

1-1-1989

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### Recommended Citation

Gregg, Joseph B. (1989) "Questionnaire Construction," *Hospitality Review*: Vol. 7 : Iss. 2 , Article 6.

Available at: <https://digitalcommons.fiu.edu/hospitalityreview/vol7/iss2/6>

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# Questionnaire Construction

## **Abstract**

Questionnaires used in survey research can elicit excellent data for analysis for any part of the industry. The author discusses how to design questions, construct the survey, and watch for errors in conducting the research so that the results secured advance scientific inquiry.

## **Keywords**

Joseph B. Gregg, Questionnaire Construction, Question design, Evaluation, Delphi Technique, Letter of Transmittal, FIU

# Questionnaire Construction

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*Questionnaires used in survey research can elicit excellent data for analysis for any part of the industry. The author discusses how to design questions, construct the survey, and watch for errors in conducting the research so that the results secured advance scientific inquiry.*

Questionnaire design is intended to develop data for the purposes of description, evaluation, and/or prediction. If the researcher keeps this fundamentally simple charge in mind, carefully structures the sample population, designs out superfluity and bias, and incorporates the stated objectives, the questionnaire can be one of the most effective ways of conducting survey research. The diversity of structure permits data enhancement; the variety of question types engenders more complete response. There is little excuse for erroneous conclusions with such a clear, readily-available questionnaire format. The researcher needs only a real commitment to scientific inquiry by following these established procedures.

Essentially, the survey is a helpful method of collecting information on socially relevant topics,<sup>1</sup> an expeditious way of guiding actions for the purpose of analyzing the relationships between variables, as, for example, smoking and cancer.<sup>2</sup> The questionnaire, additionally, offers perhaps the broadest range of design types<sup>3</sup> and treatment methodology, and, although there are problems inherent in this method of social research, the questionnaire, dating back to the ancient Egyptians<sup>4</sup> provides at least as diverse and efficient a method of studying relationships, effects of treatment, longitudinal change, and comparisons between groups as other forms of business, social, scientific, and educational research<sup>5</sup>. As such, it merits the attention and understanding of the serious student of the human condition.

If a survey collects data on and/or from an entire population, it is called a census. This can be done with near equal efficiency by sampling a representative proportion of that population by means of simple random, stratified random, or cluster sampling.<sup>6</sup> In market research there are other sampling approaches such as quota, systematic convenience, and judgment,<sup>7</sup> all of which have the intent of gathering information on pre-defined, limited target groups, usually for a specific purpose, also clearly pre-defined.

The questionnaire has, equally, a varied number of applications. The simplest use of a questionnaire is called a "marginal tabulation," a

description of how a total sample has distributed itself on the response alternatives to a single questionnaire item, normally in a set or series of such questions. A public opinion poll is a good example of this kind of normative description.<sup>8</sup>

Questionnaires also have the characteristic of being capable of exploring relationships between variables, and are able to identify possible cause and effect relationships, with confidence, under stringent controls. These causally-related studies may either be time-bound, i.e., the study of phenomena at a given (same) point in time, or they may be ordered relative to one another, temporarily, and are then referred to as time-ordered association studies.

Questionnaires as survey instruments can also be used to evaluate programs and develop indicators, because of their ability to provide systematic answers to such questions as "who does what?," "why?," "how?," "how well?," and "with what effect?,"<sup>9</sup> This implies that this form of research permits the development of outcomes related to the intended effects of intervention, an important research tool, and will allow the study, as in "to what effect?," of a consideration of consequences.

Questionnaires are also legitimate instruments in determining likely future conditions in a predictive sense, as economists frequently demonstrate. The RAND Corporation is credited with developing and refining this technique, used both to develop consensus on significant issues and predict future events. It is called the Delphi technique.

A questionnaire is a reasonable, ordered, and scientifically-accepted means, given recognized controls, of collecting data from which valid and accurate conclusions may be drawn.<sup>10</sup> There are inherent weaknesses in this form of research, flaws that can invalidate the data-gathering even while it is taking place. Before attempting to construct a questionnaire, the careful researcher will first understand that experiences are not too easily categorized by simple survey questions.

#### **Some Problems Occur in Questionnaire Development**

The function of a survey is the collection of data for the purpose of evaluation, description or prediction, in a planned manner, as a guide to action or to analyze variables.<sup>11</sup> It is not just a list of questions that will somehow, magically, reveal a hidden truth or provide gestaltive insight. A questionnaire, as much as any survey method, perhaps more than most, is subject to major error. To develop a good questionnaire, one must first decide what job the instrument is meant to accomplish. If the investigation desired is soundly designed, the wording of the questions is facilitated. Too often researchers put the investigative cart before the horse. If the emphasis is improperly put on the data gathering, the researcher runs the risk of error-ridden conclusions drawn from flawed inferences based on inadequate data, improperly ordered and haphazardly collected. Published research (so-called) too often reflects this process.

