP's efforts in research and development and should relate to the following areas:

- 1) Use, when possible, of standard concepts and definitions for at least common items.
- 2) Use of standard phrases to assure respondents of the confidentiality of their replies, to inform respondents of the availability of the document in optional languages, to assure respondents of the legitimacy of the survey, and to instruct respondents in how to fill in the questionnaires.

- 3) Use of standard layouts, formats, and type fonts for designing questions, response categories, interviewer instructions, data capture boxes or circles, etc.
- 4) Guidelines for questionnaire length and complexity.
- 5) Guidelines for physical size and colour of questionnaires.
- 6) Guidelines for asking attitudinal (opinion-type) questions.
- 7) Guidelines for determining whether questions should be considered sensitive and how such questions should be asked.
- 8) Guidelines for ensuring maximum respondent cooperation. (This would involve assurances of survey legitimacy, confidentiality, etc.).
- 9) Standards for having questionnaires physically designed and produced.
- 10) Standards for developing tailor-made questionnaires (i.e. questionnaires designed for particular sub-populations).
- 11) Guidelines for choice of method of data collection, follow-up, and data capture.
- 12) Guidelines for selecting the respondent who is to fill in the questionnaire.

In most of the above cases, standards and guidelines must be developed in the context of an overall survey design frame. Standards for questionnaire design cannot be considered in isolation of methods used for data capture, processing, analysis, and dissemination. In some cases, the development of such standards and guidelines will reflect basic common sense, in others it will reflect the prevailing consensus of work done elsewhere and, in still other cases, it will depend upon research and testing carried out by the QDFP.

5. Conclusion

The preceding sections have illustrated the questionnaire's role as both an expression of the user's information needs and as an important determinant of the quality of survey

data. In both roles, the questionnaire is closely linked to all of the components of survey design. The total survey design, and in particular the questionnaire must try to maximize both the relevance of the data to the user and the accuracy of the data. Successful questionnaire design incorporates both; we must ask the right question, and we must ask it in the right way.

In most statistical organizations questionnaire design is largely done by individual program managers. As a result, most of the expertise in questionnaire design is survey specific and fragmented. An institutionalized Questionnaire Design Focal Point would address these difficulties. It could serve as a centralized unit maintaining an inventory of questionnaires, develop standards for various aspects of questionnaire design and provide consultation based both on research and documentation of previous surveys. Hence the coordination of questionnaire design would facilitate comparisons and integration of results from different collection activities and would improve the quality of survey data.

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