Therefore, professional questionnaire research establishes several cautions:

• **Know what precise conclusions the researcher wishes:** Will the research instrument provide answers to the major questions which gave rise to the need for the research in the first place? Researchers sometimes try to leap tall buildings in a single bound, seeking definitive cause and effect relationships which questionnaires do not purport to establish. For example, a comparison of smokers versus non-smokers vis-a-vis church-going may suggest the former attend any kind of religious services far less than the latter group, but such a casual-appearing conclusion is badly flawed. Survey research rarely finds these kinds of relationships. At best, it can indicate an association, or a correlation, but not a casual connection.

• **Understand that surveys are fact-finding in intent:** They tell us how samples are characteristically, and how often events happen. They work best if one understands surveys are intended to find associations and explanations. It is meant to explore hypotheses based on specific relationships between particular variables.

• **Know what variables are:** In surveys, it is wise to understand the effect of variables, but wiser still to know what variables are in the first place. For experimental studies, researchers try to introduce change, or manipulate it systematically so they can see what happens to samples; these are experimental variables, not typically the function of questionnaires. A second form called controlled variables are those researchers try to eliminate by exclusion (if one studies only women in a sample, sex as a variable is controlled). The uncontrolled variables are those not usually observed, which tend to bias results or allow error in capitulating the data, and thus misinterpretation. Lastly, dependent variables in a survey study the outcome (or results of study) and ought to be precisely measured and/or difference-tested for significance.

• **Thus, look for multiple variables in interaction:** Study them for proportionality of the output variable(s). There may be an association, or a correlation, to answers from respondents, but are they biased or distorted, and could this be because of respondent perception of the condition, or/and because of the wording of the instrument? A fundamental understanding of the limits of survey research is important in effective performance. Questionnaires are limited in their ability to control important variables. This does not eliminate the questionnaire if it is constructed with this next point in mind.

• **Select samples with characteristics required for the study:** Then compare them in groupings. Questionnaires are best used with qualitative data. Other designs are better able to impose experimental factors, or to manipulate, than questionnaires. If the researcher limits the study approach to what can best be accomplished, valid and reliable data are more likely to result. Avoid attempting the analysis of complex relationships. Do not attempt before and after analysis. Avoid trying to evaluate complexities, as for example, changes in an evolutionary manner in a sample or cohort, with a questionnaire. Don't try to develop absolute cause and effect; avoid analysis of complex interrelationships, control

for variables in a questionnaire, develop qualitative information, keep the sample simple, and know what is sought before the study commences.

- **Watch for error throughout the study:** In questionnaire design, a major cause of error develops when the researcher does not recognize the existence of variables in a rush to distribute the survey. This is the most flagrant flaw: survey design. Other errors of significance are bias due to question-wording; sampling errors; errors caused by non-response; respondent misunderstanding of question, or respondent bias; errors in recording data; errors in processing data; incorrect researcher interpretation.<sup>12</sup>

Therefore, to design a valid questionnaire survey instrument, the researcher must first learn the pitfalls of survey research, know what needs to be studied, and understand how to design a valid questionnaire that is as error-free as the researcher can make it.

### **Proper Design is Critical**

The major thrust at this point is proper preparation. This exploratory phase is designed to ensure that the researcher understands the problem to be studied as well as what the study will require. Much of this may be conversation, interviews with the individual involved in the problem. A review of the literature on the subject is essential. Look at a variety of existing questionnaires on related, as well as different, subjects. Note question wording: the “open” (free-answer) approach, the multiple choice, the closed question, the index or scale format. Which appears best suited for the type of data required?

Look, too, at the questions; study existing questionnaires for inadvertent bias. Can questions be misunderstood? Do questions suggest too narrow a range of responses? Do they ask for information sample respondents are not likely to have, or are willing to share? Do questions infer meaningless answers? Are the questions leading the respondent to a desired answer? Is the question too intimate to elicit a legitimate answer?

Once irrelevances and biases have been filtered out of the proposed questionnaire, develop a preliminary questionnaire and pilot it (pre-test) on a small group similar to that of the proposed sample. This may not be ideally random, but results, carefully studied, should indicate areas for questionnaire improvement.

Questionnaire construction is not dissimilar to that of objective test writing<sup>13</sup> and the rules for one fairly well parallel those for the latter:

- **Clarity is essential:** Validity results when a question means the same thing to all readers. Avoid imprecise terms as “nearly,” “several.” Answers should reflect the intent of the researcher.

- **Keep questions short:** They are simpler to understand.

- **Avoid technical terms:** The researcher cannot verify respondent professional comprehension in a questionnaire as can be done in an interview.

- **Watch for biased or leading questions:** Don't suggest answers, tendencies or appropriateness.
- **Stay away from negatives:** These confuse and may result in an agree-disagree construct eliciting incorrect answers because of taking the easy way out.
- **Always ask general questions before specifics:** Specific questions imply narrow precise answers, which might mitigate data needed from the general question; Leedy adds some further professional advice as follows:<sup>14</sup>
  - **Be courteous:** Questions should occasionally include "please."
  - **Simplify:** Where a respondent can efficiently check off an answer, allow it.
  - **Limit demands:** For respondents, make it fairly easy.
  - **Concentrate on the universal:** This is rather than narrow specifics, unless the latter is essential.
  - **Check for consistency:** Include cross-check questions in the instrument, far enough apart to verify consistency of answers.
  - **Encourage response:** By freeing the respondent of any costs, save time.
  - **Share the results:** Offer a summary of the study to respondents who may be interested.

Once these fundamental rules of questionnaire construction are understood, the design of the survey instrument is readily facilitated.

#### **Questionnaire Design Has Many Considerations**

The researcher first needs to understand the objectives of the questionnaire: to obtain information relevant to the purposes of the survey and to collect information with maximum reliability and validity.<sup>15</sup>

With these in mind, the researcher makes several key decisions:

- **The physical layout:** The instrument should be letter-sized, with enough space between items that the respondent finds it easy to follow and answer. With open-ended instruments, allow adequate space for written answers. The paper should be of good quality, heavy weight to compensate for casual handling. Black ink on off-white is the most easily read combination, and 12 to 14 point size type is the minimum recommended. Instructions to respondents and questions are best separated by using two different typefaces.
- **Numbering items:** Every question (item) should be numbered consecutively, allowing for no omissions or sequenced repetitions. Don't use number "1" twice with sections "A" and "B." It confounds data recording.
- **Using symbols:** They serve as arrows, boxes, line drawings, etc. to guide the respondent through the questionnaire.

- **Locating sensitive questions:** Data critical to the study should be carefully developed in the survey document only when a respondent has had an opportunity to develop a high degree of comfort with the instrument, and confidence in the questions. These ought to be located where it is most meaningful in context with related questions. If they are truly sensitive, i.e., likely to evoke a strong emotion, or reaction, they should follow more neutral-type questions.

- **Opening/beginning questions:** They should be, first, easy, positive, and pleasant as well. Opening with demographic questions frequently casts a dull pallor on an otherwise well-constructed questionnaire. Opening questions ought to project a conversational tone.

- **Item flow:** They must appear logical to the respondent and clearly relevant to the stated purpose of the questionnaire. A question on sex in a study of food preferences had better “fit” or the survey may instantly become useless through suspicion, even if the respondent completes it.

- **Sequence of questions:** There must be a clear and obvious pattern to the questions, with exact instructions on movement from one section to another. Do not make respondents flip pages backward or forward to respond or get further directions. A good questionnaire accomplishes four objectives by correct sequencing: It arouses increased interest as it develops; it overcomes suspicion and replaces it with trust and confidence; it facilitates respondent recall; and, finally, it becomes a motivating environment for respondent full collaboration.

#### **Questions Must Be Carefully Considered**

The questionnaire as a survey instrument is exceptional in its ability to offer variety in construct form. Depending on the needs, and the level of sophistication of the respondents, any of the following may be appropriate, with the caution that only a very limited number of types of questions be used in any given questionnaire.

- **Checklist:** This form offers respondents several answers to a question, and respondent is asked to check off one or more of the answers which apply.

- **Frequency scale:** The “how much,” “how often” preferred answer, it seeks proportionate answers.

- **Quantity scale:** Also called an intensity scale, this mechanism seeks a single dimension of quantity or intensity from more to less, full to empty, all to none, etc.

- **Likert scale:** An intensity scale on a continuum from “strongly agree” to “strongly disagree.”

- **Story identification:** In this form, two “stories” or illustrations are presented and the respondent selects the one most nearly approximating his beliefs, or position. This is known as “the response style of social desirability.”<sup>16</sup>

- **Ranking questions:** The respondent is asked to arrange a series



of options in rank order of preference or to some pre-established standard. It should be limited to six possible options.

- **Semantic differential:** A method employing a seven-point scale on a dimensional basis: the use of opposite adjectives as good-bad, strong-weak, fast-slow, active-passive, conservative-liberal, with the opposite adjectives as anchors and seven unweighted blanks between them for degrees of potency, evaluation, and activity.

- **Sociometrics:** This is a technique used to elicit positive-negative feelings among group members for each other. An example would be “name two fellow workers you respect and admire, irrespective of the reasons.”

- **Objective information data:** An approach used to gather data as demographics, family data, work history, etc. Typically, it asks a narrative question and supplies proportionate answers to be checked, similar to census-taking methods. It is also very easily exaggerated, and careful cross-check analysis of this kind of data is recommended.

It can thus be observed that the questionnaire, properly utilized, offers an exceptional variety of form for the researcher, a condition which encourages valid data-gathering when best fit to the respondent groups.<sup>17</sup>

### Questions Must Respect Respondent

Internally, the relevancy of the entire questionnaire depends on the degree to which the instrument respects the respondent, develops his cooperation, and obtains accurate, useful information. If the researcher keeps these goals in mind, the individual questions will support the purposes of the study.

- **Avoid the pitfalls** of slang, technology, specialized language, or colloquialisms. Do not be unintentionally demeaning, but address the language to the educational norm of the sample.

- **Be as precise as possible.** Avoid the extremes of generality or complexity; use known frames of reference; words such as “many,” “near,” “often” are too indefinite to draw conclusions. Also, single examples frequently too narrowly delimit, as “Do you admire athletes like Jack Nicklas?”

- **Avoid double negatives** which can elicit precisely the opposite data the respondent intended.

- **Don't save space by covering two topics in one**, as “Do you prefer opera and the classics, or rock music and contemporary literature?” There is confusion here beyond reasonable measurement.

- **Don't ask leading questions** which imply a stated position relative to the balance of the answer: “Compared to your supervisor, do you believe you have now or have had equal opportunities for promotion and career growth?” Try to analyze the meaning of either “yes” or “no” to this inquiry.

- **Watch for question loading.** These are inherent “Don’t you agree” questions, and the respondent will look for the easiest way to get through the ambiguity. This is a leading cause of bias.

- **Stay away from words with emotional content.** These have long been known to be information blockers and develop distorted data. Even the word “American” in a question can skew the answer. Strive for neutral language.

- **Be careful not to flatter or insult to bias.** Words as simple as “honorable,” “fair,” “experienced” impact on answers to the researcher’s possible disadvantage. “Present employment status” with a check-off list is more likely to receive an honest answer than “Are you employed?”

- **Minimize personalizing questions.** Research has shown that a neutral statement as “Is it desirable to levy a state income tax in Florida?” will receive more objective assessment than “Do you favor a state income tax?”<sup>18</sup>

- **Is the question applicable to all survey respondents.** Single respondents may not want to read about family life and children. Where one lived formerly may be useless data to stable respondents in one domicile for 30 years. Don’t assume for the respondents; inapplicable questions confuse, irritate, mislead and, possibly, invalidate sizable amounts of other data.

- **Insure your questions do not influence response patterns.** This suggests that it is possible for respondents to be lulled into a “true-false,” “agree-disagree” pattern, again distorting data. This can be avoided by asking the same question in an option format: Inflation in the past year is “better,” “worse,” “same,” “don’t know,” compared to the previous year. Also, this “question trap” tends to lead respondents to make more socially-desirable answers.

- **Make the question as short as possible** with no loss of meaning. The general guideline for a good question is under 22 words. If it can’t be asked in that number or less, the researcher may well not understand what is sought, either.

- **Ensure that the question “reads” well.** Punctuation may serve to break the flow of the thought. Use it scientifically, not necessarily grammatically.

- **Underline critical words** to emphasize uniformity in interpretation.

- **Do not abbreviate.** Spell out all words and numbers.

- **Qualifying material** should always precede key information in a question.

### Sample Must Approximate Population Qualities

Researchers inevitably face the problem of "How many questionnaires will be needed to get a useful response?" Sample size is no simple answer. It depends on the degree to which the sample population selected approximates the qualities of its larger population. Professional researchers look for these three factors: the variability factor of the population, the sampling method, and the degree of precision required between the sample and the population.<sup>19</sup>

There is a statistical formula used to estimate the representativeness of the sample on certain parameters at an acceptance level of probability:

$$N = \left(\frac{z}{e}\right)^2 (p) (1 - p)$$

where: N =size of sample  
z = the standard score corresponding to a given confidence level  
e = the proportion of sampling error in a given situation  
p = the estimated proportion of cases in the population

A simpler approach might be to define the population and group it by strata, that is, to develop a proportional stratified population, or to divide it into a number of relatively equal clusters. From these the researcher would randomly select a proportionate sample, perhaps 20 percent of the total population of the larger body, or each stratified subgroup thereof. This number would, at first glance, seem adequate, but can be impacted by the non-response rate, which could skew or distort the data with reference to the larger population. Therefore, a second or even third distribution might be necessary. Even with this, there exists the possibility in response bias because non-response is not a random process. Therefore, questionnaire follow-up may be more important than additional mailings. The size of the sample is one important factor; the size of the return equally so. A response rate of 40 to 60 percent is typical; even among interested groups, 80 percent response is considered exceptional. Some guidelines are as follows: sample, 20 percent of population; return, 40 to 80 percent range; additional questionnaire mailings, two to three. Sample size is no easy question, but a representative sample size is critical to useful data.

Most questionnaires are mailed out with or following a cover letter (called the letter of transmittal). Ideally, this letter precedes the questionnaire, but, realistically, is often combined as a cost-cutting measure. If it is well designed, clear and positive, positive returns should result. There will be the inevitable non-respondent, whose non-answer may bias the results. For these, a follow-up by letter, or preferably by phone, is advised, making sure these respondents-to-be understand that their non-response was, of course, an oversight, making sure they realize the importance of the study, and the value of their input. The key in follow-up is to insure adequate representation of the original sample.

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**Exhibit 1**  
**Specific Design Samples as Illustrations**  
**of Questionnaire Information Development**

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1. Information on Perceptions

Would you say you are better or worse off financially than you were two years ago, or about the same?

Better \_\_\_\_\_ Worse \_\_\_\_\_ Same \_\_\_\_\_ Don't Know \_\_\_\_\_

(For better or worse) How is that so? \_\_\_\_\_

2. Objective Information

What is the cost of your housing monthly? \$ \_\_\_\_\_

Does that include:

Utilities Yes \_\_\_\_\_ No \_\_\_\_\_ Don't Know \_\_\_\_\_

Furnishings Yes \_\_\_\_\_ No \_\_\_\_\_ Don't Know \_\_\_\_\_

(This device is also useful for cross-checking information developed in other questions)

3. Demographics

Please list all other supervisors in your company who are on the same organization level as yourself. Complete names are not necessary.

Supervisor #	Title	Sex	Age	Time in Industry	Time with Company	Number of Promotions

4. Using Skip Patterns

What was your employment status in February, 1986?

Working (Proceed to Question 15)

Unemployed  
 Retired (Proceed to Question 20)

Terminated  
 Homemaker

Student (Proceed to Question 25)

Other (explain)

5. Eliciting behavior information by other means including *all* sources, what was your family unit income in 1985, before any deductions for any reason?

Less than \$5,000 \_\_\_\_\_ \$5,001-10,000 \_\_\_\_\_ \$10,001-20,000 \_\_\_\_\_

\$20,001-30,000 \_\_\_\_\_ \$30,001-40,000 \_\_\_\_\_ \$40,001-Up \_\_\_\_\_

6. Filter Questions: Are you:

Married \_\_\_\_\_  
Single, widowed, \_\_\_\_\_  
divorced, separated \_\_\_\_\_ (go to question 40)

7. Attitude Questions

What position in the corporation would you eventually like to occupy? \_\_\_\_\_  
Why? \_\_\_\_\_  
\_\_\_\_\_

Have you ever heard anything specific about your supervisor's opinion of your work? Yes \_\_\_ No \_\_\_

If yes, did you hear this from:

peers                      yes \_\_\_ no \_\_\_

subordinates            yes \_\_\_ no \_\_\_

superiors                yes \_\_\_ no \_\_\_

friends                    yes \_\_\_ no \_\_\_

family                    yes \_\_\_ no \_\_\_

others(explain)        yes \_\_\_ no \_\_\_

8. Specific Study Question: Related to the objectives of the study, and intended to interrelate to form evaluative indices.

Suppose you earned enough money to quit your job and travel. What would you do?

Stay where I am \_\_\_\_\_

Relocate in state and continue working \_\_\_\_\_

Relocate in another state \_\_\_\_\_

Leave the country \_\_\_\_\_

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- <sup>13</sup>Belson, *op. cit.*, p. 421.
- <sup>14</sup>Leedy, *op. cit.*, p. 82.
- <sup>15</sup>Warwick and Lininger, *op. cit.*, p. 127.
- <sup>16</sup>*Ibid.*, pp. 155.
- <sup>17</sup>*Ibid.*, pp. 148-60.
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